Central Line Associated Bloodstream Infection Surveillance

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Basics of Infection Prevention
Healthcare-Associated Infections Program
Center for Health Care Quality
California Department of Public Health

Objectives

- Review CLABSI surveillance definitions
- Discuss importance of accurate data collection
- Demonstrate how to report CLABSI events summary data in NHSN
- Discuss NHSN data analysis and feedback to staff

CLABSI Surveillance for Prevention

1. Perform surveillance for CLABSI using NHSN standardized definitions and methods
2. Compare SIR or rate over time to assess prevention progress
3. Monitor CLABSI incidence over time using the standardized infection ratio (SIR) metric

(See Introduction to NHSN slides)

CLABSI Surveillance Key Terms

- Lab confirmed bloodstream infection (**LCBI**)
  - Blood culture positive for a pathogen
- **Commensal**
  - Organism not usually considered pathogenic
  - Include (but not limited to)
    - Diphtheroids
    - *Propionibacterium* spp.
    - coagulase-negative staphylococci
    - viridans group streptococci
    - *Aerococcus* spp.
    - *Micrococcus* spp.

See NHSN Patient Safety Manual: Chapter 4, pp 4-10, NHSN organism list
https://www.cdc.gov/nhsn/pdfs/pscmanual/4psc_clabscurrent.pdf

CLABSI Surveillance

- For BSI to be considered a CLABSI, a **central line** must be
  - In place for >2 days on the date of the event (date device placed = day one)

AND

  - Still in place on day of event -or- in place on the day prior to the event
- The CLABSI **event date** is defined as the day the first element used to meet the surveillance definition occurs within the seven-day window period

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CLABSI Surveillance Definition

LCBI 1

Patient of any age

- ❑ has a recognized pathogen cultured from one or more blood cultures

and

- ❑ Organism cultured from blood is not related to an infection at another site

LCBI 2*

Patient of any age

- ❑ has common skin commensals cultured from 2 or more blood cultures drawn on separate occasions

and

has at least one of the following signs or symptoms

- ❑ Fever (>38^{0}C), chills, or hypotension

and

- ❑ Signs and symptoms and (+) lab results are not related to an infection at another site

LCBI 3*

Patient of ≤ 1 year of age

- ❑ has common skin commensals cultured from 2 or more blood cultures drawn on separate occasions

and

has at least one of the following signs or symptoms

- ❑ Fever (>38^{0}C), hypothermia (<36^{0}C core), apea, or bradycardia

and

- ❑ Signs and symptoms and (+) lab results are not related to an infection at another site

*All criteria occur within 7 day infection window period

Mucosal Barrier Injury (MCBI) BSI

- More specific BSI definition for oncology patients
- BSI resulting when intestinal organisms from compromised intestinal wall mix into the bloodstream
- Occurs in post allogeneic hematopoietic transplant or severely neutropenic patients
- MCBI SIR is calculated separately from CLABSI SIR

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CLABSI Infection Criteria- Acute Care Hospitals

Diagnostic Test for Possible CLABSI

- Positive blood culture with a pathogen OR-
- 2 positive blood cultures with common commensals

Localized Sign or Symptom s for Possible CLABSI (ONLY used with 2 blood commensals)

- Fever
- Chills
- Hypotension

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CLABSI due to Common Commensal Organisms

- Two blood cultures have been collected on the same or consecutive days
  - One positive culture may be due to poor skin prep prior to lab draw (skin contaminant)
  - Two matching positive cultures of the same commensal, meeting criteria, are considered a true pathogen

Example: Blood cultures positive for common commensal organism (e.g., S. epi) collected on Mon-Tues meets LCBI 2; cultures collected on Mon-Wed are too far apart

CLABSI Infection Window Period

- Defined as the 7-days during which all site-specific infection criteria must be met
- Includes the day the **first** positive blood culture was obtained, 3 calendar days before and 3 calendar days after

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CLABSI Infection Window Period

Infection Window Period:	3 days before first positive diagnostic test			FIRST POSITIVE DIAGNOSTIC TEST	3 days after first positive diagnostic test		
Example:	Mar 7	Mar 8	Mar 9	Mar 10	Mar 11	Mar 12	Mar 13

