# Central Line Associated Bloodstream Infection Surveillance

Last updated 2019

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

California Department of
PublicHealth

# 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 $\leq$ 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

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# 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**

**Localized Sign or Symptoms for Possible CLABSI (ONLY used with 2 blood commensals)**

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

- Fever
- Chills
- Hypotension

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# CLABSI due to Common Commensal Organisms

- Two blood cultures have been collected on the <u>same or consecutive days</u>

  - 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

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# CLABSI  Infection Window Period

- Defined as the 7-days during which all site-specific infection criteria must be met

- Includes the <u>day the **first** positive blood culture</u> was obtained, <u>3 calendar days before</u> and <u>3 calendar days after</u>

| 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 Event Date

- The <u>date of event</u> is the date the first element is used to meet the definition for the first time

- May or may not be the positive blood culture date

# 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 <u>added</u> 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

# NHSN HAI and POA Worksheet Generator

Based on the information you provided:

Admit Date: Tue Jan 01 2019

The event is: **HAI**

Date of Event: Fri Jan 04 2019

Infection Window Period: Tue Jan 01 2019 - Mon Jan 07 2019

Repeat Infection Timeframe (RIT): Fri Jan 04 2019 - Thu Jan 17 2019

Event Type: BSI

www.cdc.gov/nhsn

Admit date: 1/1/2019

| Hospital Day/Date | First Diagnostic Test | Infection Window Period (*) | Date of Event | Repeat Infection Timeframe (*) |
|---|---|---|---|---|
| 1. - 1/1/2019 - Admit Date | | ☐ | - | |
| 2. - 1/2/2019 | | ☐ | - | |
| 3. - 1/3/2019 | | ☐ | - | |
| 4. - 1/4/2019 | ✓ | ✓ | - HAI | |
| 5. - 1/5/2019 | | ☐ | - | |
| 6. - 1/6/2019 | | ☐ | - | |
| 7. - 1/7/2019 | | ☐ | - | |
| 8. - 1/8/2019 | | | - | |
| 9. - 1/9/2019 | | | | |
| 10. - 1/10/2019 | | | | |
| 11. - 1/11/2019 | | | | |
| 12. - 1/12/2019 | | | | |
| 13. - 1/13/2019 | | | | |
| 14. - 1/14/2019 | | | | |
| 15. - 1/15/2019 | | | | |
| 16. - 1/16/2019 | | | | |
| 17. - 1/17/2019 | | | - | |

- Enter 3 data points into Worksheet Generator:
  - Date of Admission
  - Date of first diagnostic test
  - Event type
- NHSN Generates a worksheet for you to enter additional data
- You must determine if the HAI definition is met

Start Over...    Back...    Print Friendly Window...    Generate Table...

# BSI Event Date

| Hospital Day/Date | First Diagnostic Test | Infection Window Period (*) | Date of Event | Repeat Infection Timeframe (*) |
|---|---|---|---|---|
| 12/30/2018 | | ☐ | - | |
| 12/31/2018 | | ☐ | - | |
| 1. - 1/1/2019 - Admit Date | | ☐ | - | |
| 2. - 1/2/2019 | ✓ | ☑ BC + Staph aureus | - POA | |
| 3. - 1/3/2019 | | ☐ | - | |
| 4. - 1/4/2019 | | ☐ | - | |
| 5. - 1/5/2019 | | ☐ | - | |
| 6. - 1/6/2019 | | | - | |
| 7. - 1/7/2019 | | | - | |
| 8. - 1/8/2019 | | | - | |
| 9. - 1/9/2019 | | | - | |
| 10. - 1/10/2019 | | | - | |
| 11. - 1/11/2019 | | | - | |
| 12. - 1/12/2019 | | | - | |
| 13. - 1/13/2019 | | | - | |
| 14. - 1/14/2019 | | | - | |
| 15. - 1/15/2019 | | | - | |

Automatically populates HAI or POA on date of event

BSI: POA
Date of Event: date of the first diagnostic test
Pathogen: Staph A

# CLABSI Event Date

| Hospital Day/Date | First Diagnostic Test | Infection Window Period (*) | | Date of Event | Repeat Infection Timeframe (*) | Secondary BSI Attribution Period (*) |
|---|---|---|---|---|---|---|
| 1. - 1/1/2019 - Admit Date | | ☐ | Central line inserted | - | | |
| 2. - 1/2/2019 | | ☐ | | - | | |
| 3. - 1/3/2019 | | ☑ | Fever 38.8 | - HAI | | |
| 4. - 1/4/2019 | ✓ | ☑ | BC + Staph epi | | | |
| 5. - 1/5/2019 | | ☐ | BC + Staph epi | - | | |
| 6. - 1/6/2019 | | ☐ | | - | | |
| 7. - 1/7/2019 | | ☐ | | - | | |
| 8. - 1/8/2019 | | | | - | | |
| 9. - 1/9/2019 | | | | - | | |
| 10. - 1/10/2019 | | | | - | | |
| 11. - 1/11/2019 | | | | - | | |
| 12. - 1/12/2019 | | | | - | | |
| 13. - 1/13/2019 | | | | - | | |
| 14. - 1/14/2019 | | | | - | | |
| 15. - 1/15/2019 | | | | - | | |
| 16. - 1/16/2019 | | | | - | | |

