



# Device-associated Analysis – CLABSI Group Exercise

March 26, 2019

You have been tasked to review your facility CLABSI data for Quarter 1 of 2019. As you work through reviewing your facility data, you want to ensure that the data you will be presenting to your colleagues is accurate and complete. Keeping this in mind, you set out to obtain the CLABSI numerator, number predicted, and final CLABSI SIR.

The table and facility level information in the scenarios are comprised of fictitious data for the purpose of this exercise. Please answer all of the questions.

# Scenario 1: Quantify the CLABSI numerator

Table 1: DHQP Memorial Hospital CLABSI Events Line List for 2019Q1

orgID	patID	eventID	eventDate	ecmo	vad	centralLine	spcEvent	loccdc
10000	032656	28847360	1/02/2019	N	N	Y	LCBI	Telemetry Ward
10000	1000	28868925	1/03/2019	Y	N	Y	LCBI	Surgical ICU
10000	1001	28869070	1/18/2019	N	N	Y	LCBI	Telemetry Ward
10000	12012	29058712	1/01/2019	N	Y	Y	LCBI	Medical Ward
10000	12345	29741410	2/13/2019	N	N	Y	LCBI	Pediatric Medical Surgical Ward
10000	12345CG	29741396	2/01/2019	N	N	Y	LCBI	Adult Mixed Acuity
10000	1234CG	29742323	2/12/2019	N	N	Y	LCBI	NICU
10000	225654	28834507	1/04/2019	Y	N	Y	LCBI	Surgical Ward
10000	41528	28848089	1/01/2019	N	N	Y	LCBI	Surgical Ward
10000	456987	28847473	2/01/2019	N	Y	Y	LCBI	Rehab
10000	85236	28841374	2/01/2019	Y	N	Y	LCBI	NICU
10000	CM0109	29862893	2/07/2019	N	Y	Y	LCBI	Rehab
10000	YOUMA	29271741	1/20/2019	N	N	Y	LCBI	Surgical Ward
10000	YOUMA	29793848	2/15/2019	Y	N	Y	LCBI	Medical Ward

\*Fictitious data

**Question 1: Using the Line List in Table 1, please identify how many events will be included in the CLABSI IQR SIR numerator? How many events would be in the device-associated CLABSI reports?**

**Question 2: Why are certain events excluded from the CLABSI IQR SIR numerator count?**

## Scenario 2: Calculate the number predicted and CLABSI SIR for this ward for 2019 Q1

**Question 3: Calculate the number predicted for the facility location below:**

DHQP Memorial Hospital is a general acute care facility and, as recorded in their most recent survey, has 650 beds within their facility. The facility is also a graduate teaching facility. We want to calculate the number predicted for a Surgical ward within DHQP Memorial. For 2019 Q1, this ward has a cumulative total of 1,751 central line days.

*\*Please refer to the slides for the CLABSI Model for calculating the number predicted. Surgical Ward is included in Select Adult Wards category*

<b>Parameter</b>	<b>Parameter Estimate</b>
<u>CDC Location Code: Step-down Units</u> <i>Adult Step-down Unit</i> <i>Oncology Step-down Unit</i> <i>Pediatric Step-down Unit</i> <i>Step-down Neonatal Nursery (Level II)</i>	0.2155
<u>CDC Location Code: Select Adult Wards</u> <i>Medical Ward</i> <i>Medical/Surgical Ward</i> <i>Neurology Ward</i> <i>Neurosurgical Ward</i> <i>Surgical Ward</i> <i>Telemetry Ward</i>	0.1797
Facility bed size*: $\geq 224$ beds	0.2571
Facility bed size*: 94 - 223 beds	0.1160
Facility bed size*: $\leq 93$ beds	REFERENT
Medical school affiliation*: Major	0.2627
Medical school affiliation*: Graduate	0.1494
Medical school affiliation*: Undergraduate/Non-teaching	REFERENT
<u>Facility type: (based on NHSN enrollment)</u> <i>Children's</i> <i>Military</i> <i>Veterans' Affairs</i> <i>Women's</i> <i>Women's and Children's</i>	0.1429
<u>Facility type: (based on NHSN enrollment)</u> <i>General Acute Care</i> <i>Oncology</i> <i>Orthopedic</i> <i>Psychiatric</i> <i>Surgical</i>	REFERENT

