OBJECTIVES

1. Describe what the Standardized Infection Ratio (SIR) is and how it is calculated.
2. Explain the relationship between healthcare associated infection (HAI) rates and the SIR.
3. Describe advantages/disadvantages of the SIR.
4. Explain how to interpret a report utilizing the SIR.
5. List SIR resources.
EVERYTHING YOU NEED TO KNOW ABOUT THE SIR
WHAT IS A STANDARDIZED INFECTION RATIO?

• The standardized infection ratio (SIR) is a summary measure used to track healthcare-associated infections (HAIs) at a national, state, or local level over time.
THE SIR CALCULATION

• In HAI data analysis, the SIR compares the actual number of HAIs reported (observed) with the baseline U.S. experience (expected/predicted), adjusting for several risk factors that have been found to be significantly associated with differences in infection incidence.

\[
\text{SIR} = \frac{\text{number of observed (O)}}{\text{number of expected (E)}}
\]

– NHSN aggregate data are used as the standard population and considered the baseline U.S. experience.
– NHSN baseline data used in a SIR are used to calculate the expected or predicted number of HAIs adjusting for the identified risk factors.
– SIR will only be calculated for your hospital if the expected number of HAIs is >1 (because can’t have less than a whole person infected!)
TERMINOLOGY

• SIR is not a rate
• It is a ratio, comparing 1 number to another
• You may refer to it as a value
• Try to use term “predicted” rather than “expected”, although you will still see the terms used interchangeably
WHAT IS THE "BASELINE U.S. EXPERIENCE"?

• 2006-2008 NHSN aggregate data are used as the standard population and considered to be the baseline U.S. experience for the SIR calculations.

• NHSN baseline data used in an SIR are used to calculate the predicted number of HAIs adjusting for the identified risk factors.
HOW ARE EXPECTED CLABSI & CAUTI CALCULATED?

Risk adjusted for patient mix by:

✓ type of patient care location
✓ hospital affiliation with a medical school
✓ bed size of the patient care location
HOW ARE EXPECTED SSI CALCULATED?

• Uses a logistic regression model from the standard population during the period 2006-2008
• Assigns a probability of infection to each procedure
• NHSN performs these calculations

Example:

- For abdominal hysterectomies, HAI risk factors include:
  ✓ Patient age
  ✓ American Society of Anesthesiologists (ASA) score
  ✓ Procedure duration
  ✓ Endoscope
  ✓ Number of beds
BENEFITS OF USING THE SIR

Single metric
- One number that can be used to make comparisons
- Relatively easy to assess performance since SIR is always compared to 1.0

Scalable
- National, regional, facility-wide, location-specific, by surgeon for SSIs, etc.
- Can combine the SIR values at any level of aggregation
- Can perform more detailed comparisons within any individual risk group

Risk-adjusted
- Adjusts for factors known to be associated with differences in HAI rates
- Risk-adjustment differs between types of HAIs and types of surgical procedures
POTENTIAL PITFALLS OF USING THE SIR

- Risk adjustment still suboptimal – especially with CLABSI and CAUTI data
- Not designed to compare one institution to another only to compare with national average
- Potential problems with ranking, etc
- Overall rates can cloud the big picture
HOW DO YOU INTERPRET A SIR?

• An SIR > 1 indicates that more HAI were observed than expected
• An SIR < 1 indicates that fewer HAI were observed than expected
• An SIR = 1 indicates that same number of HAI were observed as were expected

However, the SIR alone does not imply statistical significance.

- The SIR is only a point estimate and needs additional information to indicate if the finding is significant and not likely due to chance (that is, statistically significantly different from 1).
HOW DO YOU INTERPRET A SIR?

• The difference **above** 1.0 is the percentage by which the infection rate exceeds that of the standard population.

• The difference **below** 1.0 is the percentage by which the infection rate is lower than that experienced by the standard population.
HOW DO YOU INTERPRET A SIR?