Remember:
The date of event is the date the first element is used to meet the definition for the first time

# Primary and Secondary Examples

| Hospital Day/Date | First Diagnostic Test | Infection Window Period (*) | | Date of Event | Repeat Infection Timeframe (*) | Secondary BSI Attribution Period (*) |
|---|---|---|---|---|---|---|
| 1. - 1/1/2019 - Admit Date | | ☐ | | - | | |
| 2. - 1/2/2019 | | ☐ | | - | | |
| 3. - 1/3/2019 | | ☑ | Dysuria | - HAI | | |
| 4. - 1/4/2019 | ✓ | ☑ | Urine culture >100,000cfu/ml E. faecalis | - | | |
| 5. - 1/5/2019 | | ☐ | | - | | |
| 6. - 1/6/2019 | | ☐ | | - | | |
| 7. - 1/7/2019 | | ☐ | | - | | |
| 8. - 1/8/2019 | | | | - | | |
| 9. - 1/9/2019 | | | | - | | |
| 10. - 1/10/2019 | | | | - | | |
| 11. - 1/11/2019 | | | Blood culture E. faecalis/Yeast | - | | Blood Culture E. faecalis/Yeast |
| 12. - 1/12/2019 | | | | | | |
| 13. - 1/13/2019 | | | | | | |
| 14. - 1/14/2019 | | | | | | |
| 15. - 1/15/2019 | | | | | | |
| 16. - 1/16/2019 | | | | | | |

UTI & Secondary BSI
DOE= 1/3/19
Pathogen: E. faecalis

Primary BSI
DOE = 1/11/19
Pathogen: Yeast

# Add Monthly CLABSI Summary Data to NHSN



**NHSN Home**

Alerts

Dashboard

Reporting Plan

Patient

Event

Procedure

Summary Data

Import/Export

Surveys

Analysis

Users

Facility

Group

Logout

**Denominators for Intensive Care Unit (ICU)/Other locations (not NICU or SCA)**

Mandatory fields marked with *

Facility ID *: California General Hospital (ID 15633) ▾
Location Code *: .A7W.W1 - IUC-SURG/MED1
Month *: July ▾
Year *: 2017 ▾

Add

Find

Report No Events

Total Patient Days: 100
Central Line Days: 50
Urinary Catheter Days: 120
Ventilator Days:
APRV Days:
Episodes of Mechanical Ventilation:
Mechanical Ventilation:

CLABSI: ☐
CAUTI: ☐
VAE: ☐
PedVAP: ☐

Custom Fields ? Help

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

# Optional: Denominator Data Sampling

**How to sample**: Count the number of the location patient days and the number of central lines on a designated day each week. Not on Saturday or Sunday. Add those numbers for the month and enter here.

1. Enter Monthly patient days for this location based on daily collection

| Denominator Data | | Report No Events |
|---|---|---|
| Total Patient Days: | 450 | |
| Central Line Days: | 32 | CLABSI: ☐ |
| Urinary Catheter Days: | | CAUTI: ☐ |
| Ventilator Days: | | VAE: ☐ |
| | | PedVAP: ☐ |

5. NHSN will estimate the central line days for the month

| Sample Values For Estimating Denominator Data | | Check Box(es) if Sampling Used |
|---|---|---|
| Sample Patient Days *: | 300 | |
| Sample Central Line Days *: | 21 | ☑ |
| Sample Urinary Catheter Days: | | ☐ |

2. Check Box if sampling is used
3. Enter sampled total patient-days
4. Enter sampled total central line days

*Note: Sampling may not be used for NICU or specialty care areas/oncology*

# Add CLABSI Event to NHSN

**NHSN Home**

- Alerts
- Dashboard
- Reporting Plan ▶
- Patient ▶
- Event ▶
- Procedure ▶
- Summary Data ▶
- Import/Export
- Surveys ▶
- Analysis ▶
- Users ▶
- Facility ▶
- Group ▶
- Logout

**Add Event**

- Add
- Find
- Incomplete

Mandatory fields marked with *
Fields required for record compl...
Fields required when in Plan ma...

Facili...
Patie...
Secon...
Las...
Middl...
Ge...
E...

