Analysis: Telling Your Hospital's Story with NHSN Data

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NHSN Annual Training

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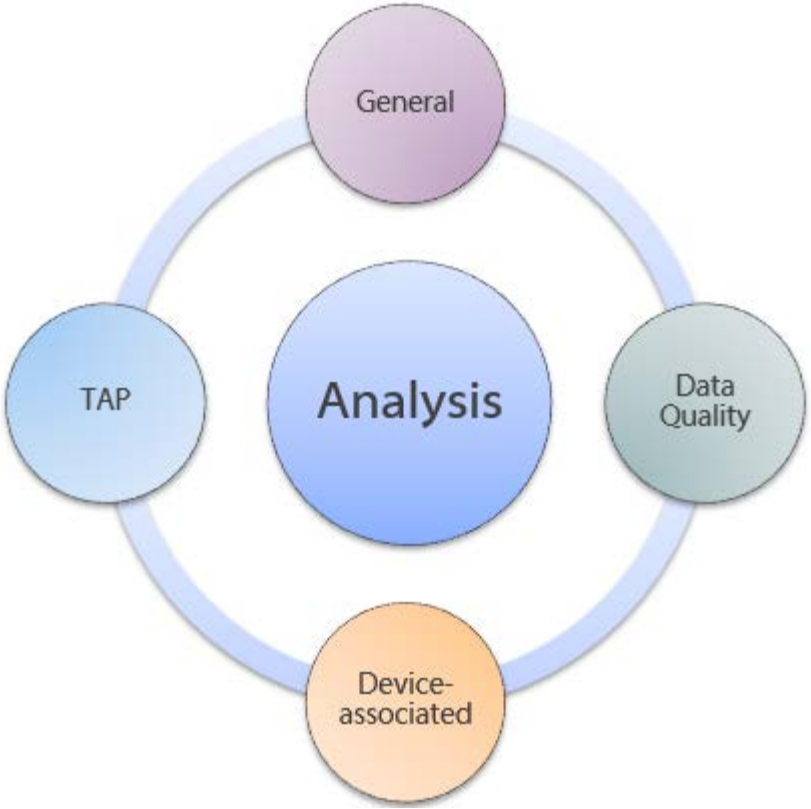
Objectives

- Identify various HAI reports that can complement the SIRs
- Interpret SIRs, rates, and summarized event-level data
- Use the NHSN Statistics Calculator to make conclusions regarding a hospital's HAI experience and comparison to goals and/or itself over time

What have we covered so far?




95CI
different
better
DUR
benchmark
worse
model
significant
risk-adjustment
SIR
SUR
percentile
rates
p-value

Building a story

- All of the following options can provide data that will complement the overall SIRs for each of the HAIs we're measuring
  - Location-specific SIRs and rates
  - Procedure- and surgeon-specific SSI SIRs
  - Event- and pathogen-level information
  - Quarterly SIRs
  - Statistics Calculator
  - Location-specific SURs and device-utilization ratios
  - TAP Reports and TAP Dashboard

Event-level Data

Event-level Data: Time between Admission and Event

- Available for all HAIs and LabID events
  - For labID, use the variable **facToSpecDays** (*Days: Fac Admit to Spec Collect*)

Event Type=UTI

Facility Org ID	Event ID	Event Type	Location	Fac Admission Date	Event Date	Days: Admit to Event
10000	25985590	UTI	CMICU_N	03/02/2017	03/08/2017	7
10000	27752601	UTI	REHAB	03/16/2017	04/09/2017	25
10000	27752126	UTI	3 CENTRAL	03/29/2017	04/08/2017	11
10000	27750024	UTI	REHAB	04/01/2017	04/08/2017	8
10000	27750026	UTI	REHAB	04/01/2017	04/22/2017	22
10000	27752194	UTI	5 WEST	04/01/2017	04/15/2017	15
10000	27752208	UTI	3 CENTRAL	04/02/2017	04/22/2017	21
10000	27753015	UTI	REHAB	04/11/2017	04/27/2017	17
10000	27752262	UTI	3 CENTRAL	05/01/2017	05/06/2017	6
10000	27752377	UTI	3 CENTRAL	05/29/2017	06/03/2017	6
10000	27750747	UTI	REHAB	06/04/2017	06/17/2017	14
10000	27752460	UTI	3 CENTRAL	06/04/2017	06/17/2017	14
10000	27715204	UTI	ICUICU	06/12/2017	07/04/2017	23
10000	27752489	UTI	3 CENTRAL	06/20/2017	06/28/2017	9
10000	27777176	UTI	5WEST	06/21/2017	07/07/2017	17

TIP:
Calculate the average # days from admission to event by exporting the line list into .xlsx or .csv

Fictitious data used for illustrative purposes only.

Event-Level Data: SSI criteria and detection

Event ID	Procedure Code	Event Type	Specific Event	Event Date	Days: Procedure to Event	When Detected	Physician Diagnosis of this Event Type?	Pathogen Identified
17773116	HPRO	SSI	DIP	02/01/2015	21	RF		Y
22847103	HYST	SSI	IAB	04/09/2015	11	RO		Y
22847016	COLO	SSI	SIP	03/26/2015	17	RF		Y
22847105	COLO	SSI	DIP	06/27/2015	16	P		Y
22847079	HPRO	SSI	BONE	03/26/2015	25	RF		Y
20996240	HPRO	SSI	PJI	10/03/2015	2	RO		Y
21010090	HPRO	SSI	BONE	01/05/2016	5	A		Y
21321000	KPRO	SSI	BONE	01/05/2016	5	P		Y
21010092	HPRO	SSI	PJI	01/05/2016	5	RF		Y
23158005	COLO	SSI	DIP	01/28/2016	17	A		Y
23430132	COLO	SSI	DIP	03/25/2016	30	A		Y
				03/12/2016	5	P		N
				05/31/2016	21	RF		Y
				0/24/2016	2	RO		Y
				0/19/2016	1	A	Y	N
				2/11/2016	2	P		Y
				0/21/2016	3	A	Y	N
				2/01/2017	3	P		N
				1/10/2017	10	A		Y

Did you know??

The SSI Line List can include all of the event and procedure-level data for each SSI reported.

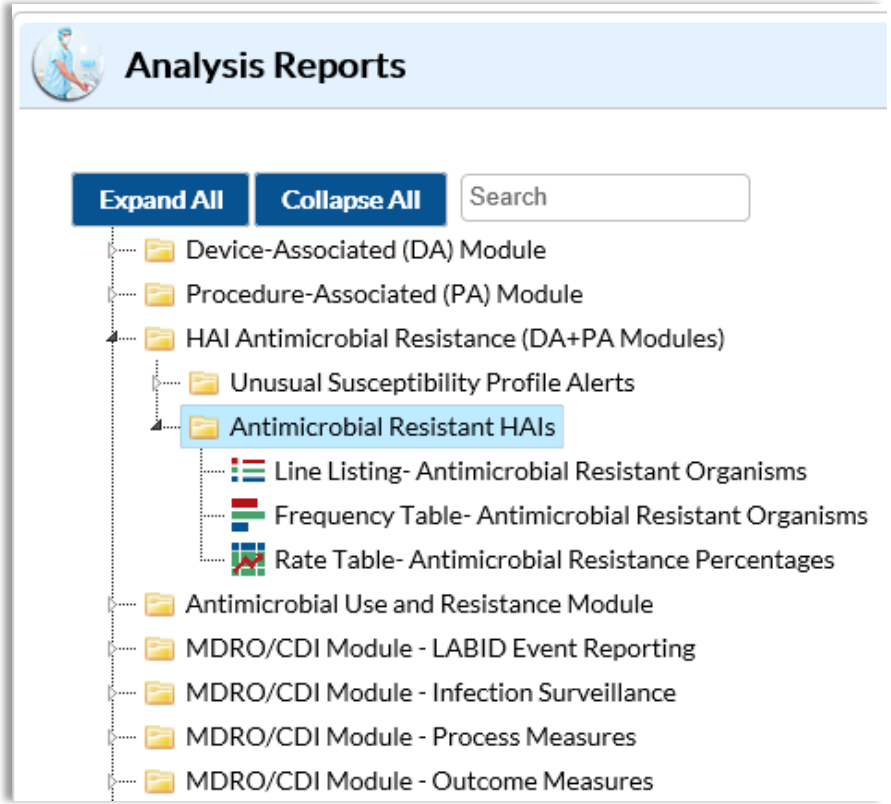
Event-level Data: Pathogens

- Consider a **Frequency Table** that will display pathogen counts for each HAI type
- This example is a frequency table in it's simplest form, exported as a .xls and modified
- Could run a frequency table of pathogens by location, location type, or specified time period (e.g., month, quarter)