- An SIR of 1.5 is 50% higher than expected
- An SIR of 0.6 is 40% lower than expected
- An SIR of 2.5 is 150% higher than expected
- An SIR of 0.97 is 3% lower than expected
STATISTICAL SIGNIFICANCE OF THE SIR: (P-VALUE AND 95% CONFIDENCE INTERVAL)

• The SIR is only a point estimate and needs additional information to indicate if it is statistically significantly different from 1.

• A 95% confidence interval (CI) and a p-value are calculated by NHSN for each SIR and determines statistical significance.
  – A 95% CI assesses the magnitude and stability of a SIR.
  – Therefore, a 95% CI is the range of estimated SIR values that have a 95% probability of including the true SIR for the population.
P VALUE

- P value is a probability that your results are statistically significant

- If the p-value is less than .05, then your rates are different than the national average

- P value < 0.05 shows statistical significance
  - p value of 0.02 is statistically significant
  - p value of 0.14 is not statistically significant
WHAT IS A CONFIDENCE INTERVAL?

• Estimated range of values which is likely to include an unknown parameter estimate (e.g. SIR)
• There is always variability in data so the confidence interval tries to capture this variability
• You can think of a confidence interval as a margin of error (e.g. political polls)
• The range of the interval is dependent on the number of observations
  – More observations = narrower interval
  – Fewer observations = wider interval
INTERPRETING A 95% CONFIDENCE INTERVAL

• In relation to SIRs, a confidence interval that spans 1 (e.g. 0.5, 1.5) is **not** statistically significant.

• A confidence interval that does not span 1 (e.g. 0.2, 0.8) **is** statistically significant.

• If the confidence level does not overlap 1, then your rates are different than the national average.
IS MY SIR SIGNIFICANTLY HIGHER OR LOWER THAN THE NHSN REPORTED SIR?

<table>
<thead>
<tr>
<th>Org ID</th>
<th>Summary Yr</th>
<th>Infection Count</th>
<th>Number Expected</th>
<th>Central Line Days</th>
<th>SIR</th>
<th>SIR p-value</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>10018</td>
<td>2009</td>
<td>9</td>
<td>7.191</td>
<td>3786</td>
<td>1.25</td>
<td>0.2962</td>
<td>0.653, 2.184</td>
</tr>
</tbody>
</table>

1. If the p-value is above 0.05, the observed difference is not statistically significant.

2. If the 95% Confidence interval overlaps 1.0, the observed difference is not statistically significant.

*If the p-value is not significant, the confidence interval won’t be significant either and vice versa*
Let’s take a closer look . . .
### HOW DO I INTERPRET THE SIR?

<table>
<thead>
<tr>
<th>Facility name</th>
<th>CLABSI (#)</th>
<th>Central line days (#)</th>
<th>Predicted CLABSIs (#)</th>
<th>SIR</th>
<th>SIR p-value</th>
<th>SIR 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital X</td>
<td>8</td>
<td>1,976</td>
<td>4.15</td>
<td>1.93</td>
<td>0.06</td>
<td>0.83, 3.80</td>
</tr>
</tbody>
</table>

- During this timeframe there were 8 CLABSIs identified and 1,976 central line days observed in Hospital X’s intensive care units.
- Based on the NHSN 2006-2008 baseline data and the composition of ICU locations in Hospital X, 4.15 CLABSIs were predicted.
- This results in an SIR of 1.93 (O/P= 8/4.15), signifying that during this time period, Hospital X identified 93% more CLABSIs than predicted.
- The p-value (0.06) and 95% confidence interval (CI) (0.83, 3.80) indicate that the number of observed CLABSIs is not statistically significantly higher than the number of predicted CLABSIs. (Reminder: If the p-value is not less than 0.05 and the 95% CI does crossing 1, the SIR is not statistically significantly different than 1.)
SIR INTERPRETATION ACTION EXAMPLE

1. 9 CLABSI; 7.2 expected; SIR 1.25 (25% higher than predicted from national data).

2. Difference is not significantly different.

3. SIR may be anywhere from 35% below to more than double the predicted value (0.65 – 2.2)

4. Action: Continue to monitor CLABSI. The goal is zero.
1. 74 CLABSIs; 26.6 predicted; SIR is 2.78 or nearly 3 times higher than would be predicted from national data.