**Question 4: Calculate the SIR, if this location has 2 CLABSI events for the 1<sup>st</sup> quarter in 2019. Provide a brief interpretation of the SIR.**

**Table 2: SIR table for 2019Q1 for DHQP Memorial Hospital Surgical Ward**

<b>orgID</b>	<b>CCN</b>	<b>summaryYQ</b>	<b>infCount</b>	<b>numPred</b>	<b>numcldays</b>	<b>SIR</b>	<b>SIR_pval</b>	<b>Sir95ci</b>
10000	32M2222	2019Q1	2		1751		0.0103	1.016, 3.276

\*Fictitious data

**Question 5: Using Table 2, provide a brief interpretation of the location's SIR p-value and 95% confidence interval.**

# CLABSI Analysis Group Exercise – Answers

## Please identify how many events will be included in the CLABSI IQR SIR numerator?

orgID	patID	eventID	eventDate	ecmo	vad	centralLine	spcEvent	loccdc
10000	032656	28847360	1/02/2019	N	N	Y	LCBI	Telemetry Ward
10000	1000	28868925	1/03/2019	Y	N	Y	LCBI	Surgical ICU
10000	1001	28869070	1/18/2019	N	N	Y	LCBI	Telemetry Ward
10000	12012	29058712	1/01/2019	N	Y	Y	LCBI	Medical Ward
10000	12345	29741410	2/13/2019	N	N	Y	LCBI	Pediatric Medical Surgical Ward
10000	12345CG	29741396	2/01/2019	N	N	Y	LCBI	Adult Mixed Acuity
10000	1234CG	29742323	2/12/2019	N	N	Y	LCBI	NICU
10000	225654	28834507	1/04/2019	Y	N	Y	LCBI	Surgical Ward
10000	41528	28848089	1/01/2019	N	N	Y	LCBI	Surgical Ward
10000	456987	28847473	2/01/2019	N	Y	Y	LCBI	Rehab
10000	85236	28841374	2/01/2019	Y	N	Y	LCBI	NICU
10000	CM0109	29862893	2/07/2019	N	Y	Y	LCBI	Rehab
10000	YOUMA	29271741	1/20/2019	N	N	Y	LCBI	Surgical Ward
10000	YOUMA	29793848	2/15/2019	Y	N	Y	LCBI	Medical Ward

\*Fictitious data

## How many events would be in the device-associated CLABSI reports?

orgID	patID	eventID	eventDate	ecmo	vad	centralLine	spcEvent	loccdc
10000	032656	28847360	1/02/2019	N	N	Y	LCBI	Telemetry Ward
10000	1000	28868925	1/03/2019	Y	N	Y	LCBI	Surgical ICU
10000	1001	28869070	1/18/2019	N	N	Y	LCBI	Telemetry Ward
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\*Fictitious data

## Question 2: Why are certain events excluded from the CLABSI IQR SIR numerator count?

- Events that occur in non-CMS reportable locations are excluded from IQR reports.
- Also, if ECMO or VAD are indicated as “Yes” for a CLABSI event then those events are excluded from CMS and non-CMS CLASBI numerator values.

### **CLABSI**

Start Q1 2011 - adult, pediatric, and neonatal ICUs

Start Q1 2015 - adult and pediatric medical, surgical, and medical/surgical wards

### **CAUTI**

Start Q1 2012 - adult and pediatric ICUs

Start Q1 2015 - adult and pediatric medical, surgical, and medical/surgical wards

## Scenario 2: Calculate the number predicted and CLABSI SIR for this ward for 2019 Q1

**Question 3: Calculate the number predicted for the facility location below:**

DHQP Memorial Hospital is a general acute care facility and, as recorded in their most recent survey, has 650 beds within their facility. The facility is also a graduate teaching facility. We want to calculate the number predicted for a Surgical ward within DHQP Memorial. For 2019 Q1, this ward has a cumulative total of 1,751 central line days.