Pathogen 1 Description	Frequency	Percent
Acinetobacter baumannii - ACBA	3	11.11%
Acholeplasma laidlawii - ACHOLAID	1	3.70%
Achromobacter - ACHSP	1	3.70%
Anaerobiospirillum succinoproducens - ANSU	1	3.70%
Bacillus patagoniensis - BPATA	1	3.70%
Enterobacter aerogenes - EA	2	7.41%
Enteropathogenic Escherichia coli - ECEP	1	3.70%
Enterococcus faecium - ENTFM	5	18.52%
Enterococcus faecalis - ENTFS	3	11.11%
Gram-negative bacillus - GNR	1	3.70%
Granulicatella adiacens - GRADJ	2	7.41%
Klebsiella pneumoniae - KP	4	14.81%
Raoultella ornithinolytica - RAOORN	1	3.70%
Staphylococcus chromogenes - STACHR	1	3.70%
TOTAL	27	100

Fictitious data used for illustrative purposes only.

Event-level Data: HAI Antimicrobial Resistance



- Reports for select phenotypes reported with DA and SSI events.
- Phenotype definitions are available at: https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/phenotype_definitions.pdf

Event-level Data: HAI Antimicrobial Resistance

National Healthcare Safety Network
Line Listing- Antimicrobial Resistant Organisms
MRSA_HAI - Methicillin-resistant Staphylococcus aureus

As of: June 9, 2017 at 1:05 PM
Date Range: All ANTIBIOGRAM_HAI

Event ID	Gender	Fac Admission Date	Event Date	Event Type	Location	Pathogen Description
44759	M	01/13/2014	01/15/2014	UTI	1098REMDRO	Staphylococcus aureus - SA
47495	F	02/02/2015	02/06/2015	BSI	REHABIRF-1	Staphylococcus aureus - SA
54954	F	01/01/2015	01/05/2015	BSI	ICU-A	Staphylococcus aureus - SA

Criteria used to define each phenotype can be found on the Patient Safety Analysis Resources webpage.
The data in this table include all applicable pathogens entered for an HAI, and are not limited to the first pathogen.
Sorted by orgID eventDate
Data contained in this report were last generated on June 7, 2017 at 10:46 AM.

National Healthcare Safety Network
Frequency Table- Antimicrobial Resistant Organisms
As of: June 9, 2017 at 1:00 PM
Date Range: All ANTIBIOGRAM_HAI

Frequency
Row Pct

Table of phenotype by eventType			
	eventType(Event Type)		
phenotype(Resistant Organism)	BSI	UTI	Total
CREall_HAI	8 72.73	3 27.27	11
MDR_Acine_HAI	2 40.00	3 60.00	5
MDR_PA_HAI	0 0.00	1 100.00	1
MRSA_HAI	2 66.67	1 33.33	3
VREfaecalis_HAI	2 100.00	0 0.00	2
carbNS_Acine_HAI	4 50.00	4 50.00	8
carbNS_PA_HAI	1 50.00	1 50.00	2
Total	19	13	32

Criteria used to define each phenotype can be found on the Patient Safety Analysis Resources webpage.
The data in this table include all applicable pathogens entered for an HAI, and are not limited to the first pathogen.
Data contained in this report were last generated on June 7, 2017 at 10:46 AM.

Fictitious data used for illustrative purposes only.

Event-level Data: Interpreting a Frequency Table

Frequency
Percent
Row Pct
Col Pct

Table of location by onset

location	onset			
	CO	CO-HCFA	HO	Total
ICU	11	0	7	18
	15.28	0.00	9.72	25.00
	61.11	0.00	38.89	
	35.48	0.00	18.42	
STEP	1	1	4	6
	1.39	1.39	5.56	1.39
	16.67	16.67	66.67	
	3.23	33.33	10.53	
ED	8	0	0	8
	11.11	0.00	0.00	11.11
	100.00	0.00	0.00	
	25.81	0.00	0.00	
WARD	11	2	27	40
	15.28	2.78	37.50	55.55
	27.50	5.00	67.50	
	35.48	66.67	71.05	
Total	31	3	38	72
	43.06	4.17	52.78	100.00

- Based on the data in this table, please provide the following:
  a. Percent of events in the Ward that are CO-HCFA: **5% (row %)**
  b. Percent of HO events that were identified in the ICU: **18.42% (col %)**
  c. Percent of all CDI events that are CO and identified in the WARD: **15.28% (total %)**
  d. Percent of all events that are HO: **52.78%**

Summarized Data

Summarized Data Can Include:

Rates	DURs	SIRs	CADs	SURs	SAARs
May use person-time as the denominator, along with a multiplier. Useful for internal comparisons.	Ratio of device days to patients days. No multiplier. Available by location only.	Risk-adjusted, scalable, summary measure. Ratio of observed to predicted infections. Uses a single baseline to measure progress.	Difference between observed and predicted infections. May use SIR goal as a multiplier to heighten prevention targets. First step in TAP strategy.	Risk-adjusted, scalable summary measure. Ratio of observed to predicted **device days**. Uses a single baseline to measure progress.	Risk-adjusted, scalable summary measure. Ratio of observed to predicted **days of antimicrobial therapy** . Uses a single baseline.

Making a Case for Device-associated (DA) Rates and DURs

- Can make monthly-level assessment of HAI incidence and exposure for each location
- Allows for internal trend assessment – where have we seen reductions? How has the device use changed over time? How is this location performing compared to itself over time?

