

Gemelli



Fondazione Policlinico Universitario A. Gemelli  
Università Cattolica del Sacro Cuore

GAVECeLT

Gli Accessi Venosi Centrali a Lungo Termine



# RISCHIO DI INFEZIONE CATETERE CORRELATE IN ICU: COME PREVENIRE

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FONDAZIONE POLICLINICO UNIVERSITARIO "A. GEMELLI"- ROMA



# Central Line Bundle

- Hand Hygiene
- Maximal Barrier Precautions Upon Insertion
- Chlorhexidine Skin Antisepsis
- Optimal Catheter Site Selection, with Subclavian Vein as the Preferred Site for Non-Tunneled Catheters
- Daily Review of Line Necessity with Prompt Removal of Unnecessary Lines

[WWW.IHI.ORG](http://WWW.IHI.ORG), 2008



*The* NEW ENGLAND  
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An Intervention to Decrease Catheter-Related Bloodstream  
Infections in the ICU

Peter Pronovost, M.D., Ph.D., Dale Needham, M.D., Ph.D., Sean Berenholtz, M.D., David Sinopoli, M.P.H., M.B.A.,  
Haitao Chu, M.D., Ph.D., Sara Cosgrove, M.D., Bryan Sexton, Ph.D., Robert Hyzy, M.D., Robert Welsh, M.D.,  
Gary Roth, M.D., Joseph Bander, M.D., John Kepros, M.D., and Christine Goeschel, R.N., M.P.A.

# Checklist for Prevention of Central Line Associated Blood Stream Infections

*Based on 2011 CDC guideline for prevention of intravascular catheter-associated bloodstream infections:  
<http://www.cdc.gov/hicpac/pdf/guidelines/bsi-guidelines-2011.pdf>*

## For Clinicians:

### Promptly remove unnecessary central lines

- ☐ Perform daily audits to assess whether each central line is still needed

### Follow proper insertion practices

- ☐ Perform hand hygiene before insertion
- ☐ Adhere to aseptic technique
- ☐ Use maximal sterile barrier precautions (i.e., mask, cap, gown, sterile gloves, and sterile full-body drape)
- ☐ Perform skin antisepsis with >0.5% chlorhexidine with alcohol
- ☐ Choose the best site to minimize infections and mechanical complications
  - Avoid femoral site in adult patients
- ☐ Cover the site with sterile gauze or sterile, transparent, semipermeable dressings

### Handle and maintain central lines appropriately

- ☐ Comply with hand hygiene requirements
- ☐ Scrub the access port or hub immediately prior to each use with an appropriate antiseptic (e.g., chlorhexidine, povidone iodine, an iodophor, or 70% alcohol)
- ☐ Access catheters only with sterile devices
- ☐ Replace dressings that are wet, soiled, or dislodged
- ☐ Perform dressing changes under aseptic technique using clean or sterile gloves

## For Facilities:

- ☐ Empower staff to stop non-emergent insertion if proper procedures are not followed
- ☐ "Bundle" supplies (e.g., in a kit) to ensure items are readily available for use
- ☐ Provide the checklist above to clinicians, to ensure all insertion practices are followed
- ☐ Ensure efficient access to hand hygiene
- ☐ Monitor and provide prompt feedback for adherence to hand hygiene  
<http://www.cdc.gov/handhygiene/Measurement.html>
- ☐ Provide recurring education sessions on central line insertion, handling and maintenance

## Supplemental strategies for consideration:

- 2% Chlorhexidine bathing
- Antimicrobial/Antiseptic-impregnated catheters
- Chlorhexidine-impregnated dressings

National Center for Emerging and Zoonotic Infectious Diseases  
Division of Healthcare Quality Promotion



## APIC's Targeting Zero Campaign

- Targeting zero is the philosophy that every hospital should be working toward a goal of zero HAIs
- While not all HAIs are preventable, APIC believes we should strive for the goal of elimination and strive for zero infections
- Association for Professionals in Infection Control and Epidemiology (APIC) put together many resources to help hospitals to start to meet this goal
- Prompt investigation of HAIs of greatest concern to the hospital (like MRSA, C-Diff surgical site infections, catheter associated UTIs)
- Needed because of our declining arsenal of antibiotics to treat infections



Morbidity and Mortality Weekly Report

## **Vital Signs: Central Line–Associated Blood Stream Infections — United States, 2001, 2008, and 2009**

*On March 1, this report was posted as an MMWR Early Release on the MMWR website (<http://www.cdc.gov/mmwr>).*

**TABLE 2. Estimated annual number of central line–associated blood stream infections (CLABSI), by health-care setting and year — United States, 2001, 2008, and 2009**

| Health-care setting      | Year | No. of infections (upper and lower bound of sensitivity analysis) |
|--------------------------|------|-------------------------------------------------------------------|
| Intensive-care units     | 2001 | 43,000 (27,000–67,000)                                            |
|                          | 2009 | 18,000 (12,000–28,000)                                            |
| Inpatient wards          | 2009 | 23,000 (15,000–37,000)                                            |
| Outpatient hemodialysis* | 2008 | 37,000 (23,000–57,000)                                            |

\* Case definitions approximate current definition of CLABSI according to the National Healthcare Safety Network.



U.S. Department of Health & Human Services

[www.hhs.gov](http://www.hhs.gov)



**AHRQ** Agency for Healthcare Research and Quality

Advancing Excellence in Health Care

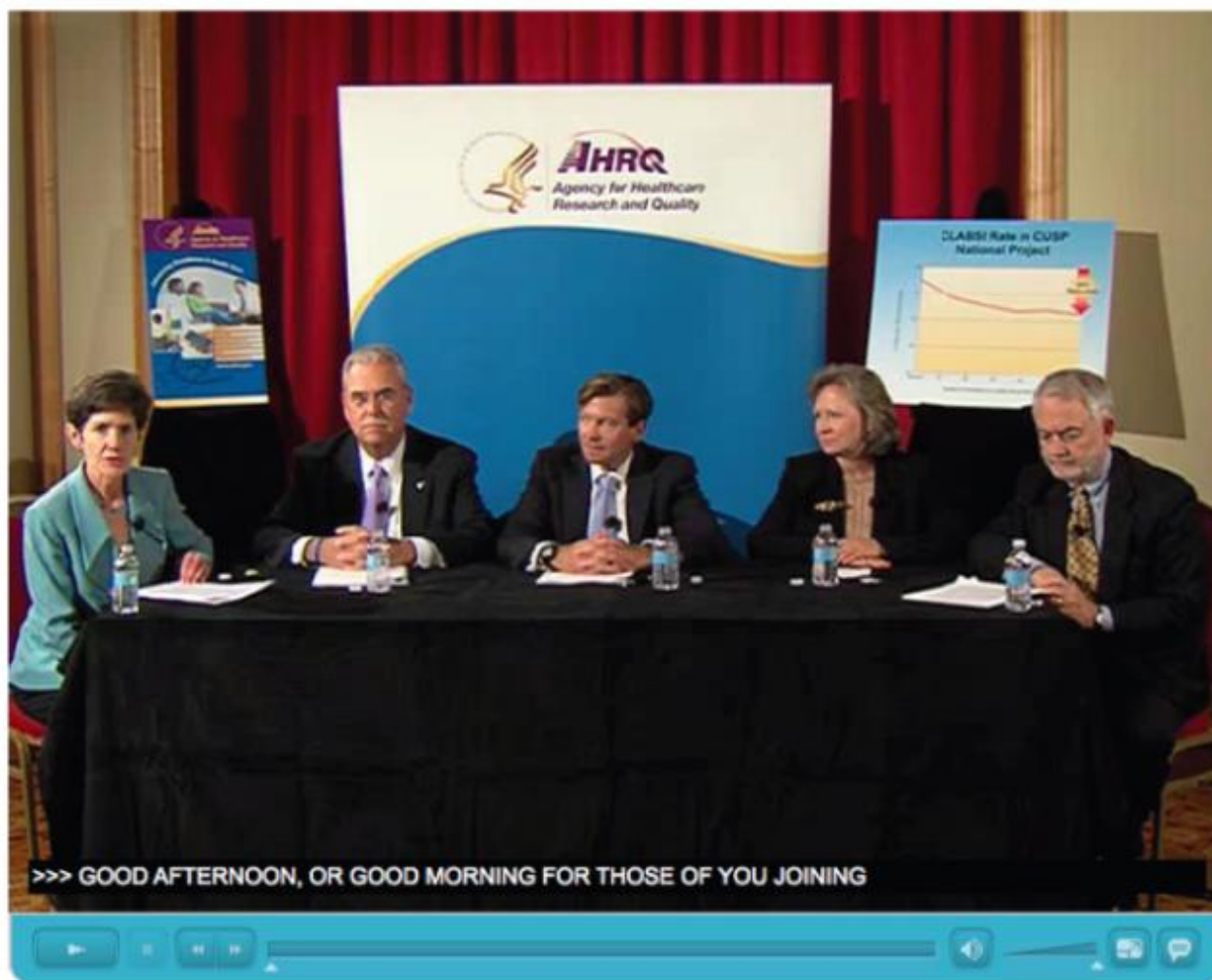
[www.ahrq.gov](http://www.ahrq.gov)

**You Are Here:** [AHRQ Home](#) > [Events & Announcements](#) > [AHRQ 2012 Annual Conference](#) > Press Briefing on CLABSI, CUSP Toolkit

## AHRQ Annual Conference 2012

### Press Briefing on CLABSI, CUSP Toolkit

On September 10, 2012, Dr. Carolyn Clancy held a press briefing on a unique nationwide patient safety project funded by AHRQ that reduced the rate of central line-associated bloodstream infections (CLABSIs) in intensive care units by 40 percent, according to the Agency's preliminary findings of the largest national effort to combat CLABSIs to date. The project used the Comprehensive Unit-based Safety Program to achieve its landmark results that include preventing more than 2,000 CLABSIs, saving more than 500 lives and avoiding more than \$34 million in health care costs.



<http://www.ahrq.gov/about/annualconf12/video/clabscusp/>

Pagina 1 di 2



**NATIONAL  
AND STATE  
HEALTHCARE  
ASSOCIATED  
INFECTIONS  
PROGRESS  
REPORT**



THIS REPORT IS BASED ON 2014 DATA,  
PUBLISHED IN 2016



Centers for Disease  
Control and Prevention  
National Center for Emerging and  
Zoonotic Infectious Diseases

This report's national and state factsheets include infection-specific SIRs and progress in reducing HAIs. State-specific information also includes prevention efforts, HAI reporting mandates, and data validation. These customized factsheets can aid in identifying areas in need of improvement from a national level and within states.

**The report includes national and state-level data from acute care hospitals for**

- central line-associated bloodstream infections (CLABSI),
- catheter-associated urinary tract infections (CAUTI),
- surgical site infections (SSI),
- hospital-onset *Clostridium difficile* infections (*C. difficile*), and
- hospital-onset methicillin-resistant *Staphylococcus aureus* (MRSA) bacteremia (bloodstream infections).

State-specific SSI data are presented for colon surgery and abdominal hysterectomy surgery, the two surgeries mandated by the Centers for Medicare and Medicaid (CMS) Inpatient Quality Reporting Program. National SSI data includes the 10 select procedures published in previous years, and, for the first time in this report, the additional 29 surgical procedures reported to NHSN.

The report includes data reported to NHSN from the following locations:

- CLABSI: intensive care units, neonatal intensive care unit, and wards
- CAUTI: intensive care units and wards
- *C. difficile*: all inpatient locations in the facility, with the exception of the neonatal intensive care units and well-baby locations
- MRSA bacteremia: all inpatient locations in the facility

For more details on location-specific information, refer to the report's [Technical Appendix](#).

Previous reports included data from acute care hospitals only. For the first time, this report includes national data from two additional facility types. The report will describe CLABSI and CAUTI data from long-term acute care hospitals (LTACH), which provide treatment for patients who are generally very sick and stay, on average, more than 25 days. The report will also describe CAUTI data from inpatient rehabilitation facilities (IRFs), which include hospitals, or part of a hospital, that provide intensive rehabilitation services using an interdisciplinary team approach. Data in this report are reported from free-standing IRFs and rehabilitation locations within other hospitals.



