

# Behind the Mask:

## *Fundamentals of a Successful CLABSI Prevention Program*

Terry Micheels MSN, RN, FAPIC

Alisha Sheffield BSN, RN, CIC

Lauren Musil BSN, RN



# Meet our Subject Matter Experts



## **Terry Micheels MSN, RN, CIC, FAPIC**

Terry is a Masters-prepared registered nurse with 29 years' experience as an Infection Preventionist in acute care settings. Fourteen of her 29 years involved managing IPC programs for community- and academic multi-hospital systems, including outpatient and ambulatory services. She has been certified in Infection Control since 2009 and is a Fellow in APIC. She is currently an IPC Consultant. She has multiple publications and has presented at National Annual APIC Conferences, national IPC webinars and multiple regional conferences.



## **Alisha Sheffield BSN, RN CIC**

Alisha is an Infection Preventionist and Registered Nurse with 21 years of experience in a variety of healthcare settings including ambulatory, acute care, and surgical areas. Over the past 13 years, she has worked as an Infection Preventionist in outpatient surgery as well as at a large academic medical center. Her recent work has focused on utilizing her IPC expertise to develop infection control tools and resources to assist Infection Preventionists in under-resourced settings.



## **Lauren Musil BSN, RN**

Lauren is an Infection Preventionist with a background as Registered Nurse. She has a wide variety of healthcare experience having worked in neurology, neurosurgery, ambulatory surgery, home health and with the Nebraska Biocontainment unit. As an IP, her primary focus was in critical care, oncology, VAE prevention and as the IP to the Nebraska Biocontainment Unit. Her recent work has been spent in a grant funded role to develop innovative tools to aid IPs in rural and remote settings.



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  - Email
  - Discipline/Role
    - E.g., RN, BSN
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# Disclosure Declaration

We have no financial disclosures or conflicts related to this presentation.

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The views and opinions expressed during this webinar are those of the presenters and do not necessarily reflect those of the University of Nebraska Medical Center, The Nebraska Medical Center or the Centers for Disease Control and Prevention.



# Overall Series Objectives



Analyze the fundamental components of a robust infection prevention and control program



Interpret guidelines, regulatory requirements, and best practice literature for a successful application to the infection prevention program



Utilize identified strategies to incorporate best practice into Infection Prevention programs



Integrate Infection Prevention program data to target prevention and improvement strategies.



Combine acquired knowledge to enhance collaboration and teamwork within the healthcare system.

# IPC Program Objectives



Define CLABSI and its relevance to an IPC program.



Define the necessary elements of a CLABSI prevention program



Explore various roles and reporting structures to sufficiently report CLABSI data.



Utilize information presented to identify common gaps and opportunities for CLABSI.



Evaluate CLABSI program to ensure alignment with regulatory requirements.

# IPC Program Fundamentals

## Programmatic

Documents and Processes that support the program

## Implementation of Plan Boots on the Ground

Tasks that support the program





# What is a CLABSI? 4

CLABSI is the term used by the US Centers for Disease Control and Prevention's (CDC's) National Healthcare Safety Network (NHSN)



CLABSI

## Central Line Associated Blood Stream Infection

A laboratory confirmed bloodstream infection, unrelated to an infection at another site, that develops in a patient with a CVAD in place > two consecutive calendar days (following first access) in an inpatient location during admission.

## Catheter Related Blood Stream Infection

A clinical definition, used when diagnosing and treating patients, that requires specific laboratory testing identifying the catheter as the source of the BSI.



CRBSI



# Burden of CLABSI in Acute Care

## Background <sup>13</sup>

Insertion of CVADs is one of the most common procedures performed at the patient's bedside.

The majority of CLABSIs occur in hospital units outside of the ICU, despite greater risks associated with the ICU setting.

The risk of developing a CLABSI extends from the insertion procedure to all aspects of device and site care during the CVADs dwell time.

# Burden of CLABSI in Acute Care

Increased length of hospital stay<sup>12</sup>

Increased cost<sup>7</sup>

- CLABSIs are associated with increased healthcare cost with each case accounting for approximately \$46,000

Increased morbidity and mortality<sup>22</sup>

- CLABSIs carry a mortality rate of 12%-15%



# IPs Role in CLABSI Oversight <sup>5</sup>

Centers for Medicare and Medicaid Services, State Operations Manual for Hospitals and Critical Access Hospitals:



The Infection Preventionist is responsible for the prevention and control of HAIs, including auditing of adherence to infection prevention and control policies and procedures by hospital personnel



# NHSN Central Line Definition<sup>15</sup>

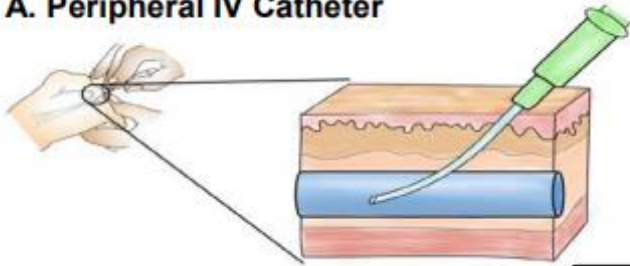
An intravascular catheter that terminates at or close to the heart, or in one of the great vessels AND is used for infusion, withdrawal of blood, or hemodynamic monitoring.

- Aorta
- Pulmonary artery
- Superior vena cava
- Inferior vena cava
- Brachiocephalic veins
- Internal jugular veins
- Subclavian veins
- External iliac veins
- Common iliac veins
- Femoral veins
- In neonates, the umbilical artery/vein

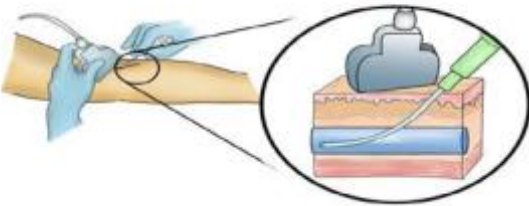


# Vascular Access Devices 20

**A. Peripheral IV Catheter**



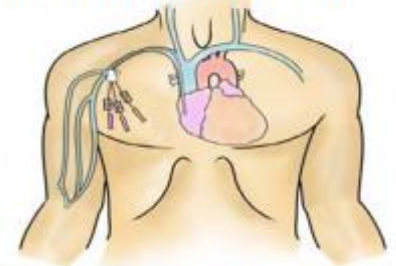
**B. US-Guided Peripheral IV Catheter**



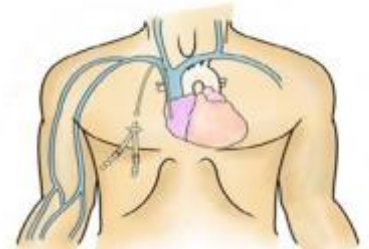
**C. Midline Catheter**



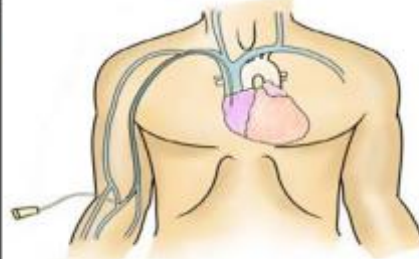
**D.1 Non-Tunneled Central Venous Catheter**