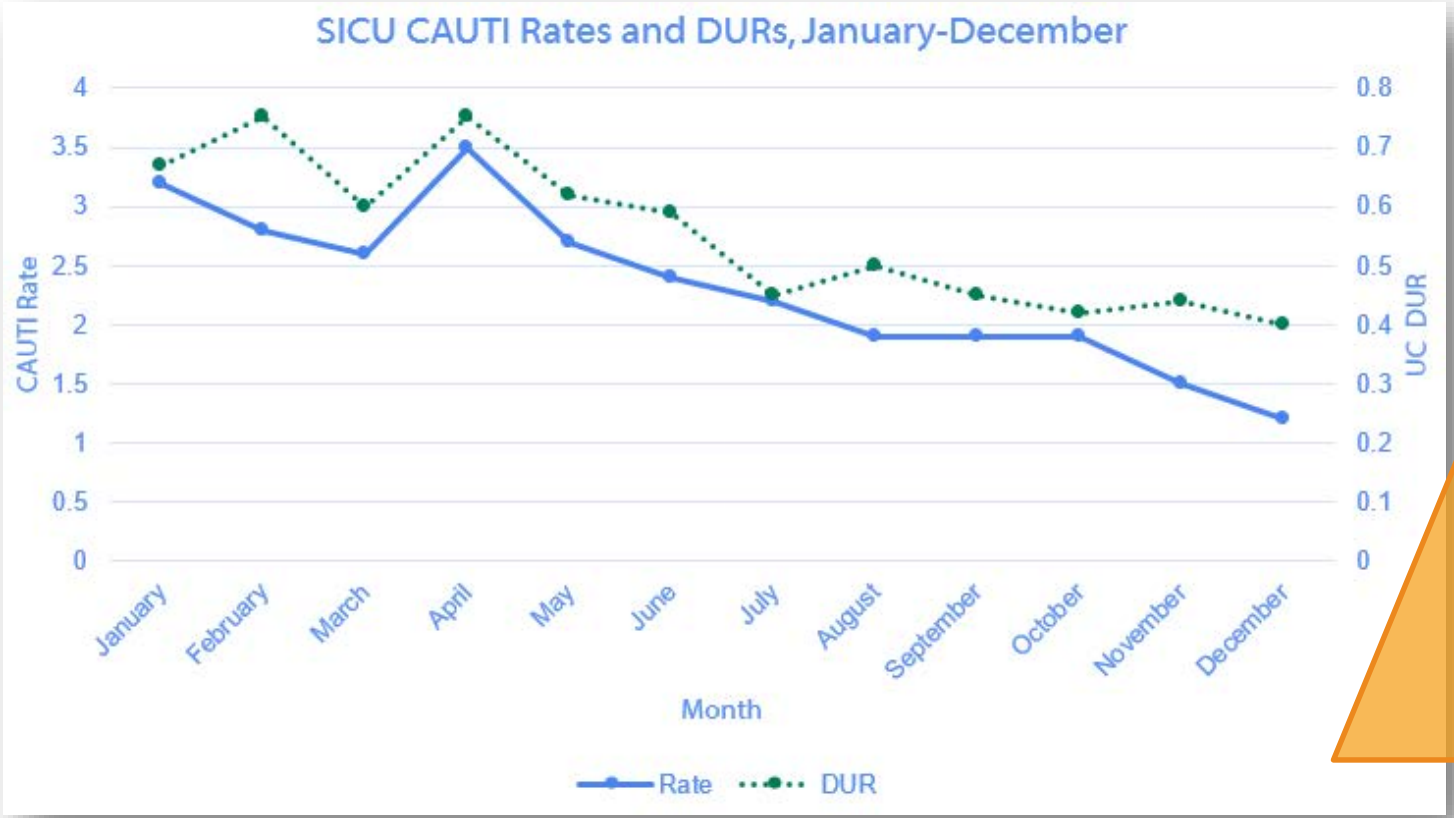
Quarter	Location	# CAUTI	# UC Days	Rate	DUR
1	Med ICU	5	1,360	3.67	0.60
2	Med ICU	4	1,287	3.11	0.51
3	Med ICU	4	1,462	2.74	0.61
4	Med ICU	3	1,201	2.50	0.48

Making a Case for DA Rates and DURs

- Can be calculated as long as the denominator is >0
  - BE CAREFUL! Lower device days or patient days = less precision

Location A	Location B
1 CLABSIs	10 CLABSIs
500 central line days	5,000 central line days
2.00 per 1,000 CL days	2.00 per 1,000 CL days

Making a Case for Internal Use of DA Rates and DURs



CAUTION!
This run chart does not represent statistical evidence of a trend.

$$\text{SIR} = \frac{\#\ observed\ HAIs}{\#\ predicted\ HAIs}$$

Standardized Infection Ratio (SIR)

- The SIR takes into account the national data at the baseline year, and your hospital's experience when calculating the # predicted
- The SIR is a comparison to a National standard – in our case, the NHSN baseline.
- The SIR is risk-adjusted, using the data reported to NHSN
- Your hospital is being compared to other hospitals with similar patient population, during the baseline year
  - P-value and 95% CI provided as statistical evidence with each SIR

Knowledge Check #1: True or False: Your facility's KPRO SIR of 0 (95% CI: . , 2.149) is statistically significant.

Knowledge Check #1 RATIONALE
True or False: Your facility's KPRO SIR of 0 (95% CI: . , 2.149) is statistically significant.

A. True

B. False

While the lower bound of the confidence interval is not calculated, it can be assumed to be zero. Therefore, the lower bound and upper bound are on opposite sides of the nominal value of 1.

Quarterly CLABSI SIRs, Rates, and DURs

Location	Quarter	Events	CL Days	Pt days	# Pred	SIR	Rate	DUR
Med ICU	1	4	2250	3840	3.002	1.332	1.78	0.59
Med ICU	2	5	2280	4780	3.057	1.635	2.19	0.48
Med ICU	3	2	2560	4500	3.419	0.585	0.78	0.57
Med ICU	4	1	2270	3300	3.029	0.330	0.44	0.69
Surg ICU	1	3	2660	5220	5.058	0.593	1.13	0.51
Surg ICU	2	3	2600	3480	4.893	0.613	1.15	0.75
Surg ICU	3	4	2480	4610	4.873	0.821	1.61	0.54
Surg ICU	4	2	2360	4400	4.315	0.463	0.85	0.54
HemOnc	1	0	2060	3750	2.538	0.000	0.00	0.55
HemOnc	2	2	2450	3650	3.018	0.663	0.82	0.67
HemOnc	3	1	2370	3540	2.920	0.342	0.42	0.67
HemOnc	4	1	1880	2920	2.316	0.432	0.53	0.64

Fictitious data used for illustrative purposes only.

Knowledge Check #2:

You are asked by the C-suite for a national rate to benchmark your hospital's DA rates, as has been provided in the past. Should you use pre-2015 NHSN reports to meet this request?

A. Yes, in order to fulfill the requirement by the C-suite
B. Yes, my hospital was not impacted by definition changes
C. No, the data are not comparable
D. No, the comparison is not in NHSN and can't be made elsewhere
E. It depends...does my job depend on it?

Knowledge Check #2 – Answer

C. No, the data are not comparable

- Various protocol and definition changes impact the applicability of previous National pooled means and SIR baselines to current data.

- **National 2015 Standardized Infection Ratios (SIRs) Calculated Using Historical Baselines**

  https://www.cdc.gov/hai/surveillance/data-reports/2015-SIR-report.html

Hospital DA Infections – Overall SIRs

HAI	# Events	# pt days	# device days	Rate	# pred	SIR	P-value	95% CI
CLABSI	28	47,990	28,220	0.96	42.438	0.660	0.0199	(0.447, 0.941)
CAUTI	36	47,990	21,450	1.678	34.158	1.054	0.7343	(0.749, 1.443)
Total VAE	16	17,320	2,230	7.175	15.061	1.062	0.7799	(0.629, 1.688)

What's wrong with this picture???

Fictitious data used for illustrative purposes only.

Hospital DA Infections – Overall SIRs

HAI	# Events	# pt days	# device days	[illegible]	# pred	SIR	P-value	95% CI
CLABSI	28	47,990	28,220	[illegible]	42.438	0.660	0.0199	(0.447, 0.941)
CAUTI	36	47,990	21,450	[illegible]	34.158	1.054	0.7343	(0.749, 1.443)
Total VAE	16	17,320	2,230	[illegible]	15.061	1.062	0.7799	(0.629, 1.688)

Crude, unadjusted device-associated rates do not provide an accurate picture of what may be happening in your hospital. Rates can differ depending on patient population and patient care areas.

Fictitious data used for illustrative purposes only.

A Tale of Two Sister Hospitals

- You are looking at an annual SIR for your hospital, alongside the sister hospital.
- Although the hospitals are similar, why are the SIRs and interpretations different?