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CLABSI Location Attribution

- A CLABSI is attributed to the location of the patient on the day of event
  - Defined as the date that the **first** element used to meet the LCBI criterion occurred
- If the date of event for a CLABSI is the day of transfer or discharge, or the next day, the infection is attributed to the transferring location
- Attribute CLABSI to correct location for accurate SIR calculations. Each location has different risk adjustments in NHSN

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CLABSI Cannot Re-Occur in the Same Patient within a 14-Day Timeframe

- The date of the CLABSI event is considered day 1
- A new CLABSI is not reported until 14 days have elapsed
- If a new pathogen is identified in the blood within the 14 day timeframe, it should be added to the CLABSI already reported
  - Refer to the CLABSI protocol for more details

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Secondary BSI Attribution

- The period in which a positive blood culture must be collected to be considered a secondary BSI to a primary site of infection
  - Includes the 7-day infection window combined with the 14-day repeat infection timeframe, or 14-17 days depending on the date of the event
  - A positive blood culture collected outside this 14-17 date range cannot be considered a secondary BSI to the primary infection
- A primary BSI (CLABSI) cannot have a secondary BSI

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Secondary BSI Attribution -2

- A secondary BSI may be attributed to a primary site of infection if one of the following is true:
  1. The blood culture pathogen matches an organism also cultured in the primary infection site

     OR

  2. A positive blood culture is an element used to meet the primary site infection
- See the Secondary BSI Guide (Table B1) of the CLABSI protocol for more details

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Secondary BSI Attribution -3

- NHSN Infections that include a positive blood culture as an element in the primary site definition:

  - Bone-Osteomyelitis
  - Burn
  - Disc space infection
  - Endocarditis
  - GI tract infection
  - Intra-abdominal infection
  - Joint
  - Meningitis
  - Other infection-reproductive tract
  - Pneumonia
  - Spinal abscess
  - Omphalitis
  - Urinary System Infection

NHSN Patient Safety Module: Chapter 4, Secondary BSI Guide, pp 4-27, Table B1
https://www.cdc.gov/nhsn/pdfs/pscmanual/pcsmanual_current.pdf

Pathogen Assignment

- If a new blood pathogen is identified within the 14-day repeat infection timeframe, it should be added to the already reported CLABSI as an additional pathogen
- Do not report it as a new CLABSI
- Pathogens excluded from specific infection definitions (e.g. yeast for UTI and PNEU) are also excluded from being considered secondary bloodstream infections
  - Example: Yeast in the blood and urine would be reported as a CLABSI, as yeast is excluded from the UTI definition
- Refer to the NHSN protocol for more details on pathogen assignment and secondary BSI

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Pathogens Associated with CLABSI

• Coagulase-negative Staphylococci	16%
• *Staphylococcus aureus*	13%
• *Klebsiella (pneumoniae/oxytoca)*	8%
• *Enterococcus faecalis*	8%
• *Enterococcus faecium*	7%
• *Candida albicans*	6%
• *Escherichia coli*	5%
• Candida spp	5%

NHSN Antimicrobial Resistance Report: Distribution of all Pathogens Reported by HAI Type, Appendix to Table 4, 2011-2014
https://www.cdc.gov/nhsn/xls/reportdatatables/2014-appendix-pathogens.xlsx

How do I Apply the CLABSI Surveillance Definitions?

Let's look at some .

CLABSI Event Date

- Date the first element used to meet the definition for the first time

HOSPITAL DAY	INFECTION WINDOW PERIOD
1	
2	Blood Culture *+Staph A*
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
	BSI-POA Date of Event =2 Pathogen= *Staph A*

HOSPITAL DAY	INFECTION WINDOW PERIOD
1	Central Line inserted
2	
3	Fever 38.8C
4	*Blood Culture + Staph epi*
5	Blood Culture + *Staph epi*
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
	CLABSI-HAI Date of Event =3 Pathogen= *Staph epi*