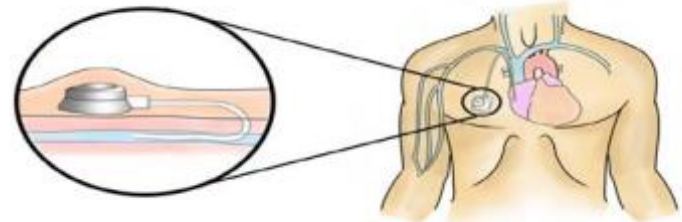
**D.2 Tunneled Central Venous Catheter**



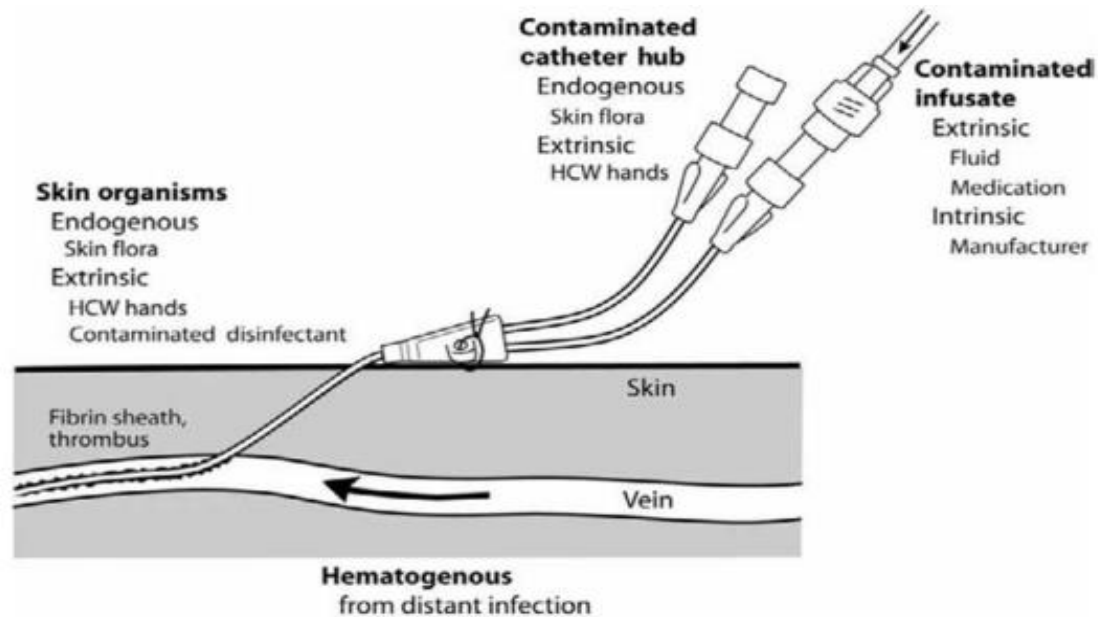
**Peripherally Inserted  
Central Catheter (PICC)**



**E. Implanted Port**



# Four Recognized Routes for Catheter Contamination <sup>8</sup>



## Routes for Central Venous Catheter Contamination with Microorganisms

Potential sources of infection of a percutaneous intravascular device (IVD): the contiguous skin flora, contamination of the catheter hub and lumen, contamination of infusate, and hematogenous colonization of the IVD from distant, unrelated sites of infection. HCW: health care worker.

**Source:** Crnich CJ, Maki DG. The promise of novel technology for the prevention of intravascular device-related bloodstream infection. I. Pathogenesis and short-term devices. *Clin Infect Dis*. 2002 May 1;34(9):1232–1242 by permission of the Infectious Diseases Society of America.



# CLABSI Risk Factors 2, 11, 17

Intrinsic Risk Factors	Extrinsic Risk Factors
Patient's age - Prematurity	Prolonged hospitalization before CVAD insertion
Underlying diseases or conditions, specifically <ul style="list-style-type: none"><li>- Chemotherapy</li><li>- Immunosuppression</li></ul>	Femoral or internal jugular access site
	Substandard Catheter care (Maintenance)
	Parenteral nutrition
Body mass index (BMI > 40)	Multiple CVADs
	Heavy microbial colonization at insertion site and catheter hub
	Multi-lumen CVADs (> 2 lumens)
	Lack of maximal sterile barriers for line insertion
	Prolonged duration of catheterization



# Common CLABSI Pathogens <sup>4, 11</sup>

## Gram positive cocci

Most frequent isolated organisms contributing to CLABSI

Coagulase-negative Staphylococci is the most prevalent

Others – Staphylococcus aureus, Enterococci

## Gram negative bacilli

Accounts for 19% and 21% of CLABSIs reported to CDC

## Antimicrobial resistance

Problematic for all common pathogens causing CLABSI

MRSA – incidence is decreasing

Gram negative rods have increased significantly

Fungemia with increasing fluconazole resistance

# Regulatory Considerations <sup>5</sup>

Meaningful data requires strict adherence to NHSN definitions

Several states have a CLABSI (HAI) reporting mandate. Hospitals must abide by their state's reporting requirements

CMS requires CLABSI (HAI) reporting via NHSN for participating acute care hospitals

\*Required quarterly NHSN reporting, includes denominator data (patient days, central line days)



# Hospital Onset Bacteremia <sup>19, 22</sup>

Bacteremia is the presence of bacteria in the blood as evidenced by a positive blood culture.

- Transient, intermittent or persistent
- Higher case burden than CLABSI
- Proposed Safety measure
  - Reported electronically regardless of bacterial or fungal source
  - NHSN Collaborative (or NHSNCoLab) HOB module anticipated to be available to hospitals some time in 2024
    - Preliminary: growth of a recognized bacterial or fungal pathogen (non-commensal) from a blood culture specimen obtained on day 3 of admission or after
- Sources: Device-related, procedure-related, pneumonias, other sources (implants/foreign body, contaminates)



# IPC Program Oversight - Reporting

Partner with units and staff that insert and care for central lines

- Provide Unit-specific incidence of CLABSI
- Promotes a culture of ownership

Partner in prevention strategies

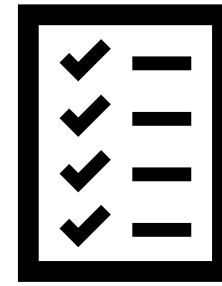
- Insertion bundles & kits
- Line maintenance bundles
- Horizontal measures

Product Selection & Evaluation

- Must allow the IP to provide necessary input into decisions related to infection prevention
- Product standardization



# Gap Analysis



- A GAP analysis compares the actual performance with the desired performance
- Can be applied at a system level or at a department level.
- GAP tool based upon national guidelines
  - Consider Quality of Evidence
  - Compare current practices to evidenced-based practices
- Prioritize by the strength of evidence
- Rank order opportunities



# Quality of Evidence <sup>2</sup>

Category	Definition
HIGH	Highly confident that the true effect lies close to that of the estimated size and direction of the effect. Evidence is rated as high quality when there are a wide range of studies with no major limitations, there is little variation between studies, and the summary estimate has a narrow confidence interval.
MODERATE	The true effect is likely to be close to the estimated size and direction of the effect, but there is a possibility that it is substantially different. Evidence is rated as moderate quality when there are only a few studies and some have limitations but not major flaws, there is some variation between studies, and/or the confidence interval of the summary estimate is wide.
LOW	The true effect may be substantially different from the estimated size and direction of the effect. Evidence is rated as low quality when supporting studies have major flaws, there is important variation between studies, the confidence interval of the summary estimate is very wide, and/or there are no rigorous studies.