2. Difference is significantly different than national hospital data.

3. Need to implement CLABSI action plan. Look at possible root causes.
*Clostridium difficile (C. diff.)* Laboratory-identified Events (Intestinal infections)

Why is this important?

Hide Graph

Lower Numbers are Better

Hover over the caret to view interval estimate range

ST JOSEPH’S HOSPITAL

HEALTHCARE ST JOHN’S HOSPITAL

Minnesota

U.S. National Benchmark = 1
Catheter-Associated Urinary Tract Infection (CAUTI)
State Comparison
Standardized Infection Ratio (SIR)

http://www.stratishealth.org/documents/HospCkInJun14_R.pdf
### State Reporting

#### New Jersey

<table>
<thead>
<tr>
<th>Hospital Name</th>
<th>Number of CLABSI (E)</th>
<th>SIR</th>
<th>National Comparison</th>
<th>Number of Central Line-days</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atlanticare Regional Medical Center  City</td>
<td>6.61</td>
<td>0.86</td>
<td>Similar to Expected</td>
<td>2,474</td>
<td>(0.98, 3.90)</td>
</tr>
<tr>
<td>Atlanticare Regional Medical Center  Mainland</td>
<td>4.26</td>
<td>0.90</td>
<td>Similar to Expected</td>
<td>5,014</td>
<td>(0.90, 6.07)</td>
</tr>
<tr>
<td>Bayshore Community Hospital</td>
<td>3.08</td>
<td>0.78</td>
<td>Similar to Expected</td>
<td>2,324</td>
<td>(0.93, 5.80)</td>
</tr>
<tr>
<td>Bergen Regional Medical Center</td>
<td>2.76</td>
<td>0.66</td>
<td>Similar to Expected</td>
<td>1,616</td>
<td>(0.90, 3.90)</td>
</tr>
<tr>
<td>Cape Regional Medical Center</td>
<td>3.18</td>
<td>0.59</td>
<td>Similar to Expected</td>
<td>2,692</td>
<td>(0.52, 3.77)</td>
</tr>
<tr>
<td>Capital Health System at Field</td>
<td>3.86</td>
<td>0.59</td>
<td>Similar to Expected</td>
<td>3,155</td>
<td>(0.65, 2.72)</td>
</tr>
<tr>
<td>Capital Health System at Mercer</td>
<td>3.18</td>
<td>0.59</td>
<td>Similar to Expected</td>
<td>3,123</td>
<td>(0.68, 2.72)</td>
</tr>
<tr>
<td>Cherokee Memorial Hospital</td>
<td>3.86</td>
<td>0.59</td>
<td>Similar to Expected</td>
<td>3,155</td>
<td>(0.65, 2.72)</td>
</tr>
<tr>
<td>Christ Hospital</td>
<td>3.18</td>
<td>0.59</td>
<td>Similar to Expected</td>
<td>3,123</td>
<td>(0.68, 2.72)</td>
</tr>
<tr>
<td>Cosa Maas Medical Center</td>
<td>3.86</td>
<td>0.59</td>
<td>Similar to Expected</td>
<td>3,155</td>
<td>(0.65, 2.72)</td>
</tr>
</tbody>
</table>