- 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

**Event Information**

Event Type *: BSI - Bloodstream Infection ▼
Post-procedure: N - No ▼
MDRO Infection Surveillance *: No, this infection's pathogen/location are not in-plan for Infec...
Location *: 5 NORTH - MICU ▼
Date Admitted to Facility >: [____] 📅

**Risk Factors**

Central line *: Y - Yes ▼
Any hemodialysis catheter present: Y - Yes ▼
Location of Device Insertion: ED - EMERGENCY DEPARTMENT (ED) ▼
Date of Device Insertion: [____] 📅

**Event Details**

Specific Event >: LCBI - Laboratory confirmed bloodstream infection ▼

# NHSN CLABSI Analysis Reports

**NHSN Home**
- Alerts
- Dashboard
- Reporting Plan ▶
- Patient ▶
- **Event** ▶
- Procedure ▶
- Summary Data ▶
- Import/Export
- Surveys ▶
- Analysis ▶
- Users ▶
- Facility ▶
- Group ▶
- Logout

**Add Event**

Mandatory fields marked with *
Fields required for record compl...
Fields required when in Plan ma...

Add
Find
Incomplete

Faci...
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Central line *: Y - Yes ▼
Any hemodialysis catheter present: Y - Yes ▼
Location of Device Insertion: ED - EMERGENCY DEPARTMENT (ED) ▼
Date of Device Insertion: [           ] 4

**Event Details**

Specific Event >: LCBI - Laboratory confirmed bloodstream infection ▼

# 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 needed additional interventions



Sample: California General Hospital CLABSI Progress 2015 - 2018
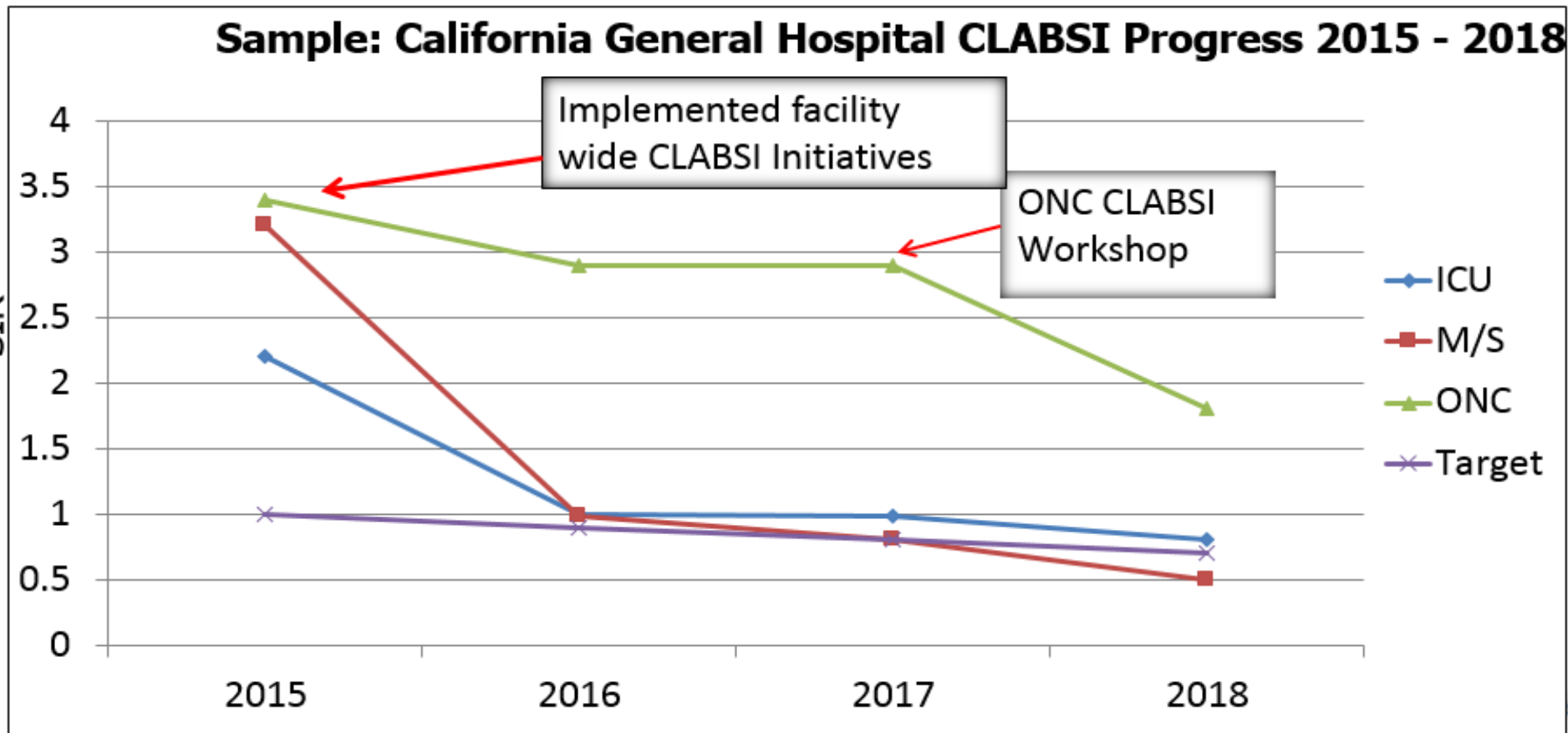
# CLABSI Surveillance Summary

- 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
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