Factor	Your Hospital	Your (Sister) Hospital
Bedsize	250	300
Medical SchoolAff	Nonteaching	Nonteaching
Number of ICU beds	40	50
CAUTISIR	1.37	1.42
Interpretation	Worsethan Nat'l	No different

A Tale of Two Sister Hospitals

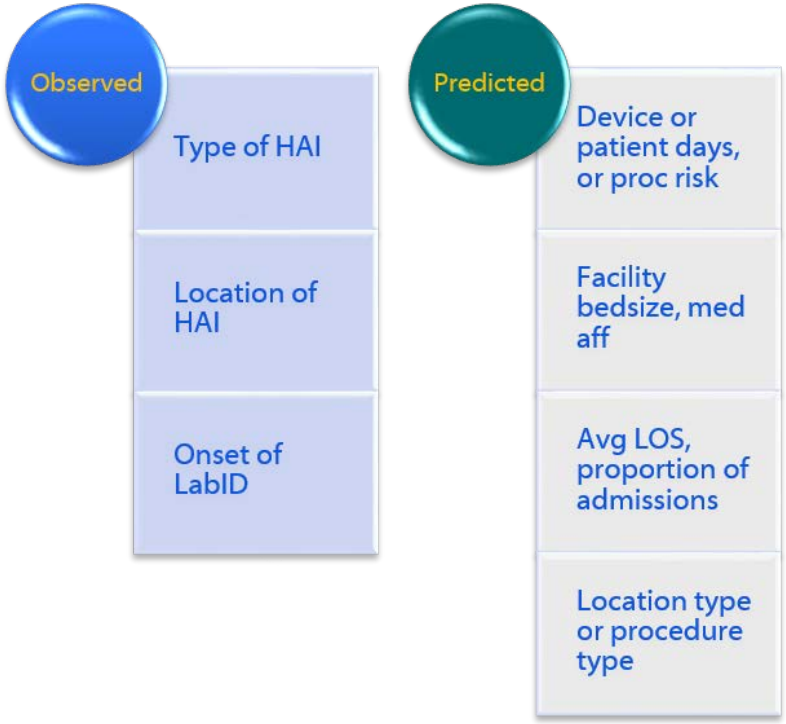
- Are these two hospitals *directly* comparable?
- Additional information is needed:
  - What types of units are reporting?
  - How many infections?
  - How many predicted?
  - How many device days?

Factor	Your Hospital	Your (Sister) Hospital
Bedsize	250	300
Medical School Aff	Nonteaching	Nonteaching
Number of ICU beds	40	50
CAUTI SIR	1.37	1.42
Interpretation	Worse than Nat'l	No different

SIR: More than Just a Number

$$\text{SIR} = \frac{\#\ observed\ HAIs}{\#\ predicted\ HAIs}$$

- Remember to look at SIR *in addition to:*
  - number predicted
  - number observed
  - patient and/or device days
  - Changes in facility demographics (reported on Annual Surveys)
  - CO prevalence rates (LabID)
  - Changes in reporting locations (DA)
  - Changes in procedures (SSI)



Interpretation – Additional Elements to Consider

- Internal and External Validation
- Prevention initiatives
- Educational endeavors
- Change in facility demographics
  - Diff. patient population?
  - Closing of units?
  - New services?

Let’s talk about…Low Exposure

- Oftentimes, this is defined as # predicted <1
  - Also low device and/or patient days
- What do you do when the SIR is not calculated due to low exposure?
  - Consider using rates, even without National rate for comparison
  - Review data over longer periods of time – may result in ability to calculate the SIR
- Oftentimes (but not always) there are 0 observed HAIs

Low exposure…continued

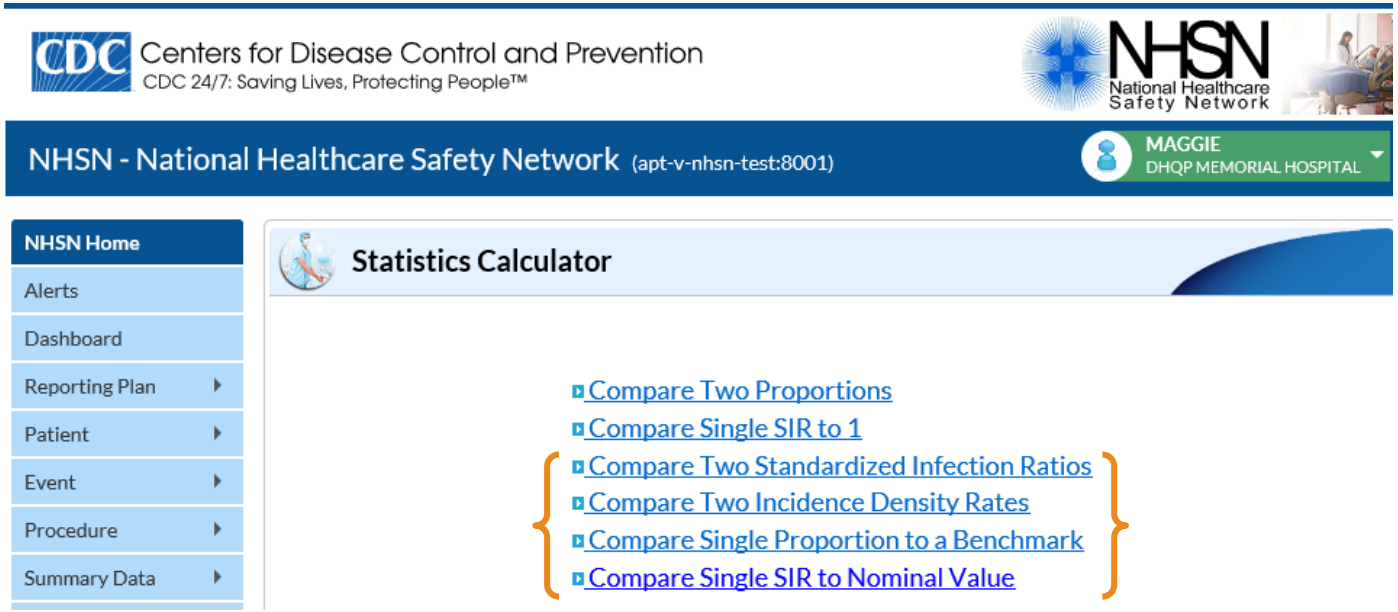
- Units or procedures with <1 predicted infection are still included in the overall SIR
  - Remember – the SIR is scalable
  - In the below example, the FUSN SSI, procedures, and # pred are included in the Overall SSI SIR for the facility.

Procedure	# SSI	# procedures	# pred	SIR	P-value	95% CI
Overall	*14*	*601*	*17.890*	*0.783*	*0.3637*	*(0.445, 1.282)*
COLO	7	236	11.604	0.603	0.1653	(0.264, 1.193)
HYST	3	58	1.340	2.239	0.1994	(0.569, 6.093)
HPRO	3	94	2.592	1.157	0.7418	(0.294, 3.150)
KPRO	0	53	1.394	0.000	0.2481	(. , 2.149)
FUSN	1	160	0.960			

A Step Further – Statistics Calculator

NHSN Statistics Calculator

- Options available for making internal comparisons, as well as comparing to a benchmark or goal, or a nominal SIR value.



NHSN Statistics Calculator

- Compare Two Standardized Infection Ratios:
  - Use SIR data from NHSN that are calculated using the same baseline!
  - Have to enter numerator (# observed) and denominator (# predicted)
  - Use for internal comparisons
- Compare Two Incidence Density Rates
  - Allows for comparison of two device-associated rates
  - Useful for internal comparison without the need for national pooled mean rates.