## STATE HAI PROGRESS

### ACUTE CARE HOSPITALS

#### LEGEND



2014 state SIR is significantly lower (better) than comparison group in column header



Change in 2014 state SIR compared to group in column header is not statistically significant



2014 state SIR is significantly higher (worse) than comparison group in column header



2014 state SIR cannot be calculated



Yes

| STATE         | CLABSIs: CENTRAL LINE-ASSOCIATED BLOODSTREAM INFECTIONS |                         |                                           |                                       |                                              |                       |                    |                         |  |
|---------------|---------------------------------------------------------|-------------------------|-------------------------------------------|---------------------------------------|----------------------------------------------|-----------------------|--------------------|-------------------------|--|
|               | 2014 Reporting and Validation                           |                         |                                           |                                       |                                              | 2014 State CLABSI SIR |                    |                         |  |
|               | # Hospitals Reporting to NHSN <sup>1</sup>              | State Reporting Mandate | State HIC <sup>2</sup> has Access to Data | Data Checked for Quality <sup>3</sup> | Additional In-Depth Data Review <sup>4</sup> | vs. 2013 State SIR    | vs. 2014 Nat'l SIR | vs. 2008 Nat'l Baseline |  |
| Alabama       | 70                                                      | ✓                       | ✓                                         | ✓                                     | ✓                                            | ↑                     | ↑                  | ↓                       |  |
| Alaska        | 11                                                      |                         | ✓                                         |                                       |                                              | ↑                     | ↑                  | ↓                       |  |
| Arizona       | 60                                                      |                         | ✓                                         |                                       |                                              | ↓                     | ↑                  | ↓                       |  |
| Arkansas      | 47                                                      | ✓                       | ✓                                         | ✓                                     | ✓                                            | ↑                     | ↑                  | ↓                       |  |
| California    | 358                                                     | ✓                       | ✓                                         | ✓                                     | ✓                                            | ↓                     | ↑                  | ↓                       |  |
| Colorado      | 53                                                      | ✓                       | ✓                                         | ✓                                     | ✓                                            | ↓                     | ↓                  | ↓                       |  |
| Connecticut   | 31                                                      | ✓                       | ✓                                         | ✓                                     |                                              | ↓                     | ↓                  | ↓                       |  |
| D.C.          | 8                                                       | ✓                       | ✓                                         | ✓                                     |                                              | ↓                     | ↑                  | ↓                       |  |
| Delaware      | 8                                                       | ✓                       | ✓                                         | ✓                                     |                                              | ↓                     | ↑                  | ↓                       |  |
| Florida       | 194                                                     |                         |                                           |                                       |                                              | ↓                     | ↑                  | ↓                       |  |
| Georgia       | 108                                                     | ✓                       | ✓                                         |                                       |                                              | ↓                     | ↑                  | ↓                       |  |
| Hawaii        | 16                                                      | ✓                       | ✓                                         | ✓                                     |                                              | ↓                     | ↓                  | ↓                       |  |
| Idaho         | 15                                                      |                         | ✓                                         |                                       |                                              | ↑                     | ↓                  | ↓                       |  |
| Illinois      | 150                                                     | ✓                       | ✓                                         | ✓                                     |                                              | ↓                     | ↓                  | ↓                       |  |
| Indiana       | 101                                                     | ✓                       | ✓                                         | ✓                                     |                                              | ↓                     | ↑                  | ↓                       |  |
| Iowa          | 61                                                      |                         | ✓                                         | ✓                                     | ✓                                            | ↓                     | ↓                  | ↓                       |  |
| Kansas        | 48                                                      |                         | ✓                                         | ✓                                     |                                              | ↑                     | ↑                  | ↓                       |  |
| Kentucky      | 70                                                      |                         | ✓                                         |                                       |                                              | ↓                     | ↑                  | ↓                       |  |
| Louisiana     | 80                                                      |                         | ✓                                         | ✓                                     |                                              | ↓                     | ↑                  | ↓                       |  |
| Maine         | 21                                                      | ✓                       | ✓                                         | ✓                                     |                                              | ↑                     | ↑                  | ↓                       |  |
| Maryland      | 48                                                      | ✓                       | ✓                                         | ✓                                     |                                              | ↑                     | ↑                  | ↓                       |  |
| Massachusetts | 69                                                      | ✓                       | ✓                                         | ✓                                     |                                              | ↓                     | ↑                  | ↓                       |  |
| Michigan      | 98                                                      |                         | ✓                                         | ✓                                     |                                              | ↓                     | ↓                  | ↓                       |  |
| Minnesota     | 48                                                      | ✓                       | ✓                                         |                                       |                                              | ↑                     | ↓                  | ↓                       |  |
| Mississippi   | 49                                                      | ✓                       | ✓                                         |                                       | ✓                                            | ↓                     | ↑                  | ↓                       |  |
| Missouri      | 76                                                      |                         |                                           |                                       |                                              | ↑                     | ↓                  | ↓                       |  |

<sup>1</sup>The number of hospitals that reported to NHSN and are included in the SIR calculation.

<sup>2</sup>State Health Department

<sup>3</sup>State analyzed 2014 data for quality and completeness.

<sup>4</sup>State reviewed medical records to determine 2014 data accuracy.

THIS REPORT IS BASED ON 2014 DATA. PUBLISHED IN 2015



## STATE HAI PROGRESS

### ACUTE CARE HOSPITALS

#### LEGEND



2014 state SIR is significantly lower (better) than comparison group in column header



Change in 2014 state SIR compared to group in column header is not statistically significant



2014 state SIR is significantly higher (worse) than comparison group in column header



2014 state SIR cannot be calculated



Yes

| STATE          | CLABSIs: CENTRAL LINE-ASSOCIATED BLOODSTREAM INFECTIONS |                         |                                           |                                       |                                              |                       |                    |                         |  |
|----------------|---------------------------------------------------------|-------------------------|-------------------------------------------|---------------------------------------|----------------------------------------------|-----------------------|--------------------|-------------------------|--|
|                | 2014 Reporting and Validation                           |                         |                                           |                                       |                                              | 2014 State CLABSI SIR |                    |                         |  |
|                | # Hospitals Reporting to NHSN <sup>1</sup>              | State Reporting Mandate | State HIC <sup>2</sup> has Access to Data | Data Checked for Quality <sup>3</sup> | Additional In-Depth Data Review <sup>4</sup> | vs. 2013 State SIR    | vs. 2014 Nat'l SIR | vs. 2008 Nat'l Baseline |  |
| Montana        | 16                                                      |                         |                                           |                                       | ✓                                            | ↓                     | ↑                  | ↓                       |  |
| Nebraska       | 27                                                      |                         |                                           |                                       |                                              | ↑                     | ↑                  | ↓                       |  |
| Nevada         | 24                                                      | ✓                       | ✓                                         |                                       |                                              | ↓                     | ↑                  | ↓                       |  |
| New Hampshire  | 24                                                      | ✓                       | ✓                                         | ✓                                     |                                              | ↑                     | ↑                  | ↓                       |  |
| New Jersey     | 72                                                      | ✓                       | ✓                                         | ✓                                     |                                              | ↓                     | ↑                  | ↓                       |  |
| New Mexico     | 34                                                      | ✓                       | ✓                                         | ✓                                     |                                              | ↑                     | ↑                  | ↓                       |  |
| New York       | 168                                                     | ✓                       | ✓                                         | ✓                                     | ✓                                            | ↓                     | ↑                  | ↓                       |  |
| North Carolina | 98                                                      | ✓                       | ✓                                         | ✓                                     |                                              | ↓                     | ↓                  | ↓                       |  |
| North Dakota   | 8                                                       |                         |                                           |                                       |                                              | ↑                     | ↓                  | ↓                       |  |
| Ohio           | 137                                                     |                         |                                           |                                       |                                              | ↓                     | ↓                  | ↓                       |  |
| Oklahoma       | 58                                                      | ✓                       | ✓                                         |                                       |                                              | ↑                     | ↓                  | ↓                       |  |
| Oregon         | 50                                                      | ✓                       | ✓                                         | ✓                                     |                                              | ↑                     | ↓                  | ↓                       |  |
| Pennsylvania   | 176                                                     | ✓                       | ✓                                         | ✓                                     |                                              | ↓                     | ↓                  | ↓                       |  |
| Puerto Rico    | 16                                                      |                         |                                           |                                       |                                              | ↓                     | ↑                  | ↓                       |  |
| Rhode Island   | 11                                                      |                         | ✓                                         |                                       |                                              | ↓                     | ↑                  | ↓                       |  |
| South Carolina | 67                                                      | ✓                       | ✓                                         | ✓                                     |                                              | ↓                     | ↓                  | ↓                       |  |
| South Dakota   | 13                                                      |                         | ✓                                         | ✓                                     | ✓                                            | ↑                     | ↓                  | ↓                       |  |
| Tennessee      | 105                                                     | ✓                       | ✓                                         | ✓                                     |                                              |                       | ↓                  | ↓                       |  |
| Texas          | 289                                                     | ✓                       | ✓                                         | ✓                                     | ✓                                            | ↓                     | ↓                  | ↓                       |  |
| Utah           | 27                                                      | ✓                       | ✓                                         | ✓                                     |                                              | ↓                     | ↓                  | ↓                       |  |
| Vermont        | 7                                                       | ✓                       |                                           | ✓                                     |                                              | ↑                     | ↓                  | ↓                       |  |
| Virginia       | 83                                                      | ✓                       | ✓                                         | ✓                                     |                                              | ↓                     | ↓                  | ↓                       |  |
| Washington     | 86                                                      | ✓                       | ✓                                         | ✓                                     | ✓                                            | ↓                     | ↑                  | ↓                       |  |
| West Virginia  | 43                                                      | ✓                       | ✓                                         | ✓                                     |                                              | ↑                     | ↓                  | ↓                       |  |
| Wisconsin      | 96                                                      |                         | ✓                                         | ✓                                     |                                              | ↓                     | ↓                  | ↓                       |  |
| Wyoming        | 22                                                      |                         |                                           |                                       |                                              | ↓                     | ↓                  | ↓                       |  |

<sup>1</sup>The number of hospitals that reported to NHSN and are included in the SIR calculation.

<sup>2</sup>State Health Department

<sup>3</sup>State analyzed 2014 data for quality and completeness.

<sup>4</sup>State reviewed medical records to determine 2014 data accuracy.

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## STATE HAI PROGRESS

## ACUTE CARE HOSPITALS

### LEGEND



2014 state SIR is significantly lower (better) than comparison group in column header



Change in 2014 state SIR compared to group in column header is not statistically significant



2014 state SIR is significantly higher (worse) than comparison group in column header



2014 state SIR cannot be calculated



Yes

| STATE         | CAUTIS: CATHETER-ASSOCIATED URINARY TRACT INFECTIONS |                         |                              |                           |                                  |                      |                    |                         |  |
|---------------|------------------------------------------------------|-------------------------|------------------------------|---------------------------|----------------------------------|----------------------|--------------------|-------------------------|--|
|               | 2014 Reporting and Validation                        |                         |                              |                           |                                  | 2014 State CAUTI SIR |                    |                         |  |
|               | # Hospitals Reporting to NHRN*                       | State Reporting Mandate | State HCF has Access to Data | Data Checked for Quality† | Additional In-Depth Data Review‡ | vs. 2013 State SIR   | vs. 2014 Nat'l SIR | vs. 2009 Nat'l Baseline |  |
| Alabama       | 86                                                   | ✓                       | ✓                            | ✓                         |                                  | ↓                    | ↓                  | ↓                       |  |
| Alaska        | 11                                                   |                         | ✓                            |                           |                                  | ↓                    | ↓                  | ↓                       |  |
| Arizona       | 60                                                   |                         | ✓                            |                           |                                  | ↓                    | ↓                  | ↓                       |  |
| Arkansas      | 49                                                   | ✓                       | ✓                            | ✓                         |                                  | ↓                    | ↓                  | ↓                       |  |
| California    | 349                                                  |                         |                              |                           |                                  | ↑                    | ↓                  | ↓                       |  |
| Colorado      | 52                                                   |                         |                              |                           |                                  | ↓                    | ↓                  | ↓                       |  |
| Connecticut   | 31                                                   | ✓                       | ✓                            | ✓                         |                                  | ↓                    | ↑                  | ↑                       |  |
| D.C.          | 7                                                    |                         | ✓                            | ✓                         |                                  | ↓                    | ↓                  | ↓                       |  |
| Delaware      | 8                                                    | ✓                       | ✓                            | ✓                         |                                  | ↑                    | ↑                  | ↑                       |  |
| Florida       | 192                                                  |                         |                              |                           |                                  | ↑                    | ↓                  | ↓                       |  |
| Georgia       | 111                                                  | ✓                       | ✓                            |                           |                                  | ↓                    | ↑                  | ↑                       |  |
| Hawaii        | 16                                                   | ✓                       | ✓                            | ✓                         |                                  | ↑                    | ↓                  | ↓                       |  |
| Idaho         | 18                                                   |                         | ✓                            |                           |                                  | ↓                    | ↓                  | ↓                       |  |
| Illinois      | 150                                                  |                         |                              |                           |                                  | ↓                    | ↓                  | ↓                       |  |
| Indiana       | 106                                                  | ✓                       | ✓                            | ✓                         |                                  | ↓                    | ↑                  | ↑                       |  |
| Iowa          | 81                                                   |                         | ✓                            | ✓                         | ✓                                | ↓                    | ↓                  | ↓                       |  |
| Kansas        | 52                                                   |                         | ✓                            | ✓                         |                                  | ↓                    | ↑                  | ↑                       |  |
| Kentucky      | 71                                                   |                         | ✓                            |                           |                                  | ↓                    | ↓                  | ↓                       |  |
| Louisiana     | 79                                                   |                         | ✓                            | ✓                         |                                  | ↓                    | ↓                  | ↓                       |  |
| Maine         | 21                                                   |                         | ✓                            | ✓                         | ✓                                | ↓                    | ↑                  | ↑                       |  |
| Maryland      | 48                                                   | ✓                       | ✓                            | ✓                         |                                  | ↓                    | ↑                  | ↑                       |  |
| Massachusetts | 69                                                   | ✓                       | ✓                            |                           |                                  | ↓                    | ↑                  | ↑                       |  |
| Michigan      | 102                                                  |                         | ✓                            | ✓                         |                                  | ↓                    | ↑                  | ↑                       |  |
| Minnesota     | 85                                                   | ✓                       | ✓                            |                           |                                  | ↓                    | ↑                  | ↑                       |  |
| Mississippi   | 49                                                   | ✓                       | ✓                            |                           |                                  | ↓                    | ↑                  | ↑                       |  |
| Missouri      | 79                                                   |                         |                              |                           |                                  | ↑                    | ↑                  | ↑                       |  |