*\*Please refer to the slides for the CLABSI Model for calculating the number predicted.*

# Example: Applying Risk Model for CLABSI, NHSN 2015

=  $\exp(-7.6325 +$

$0.3257*(0) +$

$0.5695*(0) +$

$1.4269*(0) +$

$0.6287*(0) +$

$0.3766*(0) +$

$0.2155*(0) +$

$0.1797*(1) +$

$0.3698*(0) +$

$0.6876*(0) +$

$0.1912*(0) +$

$0.2627*(0) +$

$0.1494*(1) +$

$0.1429*(0)* +$

$0.2571*(1)* +$

$0.1160*(0) * 1751 \text{ Central line days}$

**? = predicted CLABSI events for the month of January**

\* For these risk factors, if present = 1; if not = 0

Parameter	Parameter Estimate
<u>CDC Location Code: Step-down Units</u> <i>Adult Step-down Unit</i> <i>Oncology Step-down Unit</i> <i>Pediatric Step-down Unit</i> <i>Step-down Neonatal Nursery (Level II)</i>	0.2155
<u>CDC Location Code: Select Adult Wards</u> <i>Medical Ward</i> <i>Medical/Surgical Ward</i> <i>Neurology Ward</i> <i>Neurosurgical Ward</i> <i>Surgical Ward</i> <i>Telemetry Ward</i>	0.1797

# Example: Applying Risk Model for CLABSI, NHSN 2015

$$\begin{aligned}
 &= \exp(-7.6325 + \\
 &0.3257*(0) + \\
 &0.5695*(0) + \\
 &1.4269*(0) + \\
 &0.6287*(0) + \\
 &0.3766*(0) + \\
 &0.2155*(0) + \\
 &0.1797*(1) + \\
 &0.3698*(0) + \\
 &0.6876*(0) + \\
 &0.1912*(0) + \\
 &0.2627*(0) + \\
 &0.1494*(1) + \\
 &0.1429*(0)* + \\
 &0.2571*(1)* +
 \end{aligned}$$

Facility bed size*: ≥ 224 beds	0.2571	0.0471	<0.0001
Facility bed size*: 94 - 223 beds	0.1160	0.0493	0.0187
Facility bed size*: ≤ 93 beds	REFERENT	-	-
Medical school affiliation*: Major	0.2627	0.0211	<0.0001
Medical school affiliation*: Graduate	0.1494	0.0244	<0.0001
Medical school affiliation*: Undergraduate/Non-teaching	REFERENT	-	-
<u>Facility type: (based on NHSN enrollment)</u>	0.1429	0.0526	0.0066
Children's			
Military			
Veterans' Affairs			
Women's			
Women's and Children's			
<u>Facility type: (based on NHSN enrollment)</u>	REFERENT	-	-
General Acute Care			
Oncology			
Orthopedic			
Psychiatric			
Surgical			

0.1160\*(0)) \* **1751 Central line days**

**? = predicted CLABSI events for the month of January**

\* For these risk factors, if present = 1; if not = 0

## CLABSI Number Predicted

$\text{Exp}[-7.6325 + 0.1797*(1) + 0.1494*(1) + 0.2571*(1)] * \text{Central line days}$

$\text{Exp}[-7.0463] * \text{Central Line days}$

$0.000870624 * 1751 \text{ Central Line days} = 1.524 \text{ number predicted}$

**Question 4: Calculate the SIR, if this location has 2 CLABSI events for the 1<sup>st</sup> quarter in 2019. Provide a brief interpretation of the SIR.**

$$\text{SIR} = 2/1.524 = 1.3123$$

The facility has a SIR of 1.31 for 2019Q1. This indicates that the facility experienced 31% more infections than what was predicted for this quarter.

## Table 2: SIR table for 2019Q1 for DHQP Memorial Hospital Surgical Ward

orgID	CCN	summaryYQ	infCount	numPred	numcldays	SIR	SIR_pval	Sir95ci
10000	32M2222	2019Q1	2		1751		0.0103	1.016, 3.276

\*Fictitious data

**Question 5: Using Table 2, provide a brief interpretation of the location's SIR p-value and 95% confidence interval.**

DHQP Memorial hospital experienced 2 events for 2019Q1. The SIR p-value is below .05, which means that the SIR for 2019Q1 is statistically significant. There is a statistical difference between the number of infections predicted and what was observed. The confidence interval does not include the value of 1, which indicates that the SIR for this quarter is significant. This is in agreement with the p-value interpretation