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

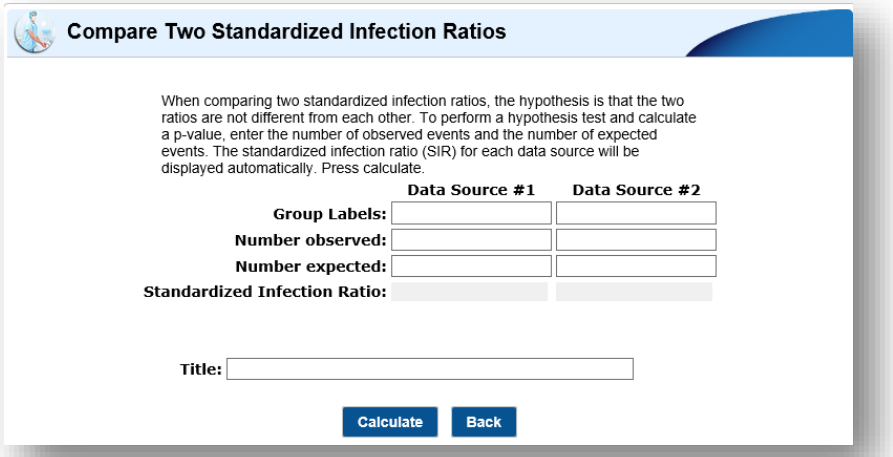
NHSN Statistics Calculator

- Compare Single Proportion to a Benchmark
  - Produces a 95% CI around the proportion
  - Produces 1- and 2-tailed p-values comparing the proportion to a benchmark/goal
- Compare Single SIR to Nominal Value
  - Nominal value could represent a Goal

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

NHSN Statistics Calculator

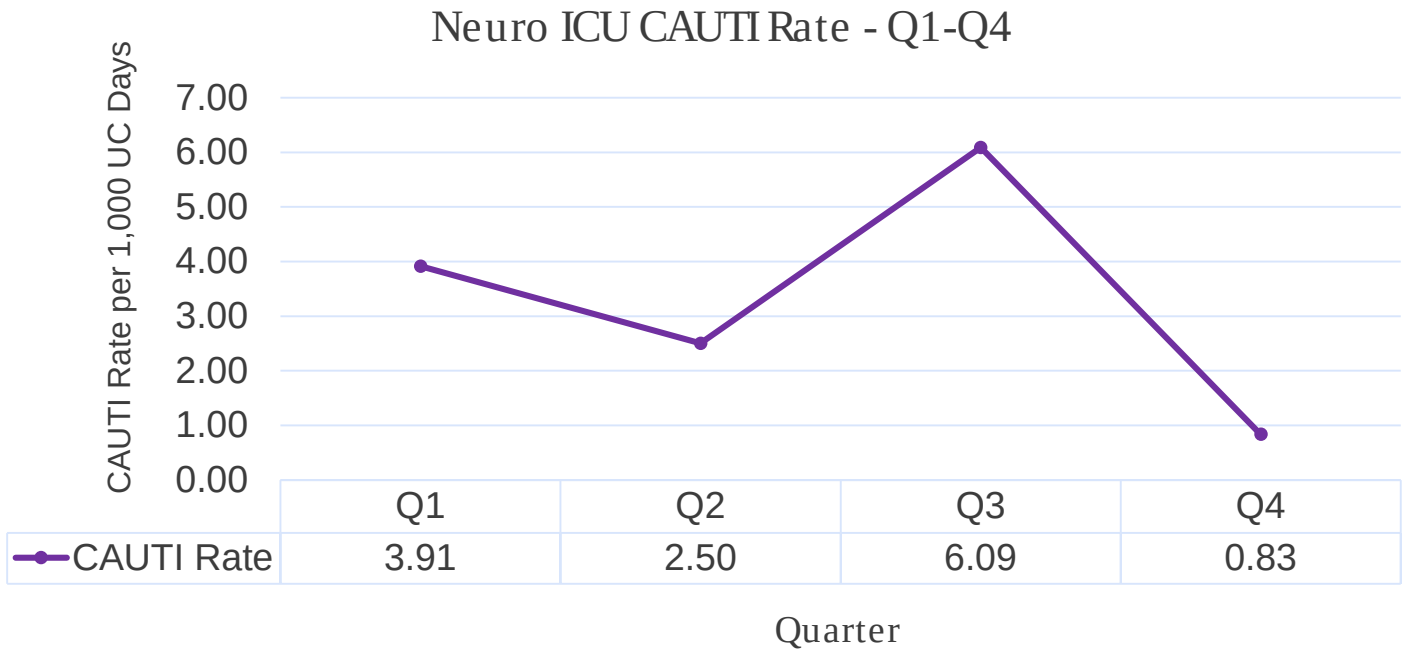
- All options require input of values
  - Data cannot be *imported* into Statistics Calculator
- Each option provides information and guidance for use
- All methods align with those used in NHSN reports (within the application, as well as for CDC NHSN reports)
- SAS Macros available online



https://www.cdc.gov/nhsn/PS-Analysis-resources/index.html

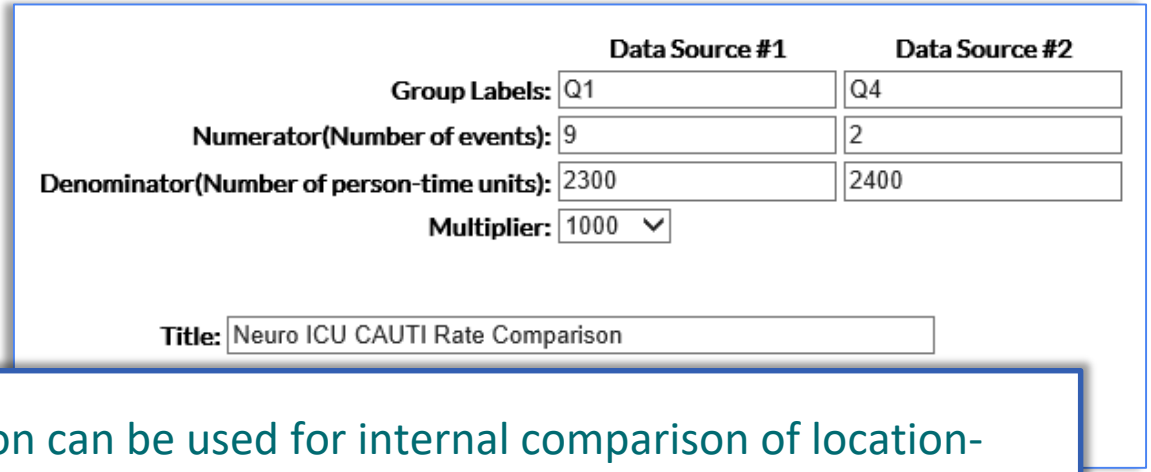
Location-specific CAUTI Rates

- Your facility has been carefully reviewing the CAUTI rates in the Neurologic ICU. Below is the quarterly data for this unit.



Compare Two Incidence Density Rates

- You want to determine if the CAUTI rate has significantly decreased in Q4.
- You decide to use the Statistics Calculator in NHSN.

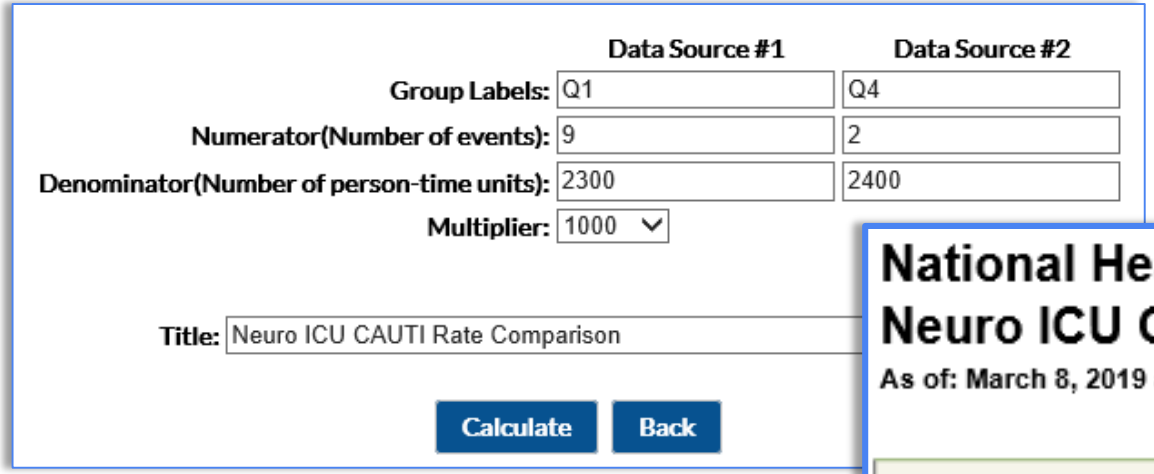


	Data Source #1	Data Source #2
Group Labels:	Q1	Q4
Numerator(Number of events):	9	2
Denominator(Number of person-time units):	2300	2400
Multiplier:	1000	

Title: Neuro ICU CAUTI Rate Comparison

NOTE: This option can be used for internal comparison of location-stratified DA rates, or inpatient HO LabID rates (FACWIDEIN or by location, if known).