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## STATE HAI PROGRESS

## ACUTE CARE HOSPITALS

### LEGEND



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2014 state SIR is significantly higher (worse) than comparison group in column header



2014 state SIR cannot be calculated



Yes

| STATE          | CAUTIS: CATHETER-ASSOCIATED URINARY TRACT INFECTIONS |                         |                              |                           |                                  |                      |                    |                         |  |
|----------------|------------------------------------------------------|-------------------------|------------------------------|---------------------------|----------------------------------|----------------------|--------------------|-------------------------|--|
|                | 2014 Reporting and Validation                        |                         |                              |                           |                                  | 2014 State CAUTI SIR |                    |                         |  |
|                | # Hospitals Reporting to NHRN*                       | State Reporting Mandate | State HCF has Access to Data | Data Checked for Quality† | Additional In-Depth Data Review‡ | vs. 2013 State SIR   | vs. 2014 Nat'l SIR | vs. 2009 Nat'l Baseline |  |
| Montana        | 17                                                   |                         |                              |                           | ✓                                | ↑                    | ↓                  | ↑                       |  |
| Nebraska       | 27                                                   |                         |                              |                           |                                  | ↑                    | ↑                  | ↑                       |  |
| Nevada         | 24                                                   |                         |                              |                           |                                  | ↓                    | ↑                  | ↑                       |  |
| New Hampshire  | 24                                                   | ✓                       | ✓                            | ✓                         |                                  | ↑                    | ↑                  | ↑                       |  |
| New Jersey     | 72                                                   | ✓                       | ✓                            | ✓                         |                                  | ↑                    | ↑                  | ↑                       |  |
| New Mexico     | 34                                                   |                         |                              |                           |                                  | ↑                    | ↑                  | ↑                       |  |
| New York       | 170                                                  |                         | ✓                            | ✓                         |                                  | ↓                    | ↑                  | ↑                       |  |
| North Carolina | 99                                                   | ✓                       | ✓                            | ✓                         |                                  | ↑                    | ↑                  | ↑                       |  |
| North Dakota   | 9                                                    |                         | ✓                            | ✓                         | ✓                                | ↓                    | ↓                  | ↓                       |  |
| Ohio           | 136                                                  |                         |                              |                           |                                  | ↓                    | ↓                  | ↓                       |  |
| Oklahoma       | 62                                                   |                         | ✓                            |                           |                                  | ↑                    | ↓                  | ↓                       |  |
| Oregon         | 51                                                   | ✓                       | ✓                            | ✓                         |                                  | ↓                    | ↓                  | ↓                       |  |
| Pennsylvania   | 183                                                  | ✓                       | ✓                            | ✓                         |                                  | ↓                    | ↓                  | ↓                       |  |
| Puerto Rico    | 17                                                   |                         |                              |                           |                                  | ↓                    | ↓                  | ↓                       |  |
| Rhode Island   | 11                                                   |                         | ✓                            |                           |                                  | ↑                    | ↑                  | ↑                       |  |
| South Carolina | 65                                                   |                         |                              |                           |                                  | ↓                    | ↑                  | ↑                       |  |
| South Dakota   | 18                                                   |                         | ✓                            | ✓                         |                                  | ↑                    | ↓                  | ↑                       |  |
| Tennessee      | 106                                                  | ✓                       | ✓                            | ✓                         |                                  | ↓                    | ↑                  | ↑                       |  |
| Texas          | 297                                                  | ✓                       | ✓                            | ✓                         | ✓                                | ↑                    | ↑                  | ↑                       |  |
| Utah           | 28                                                   | ✓                       | ✓                            | ✓                         | ✓                                | ↓                    | ↑                  | ↑                       |  |
| Vermont        | 5                                                    |                         |                              |                           |                                  | ↑                    | ↑                  | ↑                       |  |
| Virginia       | 82                                                   |                         |                              |                           |                                  | ↓                    | ↓                  | ↓                       |  |
| Washington     | 78                                                   |                         |                              |                           |                                  | ↓                    | ↓                  | ↓                       |  |
| West Virginia  | 50                                                   | ✓                       | ✓                            | ✓                         |                                  | ↑                    | ↓                  | ↓                       |  |
| Wisconsin      | 118                                                  |                         | ✓                            | ✓                         |                                  | ↓                    | ↓                  | ↓                       |  |
| Wyoming        | 26                                                   |                         |                              |                           |                                  | ↓                    | ↓                  | ↓                       |  |

\*The number of hospitals that reported to NHRN and are included in the SIR calculation.

†State Health Department

‡State analyzed 2014 data for quality and completeness.

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## STATE HAI PROGRESS

### ACUTE CARE HOSPITALS

#### LEGEND



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Change in 2014 state SIR compared to group in column header is not statistically significant



2014 state SIR is significantly higher (worse) than comparison group in column header



2014 state SIR cannot be calculated



Yes

| STATE         | SSIs: SURGICAL SITE INFECTIONS, ABDOMINAL HYSTERECTOMY |                         |                                          |                                       |                                              |                         |                    |                         |  |
|---------------|--------------------------------------------------------|-------------------------|------------------------------------------|---------------------------------------|----------------------------------------------|-------------------------|--------------------|-------------------------|--|
|               | 2014 Reporting and Validation                          |                         |                                          |                                       |                                              | 2014 State 86: HYST SIR |                    |                         |  |
|               | # Hospitals Reporting to NHSN*                         | State Reporting Mandate | State HC <sup>2</sup> has Access to Data | Data Checked for Quality <sup>3</sup> | Additional In-Depth Data Review <sup>4</sup> | vs. 2013 State SIR      | vs. 2014 Nat'l SIR | vs. 2008 Nat'l Baseline |  |
| Alabama       | 58                                                     | ✓                       | ✓                                        | ✓                                     |                                              | ↓                       | ↓                  | ↓                       |  |
| Alaska        | 9                                                      |                         | ✓                                        |                                       |                                              | ↑                       | ↓                  | ↓                       |  |
| Arizona       | 53                                                     |                         | ✓                                        |                                       |                                              | ↓                       | ↑                  | ↓                       |  |
| Arkansas      | 37                                                     | ✓                       | ✓                                        | ✓                                     |                                              | ↓                       | ↑                  | ↓                       |  |
| California    | 314                                                    | ✓                       | ✓                                        | ✓                                     |                                              | ↑                       | ↓                  | ↓                       |  |
| Colorado      | 57                                                     | ✓                       | ✓                                        | ✓                                     |                                              | ↑                       | ↑                  | ↓                       |  |
| Connecticut   | 29                                                     | ✓                       | ✓                                        | ✓                                     |                                              | ↓                       | ↑                  | ↓                       |  |
| D.C.          | 7                                                      |                         | ✓                                        | ✓                                     |                                              | ↓                       | ↑                  | ↓                       |  |
| Delaware      | 7                                                      | ✓                       | ✓                                        | ✓                                     |                                              | ↓                       | ↑                  |                         |  |
| Florida       | 167                                                    |                         |                                          |                                       |                                              | ↓                       | ↓                  | ↓                       |  |
| Georgia       | 91                                                     | ✓                       | ✓                                        |                                       |                                              | ↓                       | ↑                  | ↓                       |  |
| Hawaii        | 13                                                     | ✓                       | ✓                                        | ✓                                     |                                              | ↑                       | ↓                  | ↓                       |  |
| Idaho         | 14                                                     |                         | ✓                                        |                                       |                                              | ↓                       | ↑                  | ↑                       |  |
| Illinois      | 134                                                    |                         |                                          |                                       |                                              | ↑                       | ↓                  | ↓                       |  |
| Indiana       | 98                                                     | ✓                       | ✓                                        | ✓                                     |                                              | ↓                       | ↓                  | ↓                       |  |
| Iowa          | 40                                                     |                         |                                          |                                       |                                              | ↓                       | ↑                  | ↓                       |  |
| Kansas        | 43                                                     |                         | ✓                                        | ✓                                     |                                              | ↑                       | ↑                  | ↓                       |  |
| Kentucky      | 59                                                     |                         | ✓                                        |                                       |                                              | ↑                       | ↑                  | ↓                       |  |
| Louisiana     | 73                                                     |                         | ✓                                        | ✓                                     |                                              | ↓                       | ↓                  | ↓                       |  |
| Maine         | 19                                                     |                         | ✓                                        | ✓                                     | ✓                                            | ↓                       | ↑                  | ↓                       |  |
| Maryland      | 41                                                     | ✓                       | ✓                                        | ✓                                     |                                              | ↓                       | ↑                  | ↑                       |  |
| Massachusetts | 58                                                     | ✓                       | ✓                                        | ✓                                     |                                              | ↑                       | ↑                  | ↑                       |  |
| Michigan      | 86                                                     |                         | ✓                                        | ✓                                     |                                              | ↓                       | ↑                  | ↑                       |  |
| Minnesota     | 50                                                     | ✓                       | ✓                                        |                                       |                                              | ↑                       | ↑                  | ↑                       |  |
| Mississippi   | 43                                                     | ✓                       | ✓                                        |                                       |                                              | ↓                       | ↓                  | ↓                       |  |
| Missouri      | 70                                                     |                         | ✓                                        |                                       |                                              | ↑                       | ↓                  | ↓                       |  |

\*The number of hospitals that reported to NHSN and are included in the SIR calculation.

<sup>2</sup>State Health Department

<sup>3</sup>State analyzed 2014 data for quality and completeness.

<sup>4</sup>State reviewed medical records to determine 2014 data accuracy.