Prioritize process improvement efforts by focusing on recommendations categorized as 'high' quality of evidence

- These should be adopted by all acute care hospitals
- The potential to affect CLABSI risk outweighs the potential for undesirable effects

'Moderate' or 'Low' quality of evidence may be implemented by select patient populations, settings or unit-based interventions.



# CLABSI Targeted Assessment for Prevention (TAP)

Training	
7. Does your facility provide <i>training</i> on <b>insertion</b> of central lines for all healthcare personnel with this responsibility at least once per year?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown
8. Does your facility conduct a <i>knowledge assessment</i> (e.g., quiz, test) on <b>insertion</b> of central lines for all healthcare personnel with this responsibility at least once per year?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown
9. Does your facility conduct a <i>skills assessment</i> (i.e., personnel demonstration of tasks) on <b>insertion</b> of central lines for all healthcare personnel with this responsibility at least once per year?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown
10. Does your facility provide <i>training</i> on <b>maintenance</b> of central lines for all healthcare personnel with this responsibility at least once per year?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown
11. Does your facility conduct a <i>knowledge assessment</i> (e.g., quiz, test) on <b>maintenance</b> of central lines for all healthcare personnel with this responsibility at least once per year?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown
12. Does your facility conduct a <i>skills assessment</i> (i.e., personnel demonstration of tasks) on <b>maintenance</b> of central lines for all healthcare personnel with this responsibility at least once per year?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown



# CLABSI Prevention Committees

- Internal, multidisciplinary team targeting CLABSI improvement efforts
- Quality improvement framework
  - Systematic improvements
  - Standardize processes
  - Reduce variability
  - Achieve results
  - Improve outcomes
- Application of evidence-based guidelines
- Sustain the change
- CLABSI case review by missed opportunities
  - e.g. CVAD duration longer than needed





# What is the Difference?

## Policy



- High-level, broad, general, concise
- Outlines organizations intent on a topic
- Provides a framework that can adapt to changes
- Guides decision making
- Ensures coordinated compliance with applicable laws and regulations

## Procedure



- Specific, Detailed
- Specify how a task or process is carried out- step by step
- Step by step instructions to follow when completing a task
- Less flexible
- Standardize processes for consistency



# Intravascular Catheter Policies

May include all catheters not just central lines

- E.g., midlines, peripheral IVs, peripheral arterial lines, umbilical, etc.

Should address all phases of line lifespan

- Insertion
- Maintenance/Dwell
- Removal

Additional policies/procedures likely also needed

# Sample Central Line- Policy & Procedure(s)

## Indications for Central Line Use

- Antibiotic therapy
- Chemotherapy
- Parental nutrition
- Emergent
- Evaluate for line necessity

## CVC Types

- Non-tunneled
  - PICC
  - Subclavian
  - IJ/EJ
  - Femoral
- Tunneled
  - HD
  - Ports

## Anatomical Considerations

- Limb alerts

## Catheter Care & Maintenance

- Flushing
- Site Assessment
- Dressing Changes
- Blood Draws
- Occlusion Management

## Administration sets/tubing care

- Frequency of tubing changes

## Bundles/Checklists

- Insertion
- Maintenance

## Removal

- Protocol for patient safety

## Documentation

- Continued need of line
- Audit logs



# Essential Elements of Surveillance:

Assess & Define	Population Period of Observation
Select	Events to monitor Methodology
Apply & Identify	Case definition/ criteria (NHSN definitions) Data elements to be collected
Determine	Methods for data analysis

# BSI Surveillance



Use consistent surveillance methods and definitions to benchmark data<sup>2</sup>

Reference NHSN for standardized definitions and methods



Survey units who tend to care for patients with intravascular catheters AND central lines

Both ICU & non-ICU settings<sup>2</sup>



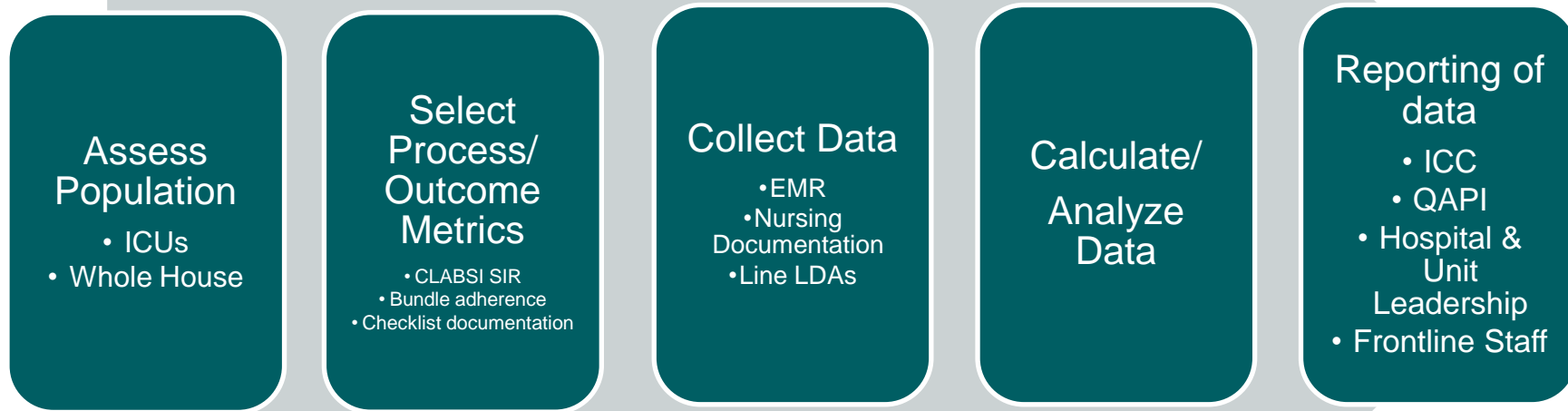
Partner with microbiology lab for timely organism identification



Capture complete & accurate data to monitor for bsi incidence.