NHSN Patient Safety Module: Chapter 2

Primary and Secondary BSI Examples

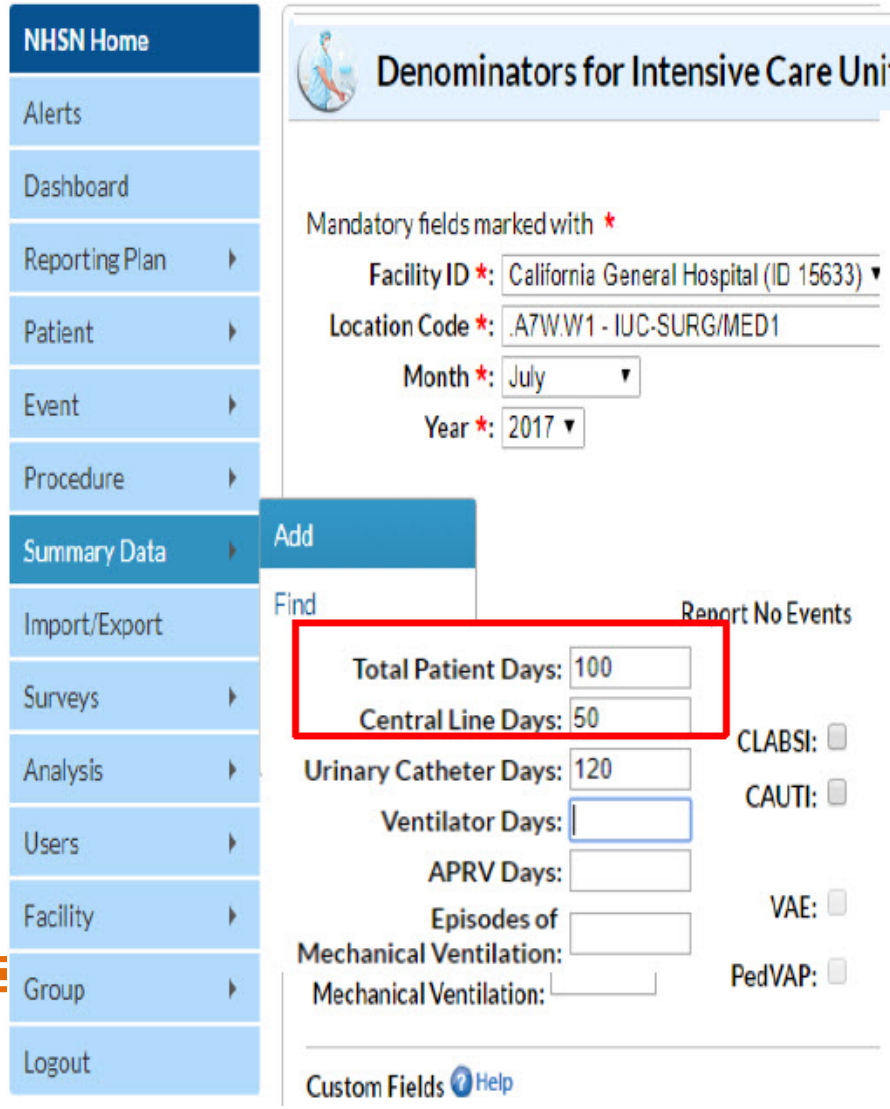
Infection Window Period (1st positive diagnostic test, 3 days before and 3 days after)

Repeat Infection Timeframe 14 days. Date of event = day 1

Secondary BSI Attribution Period (Infection window Period + RIT)