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## STATE HAI PROGRESS

### ACUTE CARE HOSPITALS

#### LEGEND



2014 state SIR is significantly lower (better) than comparison group in column header



Change in 2014 state SIR compared to group in column header is not statistically significant



2014 state SIR is significantly higher (worse) than comparison group in column header



2014 state SIR cannot be calculated



Yes

| STATE          | SSIs: SURGICAL SITE INFECTIONS, ABDOMINAL HYSTERECTOMY |                         |                                          |                                       |                                              |                         |                    |                         |  |
|----------------|--------------------------------------------------------|-------------------------|------------------------------------------|---------------------------------------|----------------------------------------------|-------------------------|--------------------|-------------------------|--|
|                | 2014 Reporting and Validation                          |                         |                                          |                                       |                                              | 2014 State 86: HYST SIR |                    |                         |  |
|                | # Hospitals Reporting to NHSN*                         | State Reporting Mandate | State HC <sup>2</sup> has Access to Data | Data Checked for Quality <sup>3</sup> | Additional In-Depth Data Review <sup>4</sup> | vs. 2013 State SIR      | vs. 2014 Nat'l SIR | vs. 2008 Nat'l Baseline |  |
| Montana        | 15                                                     |                         |                                          |                                       |                                              | ↓                       | ↓                  | ↓                       |  |
| Nebraska       | 21                                                     |                         |                                          |                                       |                                              | ↓                       | ↓                  | ↓                       |  |
| Nevada         | 20                                                     |                         |                                          |                                       |                                              | ↑                       | ↓                  | ↓                       |  |
| New Hampshire  | 23                                                     | ✓                       | ✓                                        | ✓                                     |                                              | ↓                       | ↓                  | ↓                       |  |
| New Jersey     | 66                                                     | ✓                       | ✓                                        | ✓                                     |                                              | ↑                       | ↑                  | ↑                       |  |
| New Mexico     | 26                                                     |                         |                                          |                                       |                                              | ↑                       | ↑                  | ↑                       |  |
| New York       | 152                                                    | ✓                       | ✓                                        | ✓                                     | ✓                                            | ↓                       | ↑                  | ↓                       |  |
| North Carolina | 88                                                     | ✓                       | ✓                                        | ✓                                     |                                              | ↓                       | ↑                  | ↓                       |  |
| North Dakota   | 6                                                      |                         |                                          |                                       |                                              | ↓                       | ↑                  | ↑                       |  |
| Ohio           | 128                                                    |                         |                                          |                                       |                                              | ↓                       | ↓                  | ↓                       |  |
| Oklahoma       | 63                                                     |                         | ✓                                        |                                       |                                              | ↑                       | ↓                  | ↓                       |  |
| Oregon         | 44                                                     | ✓                       | ✓                                        | ✓                                     |                                              | ↓                       | ↑                  | ↓                       |  |
| Pennsylvania   | 143                                                    | ✓                       | ✓                                        | ✓                                     |                                              | ↓                       | ↑                  | ↓                       |  |
| Puerto Rico    | 0                                                      |                         |                                          |                                       |                                              |                         |                    |                         |  |
| Rhode Island   | 11                                                     |                         | ✓                                        |                                       |                                              | ↑                       | ↓                  | ↓                       |  |
| South Carolina | 52                                                     | ✓                       | ✓                                        | ✓                                     |                                              | ↑                       | ↑                  | ↑                       |  |
| South Dakota   | 15                                                     |                         | ✓                                        | ✓                                     | ✓                                            | ↓                       | ↓                  | ↓                       |  |
| Tennessee      | 84                                                     | ✓                       | ✓                                        | ✓                                     |                                              | ↓                       | ↓                  | ↓                       |  |
| Texas          | 288                                                    | ✓                       | ✓                                        | ✓                                     | ✓                                            | ↓                       | ↓                  | ↓                       |  |
| Utah           | 32                                                     | ✓                       | ✓                                        | ✓                                     |                                              | ↓                       | ↓                  | ↓                       |  |
| Vermont        | 12                                                     | ✓                       |                                          | ✓                                     |                                              | ↑                       | ↑                  | ↑                       |  |
| Virginia       | 71                                                     |                         |                                          |                                       |                                              | ↑                       | ↓                  | ↓                       |  |
| Washington     | 68                                                     | ✓                       | ✓                                        | ✓                                     | ✓                                            | ↓                       | ↓                  | ↓                       |  |
| West Virginia  | 33                                                     | ✓                       | ✓                                        | ✓                                     |                                              | ↑                       | ↑                  | ↑                       |  |
| Wisconsin      | 81                                                     |                         | ✓                                        | ✓                                     |                                              | ↑                       | ↓                  | ↓                       |  |
| Wyoming        | 13                                                     |                         |                                          |                                       |                                              | ↓                       | ↓                  | ↓                       |  |

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## STATE HAI PROGRESS

### ACUTE CARE HOSPITALS

#### LEGEND



2014 state SIR is significantly lower (better) than comparison group in column header



Change in 2014 state SIR compared to group in column header is not statistically significant



2014 state SIR is significantly higher (worse) than comparison group in column header



2014 state SIR cannot be calculated



Yes

| STATE         | SSIs: SURGICAL SITE INFECTIONS, COLON SURGERY |                         |                              |                           |                                  |                           |                    |                         |  |
|---------------|-----------------------------------------------|-------------------------|------------------------------|---------------------------|----------------------------------|---------------------------|--------------------|-------------------------|--|
|               | 2014 Reporting and Validation                 |                         |                              |                           |                                  | 2014 State SIR: COLON SIR |                    |                         |  |
|               | # Hospitals Reporting to NHSN*                | State Reporting Mandate | State HCP has Access to Data | Data Checked for Quality† | Additional In-Depth Data Review‡ | vs. 2013 State SIR        | vs. 2014 Nat'l SIR | vs. 2008 Nat'l Baseline |  |
| Alabama       | 70                                            | ✓                       | ✓                            | ✓                         |                                  | ↑                         | ↓                  | ↓                       |  |
| Alaska        | 9                                             |                         | ✓                            |                           |                                  | ↑                         | ↓                  | ↓                       |  |
| Arizona       | 56                                            |                         | ✓                            |                           |                                  | ↓                         | ↑                  | ↑                       |  |
| Arkansas      | 41                                            | ✓                       | ✓                            | ✓                         |                                  | ↑                         | ↓                  | ↓                       |  |
| California    | 326                                           | ✓                       | ✓                            | ✓                         | ✓                                | ↑                         | ↑                  | ↑                       |  |
| Colorado      | 57                                            | ✓                       | ✓                            | ✓                         | ✓                                | ↓                         | ↓                  | ↓                       |  |
| Connecticut   | 30                                            | ✓                       | ✓                            | ✓                         |                                  | ↑                         | ↑                  | ↑                       |  |
| D.C.          | 7                                             |                         | ✓                            | ✓                         |                                  | ↑                         | ↓                  | ↓                       |  |
| Delaware      | 7                                             | ✓                       | ✓                            | ✓                         |                                  | ↑                         | ↑                  | ↑                       |  |
| Florida       | 184                                           |                         |                              |                           |                                  | ↓                         | ↓                  | ↓                       |  |
| Georgia       | 96                                            | ✓                       | ✓                            |                           |                                  | ↓                         | ↓                  | ↓                       |  |
| Hawaii        | 14                                            | ✓                       | ✓                            | ✓                         |                                  | ↑                         | ↑                  | ↑                       |  |
| Idaho         | 16                                            |                         | ✓                            |                           |                                  | ↑                         | ↑                  | ↑                       |  |
| Illinois      | 137                                           |                         |                              |                           |                                  | ↑                         | ↓                  | ↓                       |  |
| Indiana       | 101                                           | ✓                       | ✓                            | ✓                         |                                  | ↓                         | ↑                  | ↑                       |  |
| Iowa          | 42                                            |                         |                              |                           |                                  | ↓                         | ↑                  | ↑                       |  |
| Kansas        | 44                                            |                         | ✓                            | ✓                         |                                  | ↑                         | ↑                  | ↑                       |  |
| Kentucky      | 66                                            |                         | ✓                            |                           |                                  | ↑                         | ↑                  | ↑                       |  |
| Louisiana     | 74                                            |                         | ✓                            | ✓                         |                                  | ↓                         | ↓                  | ↓                       |  |
| Maine         | 22                                            |                         | ✓                            | ✓                         | ✓                                | ↑                         | ↑                  | ↑                       |  |
| Maryland      | 45                                            | ✓                       | ✓                            | ✓                         |                                  | ↑                         | ↓                  | ↓                       |  |
| Massachusetts | 62                                            | ✓                       | ✓                            |                           |                                  | ↓                         | ↑                  | ↑                       |  |
| Michigan      | 93                                            |                         | ✓                            | ✓                         |                                  | ↑                         | ↑                  | ↑                       |  |
| Minnesota     | 49                                            | ✓                       | ✓                            |                           |                                  | ↑                         | ↑                  | ↑                       |  |
| Mississippi   | 43                                            | ✓                       | ✓                            |                           |                                  | ↓                         | ↓                  | ↓                       |  |
| Missouri      | 72                                            |                         |                              |                           |                                  | ↑                         | ↓                  | ↓                       |  |

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## STATE HAI PROGRESS

### ACUTE CARE HOSPITALS

#### LEGEND



2014 state SIR is significantly lower (better) than comparison group in column header



Change in 2014 state SIR compared to group in column header is not statistically significant



2014 state SIR is significantly higher (worse) than comparison group in column header



2014 state SIR cannot be calculated



Yes

| STATE          | SSIs: SURGICAL SITE INFECTIONS, COLON SURGERY |                         |                              |                           |                                  |                           |                    |                         |  |
|----------------|-----------------------------------------------|-------------------------|------------------------------|---------------------------|----------------------------------|---------------------------|--------------------|-------------------------|--|
|                | 2014 Reporting and Validation                 |                         |                              |                           |                                  | 2014 State SIR: COLON SIR |                    |                         |  |
|                | # Hospitals Reporting to NHSN*                | State Reporting Mandate | State HCP has Access to Data | Data Checked for Quality† | Additional In-Depth Data Review‡ | vs. 2013 State SIR        | vs. 2014 Nat'l SIR | vs. 2008 Nat'l Baseline |  |
| Montana        | 16                                            |                         |                              |                           |                                  | ↓                         | ↓                  | ↓                       |  |
| Nebraska       | 21                                            |                         |                              |                           |                                  | ↓                         | ↑                  | ↑                       |  |
| Nevada         | 22                                            |                         |                              |                           |                                  | ↑                         | ↑                  | ↑                       |  |
| New Hampshire  | 25                                            | ✓                       | ✓                            | ✓                         |                                  | ↑                         | ↓                  | ↓                       |  |
| New Jersey     | 71                                            | ✓                       | ✓                            | ✓                         |                                  | ↓                         | ↓                  | ↓                       |  |
| New Mexico     | 26                                            |                         |                              |                           |                                  | ↑                         | ↑                  | ↑                       |  |
| New York       | 166                                           | ✓                       | ✓                            | ✓                         | ✓                                | ↓                         | ↑                  | ↑                       |  |
| North Carolina | 94                                            | ✓                       | ✓                            | ✓                         |                                  | ↓                         | ↓                  | ↓                       |  |
| North Dakota   | 6                                             |                         |                              |                           |                                  | ↓                         | ↑                  | ↑                       |  |
| Ohio           | 129                                           |                         |                              |                           |                                  | ↓                         | ↓                  | ↓                       |  |
| Oklahoma       | 57                                            |                         | ✓                            |                           |                                  | ↓                         | ↓                  | ↓                       |  |
| Oregon         | 48                                            | ✓                       | ✓                            | ✓                         |                                  | ↑                         | ↓                  | ↓                       |  |
| Pennsylvania   | 158                                           | ✓                       | ✓                            | ✓                         |                                  | ↑                         | ↓                  | ↓                       |  |
| Puerto Rico    | 0                                             |                         |                              |                           |                                  |                           |                    |                         |  |
| Rhode Island   | 11                                            |                         | ✓                            |                           |                                  | ↓                         | ↑                  | ↑                       |  |
| South Carolina | 56                                            | ✓                       | ✓                            | ✓                         |                                  | ↑                         | ↑                  | ↑                       |  |
| South Dakota   | 16                                            |                         | ✓                            | ✓                         | ✓                                | ↑                         | ↑                  | ↑                       |  |
| Tennessee      | 92                                            | ✓                       | ✓                            | ✓                         |                                  | ↓                         | ↓                  | ↓                       |  |
| Texas          | 280                                           | ✓                       | ✓                            | ✓                         | ✓                                | ↑                         | ↓                  | ↓                       |  |
| Utah           | 32                                            | ✓                       | ✓                            | ✓                         |                                  | ↑                         | ↑                  | ↑                       |  |
| Vermont        | 6                                             |                         |                              |                           |                                  | ↓                         | ↑                  | ↑                       |  |
| Virginia       | 77                                            |                         |                              |                           |                                  | ↑                         | ↑                  | ↑                       |  |
| Washington     | 67                                            | ✓                       | ✓                            | ✓                         | ✓                                | ↑                         | ↓                  | ↓                       |  |
| West Virginia  | 35                                            | ✓                       | ✓                            | ✓                         |                                  | ↑                         | ↑                  | ↑                       |  |
| Wisconsin      | 90                                            |                         | ✓                            | ✓                         |                                  | ↑                         | ↓                  | ↓                       |  |
| Wyoming        | 13                                            |                         |                              |                           |                                  | ↑                         | ↑                  | ↑                       |  |