Utilize SIR and line lists

# CLABSI Surveillance<sup>29</sup>



# NHSN Surveillance Definition <sup>15</sup>

- CLABSI- infection that originates from or is related to a CVC
- Surveillance definition does NOT always match clinical definition of CRBSI
- Utilize updated Patient Safety Component Manuals
  - Chapter 4 in 2024 manual
  - Utilize CDC's master organisms list to distinguish microorganisms
  - Chapter 17 for secondary sites

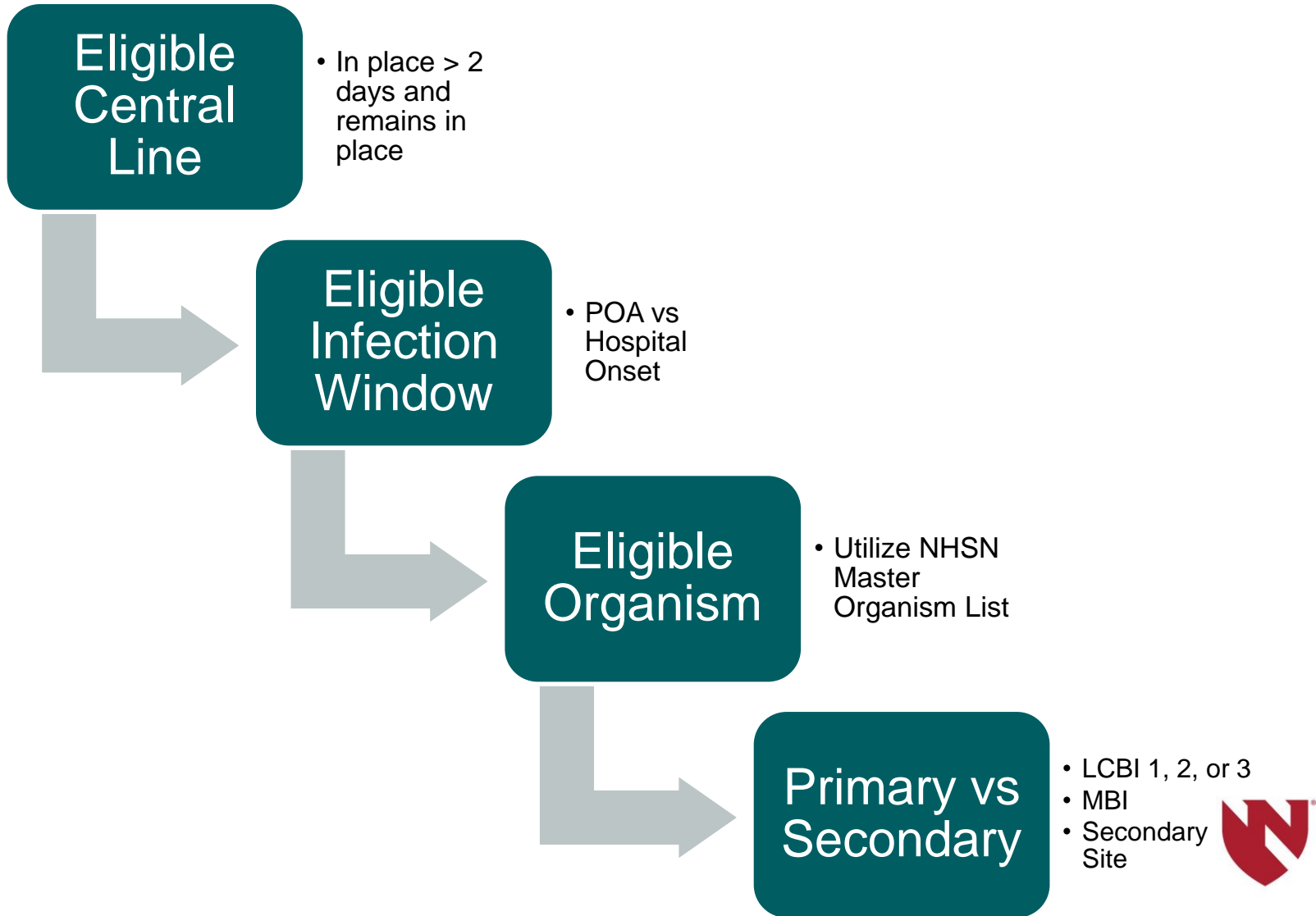


# Supporting Resources

Resource	Where to Find
BSI Events Page	<a href="https://www.cdc.gov/nhsn/psc/bsi/index.html">https://www.cdc.gov/nhsn/psc/bsi/index.html</a> -
NHSN Email Address	<a href="mailto:nhsn@cdc.gov">nhsn@cdc.gov</a>
Patient Safety FAQ	<a href="https://www.cdc.gov/nhsn/faqs/faq-index.html">https://www.cdc.gov/nhsn/faqs/faq-index.html</a> -
NHSN Educational Roadmap- BSI	<a href="https://www.cdc.gov/nhsn/training/roadmap/psc/bsi.html">https://www.cdc.gov/nhsn/training/roadmap/psc/bsi.html</a> -
APIC Implementation Guide- CLABSI	<a href="https://apic.org/Resource_/TinyMceFileManager/2015/APIC_CLABSI_WEB.pdf">https://apic.org/Resource_/TinyMceFileManager/2015/APIC_CLABSI_WEB.pdf</a> -
APIC Education Courses	<a href="https://apic.org/education-and-events/epi-education-series/">https://apic.org/education-and-events/epi-education-series/</a>
State Health Departments	



# BSI Criteria to Meet<sup>15</sup>



# Primary vs Secondary BSI<sup>15</sup>

Primary BSI- Organism cultured from the blood that is not related to an infection at another site