Compare Two Incidence Density Rates - RESULTS



National Healthcare Safety Network
Neuro ICU CAUTI Rate Comparison

As of: March 8, 2019 at 10:44 AM

	Q1	Q4
Numerator	9	2
Denominator	2300	2400
Incidence Density Rate	3.913	0.833
IDR p-value	0.0327	

Knowledge Check #3:

Based on the p-value of 0.0327,can you conclude that the Neuro ICU significantly reduced its CAUTI rate during this year?

A. Yes, the p-value is statistically significant
B. No, the p-value is not statistically significant
C. No, the comparison included only two quarters
D. No, the data are not risk-adjusted

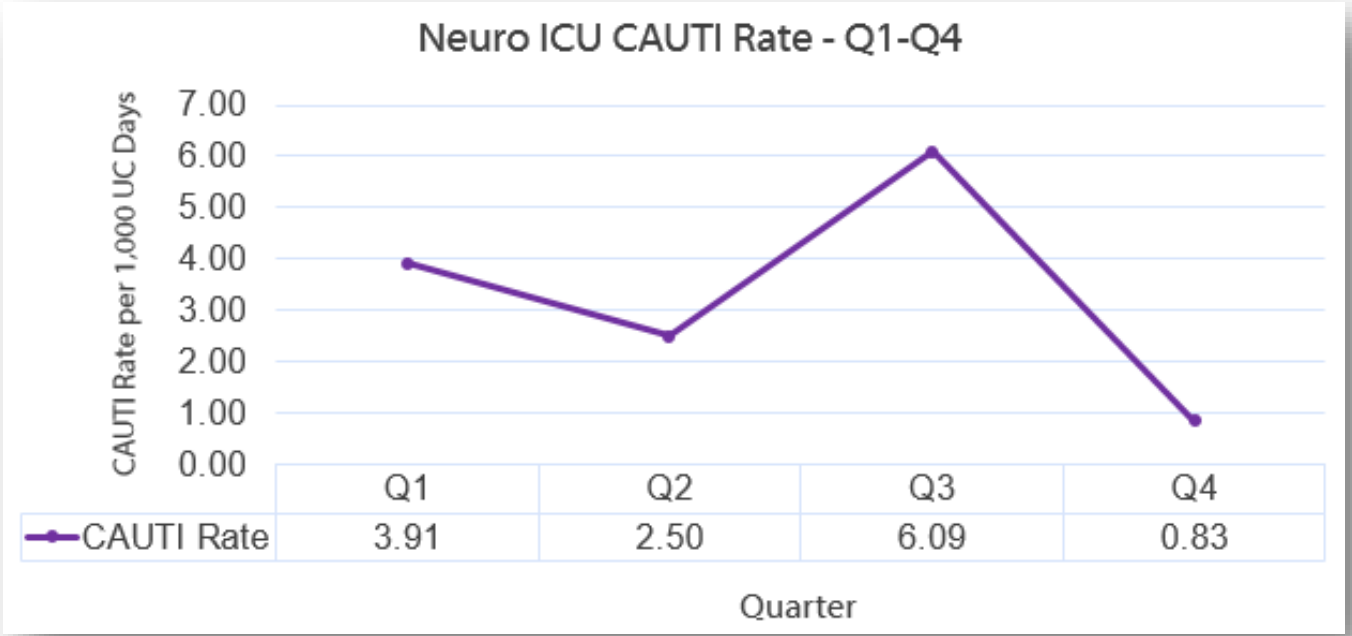
Knowledge Check #3: RATIONALE

C. No, the comparison included only two quarters

- The results of this analysis tell us that the CAUTI rate in Q4 is significantly different from the rate in Q1, as the test compares **two point estimates**. It does *not* tell us how the facility performed during the year as a whole.
- Therefore, our interpretation would instead be:
  - *The CAUTI rate in our Neuro ICU, Q4, is significantly different than the rate at the beginning of the year in Q1.*

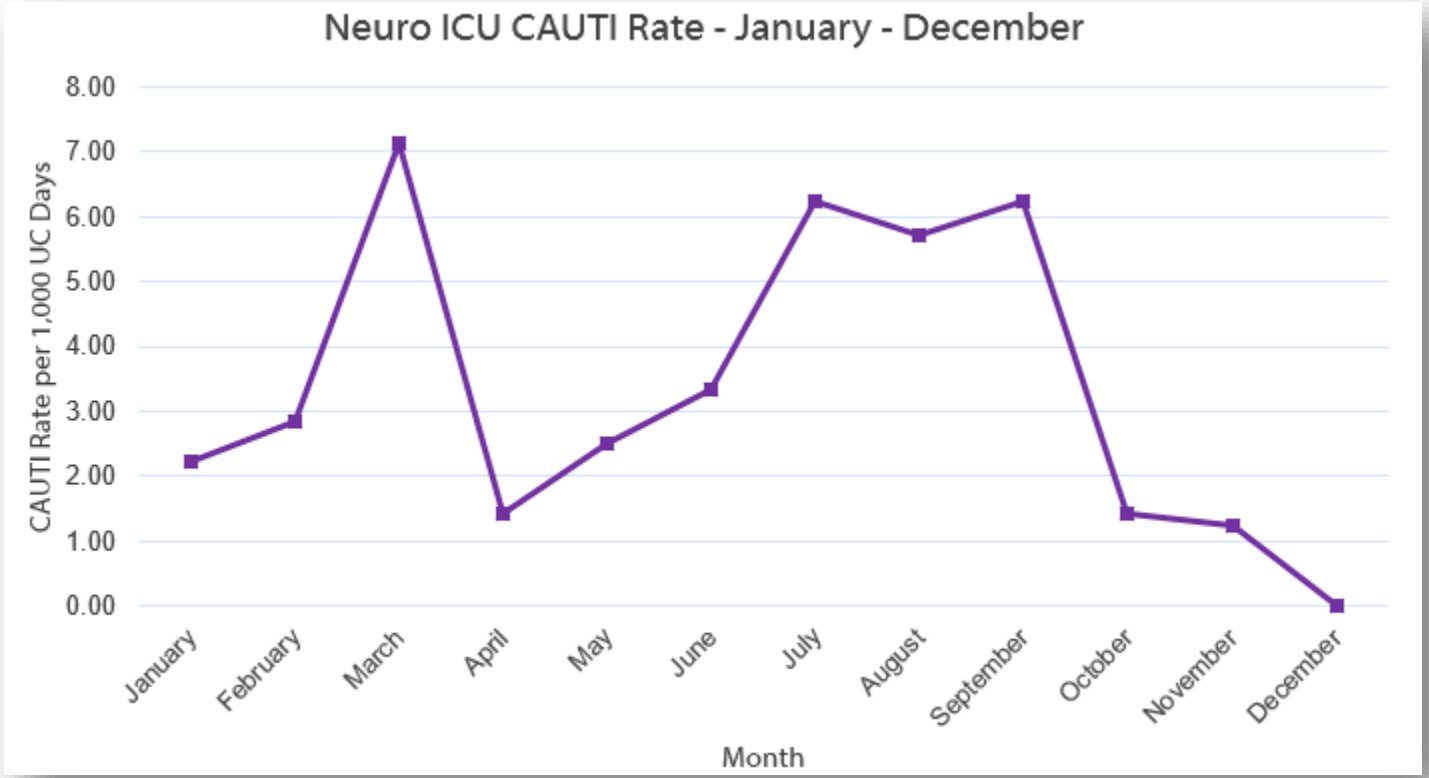
Knowledge Check #3: RATIONALE (cont'd)

- Notice the rate increased in Q3, indicating that there was not a continuous decrease in CAUTI incidence throughout the year



Knowledge Check #3: RATIONALE (cont'd)

- Looking at the data by month shows even greater variability.