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## STATE HAI PROGRESS

## ACUTE CARE HOSPITALS

### LEGEND

- 2014 state SIR is significantly lower (better) than comparison group in column header
- 2014 state SIR is significantly higher (worse) than comparison group in column header
- Change in 2014 state SIR compared to group in column header is not statistically significant
- 2014 state SIR cannot be calculated
- ✓ Yes

| STATE         | MRSA Bacteremia: LABORATORY IDENTIFIED HOSPITAL-ONSET BLOODSTREAM INFECTIONS |                         |                              |                           |                                  |                                |                    |                         |
|---------------|------------------------------------------------------------------------------|-------------------------|------------------------------|---------------------------|----------------------------------|--------------------------------|--------------------|-------------------------|
|               | 2014 Reporting and Validation                                                |                         |                              |                           |                                  | 2014 State MRSA Bacteremia SIR |                    |                         |
|               | # Hospitals Reporting to NHSN*                                               | State Reporting Mandate | State HCD has Access to Data | Data Checked for Quality† | Additional In-Depth Data Review‡ | vs. 2013 State SIR             | vs. 2014 Nat'l SIR | vs. 2011 Nat'l Baseline |
| Alabama       | 91                                                                           |                         |                              |                           |                                  | ↓                              | ↑                  | ↑                       |
| Alaska        | 11                                                                           |                         | ✓                            |                           |                                  | ↑                              | ↓                  | ↓                       |
| Arizona       | 68                                                                           |                         | ✓                            |                           |                                  | ↑                              | ↑                  | ↓                       |
| Arkansas      | 48                                                                           | ✓                       | ✓                            | ✓                         |                                  | ↓                              | ↑                  | ↑                       |
| California    | 369                                                                          | ✓                       | ✓                            | ✓                         | ✓                                | ↑                              | ↓                  | ↓                       |
| Colorado      | 60                                                                           | ✓                       | ✓                            |                           |                                  | ↓                              | ↓                  | ↓                       |
| Connecticut   | 32                                                                           | ✓                       | ✓                            | ✓                         |                                  | ↓                              | ↓                  | ↓                       |
| D.C.          | 8                                                                            | ✓                       | ✓                            | ✓                         |                                  | ↓                              | ↑                  | ↓                       |
| Delaware      | 8                                                                            | ✓                       | ✓                            | ✓                         | ✓                                | ↓                              | ↑                  | ↑                       |
| Florida       | 191                                                                          |                         |                              |                           |                                  | ↓                              | ↑                  | ↑                       |
| Georgia       | 111                                                                          | ✓                       | ✓                            |                           |                                  |                                | ↑                  | ↑                       |
| Hawaii        | 15                                                                           | ✓                       | ✓                            | ✓                         |                                  | ↑                              | ↓                  | ↓                       |
| Idaho         | 21                                                                           |                         | ✓                            |                           |                                  | ↓                              | ↓                  | ↓                       |
| Illinois      | 183                                                                          | ✓                       | ✓                            | ✓                         |                                  | ↑                              | ↓                  | ↓                       |
| Indiana       | 107                                                                          |                         |                              |                           |                                  | ↓                              | ↓                  | ↓                       |
| Iowa          | 48                                                                           |                         | ✓                            | ✓                         | ✓                                | ↑                              | ↓                  | ↓                       |
| Kansas        | 67                                                                           |                         | ✓                            | ✓                         |                                  | ↑                              | ↓                  | ↓                       |
| Kentucky      | 72                                                                           |                         | ✓                            |                           |                                  | ↑                              | ↑                  | ↑                       |
| Louisiana     | 97                                                                           |                         | ✓                            | ✓                         |                                  | ↓                              | ↑                  | ↑                       |
| Maine         | 35                                                                           | ✓                       | ✓                            | ✓                         | ✓                                | ↓                              | ↓                  | ↓                       |
| Maryland      | 47                                                                           | ✓                       | ✓                            | ✓                         | ✓                                | ↑                              | ↑                  | ↑                       |
| Massachusetts | 73                                                                           | ✓                       | ✓                            |                           |                                  | ↓                              | ↓                  | ↓                       |
| Michigan      | 102                                                                          |                         | ✓                            | ✓                         |                                  | ↑                              | ↑                  | ↓                       |
| Minnesota     | 54                                                                           | ✓                       | ✓                            |                           |                                  | ↓                              | ↓                  | ↓                       |
| Mississippi   | 64                                                                           | ✓                       | ✓                            |                           |                                  | ↓                              | ↓                  | ↓                       |
| Missouri      | 83                                                                           |                         |                              |                           |                                  | ↓                              | ↓                  | ↓                       |

\*The number of hospitals that reported to NHSN and are included in the SIR calculation.  
†State Health Department

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# NATIONAL

## ACUTE CARE HOSPITALS

Page 1 of 5

Healthcare-associated infections (HAIs) are infections patients can get while receiving medical treatment in a healthcare facility. Working toward the elimination of HAIs is a CDC priority. The standardized infection ratio (SIR) is a summary statistic that can be used to track HAI prevention progress over time; lower SIRs are better. The infection data are reported to CDC's National Healthcare Safety Network (NHSN). HAI data for nearly all U.S. hospitals are published on the Hospital Compare website. This report is based on 2014 data, published in 2016.



### CLABSI

↓ 50% LOWER COMPARED TO NAT'L BASELINE\*

#### CENTRAL LINE-ASSOCIATED BLOODSTREAM INFECTIONS

When a tube is placed in a large vein and not put in correctly or kept clean, it can become a way for germs to enter the body and cause deadly infections in the blood.

- U.S. hospitals reported a significant decrease in CLABSIs between 2013 and 2014.
- Among the 2,442 hospitals in U.S. with enough data to calculate an SIR, 10% had an SIR significantly higher (worse) than 0.50, the value of the national SIR.

### CAUTI

0% NO CHANGE COMPARED TO NAT'L BASELINE

#### CATHETER-ASSOCIATED URINARY TRACT INFECTIONS

When a urinary catheter is not put in correctly, not kept clean, or left in a patient for too long, germs can travel through the catheter and infect the bladder and kidneys.

- U.S. hospitals reported a significant decrease in CAUTIs between 2013 and 2014.
- Among the 2,880 U.S. hospitals with enough data to calculate an SIR, 12% had an SIR significantly higher (worse) than 1.00, the value of the national SIR.

### MRSA Bacteremia

↓ 13% LOWER COMPARED TO NAT'L BASELINE\*

#### LABORATORY IDENTIFIED HOSPITAL-ONSET BLOODSTREAM INFECTIONS

Methicillin-resistant *Staphylococcus aureus* (MRSA) is bacteria usually spread by contaminated hands. In a healthcare setting, such as a hospital, MRSA can cause serious bloodstream infections.

- U.S. hospitals reported a significant decrease in MRSA bacteremia between 2013 and 2014.
- Among the 2,042 U.S. hospitals with enough data to calculate an SIR, 8% had an SIR significantly higher (worse) than 0.87, the value of the national SIR.

### SSIs

#### SURGICAL SITE INFECTIONS

See pages 3-5 for additional procedures

When germs get into an area where surgery is or was performed, patients can get a surgical site infection. Sometimes these infections involve only the skin. Other SSIs can involve tissues under the skin, organs, or implanted material.

SSI: Abdominal Hysterectomy ↓ 17% LOWER COMPARED TO NAT'L BASELINE\*

- U.S. hospitals reported no significant change in SSIs related to abdominal hysterectomy surgery between 2013 and 2014.
- Among the 794 U.S. hospitals with enough data to calculate an SIR, 6% had an SIR significantly higher (worse) than 0.83, the value of the national SIR.

SSI: Colon Surgery ↓ 2% LOWER COMPARED TO NAT'L BASELINE\*

- U.S. hospitals reported a significant increase in SSIs related to colon surgery between 2013 and 2014.
- Among the 2,051 U.S. hospitals with enough data to calculate an SIR, 8% had an SIR significantly higher (worse) than 0.98, the value of the national SIR.

### C. difficile Infections

↓ 8% LOWER COMPARED TO NAT'L BASELINE\*

#### LABORATORY IDENTIFIED HOSPITAL-ONSET C. DIFFICILE INFECTIONS

When a person takes antibiotics, good bacteria that protect against infection are destroyed for several months. During this time, patients can get sick from *Clostridium difficile* (*C. difficile*), bacteria that cause potentially deadly diarrhea, which can be spread in healthcare settings.

- U.S. hospitals reported a significant increase in *C. difficile* infections between 2013 and 2014.
- Among the 3,554 U.S. hospitals with enough data to calculate an SIR, 11% had an SIR significantly higher (worse) than 0.92, the value of the national SIR.

\* Statistically significant



# Healthcare-associated infections acquired in intensive care units

Reporting on data retrieved from TESSy\* on 22 May 2017

Suggested citation: European Centre for Disease Prevention and Control. Annual Epidemiological Report 2016 – Healthcare-associated infections acquired in intensive care units. [Internet]. Stockholm: ECDC; 2016 [cited YYYY Month DD]. <https://ecdc.europa.eu/en/publications-data/healthcare-associated-infections-acquired-intensive-care-units-annual>

## Key facts

- In 2014, 6 995 (8%) of patients staying in an intensive care unit (ICU) for more than two days presented with at least one ICU-acquired healthcare-associated infection (HAI) under surveillance.
- Of all patients staying in an ICU for more than two days, 6% presented with pneumonia, 4% with bloodstream infection (BSI) and 3% with urinary tract infection (UTI).
- 98% of pneumonia episodes were associated with intubation, 48% of BSI episodes were catheter-related, and 98% of UTI episodes were associated with presence of a urinary catheter.
- The most frequently isolated microorganism was *Pseudomonas aeruginosa* in ICU-acquired pneumonia episodes, coagulase-negative *Staphylococcus* spp. in ICU-acquired bloodstream infections and *Escherichia coli* in ICU-acquired urinary tract infections.
- 25% of *Staphylococcus aureus* isolates were oxacillin-resistant (MRSA). Resistance to third-generation cephalosporins was reported in 17% of *E. coli* isolates, 44% of *Klebsiella* spp. isolates and 44% of *Enterobacter* spp. isolates. Carbapenem resistance was reported in 8% of *Klebsiella* spp. isolates, in 28% of *P. aeruginosa* isolates and in 64% of *Acinetobacter baumannii* isolates.



### ICU-acquired bloodstream infections (BSIs)

A total of 3 072 cases of ICU-acquired BSIs were reported. On average, ICU-acquired BSIs occurred in 3.5% of patients staying in an ICU for more than two days. The mean incidence density per ICU was 1.7 BSI episodes per 1 000 patient-days (ICU IQR: 0.4-3.0).

---

BSIs were catheter-related in 48.3% of cases, secondary to another infection in 32.6% of cases, and of unknown origin in 19.1% of cases. When the BSI was secondary to another infection, the primary infection site was pulmonary in 47.5%, gastrointestinal (17.2%), the urinary tract (18.6%), a surgical site (2.7%), skin and soft tissues (5.2%), and another body site in the remaining 8.5% episodes.

In patient-based surveillance, the central vascular catheter (CVC) utilisation rate was on average 70.5 CVC-days per 100 patient days; it was the lowest (57.0) in Slovakia and the highest (83.0) in Estonia. The mean device-adjusted rate in patients staying in an ICU for more than two days was 2.4 CVC-associated BSI episodes (ICU IQR: 1.3–3.0).

The most frequently isolated microorganisms in ICU-acquired BSI episodes were coagulase-negative staphylococci followed by *Enterococcus* spp., *Staphylococcus aureus* and *Klebsiella* spp.



