



Patient Safety Component

Statistics Calculator: Compare Single SIR to Nominal Value

NHSN Methods and Analytics Team

February 2020

Learning Objectives

- Explain the purpose of the statistics calculator
- Describe when you would use “Compare Single SIR to Nominal Value” option
- Use the “Compare Single SIR to Nominal Value” option to input data for comparison
- Interpret the comparison results

About the Statistics Calculator

- What is the statistics calculator?
 - A tool within the NHSN application that allows for additional comparisons of metrics
- Why should I use the calculator?
 - Conduct statistical tests to determine if there is a statistically significant difference between two measures

Compare Single SIR to Nominal Value

- Compare to a goal or a target SIR
 - Ex. Comparing your SIR to a goal SIR of 0.50
- Allows you to compare:
 - Standardized Infection Ratio (SIR)
 - Standardized Utilization Ratio (SUR)
 - Standardized Antimicrobial Administration Ratio (SAAR)

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Compare Single SIR to Nominal Value

- To compare a SIR to a nominal value, the NHSN statistics calculator uses a Mid-p exact test, based on the Poisson distribution
- The test will produce a two-tailed p-value, used to determine statistical evidence of a significant difference between the SIR and the nominal value

USING THE STATISTICS CALCULATOR

Case Study

Our hospital is interested to know if our catheter-associated urinary tract infection or **CAUTI SIR** in **2018**, is significantly different from our target **CAUTI SIR** of **0.70**. *A target SIR of 0.70 would indicate a 30% reduction compared to the baseline.*

- To compare, we need to know our number of observed infections and our number of predicted infections (also referred to as expected infections) for 2018.
 - Obtain these values from generating datasets and running reports
 - Additional information on dataset generation:
<https://www.youtube.com/watch?v=UBLJbrEO6SU>

Disclaimer: All data shown are from a fictitious facility with fictitious data.

Case study: Report Results

2018 CAUTI SIR:

orgID	ccn	summaryYr	infCount	numPred	numcathdays	SIR	SIR_pval	sir95ci
12345	999999	2018	9	9.385	1539	0.959	0.9429	0.468. 1.760

Target CAUTI SIR: 0.70

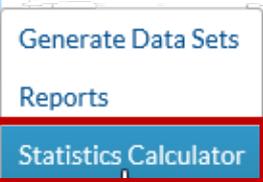
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Statistics Calculator

Access from the NHSN home page

- Locate the navigation bar on the left side of the screen in the NHSN application
- Select **Analysis**
- Select **Statistics Calculator**



Statistics Calculator

Statistics calculator menu



Statistics Calculator Quick Reference Guide:

<https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/StatsCalc.pdf>

Statistics Calculator

From the statistics calculator menu

- Select **Compare Single SIR to Nominal Value**



Comparing Two SIRs



Compare Single SIR to Nominal Value

When comparing a standardized infection ratio to a nominal value, the hypothesis is that the SIR is not different from that nominal value. To perform a hypothesis test and calculate a p-value, enter the number of observed events and the number of expected events. The SIR will be displayed automatically. Enter the nominal value. Press calculate.

Data Source

Group Label:

Number Observed:

Number Expected:

Standardized Infection Ratio:

Nominal Value:

Title:

Case Study: Inputting Values



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Title:

Case Study: Inputting Values



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Case Study: Inputting Values



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Data Source

Group Label:

Number Observed:

Number Expected:

Standardized Infection Ratio:

Nominal Value:

Title:

Case Study: Behind the Scenes...

After selecting the nominal value (e.g., HHS goal, median SIR, etc.), the calculator:

1. Multiplies the # predicted by the nominal value.
2. Calculates the new SIR (observed/new predicted)
3. Obtains p-value via comparison of original SIR to newly calculated SIR.

Example: 0.70 is the chosen nominal value

$$\frac{9}{(9.385 * 0.70)} = \frac{9}{6.5695} = 1.37$$

Case Study: Reading and Interpreting the Output

National Healthcare Safety Network 2018 CAUTI Comparison to Target SIR

As of: June 21, 2019 at 1:42 PM

CAUTI SIR Number Observed	CAUTI SIR Number Expected	SIR	p-value as compared to 0.70
9	9.385	0.959	0.3454

Case Study: Reading and Interpreting the Output

P-Value

- Less than 0.05, SIR is statistically significantly different from nominal value or target SIR
- Greater than 0.05, SIR is **not** statistically significantly different from nominal value

National Healthcare Safety Network 2018 CAUTI Comparison to Target SIR

As of: June 21, 2019 at 1:42 PM

CAUTI SIR Number Observed	CAUTI SIR Number Expected	SIR	p-value as compared to 0.70
9	9.385	0.959	0.3454

Interpretation: Our 2018 SIR is not significantly different from our target SIR of 0.70.

In Summary

- What is the Statistics Calculator and its purpose
 - When to use “Compare Single SIR to Nominal Value”
 - How to use “Compare Single SIR to Nominal Value”
 - How to interpret the results
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Additional Resources

- Statistics Calculator Quick Reference Guide: <https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/StatsCalc.pdf>
- Dataset Generation: <https://www.youtube.com/watch?v=UBLJbrEO6SU>
- Basic Statistics: https://www.youtube.com/watch?v=06Wr0_SBjwY
- SAS Macro: <https://www.cdc.gov/nhsn/sas/p-value-of-sir-compared-to-nominal.sas>

**For any questions or concerns,
contact the NHSN Helpdesk at nhsn@cdc.gov**



For more information please contact Centers for Disease Control and Prevention
1600 Clifton Road NE, Atlanta, GA 30333
Telephone, 1-800-CDC-INFO (232-4636)/TTY: 1-888-232-6348
E-mail: cdcinfo@cdc.gov Web: www.cdc.gov

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.