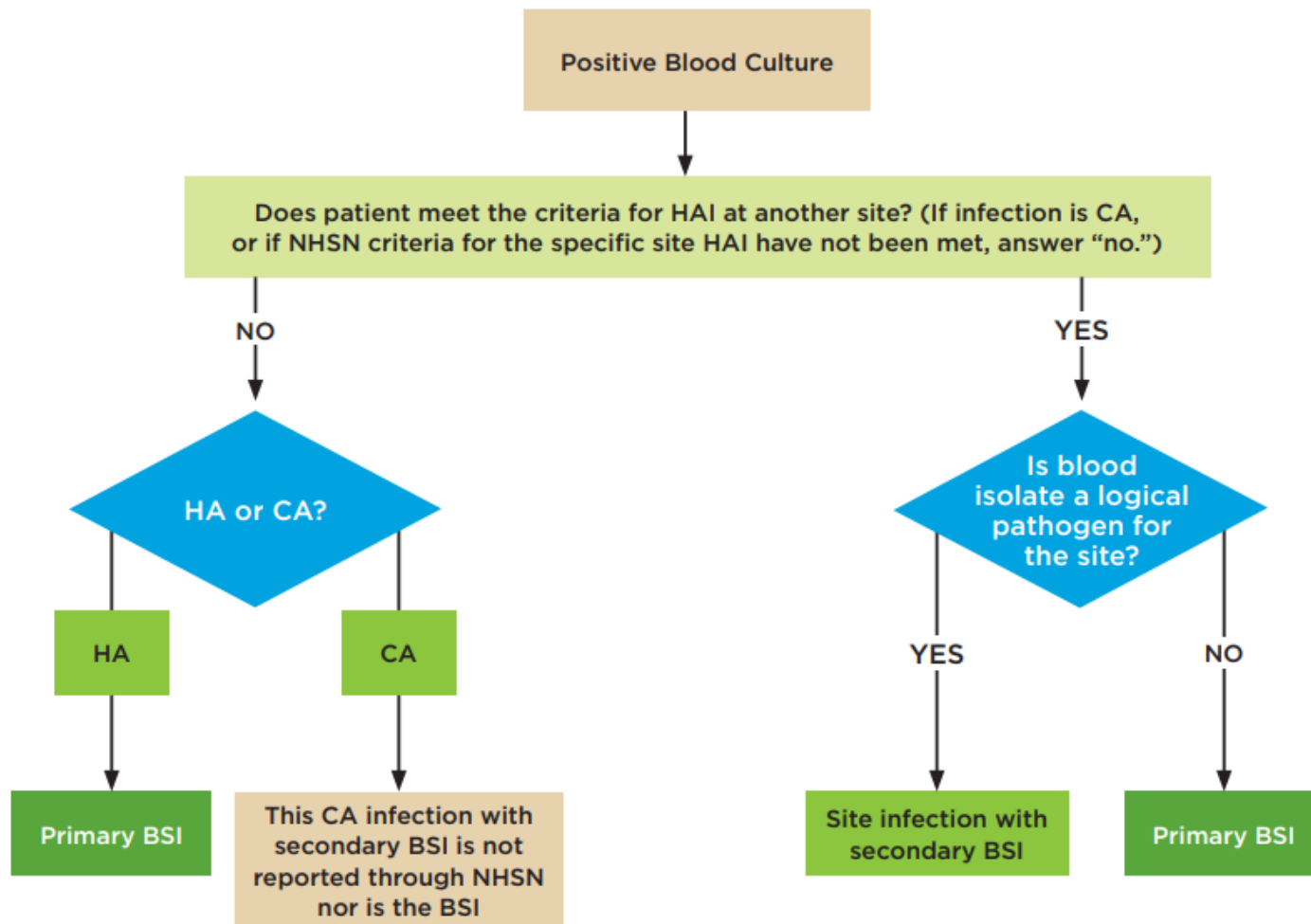
- Laboratory Confirmed Bloodstream Infection (LCBI)
  - LCBI 1
  - LCBI 2
  - LCBI 3

Secondary BSI- Bloodstream infection that is not reported as an LCBI because it is associated with a site-specific infection at another body site which has seeded the bloodstream.

- Utilize Chapter 17 in NHSN PSC Manual
- E.g., BONE, JNT, ENDO



Figure 3.2. Flowchart for Identification of CLABSI, CDC, NHSN



BSI= bloodstream infection  
CA = community acquired  
HA = healthcare associated  
HAI = healthcare-associated infection



# Surveillance & Contamination<sup>9</sup>



Frequent 1 of 2 or 2 of 2 blood cultures +  
for common commensals



May indicate practice issues (e.g., unit-  
specific, phlebotomy vs nursing, etc.)



Potential for inappropriate antibiotic  
therapy and treatment (e.g., line removal)

# What are Bundles<sup>23, 24, 25</sup>


- Grouping of evidence-based practices aimed at improving practice and decreasing HAI.
- Consistent application can lead to significant and sustained reductions in CLABSI rates.
- Bundles alone do not lead to improved practice cite article
  - Bundle policy
  - Ongoing adherence monitoring
  - > 95% compliance



# What are Checklists<sup>24</sup>?

- Checklist used to supplement bundle
- Usually includes additional practices
- Allows broad bundle strategies to be aligned and detailed

Figure 5.1. Example of a Facility-Specific Central Line Insertion Checklist



Johns Hopkins Hospital  
 Johns Hopkins Bayview  
 Other: \_\_\_\_\_

**Central Line Insertion Care Team Checklist**

Date \_\_\_\_\_ Time \_\_\_\_\_ Addressograph \_\_\_\_\_

TYPE OF LINE PLACED \_\_\_\_\_ REWIRE  LOCATION OF LINE \_\_\_\_\_ # OF LUMENS \_\_\_\_\_

<b>CRITICAL STEPS</b>		Yes ✓	Yes with Reminder ✓ (If No-add a comment)
Directions: The Assistant completes this checklist by indicating with a checkmark in the appropriate column when the task is performed. If the task is not performed, a comment must be added. The Supervisor may also function as the Assistant who completes this form.			
1. Perform a time out using the informed consent form.			
2. Clean hands			
3. Wear cap, mask, sterile gown/gloves, and eye protection if in contact with or crossing the sterile field *at any time during the procedure. a. All others entering the room during the procedure must wear cap and mask.			
4. Prep site with chlorhexidine and let air dry. (*See instructions)			
5. Drape patient from head to toe using sterile technique.			
6. Prepare catheter by pre-flushing and clamping all lumens not in use during procedure.			
7. Place patient in trendelenburg position unless contraindicated (e.g., increased ICP) or if femoral/ PICC (place supine and flat).			
8. Maintain sterile field.			
9. Ensure grasp on guide wire is maintained throughout procedure and removed post procedure.			
10. Aspirate blood from all lumens, flush, and apply sterile caps.			
11. Ensure venous placement. (*See instructions)			
12. Clean site with chlorhexidine, apply sterile dressing, and apply sterile caps on all hubs.			

\*Checklist instructions located on back of form

Operator \_\_\_\_\_ Supervisor \_\_\_\_\_ Assistant \_\_\_\_\_

Comments:

# How to develop a bundle<sup>23, 26, 27</sup>



Multidisciplinary group e.g., CLABSI reduction team



Gap Analysis

- Staff knowledge
- Products
- Patient demographics



Literature review



Collate information & prioritize initiatives

# Sample Insertion Bundle<sup>2, 25</sup>

Insertion  
Checklist  
(Moderate)

Preferred site  
identification-  
Subclavian  
(High)

Hand hygiene  
(Moderate)

Skin prep-  
Alcoholic CHG  
(High)

Maximal barrier  
precautions  
(Moderate)

Ultrasound  
guidance (High)

Standardized-  
inclusive  
insertion kits  
(Moderate)





# Sample Maintenance Bundle<sup>2</sup>

Daily CHG  
Bathing (High)

Daily  
Assessment for  
continued need  
(Moderate)

CHG Containing  
dressings in  
place and  
correct (High)

Port, hub,  
connection  
disinfection  
(Moderate)

Administrative  
tubing  
management  
(High)



# Additional approaches<sup>2</sup>



Consider if CLABSI rates remain elevated



Perform risk assessment prior to implementation<sup>1</sup>



Consider conducting business case to determine cost vs benefit

Antimicrobial-impregnated CVCs (HIGH)

Antimicrobial lock therapy for long-term CVCs (HIGH)