Comparison of Two SIRs

- Similar to comparison of two incidence density rates
- Can be used for SIRs, SURs, and SAARs
- Use for internal comparisons (e.g., Did my hospital's CDI SIR improve compared to the previous year?)

	Data Source #1	Data Source #2
Group Labels:	CDI 2016	CDI 2017
Number observed:	38	40
Number expected:	29.548	44.145
Standardized Infection Ratio:	1.286	0.906

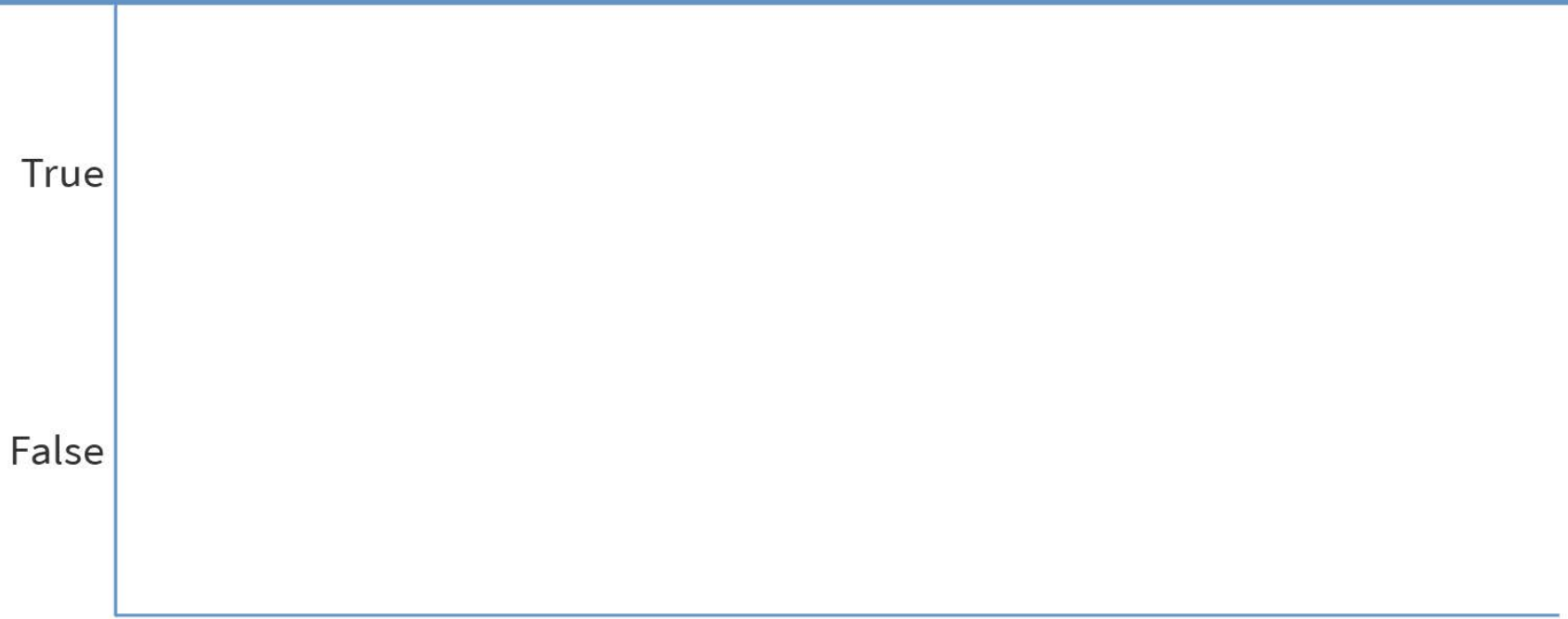
Title: Annual CDI SIR Comparisons

National Healthcare Safety Network
Annual CDI SIR Comparisons
As of: March 8, 2019 at 3:01 PM

	CDI 2016	CDI 2017
Observed	38	40
Expected	29.548	44.145
SIR	1.286	0.906

Relative ratio of SIRs (data column 2 / data column 1): 0.906/1.286 = 0.705 (70.5%)
Two-tailed p-value: 0.1246
95% Conf. Interval: 0.451, 1.103

Knowledge Check #4: You have been asked to provide comparison to a benchmark and you choose to use the Statistics Calculator to perform a comparison. TRUE or FALSE: You should use the "Compare 2 SIRs" option.



Knowledge Check #4 Answer and RATIONALE

- FALSE – the Compare 2 SIRs option is not appropriate for comparison to a benchmark or goal
- SIR Comparison to Nominal Value:
  - The National Median SIR, or other published value, should be used as a *guide* for determining a suitable goal for your hospital.
  - Your hospital's SIR should not be directly compared to a national or state SIR

HAI and Patient Population	Standardized Infection Ratio Data					Percentile Distribution of Facility-specific SIRs[8]				
	Hospital-onset events[5]	Predicted Hospital-onset events[6]	SIR	95% CI for SIR		10%	25%	50%	75%	90%
Laboratory-identified *C. difficile*, facility-wide	95,530	103,780.133	0.921	0.915	0.926	0.262	0.568	0.851	1.144	1.466

Source: 2016 HAI Progress Report https://www.cdc.gov/hai/data/portal/progress-report.html

Knowledge Check #4 RATIONALE (cont'd)

- Why can't we compare 2 SIRs in this case?
  - Comparison of 2 SIRs assumes that the distribution of exposure between the facility and the national are proportional.
    - Is a single facility's exposure proportional to that of the entire U.S.?

    Example:

    (hospital) $\frac{28}{42.438}$ *(U.S.)* $\frac{26{,}029}{26{,}183.537}$

- Best to compare to a nominal value (e.g., SIR goal)

SIR Comparison to Nominal Value

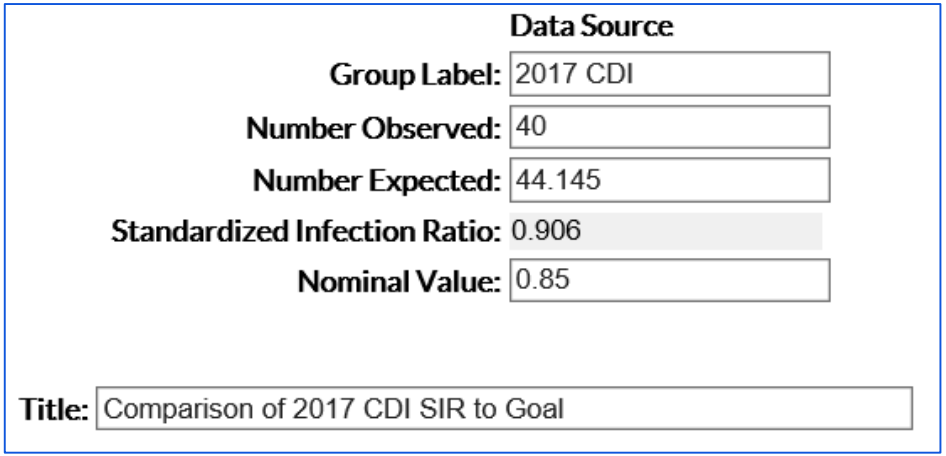
- How does this work*?
  1. Select the nominal value. (e.g., HHS goal, median SIR, etc.)
  2. Multiply the # predicted by the nominal value.
  3. Calculate the new SIR (observed/new predicted)
  4. Obtain p-value.