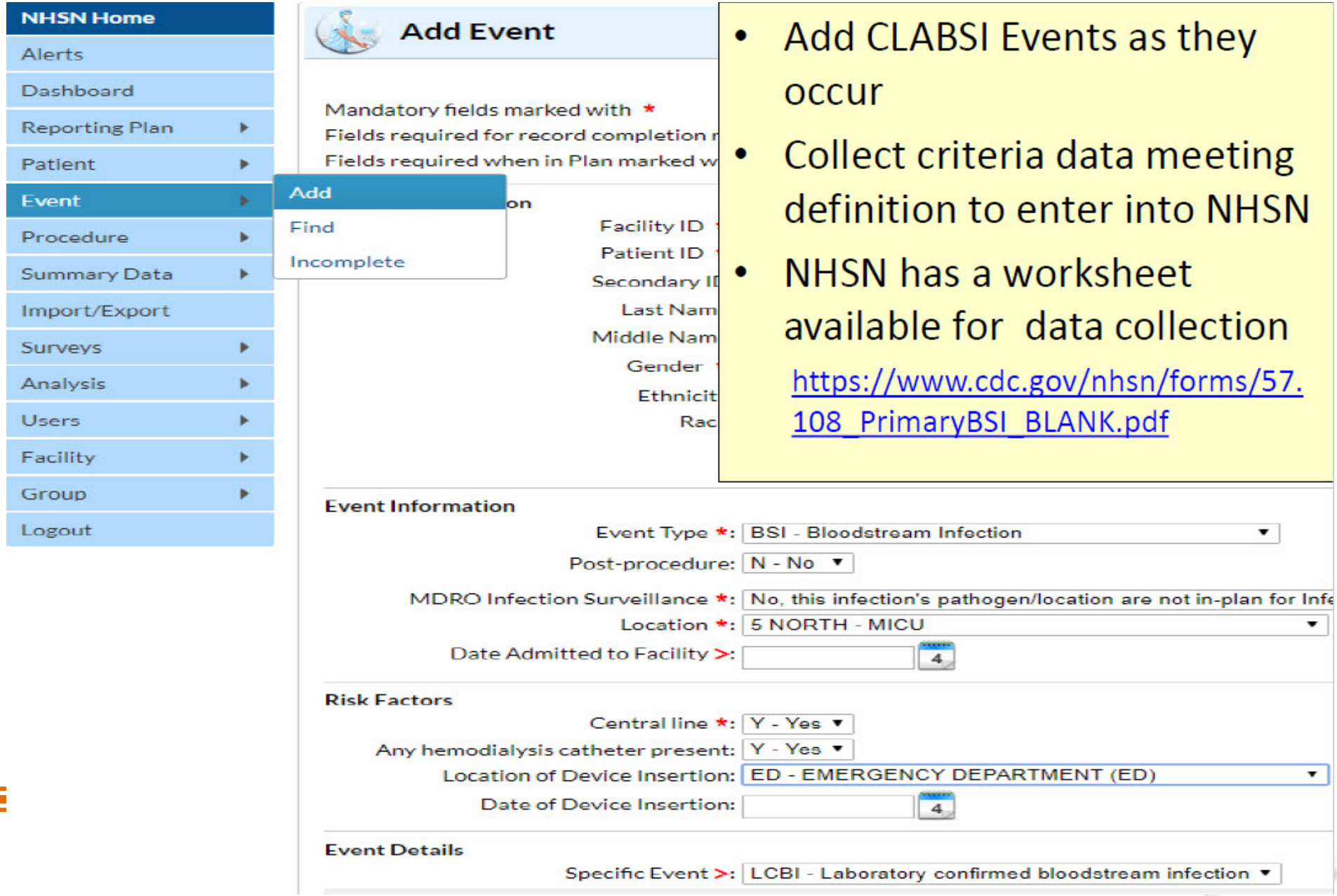
Hosp Day	BSI	RIT	Infection Window Period	Infection Window Period	RIT
1					
2					
3		1	Dysuria		
4		2	Urine culture >100,00cuf/ml E. faecalis		
5		3			
6		4			
7		5			
8		6			
9		7			
10		8			
11		9	Blood Culture E. faecalis/Yeast	Blood culture E. faecalis/Yeast	1
12		10			2
13		11			3
14		12			4
15		13			5
16		14			6
17			UTI & Secondary BSI DOE=3 Pathogen: E.faecalis	Primary BSI DOE=11 Pathogen: Yeast	7
18					8
19					9
20					10
21					11
22					12
23					13
24					14

Add Monthly CLABSI Summary Data to NHSN



- Enter monthly denominator data for each patient location
  - Patient days
  - Central line days