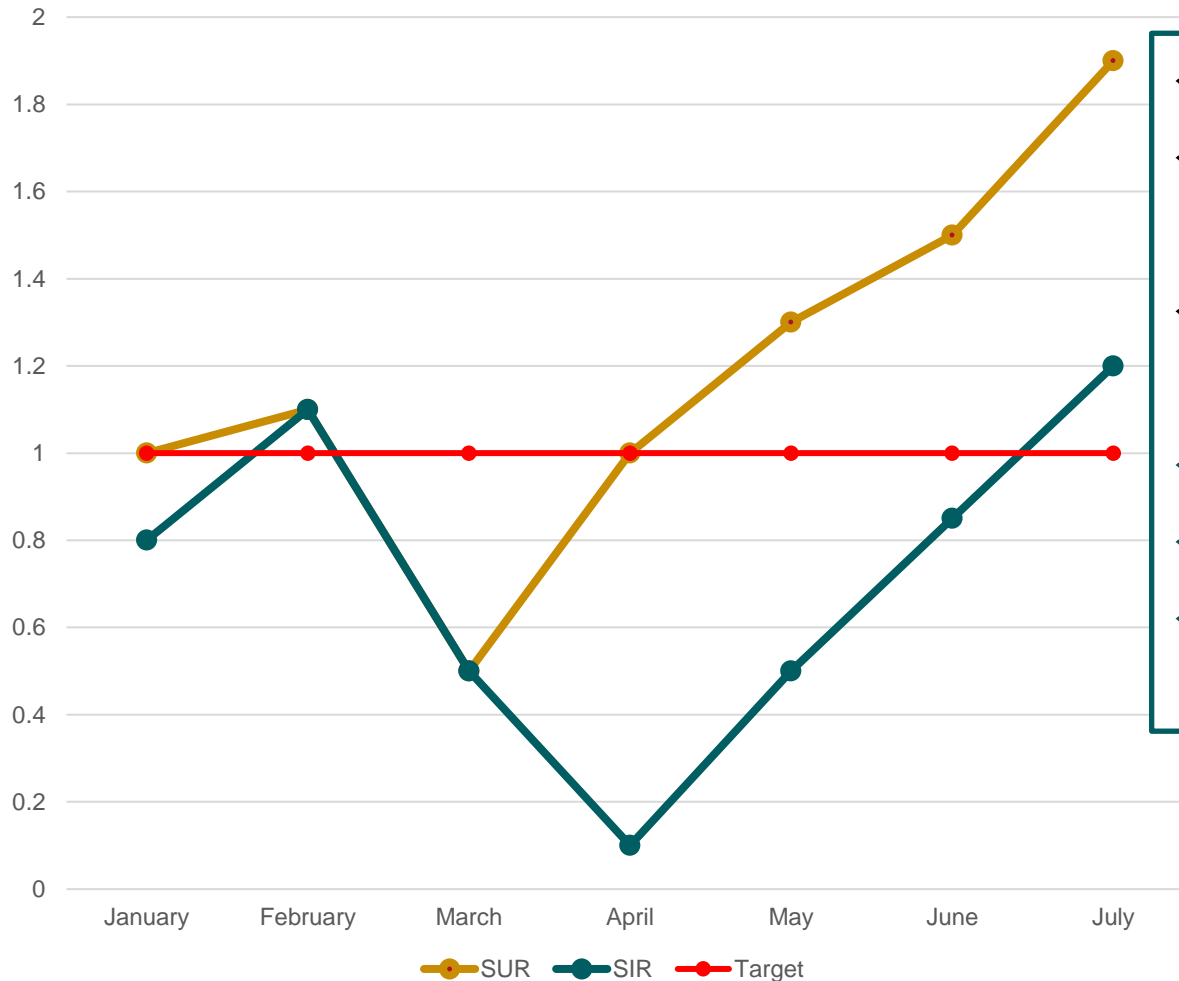
Vascular access teams for reducing CLABSI rates (LOW)

Antiseptic containing hub/connectors caps (MODERATE)