**Table 3. Number of isolates and percentages of the ten most frequently isolated microorganisms in ICU-acquired bloodstream infection (BSI) episodes by country, EU/EEA, 2014**

| Microorganism                    | Belgium<br>(n=27) | Czech<br>Republic<br>(n=95) | Estonia<br>(n=77) | France<br>(n=1<br>300) | Germany<br>(n=2 188) | Hungary<br>(n=17) | Italy<br>(n=85) | Lithuania<br>(n=45) | Luxembourg<br>(n=18) | Malta<br>(n=22) | Portugal<br>(n=207) | Romania<br>(n=49) | Slovakia<br>(n=15) | Spain<br>(n=890) | United<br>Kingdom<br>(n=65) | Total<br>(n=5 588) |
|----------------------------------|-------------------|-----------------------------|-------------------|------------------------|----------------------|-------------------|-----------------|---------------------|----------------------|-----------------|---------------------|-------------------|--------------------|------------------|-----------------------------|--------------------|
| Coagulase-negative staphylococci | 18.5              | 36.4                        | 32.5              | 20.2                   | 27.5                 | 29.4              | 38.8            | 43.9                | 22.2                 | 0               | 13.5                | 6.1               | 26.7               | 27.6             | 20                          | 25.3               |
| <i>Enterococcus</i> spp.         | 14.8              | 15.6                        | 18.2              | 12.4                   | 17.7                 | 0                 | 7.1             | 5.3                 | 27.8                 | 4.5             | 11.6                | 16.3              | 0                  | 15.1             | 13.8                        | 15                 |
| <i>Staphylococcus aureus</i>     | 22.2              | 15.6                        | 3.9               | 11.9                   | 16.5                 | 5.9               | 1.2             | 8.8                 | 5.6                  | 0               | 15                  | 0                 | 6.7                | 2.7              | 18.5                        | 12.1               |
| <i>Klebsiella</i> spp.           | 3.7               | 24.7                        | 7.8               | 11.8                   | 8.1                  | 5.9               | 14.1            | 8.8                 | 5.6                  | 36.4            | 15                  | 22.4              | 33.3               | 10.3             | 10.8                        | 10.3               |
| <i>Escherichia coli</i>          | 18.5              | 7.8                         | 3.9               | 10.8                   | 9.7                  | 5.9               | 2.4             | 3.5                 | 5.6                  | 9.1             | 7.7                 | 0                 | 6.7                | 7.6              | 9.2                         | 9.2                |
| <i>Candida</i> spp.              | 7.4               | 7.8                         | 18.2              | 9.2                    | 8                    | 0                 | 9.4             | 5.3                 | 5.6                  | 9.1             | 4.8                 | 4.1               | 6.7                | 8.4              | 12.3                        | 8.4                |
| <i>Pseudomonas aeruginosa</i>    | 3.7               | 10.4                        | 3.9               | 9.8                    | 4.4                  | 29.4              | 8.2             | 3.5                 | 5.6                  | 18.2            | 11.1                | 8.2               | 13.3               | 13.7             | 4.6                         | 8                  |
| <i>Enterobacter</i> spp.         | 0                 | 0                           | 9.1               | 10.4                   | 4.9                  | 17.6              | 3.5             | 3.5                 | 11.1                 | 13.6            | 8.7                 | 0                 | 0                  | 6                | 6.2                         | 6.7                |
| <i>Acinetobacter</i> spp.        | 0                 | 1.3                         | 1.3               | 1.3                    | 0.8                  | 5.9               | 14.1            | 15.8                | 5.6                  | 9.1             | 7.2                 | 40.8              | 6.7                | 5.4              | 4.6                         | 2.5                |
| <i>Serratia</i> spp.             | 11.1              | 3.9                         | 1.3               | 2                      | 2.3                  | 0                 | 1.2             | 1.8                 | 5.6                  | 0               | 5.3                 | 2                 | 0                  | 3.1              | 0                           | 2.5                |

*n* = number of isolates

Source: ECDC, HAI-Net patient-based and unit-based data 2014. United Kingdom: data from UK-Scotland only.

Coagulase-negative staphylococci: includes unspecified *Staphylococcus* spp.



### ICU-acquired urinary tract infections

A total of 1 178 cases of ICU-acquired UTIs were reported. On average, ICU-acquired UTIs occurred in 2.6% of patients staying in an ICU for more than two days, with 98.4% of UTI episodes being associated with the use of a urinary catheter. The mean incidence density per ICU was 1.1 UTI episodes per 1 000 patient-days (ICU IQR: 0–2.13).

On average, urinary catheters were used in 78% of the patient-days. The mean device-adjusted rate in patients staying in an ICU for more than two days was 3.8 catheter-associated UTI episodes per 1 000 catheter-days (ICU IQR: 0.2–5.2).

The most frequently isolated microorganisms in ICU-acquired UTI episodes were *Escherichia coli* followed by *Enterococcus* spp., *Pseudomonas aeruginosa* and *Klebsiella* spp.



RESEARCH

Open Access

## Clinical experience with power-injectable PICCs in intensive care patients

Mauro Pittiruti<sup>1\*</sup>, Alberto Brutti<sup>2</sup>, Davide Celentano<sup>2</sup>, Massimiliano Pomponi<sup>2</sup>, Daniele G Biasucci<sup>2</sup>, Maria Giuseppina Annetta<sup>2</sup> and Giancarlo Scoppettuolo<sup>3</sup>

See related Letter by Zampieri,

<http://ccforum.com/content/16/2/425>

### Abstract

**Introduction:** In the ICU, peripherally inserted central catheters (PICCs) may be an alternative option to standard central venous catheters, particularly in patients with coagulation disorders or at high risk for infection. Some limits of PICCs (such as low flow rates) may be overcome with the use of power-injectable catheters.

**Methods:** We retrospectively reviewed all of the power-injectable PICCs inserted in adult and pediatric patients in the ICU during a 12-month period, focusing on the rate of complications at insertion and during maintenance.

**Results:** We collected 89 power-injectable PICCs (in adults and in children), both multiple and single lumen. All insertions were successful. There were no major complications at insertion and no episodes of catheter-related bloodstream infection. Non-infective complications during management were not clinically significant. There was one episode of symptomatic thrombosis during the stay in the ICU and one episode after transfer of a patient to a non-intensive ward.

**Conclusion:** Power-injectable PICCs have many advantages in the ICU: they can be used as multipurpose central lines for any type of infusion including high-flow infusion, for hemodynamic monitoring, and for high-pressure injection of contrast media during radiological procedures. Their insertion is successful in 100% of cases and is not associated with significant risks, even in patients with coagulation disorders. Their maintenance is associated with an extremely low rate of infective and non-infective complications.

J Vasc Access. 2017 Nov 8:0. doi: 10.5301/jva.5000797. [Epub ahead of print]

## Targeting zero catheter-related bloodstream infections in pediatric intensive care unit: a retrospective matched case-control study.

Biasucci DG<sup>1</sup>, Pittiruti M<sup>2</sup>, Taddei A<sup>3</sup>, Picconi E<sup>1</sup>, Pizza A<sup>1</sup>, Celentano D<sup>1</sup>, Piastra M<sup>1</sup>, Scoppettuolo G<sup>4</sup>, Conti G<sup>1</sup>.

### Author information

#### Abstract

**INTRODUCTION:** The aim of this study was to evaluate the effectiveness and safety of a new three-component 'bundle' for insertion and management of centrally inserted central catheters (CICCs), designed to minimize catheter-related bloodstream infections (CRBSIs) in critically ill children.

**METHODS:** Our 'bundle' has three components: insertion, management, and education. Insertion and management recommendations include: skin antisepsis with 2% chlorhexidine; maximal barrier precautions; ultrasound-guided venipuncture; tunneling of the catheter when a long indwelling time is expected; glue on the exit site; sutureless securement; use of transparent dressing; chlorhexidine sponge dressing on the 7th day; neutral displacement needle-free connectors. All CICCs were inserted by appropriately trained physicians proficient in a standardized simulation training program.

**RESULTS:** We compared CRBSI rate per 1000 catheters-days of CICCs inserted before adoption of our new bundle with that of CICCs inserted after implementation of the bundle. CICCs inserted after adoption of the bundle remained in place for a mean of 2.2 days longer than those inserted before. We found a drop in CRBSI rate to 10%, from 15 per 1000 catheters-days to 1.5.

**CONCLUSIONS:** Our data suggest that a bundle aimed at minimizing CR-BSI in critically ill children should incorporate four practices: (1) ultrasound guidance, which minimizes contamination by reducing the number of attempts and possible break-down of aseptic technique; (2) tunneling the catheter to obtain exit site in the infra-clavicular area with reduced bacterial colonization; (3) glue, which seals and protects the exit site; (4) simulation-based education of the staff.



JOHNS HOPKINS QUALITY AND SAFETY RESEARCH GROUP (QSRG)

**ON THE CUSP: STOP BSI**  
**CENTRAL LINE-ASSOCIATED BLOOD STREAM INFECTION**  
**TOOLKIT**

## How to Use This Toolkit

The purpose of this toolkit is to support your efforts to implement evidence-based practices and eliminate Central Line Associated Blood Stream Infections (CLABSIs) in your clinical area. The strategies in this toolkit have nearly eliminated CLABSIs in participating Michigan ICUs (Appendix A). These strategies have been adopted by over 100 ICUs in large and small, academic and community hospitals that we have worked with to date. Most of these ICUs have demonstrated a significant reduction in their CLABSI rates and many have not had a CLABSI in >6 months.

Nevertheless, your leadership is needed to achieve these results in your clinical area. Most of your efforts will be working with staff that insert and assist with the insertion of central lines. We developed a model to help disseminate this, and other, interventions. This model includes 4 stages that answer the following questions:

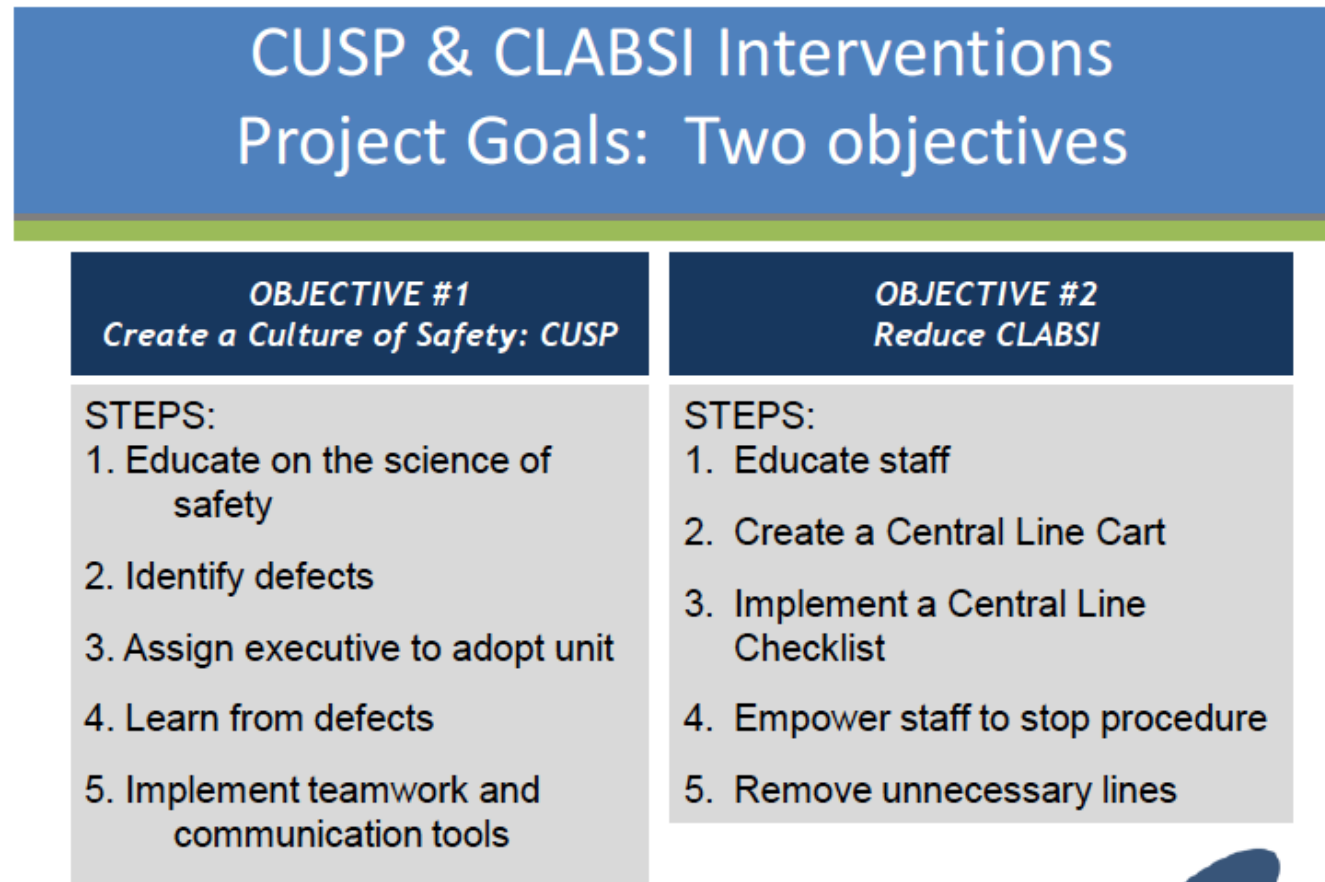
1. **Engage:** How will this make the world a better place?
2. **Educate:** How will we do this?
3. **Execute:** What do I need to do?
4. **Evaluate:** How will we know we made a difference?

This toolkit provides details of what you should do in each of these stages. In the appendices, we provide all the tools you will need to eliminate CLABSIs in your clinical area; the rest is up to you.