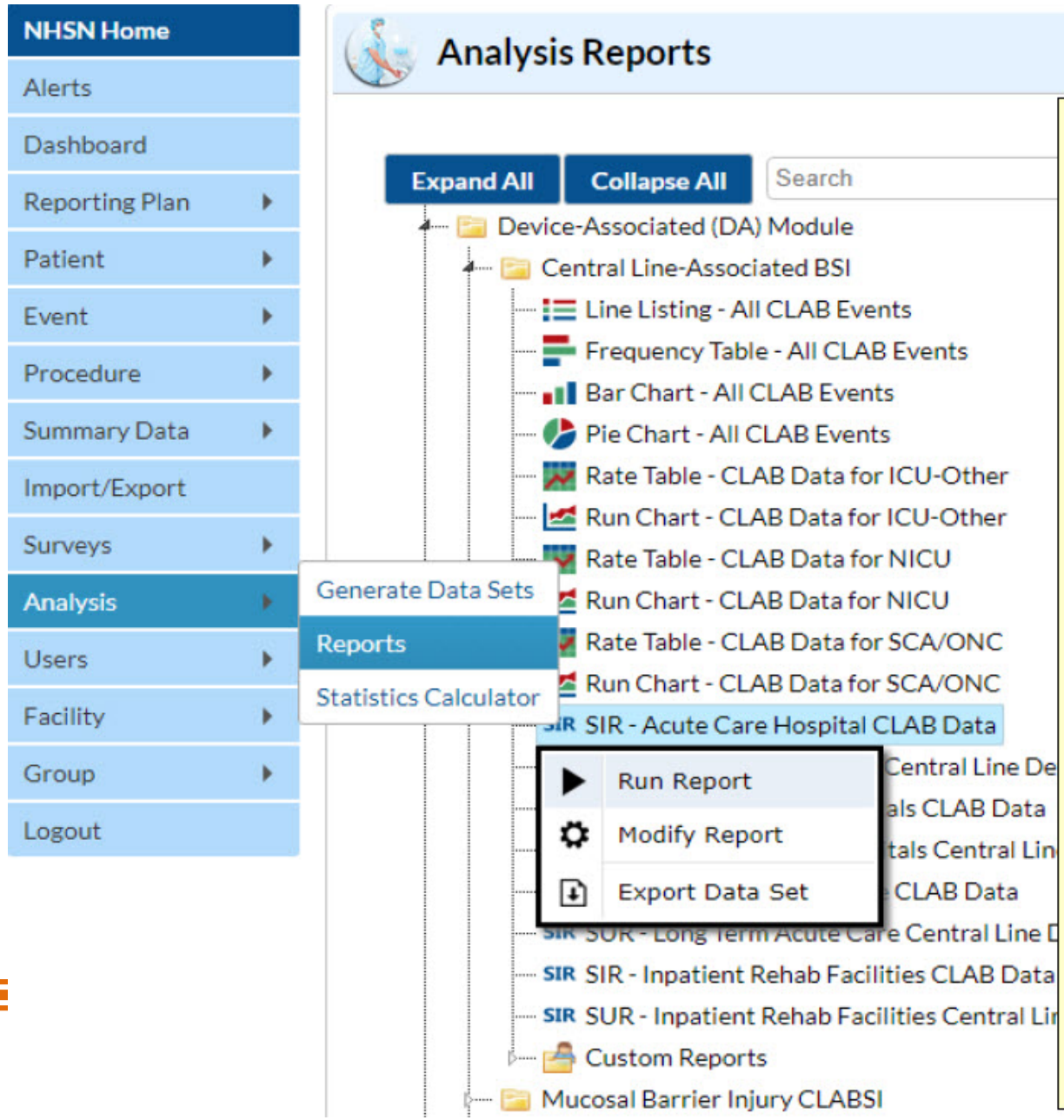
Add CLABSI Event to NHSN



- Add CLABSI Events as they occur
- Collect criteria data meeting definition to enter into NHSN
- NHSN has a worksheet available for data collection

  https://www.cdc.gov/nhsn/forms/57.108_PrimaryBSI_BLANK.pdf

NHSN CLABSI Analysis Reports



- Generate data set prior to creating a report
- Choose report according to need
  - SIR report- Your incidence compared to expected incidence
  - TAP report – Number of events that needed to be prevented to reach targeted goal –
    - which locations are priority

