Healthcare Quality Reporting Program

METHICILLIN-RESISTANT STAPHYLOCOCCUS AUREUS (MRSA) BLOODSTREAM INFECTIONS

Methods

MRSA bloodstream infections are reported on the Department of Health's (HEALTH's) Web site. The information on this page provides additional details about the results presented, including the data source, how hospital diamonds are calculated, and why this information is important.

MRSA bloodstream infections are caused by a type of bacteria that can enter the body in many ways. Hospitals in Rhode Island report MRSA bloodstream infections that their intensive care unit patients get through their central lines (a kind of catheter, or medical tube). MRSA bloodstream infections are also called MRSA central line-associated bloodstream infections, or MRSA CLABSI.

Measure Information (adapted from the Centers for Disease Control and Prevention)

Topic	Why is this information important?
Methicillin-resistant Staphylococcus aureus (MRSA)	MRSA bacteria most commonly cause skin infections. MRSA is resistant to (cannot be treated with) certain antibiotics.
MRSA central line-associated bloodstream infections (MRSA CLABSI)	MRSA CLABSI are reasonably preventable with proper care, especially good hygiene.

Definitions

Word or Phrase	What does this mean?
Bloodstream infection	An infection caused by bacteria entering a patient's blood, for example through their central line.
Central line	A special kind of medical tube ("IV") that connects directly to a patient's heart or a major blood vessel. It can be used to draw blood or give patients medicines or nutrition.
MRSA CLABSI	A type of bloodstream infection caused by MRSA bacteria that enter the blood through a central line. These infections are not related to another infection, such as a urinary tract infection, pneumonia, or wound infection. In scientific words, this includes any *S. aureus* infection that tests oxacillin-resistant.
Intensive Care Unit (ICU)	A hospital unit that cares for critically-ill patients.
Rate	A score that reflects new (hospital-acquired) infections over a period of time. For the MRSA infection rates, this timeframe is three months. *Lower* rates are better for MRSA.

Data Source

Hospitals in Rhode Island collect information about the MRSA CLABSI that their ICU patients get and share it with the Department of Health for reporting. Hospital rates are based on MRSA CLABSI. For MRSA CLABSI rates, *lower* numbers are better.

Measure Calculation

The information in this section is for people who want details about the data calculations. For each ICU, two numbers are calculated: (1) **MRSA CLABSI incidence**, and (2) a **Standardized Incidence Ratio** (SIR). Incidence is needed to calculate each hospital's SIR, and the diamonds presented in the public report are based on the SIR.

1. **MRSA CLABSI incidence** is calculated as follows:

$$Rate = \frac{(number\ of\ MRSA\ CLABSI)}{(number\ of\ central\ line\ days)}\ x\ 1{,}000$$

   The number of patients who develop a MRSA CLABSI is the **numerator**. The number of central line days (the number of days when patients could have developed an infection in the ICU) is the **denominator**. The **incidence rate** is the numerator divided by the denominator multiplied by 1,000. Each hospital's rate is compared to the rates of other hospitals nationally using SIRs.

2. Incidence rates are used to calculate **SIRs**, which are:

$$SIR = \frac{(observed\ cases)}{(expected\ cases)}$$

   The **observed cases** are the actual number of MRSA CLABSI (incidence rate numerator) and the **expected cases** are the number we expect to see if we applied the national average MRSA CLABSI incidence rate to each hospital's patient population (the incidence rate's denominator). *Lower* scores are better. An SIR score less than 1.0 means the incidence is better than expected.

For hospitals with SIRs calculated, each hospital's SIR is included in the public report and helps to determine its diamond category (see "Diamond Categories").

Diamond Categories

The diamond categories help you understand how each hospital's incidence compares to its expected incidence (or "expected cases," determined based on the national average):

◆ Worse than expected
◆◆ About the same as expected
◆◆◆ Better than expected

These categories are determined mathematically to ensure that the differences are meaningful. In detailed terms, this means that hospitals with either one diamond (◆) or three diamonds (◆◆◆) have MRSA incidence rates that are "statistically significantly different" from their expected rates.

Diamond Calculation

The information in this section is for people who want statistical details about the diamond calculations. The diamond categories are determined based on hospitals' SIRs (see "Measure Calculation"). An SIR less than 1.0 means the hospital's rate is lower (better) than expected; an SIR greater than 1.0 is higher (worse) than expected. The margin of error, or "95% confidence interval," determines whether each SIR is meaningfully different from 1.0. Diamonds are assigned as follows:

- One diamond (◆): If the SIR falls <u>above</u> 1.0 (is worse than expected) AND its margin of error, or "95% confidence interval," does not include 1.0, then the hospital has one diamond.
- Two diamonds (◆◆): If the 95% confidence interval for the SIR includes 1.0, then the hospital's score is not accurate enough to categorize it as better or worse than other hospitals (the national average). The hospital has two diamonds.

- Three diamonds (◆◆◆): If the SIR falls below 1.0 (is better than expected) AND its margin of error, or "95% confidence interval," does not include 1.0, then the hospital has three diamonds. **Note**: The exception is when the hospital does not have any infections (where zero is the best performance). When this occurs, a hospital is automatically given three diamonds, even if they have no national comparison.

Data Table, Oct-Dec 2015

The data table below provides additional details which are not presented in the Data Report, including:

- Number of MRSA CLABSI
- Number of central line days
- MRSA rate per 1,000 central line days
- SIR, based on the national average[1]
- 95% CI range

Hospital (Alphabetical by ICU Type)	Number of MRSA CLABSI Infections	Number of Central-Line Days	MRSA CLABSI Rate per 1,000 Central Line Days	SIR	95% CI		Diamonds
					Lower Limit	Upper Limit	
Kent Hospital	0	497	0.00	0.00	-	-	◆◆◆
Landmark Medical Center	0	331	0.00	0.00	-	-	◆◆◆
Memorial Hospital	1	155	6.45	19.26	0.252	107.152	◆◆
The Miriam Hospital	0	334	0.00	0.00	-	-	◆◆◆
Newport Hospital	0	120	0.00	0.00	-	-	◆◆◆
Our Lady of Fatima Hospital	0	184	0.00	0.00	-	-	◆◆◆
Rhode Island Hospital	0	2,509	0.00	0.00	-	-	◆◆◆
Roger Williams Medical Center	0	381	0.00	0.00	-	-	◆◆◆
South County Hospital	0	105	0.00	0.00	-	-	◆◆◆
Westerly Hospital	0	232	0.00	0.00	-	-	◆◆◆
Women & Infants Hospital	0	988	0.00	0.00	-	-	◆◆◆

[1] Burton DC, Edwards JR, Horan TC, Jernigan JA, Fridkin SK. Methicillin-resistant staphylococcus aureus central line-associated bloodstream infections in US intensive care units, 1997-2007. *JAMA.* 2009; 301(7):727-736.

*n/a - national ICU benchmark unavailable