# Case Study



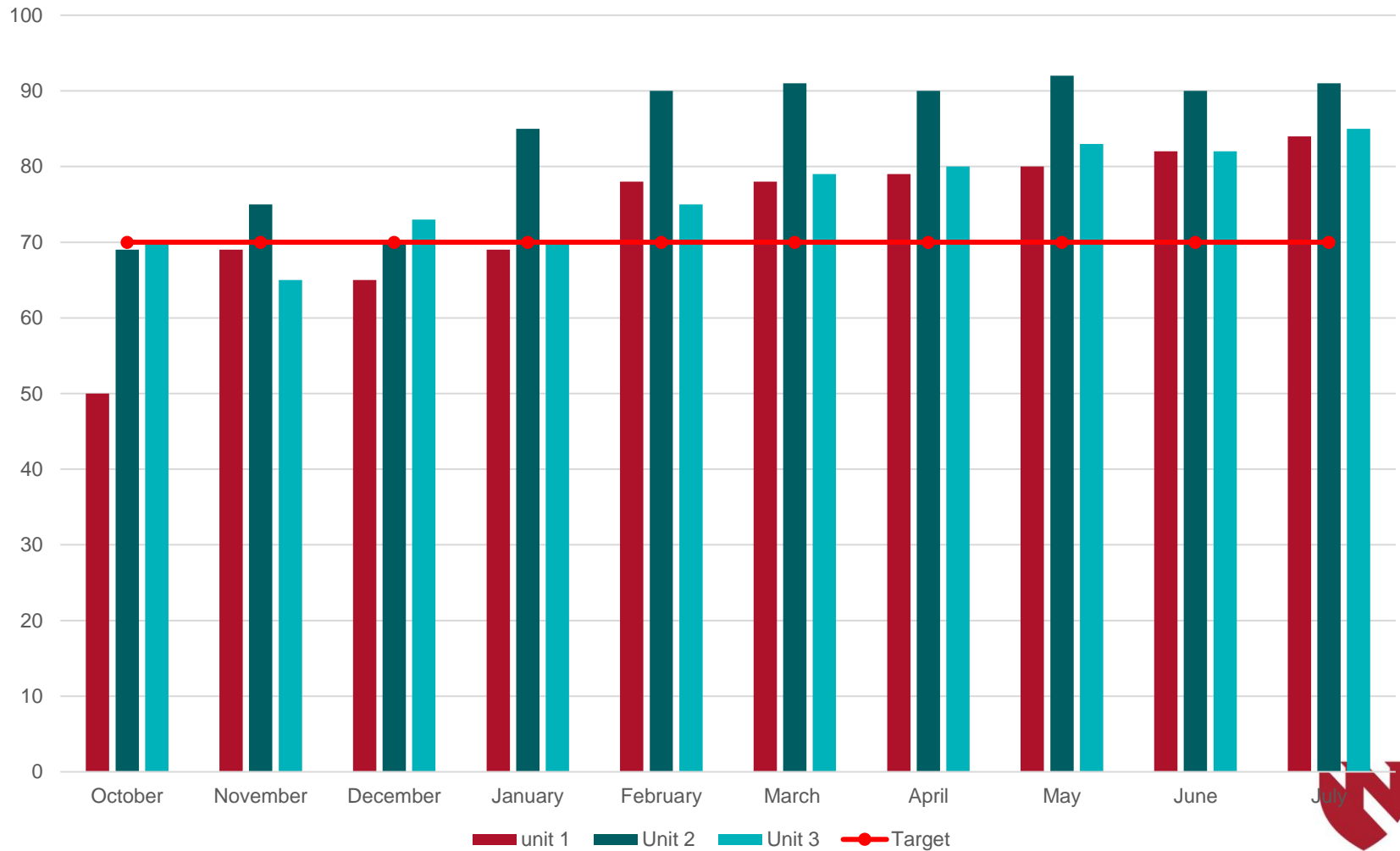
# Hospital CLABSI Data

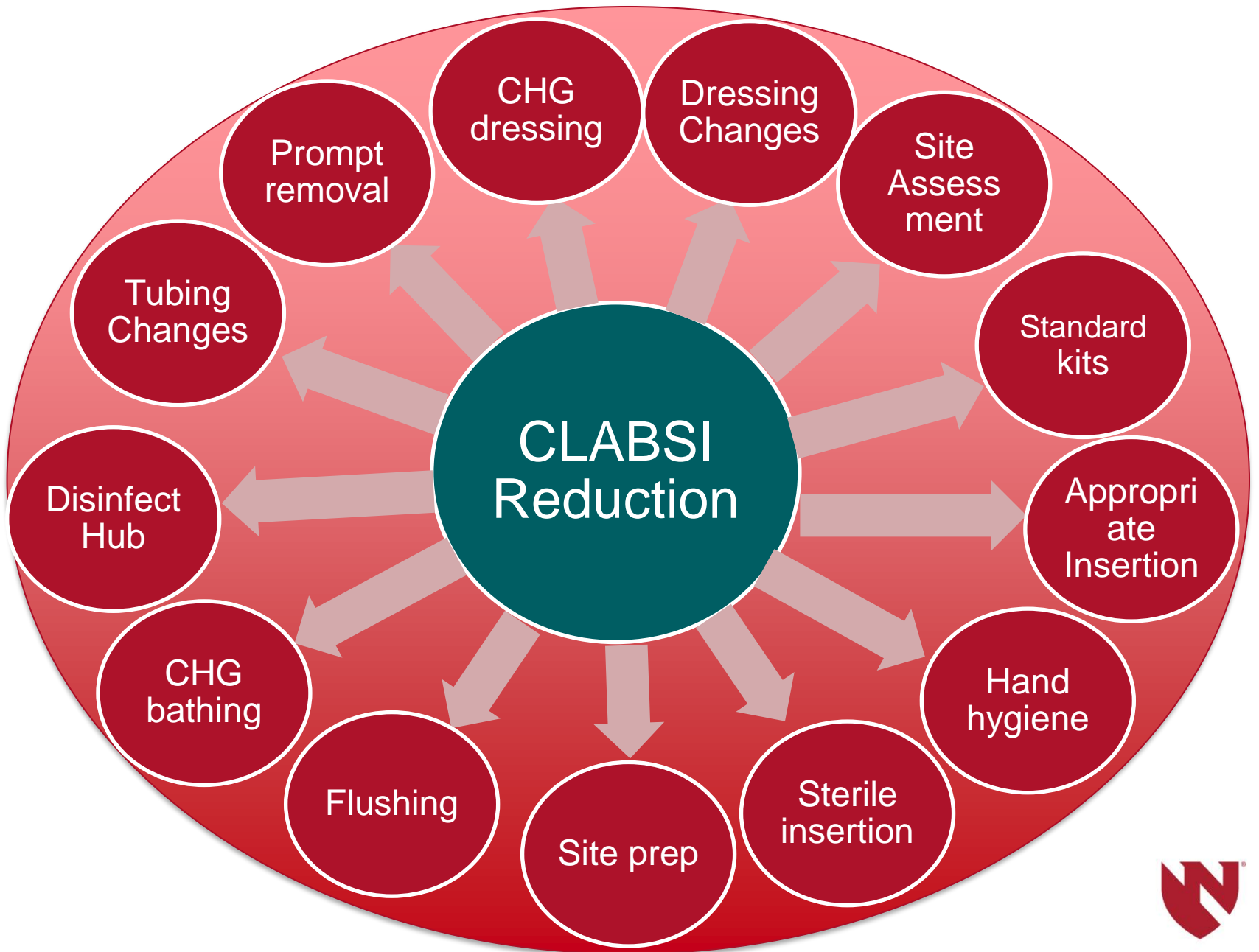


- ✓ IP rounds
- ✓ Trend Identification
- ✓ Targeted rounds
- ✓ Data Review
- ✓ Gap Analysis
- ✓ Intervention