#### Maryland

<table>
<thead>
<tr>
<th>Hospital Name</th>
<th>Number of Infections</th>
<th>Number of Central Line Days (CLD)</th>
<th>Number of Infections Predicted by National Experience</th>
<th>Ratio of Actual to Predicted Infections (SIR)</th>
<th>Hospital Performance What is this?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Howard County General Hospital</td>
<td>0</td>
<td>2162</td>
<td>3.24</td>
<td>0.00</td>
<td>▲</td>
</tr>
<tr>
<td>Carroll Hospital Center</td>
<td>0</td>
<td>1265</td>
<td>1.90</td>
<td>0.00</td>
<td>▲</td>
</tr>
<tr>
<td>Calvert Memorial Hospital</td>
<td>0</td>
<td>445</td>
<td>0.67</td>
<td>0.00</td>
<td>▲</td>
</tr>
<tr>
<td>Fort Washington Hospital</td>
<td>0</td>
<td>335</td>
<td>0.50</td>
<td>0.00</td>
<td>▲</td>
</tr>
<tr>
<td>Chester River Hospital Center</td>
<td>0</td>
<td>281</td>
<td>0.42</td>
<td>0.00</td>
<td>▲</td>
</tr>
<tr>
<td>Johns Hopkins Bayview Medical Center</td>
<td>30</td>
<td>5624</td>
<td>17.58</td>
<td>1.71</td>
<td>◆</td>
</tr>
<tr>
<td>University Of Maryland Medical Center</td>
<td>119</td>
<td>26653</td>
<td>68.50</td>
<td>1.74</td>
<td>◆</td>
</tr>
<tr>
<td>Prince George’s Hospital Center</td>
<td>21</td>
<td>5501</td>
<td>11.42</td>
<td>1.84</td>
<td>◆</td>
</tr>
</tbody>
</table>
MINNESOTA

HEALTHCARE ASSOCIATED INFECTIONS PROGRESS

HEALTHCARE-ASSOCIATED INFECTION (HAI) DATA gives healthcare facilities and public health agencies knowledge to design, implement, and evaluate HAI prevention efforts.

WHAT IS THE STANDARDIZED INFECTION RATIO?

The standardized infection ratio (SIR) is a statistic used to track healthcare-associated infection prevention progress over time. The SIR for a facility or state is adjusted to account for factors that might cause infection rates to be higher or lower, such as hospital size, teaching status, the type of patients a hospital serves, and surgery and patient characteristics.

In some cases, states that work to validate, or double check, HAI data may have higher SIRs since they are actively looking for infections.

WHAT DOES THE STANDARDIZED INFECTION RATIO MEAN?

IF THE STATE SIR IS:

LESS THAN 1

There were fewer infections reported in the state in 2012 compared to the national baseline data, indicating progress has been made in preventing infections.

1

There were about the same number of infections reported in the state in 2012 compared to the national baseline data, indicating no progress has been made.

MORE THAN 1

There were more infections reported in the state in 2012 compared to the national baseline data, indicating there has been an increase in infections.

WHAT IS MINNESOTA DOING TO PREVENT HEALTHCARE-ASSOCIATED INFECTIONS?

Minnesota is one of 10 state health departments participating in CDC's Emerging Infections Program, which allows for extra surveillance and research of HAI's. Minnesota has a state mandate to publicly report at least one HAI to NHSN.

Minnesota has several prevention efforts (known as prevention collaboratives) to reduce specific HAIs, including:

- Central line-associated bloodstream infections
- Catheter-associated urinary tract infections
- Surgical site infections
- *Clostridium difficile*, deadly diarrheal infections

Minnesota implemented prevention efforts in carbapenem-resistant Enterobacteriaceae infections, and to improve antibiotic stewardship.

NUMBER OF MINNESOTA HOSPITALS THAT REPORTED DATA TO CDC'S NHSN IN 2012

<table>
<thead>
<tr>
<th>Infection</th>
<th>Number of Hospitals</th>
<th>State SIR</th>
<th>National SIR</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLABSI</td>
<td>49 hospitals</td>
<td>0.48</td>
<td>0.56</td>
</tr>
<tr>
<td>CAUTI</td>
<td>51 hospitals</td>
<td>1.52</td>
<td>1.03</td>
</tr>
<tr>
<td>SSI, Colon Surgery</td>
<td>49 hospitals</td>
<td>0.67</td>
<td>0.80</td>
</tr>
<tr>
<td>SSI, Abdominal Hysterectomy</td>
<td>50 hospitals</td>
<td>1.08</td>
<td>0.89</td>
</tr>
</tbody>
</table>

*Not all hospitals are required to report these infections; some hospitals do not use central lines or urinary catheters, or do not perform colon or abdominal hysterectomy surgeries.