Example: 0.85 is the chosen nominal value

$$\frac{40}{(44.145 * 0.85)} = \frac{40}{37.523} = 1.07$$

*SAS Macro available from: https://www.cdc.gov/nhsn/sas/p-value-of-sir-compared-to-nominal.sas

SIR Comparison to Nominal Value



National Healthcare Safety Network
Comparison of 2017 CDI SIR to Goal
As of: March 8, 2019 at 3:44 PM

2017 CDI Number Observed	2017 CDI Number Expected	SIR	p-value as compared to 0.85
40	44.145	0.906	0.6705

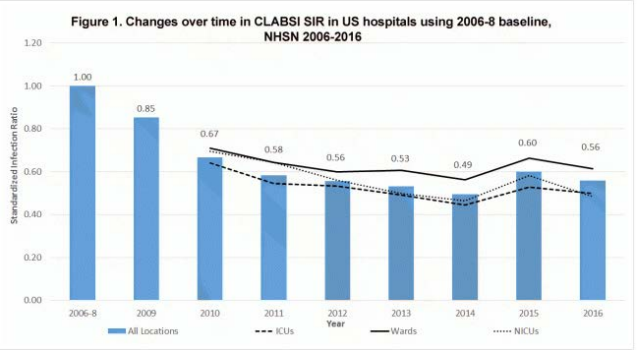
- Based on these results, our hospital's CDI LabID SIR of 0.906 is not significantly different from our chosen goal of 0.85 (p=0.6705)

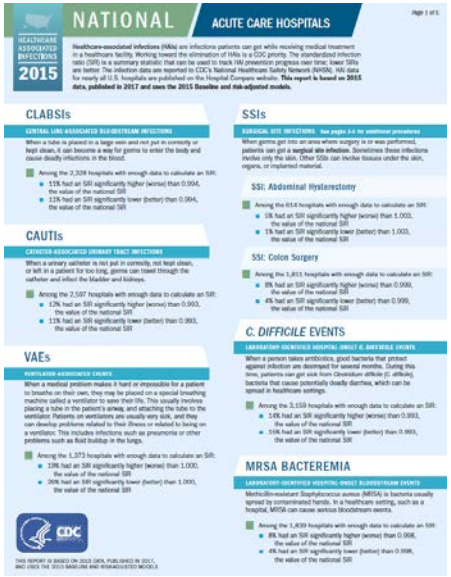
In Summary:

- Event-level reports are valuable sources of data to complement summary measures
- SIRs and rates can be used to measure local improvement
- The NHSN statistics calculator provides options to test for significant changes within a hospital, as well has difference to a chosen goal

Resources

- CDC HAI Reports
- https://www.cdc.gov/hai/surveillance/data-reports/index.html
  - *Healthcare-associated Infections in the United States, 2006-2016: A Story of Progress*[1]
  - *2015 National and State Healthcare-associated Infections Data Report*[2]
  - *National 2015 Standardized Infection Ratios (SIRs) Calculated Using Historical Baselines*[3]

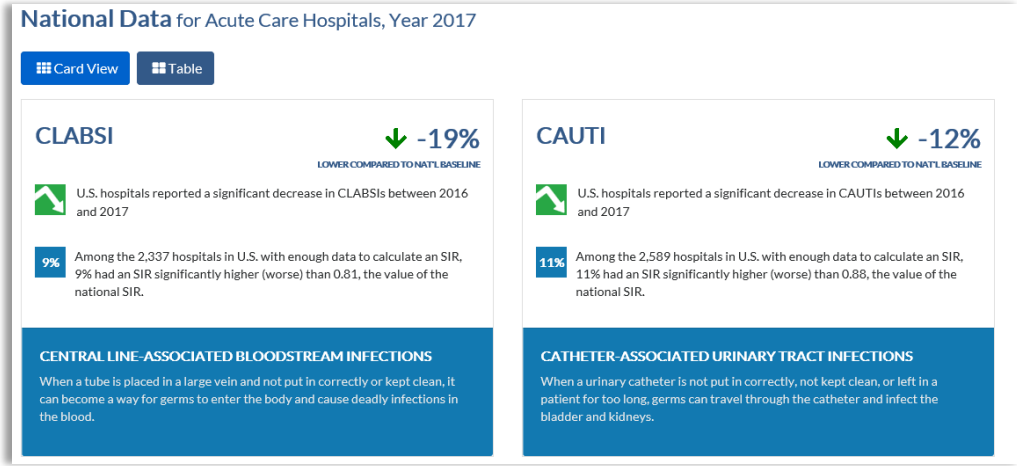


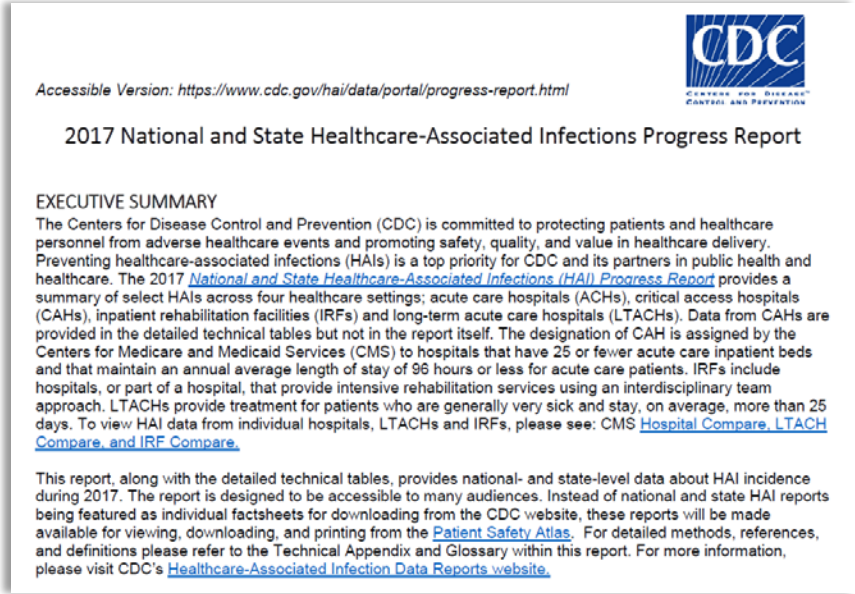


1. https://www.cdc.gov/hai/surveillance/data-reports/data-summary-assessing-progress.html
2. https://www.cdc.gov/hai/surveillance/data-reports/2015-HAI-data-report.html
3. https://www.cdc.gov/hai/surveillance/data-reports/2015-SIR-report.html

Resources

- 2017 National and State HAI Progress Report:
  - https://www.cdc.gov/hai/data/portal/progress-report.html
- CDC Patient Safety Atlas:
  - https://gis.cdc.gov/grasp/PSA/HAIreport.html





Resources

- NHSN Guide to the SIR

https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/nhsn-sir-guide.pdf

- NHSN Guide to the SUR

https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/nhsn-sur-guide-508.pdf

- Analysis Quick Reference Guides:

https://www.cdc.gov/nhsn/ps-analysis-resources/reference-guides.html

- MORE Analysis Training!

https://www.cdc.gov/nhsn/training/analysis/index.html

Thank you!!

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TTY: 1-888-232-6348 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.