## Creating Reliable Health care

|                                     | Executive Leaders                                                                                                                                                                                                                                                              | Team Leaders                                                                                                                                                                                                                                                                              | Staff                                                                                                                                                                                                                                                                 |
|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Engage</b><br><i>adaptive</i>    | <b>How Do I Make the World a Better Place?</b> <ul style="list-style-type: none"> <li>➤How do I create an organization that is safe for patients and rewarding for staff?</li> <li>➤How does this strategy fit our mission?</li> </ul>                                         | <b>How Do I Make the World a Better Place?</b> <ul style="list-style-type: none"> <li>➤How do I create a unit that is safe for patients and rewarding for staff?</li> <li>➤How do I touch their hearts?</li> </ul>                                                                        | <b>How Do I Make the World a Better Place?</b> <ul style="list-style-type: none"> <li>➤Do I believe I can change the world, starting with my unit?</li> <li>➤Can I help make my unit safer for patients and a better place to work?</li> </ul>                        |
| <b>Educate</b><br><i>technical</i>  | <b>What Do I Need to Know?</b> <ul style="list-style-type: none"> <li>➤What is the business case?</li> <li>➤How do I engage the Board and Medical Staff?</li> <li>➤How can I monitor progress?</li> </ul>                                                                      | <b>What Do I Need to Know?</b> <ul style="list-style-type: none"> <li>➤What is the evidence?</li> <li>➤Do I have executive and medical staff support?</li> <li>➤Are there tools to help me develop a plan?</li> </ul>                                                                     | <b>What Do I Need to Know?</b> <ul style="list-style-type: none"> <li>➤Why is this change important?</li> <li>➤How are patient outcomes likely to improve?</li> <li>➤How does my daily work need to change?</li> <li>➤Where do I go for support?</li> </ul>           |
| <b>Execute</b><br><i>adaptive</i>   | <b>What Do I Need to Do?</b> <ul style="list-style-type: none"> <li>➤Do the Board and Medical Staff support the plan and have the skills and vision to implement?</li> <li>➤How do I know the team has sufficient resources, incentives and organizational support?</li> </ul> | <b>What Do I Need to Do?</b> <ul style="list-style-type: none"> <li>➤Do the Staff Know the plan and do they have the skills and commitment to implement?</li> <li>➤Have we tailored this to our environment?</li> </ul>                                                                   | <b>What Do I Need to Do?</b> <ul style="list-style-type: none"> <li>➤Can I be a better team member and team leader?</li> <li>➤How can I share what I know to make care better?</li> <li>➤Am I learning from defects?</li> </ul>                                       |
| <b>Evaluate</b><br><i>technical</i> | <b>How Will I Know I Made a Difference?</b> <ul style="list-style-type: none"> <li>➤Have resources been allocated to collect and use safety data?</li> <li>➤Is the work climate better?</li> <li>➤Are patients safer?</li> <li>➤How do I know?</li> </ul>                      | <b>How Will I Know I Made a Difference?</b> <ul style="list-style-type: none"> <li>➤Have I created a system for data collection, unit level reporting, and using data to improve?</li> <li>➤Is the work climate better?</li> <li>➤Are patients safer?</li> <li>➤How do I know?</li> </ul> | <b>How Will I Know I Made a Difference?</b> <ul style="list-style-type: none"> <li>➤What is our unit level report card?</li> <li>➤Is the unit a better place to work?</li> <li>➤Is teamwork better?</li> <li>➤Are patients safer?</li> <li>➤How do I know?</li> </ul> |
|                                     |                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                           | © Quality and Safety Research Group, Johns Hopkins University                                                                                                                                                                                                         |

**Figure 1. Project Objectives**

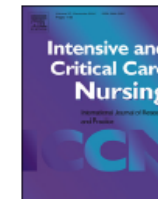




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## Intensive and Critical Care Nursing

journal homepage: [www.elsevier.com/icc](http://www.elsevier.com/icc)



### Original article

# Prevention of central venous line associated bloodstream infections in adult intensive care units: A systematic review

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### ARTICLE INFO

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### ABSTRACT

**Background:** In adult Intensive Care Units, the complexity of patient treatment requirements make the use of central venous lines essential. Despite the potential benefits central venous lines can have for patients, there is a high risk of bloodstream infection associated with these catheters.

**Aim:** Identify and critique the best available evidence regarding interventions to prevent central venous line associated bloodstream infections in adult intensive care unit patients other than anti-microbial catheters.

**Methods:** A systematic review of studies published from January 2007 to February 2016 was undertaken. A systematic search of seven databases was carried out: MEDLINE; CINAHL Plus; EMBASE; PubMed; Cochrane Library; Scopus and Google Scholar. Studies were critically appraised by three independent reviewers prior to inclusion.

**Results:** Nineteen studies were included. A range of interventions were found to be used for the prevention or reduction of central venous line associated bloodstream infections. These interventions included dressings, closed infusion systems, aseptic skin preparation, central venous line bundles, quality improvement initiatives, education, an extra staff in the Intensive Care Unit and the participation in the 'On the CUSP: Stop Blood Stream Infections' national programme.

**Conclusions:** Central venous line associated bloodstream infections can be reduced by a range of interventions including closed infusion systems, aseptic technique during insertion and management of the central venous line, early removal of central venous lines and appropriate site selection.

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### *Combining multiple interventions with central venous line bundles*

A variety of initiatives that could be combined with central venous line bundles (Table 5) primarily focussed on staff education, surveillance, development of tools and teamwork practices. The combination of any of these interventions with bundles were found to reduce CLABSI (Bonello et al., 2008; Cherifi et al., 2013; McLaws and Burrell, 2012; Tang et al., 2014).

### *Quality improvement initiatives*

These initiatives included compliance checklists (Bonello et al., 2008; Jeong et al., 2013; McLaws and Burrell, 2012; Tang et al., 2014), surveillance (Cherifi et al., 2013; Tang et al., 2014), feedback (Jeong et al., 2013), hand hygiene education programs (Jeong et al., 2013; Speroff et al., 2011), visual promotion of central venous line care campaigns (Jeong et al., 2013; Speroff et al., 2011), creation of collaborative teams (Jeong et al., 2013; Speroff et al., 2011), tools, guidelines or protocols (McLaws and Burrell, 2012; Speroff et al., 2011). The virtual collaborative intervention included monthly educational conference calls, web seminars, individual online coaching and email report access related to central venous line management (Speroff et al., 2011). These different combinations of interventions resulted in a significant reduction in CLABSI rates (Bonello et al., 2008; Cherifi et al., 2013; McLaws and Burrell, 2012; Tang et al., 2014) (Table 6).

### Education

In four studies the IHI bundle was combined with educational programs delivered in the ICU ([Cherifi et al., 2013](#); [Jeong et al., 2013](#); [Speroff et al., 2011](#); [Tang et al., 2014](#)). It included interdisciplinary improvement team implementing organisational changes related to the central venous line bundle, they introduced sharing goals and methods by collaborative charter, monthly conferences calls face

to face, learning sessions at least (three per month), education in 'Plan to Do, Study Act (PDSA) methodology, bed side checklists education and interdisciplinary interactive team rounds. Only two of these studies demonstrated a significant reduction in CLABSI rates ([Cherifi et al., 2013](#), [Tang et al., 2014](#)) ([Table 6](#)).

### *Increasing ICU medical staffing*

One study examined the effect of staffing skill mix on infection rates, by comparing infection rates before and after the introduction of an extra intensivist in the ICU ([Parikh et al., 2012](#)), demonstrating an intensivist as a cost effective and beneficial strategy in reducing CLABSI rates ([Parikh et al., 2012](#)) ([Table 7](#)). Not only were more lives saved when there was an extra intensivist in the ICU, but the cost of the intensivist was cheaper than the expenses associated with a higher CLABSI rate ([Barnett et al., 2010](#); [Parikh et al., 2012](#); [Stevens et al., 2014](#)).

### *Participating in on the CUSP*

Two studies examined the outcomes arising from participation in On the CUSP, a national program in the USA, and its impact in reducing CLABSI ([Marsteller et al., 2014](#); [Marsteller et al., 2012](#)). Both studies reported significant reductions in CLABSI after applying the intervention. The first study additional of the On the CUSP national program examined the positive outcome of mandatory reporting and CLABSI reduction. After comparing CLABSI rates from hospitals where a mandatory reporting public reports of central venous line associated infections rates was in place ([Table 8](#)).

# STEPS DA IMPLEMENTARE PER LA PREVENZIONE DELLE CLABSI IN ICU

- ▶ ALGORITMO DI SCELTA DEL CATETERE IN TERAPIA INTENSIVA
- ▶ DIFFUSIONE DELLA CULTURA DELL'EXIT SITE
- ▶ DIFFUSIONE USO GLOBALE ECOGUIDA
- ▶ MASSIME PRECAUZIONI DI BARRIERA E KIT DI IMPIANTO
- ▶ COLLA
- ▶ TUNNELLIZZAZIONE
- ▶ IMPLEMENTAZIONE NEEDLEFREE CONNECTORS
- ▶ IMPLEMENTAZIONE PORT PROTECTORS
- ▶ IMPLEMENTAZIONE SIRINGHE PRERIEMPIE STERILI PER IL FLUSH E IL LOCK DEL CATETERE



# ALGORITMO DI SCELTA DEL CATETERE IN TERAPIA INTENSIVA

## The Michigan Appropriateness Guide for Intravenous Catheters (MAGIC): Results From a Multispecialty Panel Using the RAND/UCLA Appropriateness Method

Vineet Chopra, MD, MSc; Scott A. Flanders, MD; Sanjay Saint, MD, MPH; Scott C. Woller, MD; Naomi P. O'Grady, MD; Nasia Safdar, MD, PhD; Scott O. Trerotola, MD; Rajiv Saran, MD, PhD; Nancy Moureau, BSN, RN; Stephen Wiseman, PharmD; Mauro Pittiruti, MD; Elie A. Akl, MD, MPH, PhD; Agnes Y. Lee, MD, MSc; Anthony Courey, MD; Lakshmi Swaminathan, MD; Jack LeDonne, MD; Carol Becker, MHSA; Sarah L. Krein, PhD, RN; and Steven J. Bernstein, MD, MPH

Use of peripherally inserted central catheters (PICCs) has grown substantially in recent years. Increasing use has led to the realization that PICCs are associated with important complications, including thrombosis and infection. Moreover, some PICCs may not be placed for clinically valid reasons. Defining appropriate indications for insertion, maintenance, and care of PICCs is thus important for patient safety.

An international panel was convened that applied the RAND/UCLA Appropriateness Method to develop criteria for use of PICCs. After systematic reviews of the literature, scenarios related to PICC use, care, and maintenance were developed according to patient population (for example, general hospitalized, critically ill, cancer, kidney disease), indication for insertion (infusion of peripherally compatible infusates vs. vesicants), and duration of use ( $\leq 5$  days, 6 to 14 days, 15 to 30 days, or  $\geq 31$  days). Within each scenario, appropriateness of PICC use was compared with that of other venous access devices.

After review of 665 scenarios, 253 (38%) were rated as appropriate, 124 (19%) as neutral/uncertain, and 288 (43%) as inappropriate. For peripherally compatible infusions, PICC use was rated as inappropriate when the proposed duration of use was 5 or fewer days. Midline catheters and ultrasonography-guided peripheral intravenous catheters were preferred to PICCs for use between 6 and 14 days. In critically ill patients, nontunneled central venous catheters were preferred over PICCs when 14 or fewer days of use were likely. In patients with cancer, PICCs were rated as appropriate for irritant or vesicant infusion, regardless of duration.

The panel of experts used a validated method to develop appropriate indications for PICC use across patient populations. These criteria can be used to improve care, inform quality improvement efforts, and advance the safety of medical patients.

*Ann Intern Med.* 2015;163:S1-S39. doi:10.7326/M15-0744 [www.annals.org](http://www.annals.org)  
For author affiliations, see end of text.