This report is based on 2012 data, published March 2014

Learn how your hospital is preventing infections: www.medicare.gov/hospitalcompare
For more information:

- Preventing HAIs: www.cdc.gov/hai
- NHSN: www.cdc.gov/nhsn
- HAIs in Minnesota: www.health.state.mn.us/divs/idepc/dtopics/hai/index.html

# US HHS Goals and Proposed Targets 2020

## National Action Plan to Prevent Healthcare-Associated Infections

<table>
<thead>
<tr>
<th>Measure</th>
<th>Data Source</th>
<th>Baseline Years</th>
<th>Baseline Data</th>
<th>2013 Target</th>
<th>Progress</th>
<th>Proposed Target for 2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduce central-line associated bloodstream infections (CLABSI) in ICU and ward-located patients</td>
<td>CDC/NHSN</td>
<td>2006-2008</td>
<td>1.0 SIR</td>
<td>50% reduction or .50 SIR</td>
<td>44% reduction or .56 SIR (2012)</td>
<td>50% reduction from 2015 baseline¹</td>
</tr>
<tr>
<td>Reduce catheter-associated urinary tract infections (CAUTI) in ICU and ward-located patients</td>
<td>CDC/NHSN</td>
<td>2009</td>
<td>1.0 SIR</td>
<td>25% reduction or .75 SIR</td>
<td>2% increase or 1.02 SIR (2012)</td>
<td>25% reduction from 2015 baseline²</td>
</tr>
<tr>
<td>Reduce the incidence of invasive healthcare-associated methicillin-resistant Staphylococcus aureus (MRSA) infections</td>
<td>CDC/EIP/ABC</td>
<td>2007-2008</td>
<td>27.08 infections per 100,000 persons</td>
<td>50% reduction or 13.5 infections per 100,000 persons</td>
<td>31% overall reduction or 18.6 infections per 100,000 persons (2012)</td>
<td>75% reduction from 2007-2008 baseline³</td>
</tr>
<tr>
<td>Reduce facility-onset methicillin-resistant Staphylococcus aureus (MRSA) in facility-wide healthcare</td>
<td>CDC/NHSN</td>
<td>2010-2011</td>
<td>1.0 SIR</td>
<td>25% reduction or .75 SIR</td>
<td>3% reduction or .97 SIR (2013)</td>
<td>50% reduction from 2015 baseline</td>
</tr>
<tr>
<td>Reduce facility-onset Clostridium difficile infections in facility-wide healthcare</td>
<td>CDC/NHSN</td>
<td>2010-2011</td>
<td>1.0 SIR</td>
<td>30% reduction or .70 SIR</td>
<td>2% reduction or .98 SIR (2012)</td>
<td>30% reduction from 2015 baseline</td>
</tr>
<tr>
<td>Reduce the rate of Clostridium difficile hospitalizations</td>
<td>AHRO/HCUP</td>
<td>2008</td>
<td>11.6 hospitalizations with C. difficile per 1,000 discharges</td>
<td>30% reduction</td>
<td>13.6 hospitalizations per 1,000 discharges (2012 Projected)</td>
<td>30% reduction from 2015 baseline</td>
</tr>
<tr>
<td>Reduce Surgical Site Infection (SSI) admission and readmission</td>
<td>CDC/NHSN</td>
<td>2006-2008</td>
<td>1.0 SIR</td>
<td>25% reduction or .75 SIR</td>
<td>20% reduction or .80 SIR (2012)</td>
<td>30% reduction from 2015 baseline</td>
</tr>
</tbody>
</table>
HOW YOU CAN USE YOUR DATA
2010  SSI  Expected and Observed SSI

Expected
Observed

Number Of Infections

ALL PROCEDURES  CBGB  CBGC  COLO  HPRO  CBGB

Expected
Observed
DHMC Standardized Infection Ratio (SIR) compared to nation (SIR=1)

Note; should include the time frame for the data being displayed
The TDH HAI Prevention Calculator is provided by the TDH HAI Program to assist healthcare facilities in prioritizing HAI prevention activities. To use:

1. Determine a time period and HAI of interest (e.g., quarter, calendar year, etc.)
2. Select HAI from dropdown menu, or choose "custom target" and enter a target SIR
3. Log into CDC’s National Healthcare Safety Network (NHSN) and obtain:
   - Number of infections for time period of interest
   - Number of predicted infections or Standardized Infection Ratio (SIR) for time period of interest

   NOTE: For detailed instructions on obtaining your data, please see the following:
   - CLABSI and CAUTI
   - SSI (COLO, HYST, CABG)
   - LabID Events (MRSA, CDI)

4. Enter data into form
5. Click "compute" to determine how many HAIs would have needed to have been prevented in order for the target SIR to be reached in the time period of interest

HAI: CLABSI  Target SIR: 0.5
Number of Infections: 5
Number Predicted: 1.2
-OR- Current SIR: 1.2
Compute

Need to prevent 3 infections to reach target SIR of 0.5

NOTE: This calculator is a tool provided for reference purposes only. Data are not stored or shared with anyone, including the Tennessee Department of Health. The accuracy of the results produced by this calculator is dependent upon the quality of the input data.

HTTP://HEALTH.TN.GOV/CEDS/HAI/CALCULATOR.SHTML
Your Guide to the Standardized Infection Ratio (SIR)

With the new version of NHSN (version 6.3), new output options are available that will permit the calculation of standardized infection ratios (SIRs) for central line-associated bloodstream infection (CLABSI) and surgical site infection (SSI) rate. Each of these measures falls in line with the State-Specific Healthcare-associated Infections Summary Data Report, published by CDC. For SSIs, we will make the transition from SSI rates to the SSI SIR with this new version of the NHSN tool. The SSI SIR is the result of logistic regression modeling that considered all procedure-level data collected by NHSN facilities in order to provide better risk adjustment than afforded by the risk index. In addition, the SSI SIR provided to facilities within NHSN will be more precise and be calculated only if appropriate for comparisons. As we make this transition, we understand that you will have numerous questions, including how to operationalize this new statistic in your facility to drive prevention practices. This guide is intended to answer some of these questions.

Standardized Infection Ratio (SIR)

What is a standardized infection ratio (SIR)?

The standardized infection ratio (SIR) is a summary measure used to track HAIs at a national, state, or local level over time. The SIR adjusts for patients of varying risk within each facility. The method of calculating an SIR is similar to the method used to calculate the Standardized Mortality Ratio (SMR), a summary statistic widely used in public health to analyze mortality data. In HAI data analysis, the SIR compares the actual number of HAIs reported with the baseline U.S. experience (i.e., NHSN aggregate data are used as the standard population), adjusting for several risk factors that have been found to be significantly associated with differences in infection incidence. In other words, an SIR greater than 1.0 indicates that more HAIs were observed than predicted, accounting for differences in the types of patients followed; conversely, an SIR less than 1.0 indicates that fewer HAIs were observed than predicted.

Important Take Away Points

- The new SSI SIRs provide improved risk adjustment and replace risk-stratified SSI rates.
- The SIRs use 2006-2008 as the baseline period, and therefore, SIRs are calculated for 2009 and forward.
- To allow for more precise comparisons, SIRs are calculated only if the number of expected HAIs (numExp) is ≥ 11.

Inside this issue:
- Central Line-associated Bloodstream Infection (CLABSI) SIRs
- Surgical Site Infection (SSI) SIRs
- Samples of SIR Output and List of SIR Risk Factors

Output/Report Option Types

Each of these guides will describe and provide an example of how to create, modify, and interpret the data displayed in the output/report.

- Line List [PDF - 192 KB]
- Line List - Custom Field Variable Names [PDF - 192 KB]
- Frequency Table [PDF - 331 KB]
- Bar Chart [PDF - 160 KB]
- Pie Chart [PDF - 162 KB]
- Rate Table [PDF - 301 KB]
- Run Chart [PDF - 182 KB]
- SIR Table: Device-associated [PDF - 184 KB]
- SIR Table: Surgical Site Infections [PDF - 170 KB]
- SIR Table: MRSA/CDI LabID Events [PDF - 210 KB]

This is my thank you dance!
NO SIR?