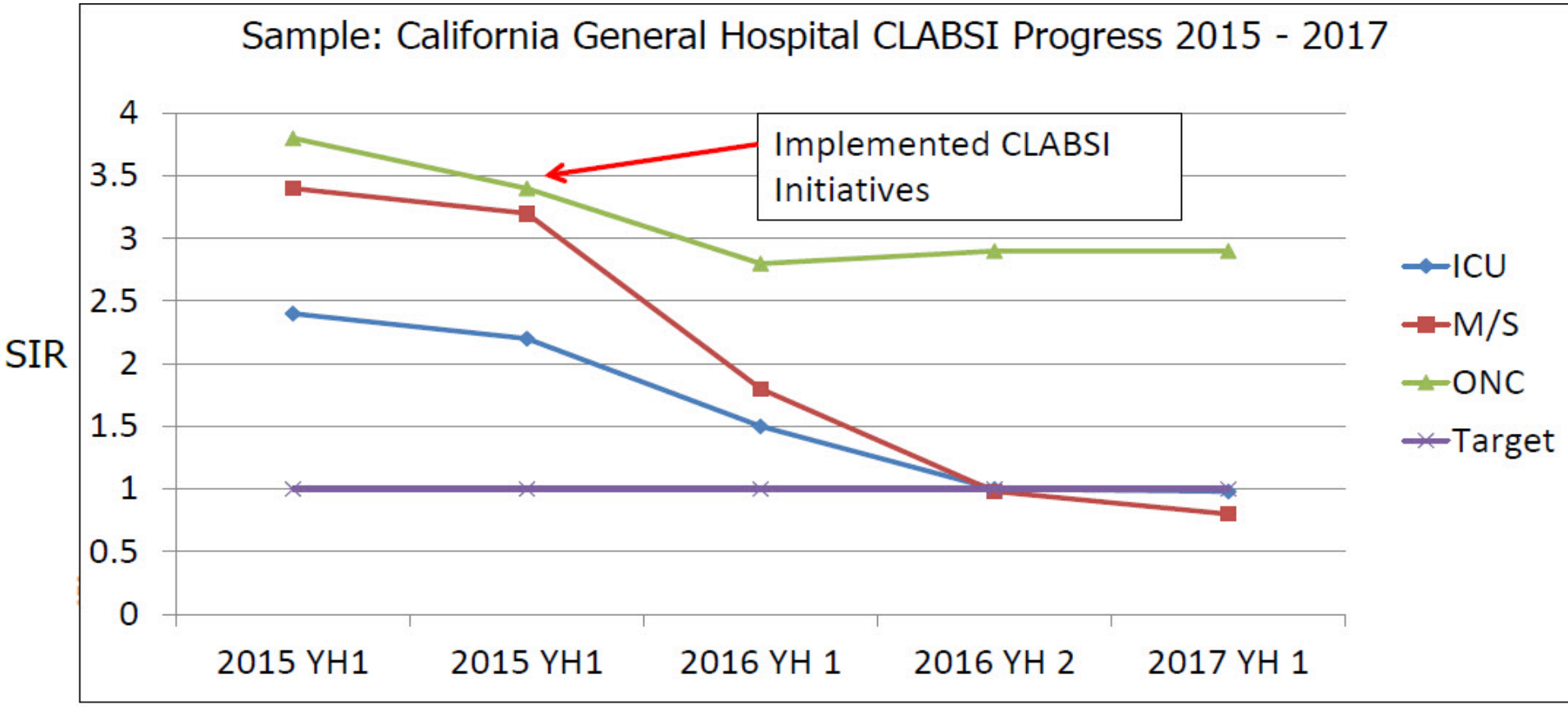
NHSN TAP Report - CLABSI

Facility CAD	Location Rank	Location	CDC Location	Events	Central Line Days	DUR %	CAD	SIR	SIR Test
20.52	1	1 West	IN:ACUTE:WARD:M	14	2269	49	13.10	7.81	
	2	2 West	IN:ACUTE:WARD:M	4	1349	42	3.40	3.34	
	3	SICU	IN:ACUTE:CC:S	3	1062	9	2.58	.	
	4	5 West	IN:ACUTE:WARD:M	2	983	9	1.61	.	

- Identifies the **number of infections that needed to prevented** to reach targeted goal (CAD)
  - Lists results high-to-low by location
  - Assists in deciding where to focus infection prevention resources

Measure CLABSI Prevention Progress

- Feedback results to your staff and leadership
- Changes in CLABSI incidence should be visible over time
- In the example, we can see ONC needs some additional interventions



CLABSI Surveillance Summary

- Consistent use of standard surveillance methods and CLABSI definitions are essential for accurate case finding
- Capturing complete and accurate data is necessary for precise CLABSI SIR calculation
- Perform surveillance and feedback CLABSI SIR with adherence monitoring results to all units and leadership

Questions?

For more information,
please contact any
HAI Program Liaison IP Team member

Or email
HAIProgram@cdph.ca.gov