## Accesso venoso centrale

pH >9 o <5  
farmaci con osmolarità >600  
farmaci vescicanti  
farmaci irritanti  
nutrizione parenterale con osmolarità >800  
necessità di prelievi ripetuti e frequenti  
necessità di monitoraggio emodinamico

### USO INTRA-OSPEDALIERO



#### Catetere ad inserzione periferica PICC

vene profonde del braccio disponibili  
soltanto in elezione

#### Catetere ad inserzione centrale CICC

vene profonde del braccio non disponibili  
inserzione in condizioni di urgenza  
necessità di catetere 'medicato'  
necessità di > 3 lumi

#### Catetere ad inserzione femorale

non tunnellizzato  
in situazioni di emergenza  
tunnellizzato  
presenza di ostruzione vena cava superiore

### USO EXTRA-OSPEDALIERO Day Hospital, Domicilio, Hospice



#### ACCESSI A MEDIO TERMINE (< 4 MESI)

##### PICC

- vene profonde del braccio disponibili

##### CICC tunnellizzato

- vene profonde del braccio non disponibili

#### ACCESSI A LUNGO TERMINE (> 4 MESI)

uso episodico: < 1/settimana:

##### Port

uso frequente: > 1/settimana:

##### Catetere Cuffiato Tunnellizzato CCT

ad inserzione periferica/centrale/femorale



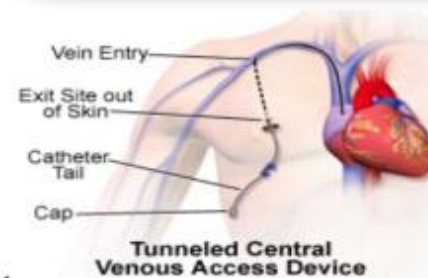
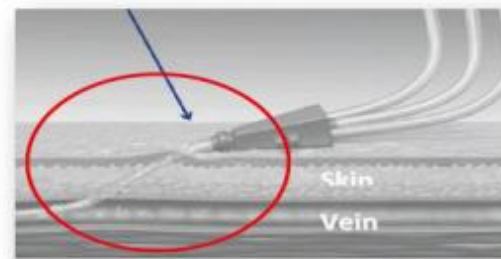
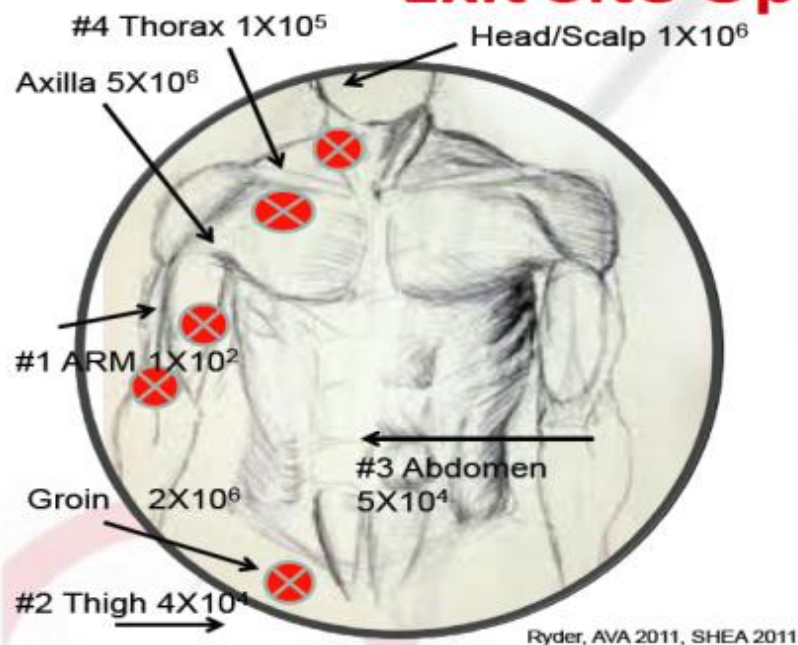
# DIFFUSIONE DELLA CULTURA DELL'EXIT SITE

ORIGINAL ARTICLE

# Intravascular Complications of Central Venous Catheterization by Insertion Site

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Bruno Mégarbane, M.D., Ph.D., Jean-Paul Mira, M.D., Ph.D.,  
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Marie Thuong, M.D., Véronique Pottier, M.D., Michel Ramakers, M.D.,  
Benoît Savary, M.D., Amélie Seguin, M.D., Xavier Valette, M.D.,  
Nicolas Terzi, M.D., Ph.D., Bertrand Sauneuf, M.D.,  
Vincent Cattoir, Pharm.D., Ph.D., Leonard A. Mermel, D.O.,  
and Damien du Cheyron, M.D., Ph.D., for the 3SITES Study Group\*

## Exit Site Options



Courtesy of N. Moreau

Era meglio un PICC...?



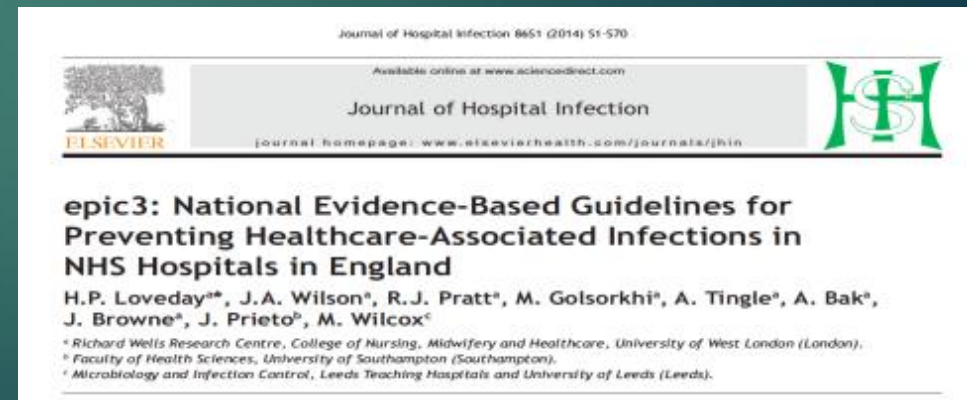
## Sito di emergenza sottoclaveare





# DIFFUSIONE USO GLOBALE ECOGUIDA

“... L’uso dell’ecografia può indirettamente ridurre il rischio di infezione facilitando il posizionamento del catetere venoso centrale...”



## Strategies to Prevent Central Line–Associated Bloodstream Infections in Acute Care Hospitals: 2014 Update

Jonas Marschall, MD;<sup>1,2,a</sup> Leonard A. Mermel, DO, ScM;<sup>3,a</sup> Mohamad Fakih, MD, MPH;<sup>4</sup>  
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Lisa L. Maragakis, MD, MPH;<sup>11</sup> Deborah S. Yokoe, MD, MPH<sup>12</sup>

5. Use ultrasound guidance for internal jugular catheter insertion (quality of evidence: II).<sup>99</sup>
  - a. Ultrasound-guided internal jugular vein catheterization reduces the risk of CLABSI and of non-infectious complications of CVC placement.<sup>100</sup>

# Consensus 2012

Intensive Care Med  
DOI 10.1007/s00134-012-2597-x

CONFERENCE REPORTS AND EXPERT PANEL

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**International evidence-based  
recommendations on ultrasound-guided  
vascular access**

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**What's really new in the field  
of vascular access? Towards  
a global use of ultrasound**

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cannulate, considering such factors as vein size, pathological abnormalities, and collapse during breathing [2]. In a critical care environment, two long-term outcome determinants are of paramount importance: (a) vessel and approach should be chosen so as to obtain an exit site allowing optimal management and dressing to reduce catheter-related infections and accidental catheter dislodgement rates; (b) vein size should be measured, since the external diameter of the catheter should not exceed 1/3 of the internal diameter of the vein: this will reduce the risk of venous thrombosis. Recently, different protocols have

used for venipuncture. As a 'tip location' technique, transthoracic echocardiography allows direct or indirect visualization of the catheter tip or J-guidewire at the CAJ or in the lower SVC by means of a subcostal bicaval view (Fig. 1b) [2, 5]. This approach meets significant limitations in obese patients, after recent open-abdomen surgery or when stomach or colon is overinflated and/or involved with bulky diseases/tumours. Transoesophageal echocardiography is the most accurate method for tip location, but it is expensive and invasive. Recently, Kim and collaborators [4] proposed the use of a micro-convex

# Ultrasound as a Screening Tool for Central Venous Catheter Positioning and Exclusion of Pneumothorax\*

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**Objectives:** Although real-time ultrasound guidance during central venous catheter insertion has become a standard of care, post-insertion chest radiograph remains the gold standard to confirm central venous catheter tip position and rule out associated lung complications like pneumothorax. We hypothesize that a combination of transthoracic echocardiography and lung ultrasound is noninferior to chest radiograph when used to accurately assess central venous catheter positioning and screen for pneumothorax. **Setting:** All operating rooms and surgical and trauma ICUs at the institution.

**Design:** Single-center, prospective noninferiority study.

**Patients:** Patients receiving ultrasound-guided subclavian or internal jugular central venous catheters.

**Interventions:** During ultrasound-guided central venous catheter placement, correct positioning of central venous catheter was accomplished by real-time visualization of the guide wire and positive right atrial swirl sign using the subcostal four-chamber view. After insertion, pneumothorax was ruled out by the presence of lung sliding and seashore sign on M-mode.

**Measurements and Main Results:** Data analysis was done for 137 patients. Chest radiograph ruled out pneumothorax in 137 of 137

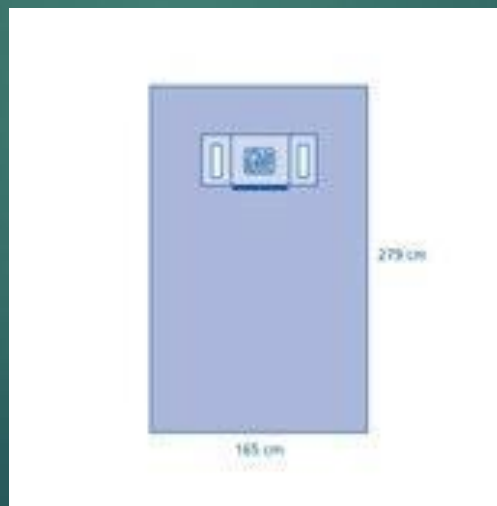
patients (100%). Lung ultrasound was performed in 123 of 137 patients and successfully screened for pneumothorax in 123 of 123 (100%). Chest radiograph approximated accurate catheter tip position in 136 of 137 patients (99.3%). Adequate subcostal four-chamber views could not be obtained in 13 patients. Accurate positioning of central venous catheter with ultrasound was then confirmed in 121 of 124 patients (97.6%) as described previously.

**Conclusions:** Transthoracic echocardiography and lung ultrasound are noninferior to chest x-ray for screening of pneumothorax and accurate central venous catheter positioning. Thus, the point of care use of ultrasound can reduce central venous catheter insertion to use time, exposure to radiation, and improve patient safety. (*Crit Care Med* 2017; 45:1192–1198)

**Key Words:** central venous catheter; noninferiority; point of care; transthoracic echocardiography; ultrasound

Traditionally, anatomical landmarks in the neck have been used for cannulation of the internal jugular (IJ) or the subclavian vein for central venous catheter (CVC) insertion. Confirmation of the CVC position via chest radio-

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# COLLA IN CIANOACRILATO



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## Further benefits of cyanoacrylate glue for central venous catheterisation

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# COLLA IN CIANOACRILATO

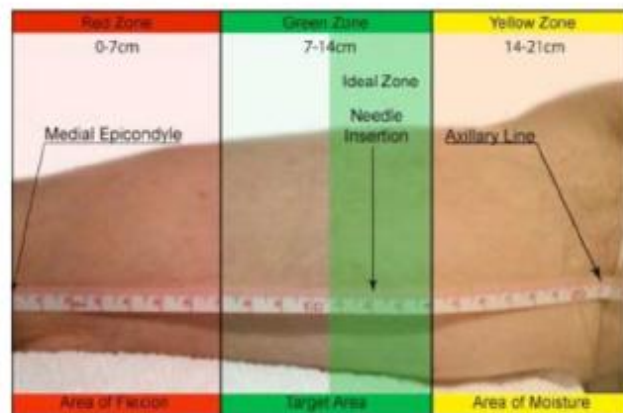
- ▶ PROTEGGE DAL RISCHIO DI SANGUINAMENTO
- ▶ PROTEGGE DAL RISCHIO DI DISLOCAZIONE
- ▶ PROTEGGE DAL RISCHIO DI CONTAMINAZIONE BATTERICA
- ▶ COSTA POCO
- ▶ NON HA CONTROINDICAZIONI



# TUNNELLIZZAZIONE

# Zone di Dawson

ZONE INSERTION METHOD (ZIM)



PICC  
tunnellizzati





# IMPLEMENTAZIONE NEEDLEFREE CONNECTORS E PORT PROTECTORS





# IMPLEMENTAZIONE SIRINGHE PRERIEMPIE STERILI PER FLUSH E LOCK DEL CATETERE



# CONCLUSIONI

- ▶ La prevenzione delle CLABSI ha trovato uno straordinario campo di applicazione nelle terapie intensive
- ▶ L'applicazione dei bundles di inserimento e di gestione insieme alle checklist si sono dimostrati strumenti efficaci nella riduzione delle CLABSI
- ▶ Per la corretta applicazione dei bundles sono necessari multipli interventi strutturati di tipo motivazionale, organizzativo ed educativo
- ▶ I bundles devono essere adeguatamente rinnovati sulla base di quanto continuamente verificato come efficace e costo-efficace



*Grazie per l'attenzione!*

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