SIR will only be calculated if the expected number of HAIs is >1
Only for procedures with baseline data
Smaller facility = lower volume
Lack of baseline data for LTC, CAH
Does this mean you should never have an infection?
NO SIR!

Strive for zero

If “SIR” was 0.5, then would expect 1 infection ~every other year
OTHER OPTIONS?

Calculate SIR over longer period of time
Look at rates and compare over time
Focus on the practical
LONGER TIME PERIODS

Can give enough data to calculate a SIR
Can dilute variability over time
  - Improvements or setbacks hidden
RATES

Not risk adjusted

One infection can cause huge jump in rate
PRACTICAL APPLICATION

If no SIR is calculated for this year, yet you’ve had 2 infections, what is that telling you?
GET TO WORK!

Line listing
Root cause analysis
PIT crew
COMPARE YOUR RATES

Compare facility data to national data
Compare 2 time periods in same facility
CAUTI rate decreased over the two periods
Number of device days almost the same
Utilization rate is unknown
Compare Two Incidence Density Rates

When comparing two incidence density rates (i.e. person-time), the hypothesis is that the rates are not different from each other. To perform a statistical test and calculate a p-value, enter the number of events as the numerator, the number of person-time units (i.e. exposure) as the denominator, and choose the multiplier you wish for the rate calculation. Press calculate. (See examples below)

Data Source #1 | Data Source #2
---|---
Group Labels: | 
Numerator (Number of events): | 
Denominator (Number of person-time units): | 
Multiplier: | 10 |

Title: 

[Submit] [Back]
Compare Two Incidence Density Rates

When comparing two incidence density rates (i.e. person-time), the hypothesis is that the rates are not different from each other. To perform a statistical test and calculate a p-value, enter the number of events as the numerator, the number of person-time units (i.e. exposure) as the denominator, and choose the multiplier you wish for the rate calculation. Press calculate. (See examples below)

<table>
<thead>
<tr>
<th>Group Labels</th>
<th>Data Source #1</th>
<th>Data Source #2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Numerator(Number of events)</td>
<td>2013H1</td>
<td>2013H2</td>
</tr>
<tr>
<td>Denominator(Number of person-time units)</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>678</td>
<td>685</td>
<td></td>
</tr>
<tr>
<td>Multiplier:</td>
<td>1000</td>
<td></td>
</tr>
</tbody>
</table>

Title: CAUTI comparison
IS CHANGE SIGNIFICANT?

Use statistics calculator to compare the Incidence Density Rates
IDR p-value = 0.4459
Not a significant difference
Practical difference
# Compare Two Proportions

When comparing two proportions (e.g. SSI Rates, Device Utilization ratios etc.), the hypothesis is that the rates are not different from each other. To perform a statistical test and calculate a p-value, enter the number of events as the numerator and the number of trials as the denominator (e.g. procedures, patient days) for two data sources. Press calculate.

<table>
<thead>
<tr>
<th>Group Labels</th>
<th>Data Source #1</th>
<th>Data Source #2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q4.13 SSI</td>
<td></td>
<td>Q1.14 SSI</td>
</tr>
<tr>
<td>Numerator (Number of Events):</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Denominator (Number of Trials):</td>
<td>590</td>
<td>480</td>
</tr>
</tbody>
</table>

Title: SSI Rate Comparison
National Healthcare Safety Network
SSI Rate Comparison
As of: August 19, 2014 at 10:08 AM

<table>
<thead>
<tr>
<th></th>
<th>Q4.13 SSI</th>
<th>Q1.14 SSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Numerator</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Denominator</td>
<td>590</td>
<td>480</td>
</tr>
<tr>
<td>Proportion</td>
<td>0.678%</td>
<td>0.417%</td>
</tr>
<tr>
<td>Proportion p-value</td>
<td>0.6108</td>
<td></td>
</tr>
</tbody>
</table>

P > .05 so rates are not statistically different
Compare Two Proportions

When comparing two proportions (e.g. SSI Rates, Device Utilization ratios etc.), the hypothesis is that the rates are not different from each other. To perform a statistical test and calculate a p-value, enter the number of events as the numerator and the number of trials as the denominator (e.g. procedures, patient days) for two data sources. Press calculate.

<table>
<thead>
<tr>
<th>Data Source #1</th>
<th>Data Source #2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group Labels:</td>
<td></td>
</tr>
<tr>
<td>2012 SSI rate</td>
<td>2013 SSI rate</td>
</tr>
<tr>
<td>Numerator (Number of Events):</td>
<td>17</td>
</tr>
<tr>
<td>Denominator (Number of Trials):</td>
<td>2249</td>
</tr>
</tbody>
</table>

Title: SSI Rate Comparison 2012-2013
# National Healthcare Safety Network

**SSI Rate Comparison 2012-2013**

As of: August 19, 2014 at 10:14 AM

<table>
<thead>
<tr>
<th></th>
<th>2012 SSI rate</th>
<th>2013 SSI rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Numerator</td>
<td>17</td>
<td>34</td>
</tr>
<tr>
<td>Denominator</td>
<td>2249</td>
<td>2265</td>
</tr>
<tr>
<td>Proportion</td>
<td>0.756%</td>
<td>1.501%</td>
</tr>
<tr>
<td>Proportion p-value</td>
<td>0.0194</td>
<td></td>
</tr>
</tbody>
</table>

P< .05 so difference is statistically significant
INTERNAL MEASURES

Calculate overall rate of SSI for all procedures
Rate is not meaningful as a comparison
Increase from baseline = action
Still look at individual surgeries
MHA HEN CAH CAUTI RATES
NO SIR? NO PROBLEM!

Tracking data over time can help you
- Notice trends
- Find problems
- Calculate statistical significance
- Implement changes
- Celebrate successes!
MDH and the Centers for Disease Control and Prevention (CDC) entered into a data use agreement to establish formal data access and data use relationship between CDC/NHSN and MDH

- Access for event dates ≥ January 1, 2014

Agreement offered by CDC for health departments with no HAI reporting mandate

Data are kept private (patients and facilities) via Federal Privacy Act

Data cannot be used for public reporting of institution-specific data, or for regulatory or punitive actions (e.g., fine or licensure)

Data not shared with regulators or surveyors
WHY DOES MDH HAVE ACCESS TO NHSN DATA?

Purpose of MDH access: HAI surveillance, prevention, and evaluation of interventions

Data are essential for:
- Measuring HAI burden in the state
- Monitoring trends over time
- Guiding planning, implementation, and evaluation of control programs
- Prioritizing resource allocation
WHAT WILL MDH DO WITH THE DATA?

<table>
<thead>
<tr>
<th>CMS Use of NHSN Data</th>
<th>MDH Use of NHSN Data</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hospital</strong></td>
<td><strong>State</strong></td>
</tr>
<tr>
<td></td>
<td><strong>CLABSI SIR</strong></td>
</tr>
<tr>
<td>Hospital</td>
<td>State</td>
</tr>
<tr>
<td></td>
<td>CLABSI SIR</td>
</tr>
<tr>
<td>![Hospital Icon]</td>
<td>![State Icon]</td>
</tr>
<tr>
<td>1.0</td>
<td>1.0</td>
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<tr>
<td>0.8</td>
<td></td>
</tr>
<tr>
<td>1.1</td>
<td></td>
</tr>
<tr>
<td>1.3</td>
<td></td>
</tr>
</tbody>
</table>
WHAT WILL MDH DO WITH THE DATA? (CONT.)

Use epidemiologic and surveillance expertise to summarize and describe HAI trends in MN

- Regionally
- By type of hospital/facility
- By unit
- By patient population
- Other ideas? (We’re open to suggestions!)

- Work with HAI Prevention partners (CHAIN, MHA, Stratis, APIC-MN, etc) to prioritize and guide prevention efforts
  - Leverage expertise and resources for prevention efforts
  - Avoid redundancies

Data validation
  On our wish list...pending available funding
Infection Control and Antimicrobial Resistance Unit
Minnesota Department of Health
www.health.state.mn.us/divs/idepc/dtopics/antibioticresistance