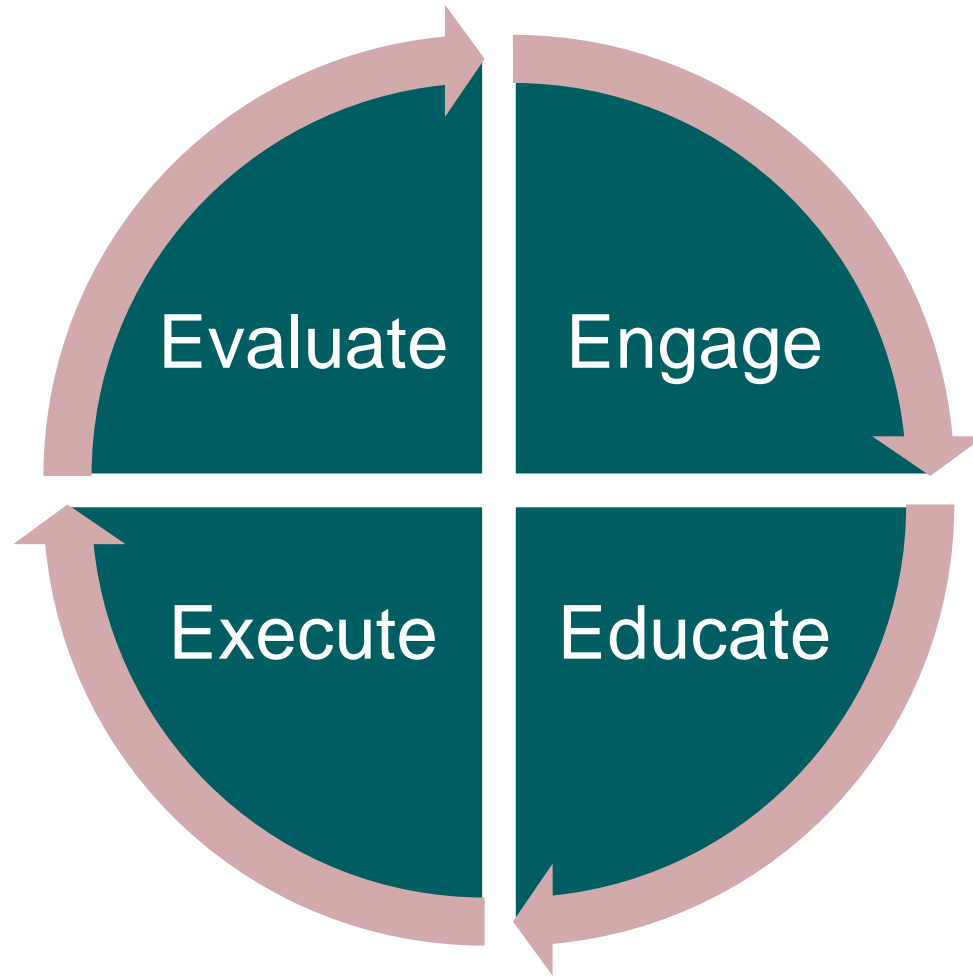


# CHG Bathing Compliance





# Programmatic Implementation



Evaluate

Engage

- Support for initiative
- Frontline staff
- Leadership support

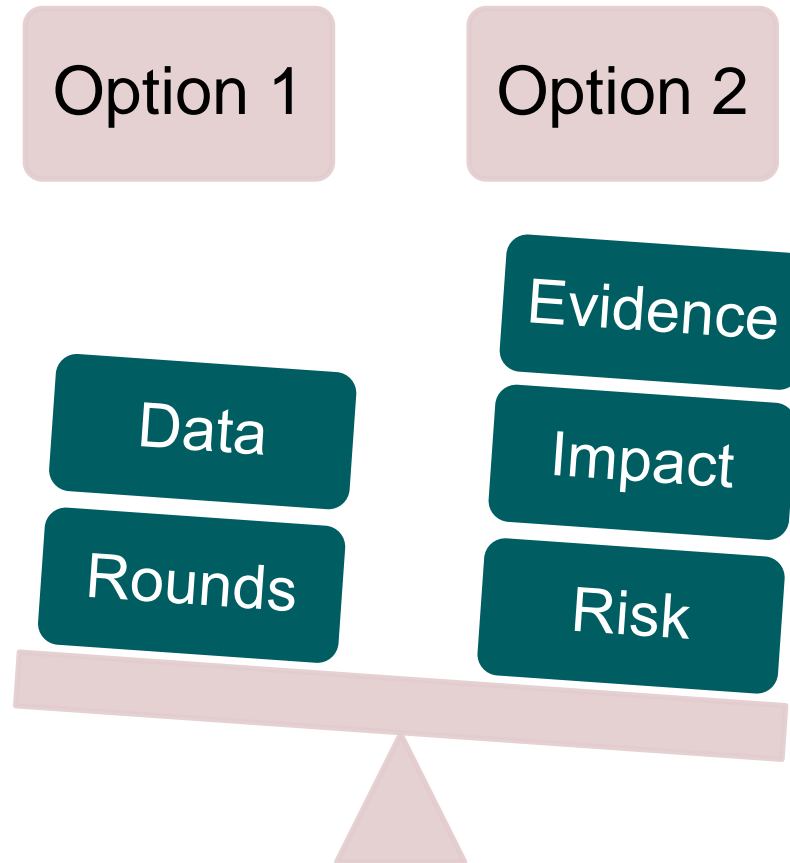
Execute

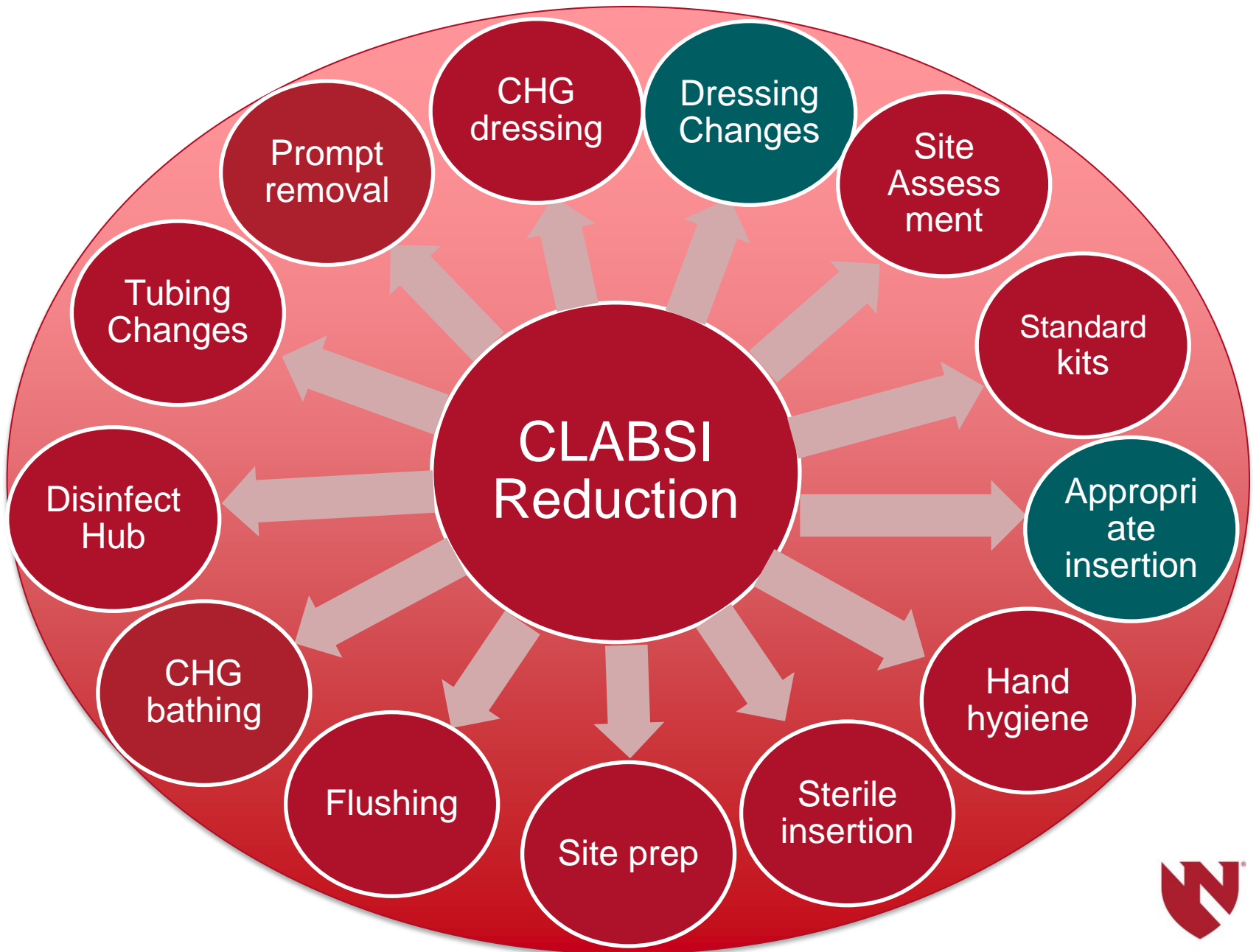
Educate





# Prioritizing Interventions





# Engage

## Narrow focus

- Appropriate indication and selection for insertion
- Dressing changes

## Set Standard

- Policy and Procedures

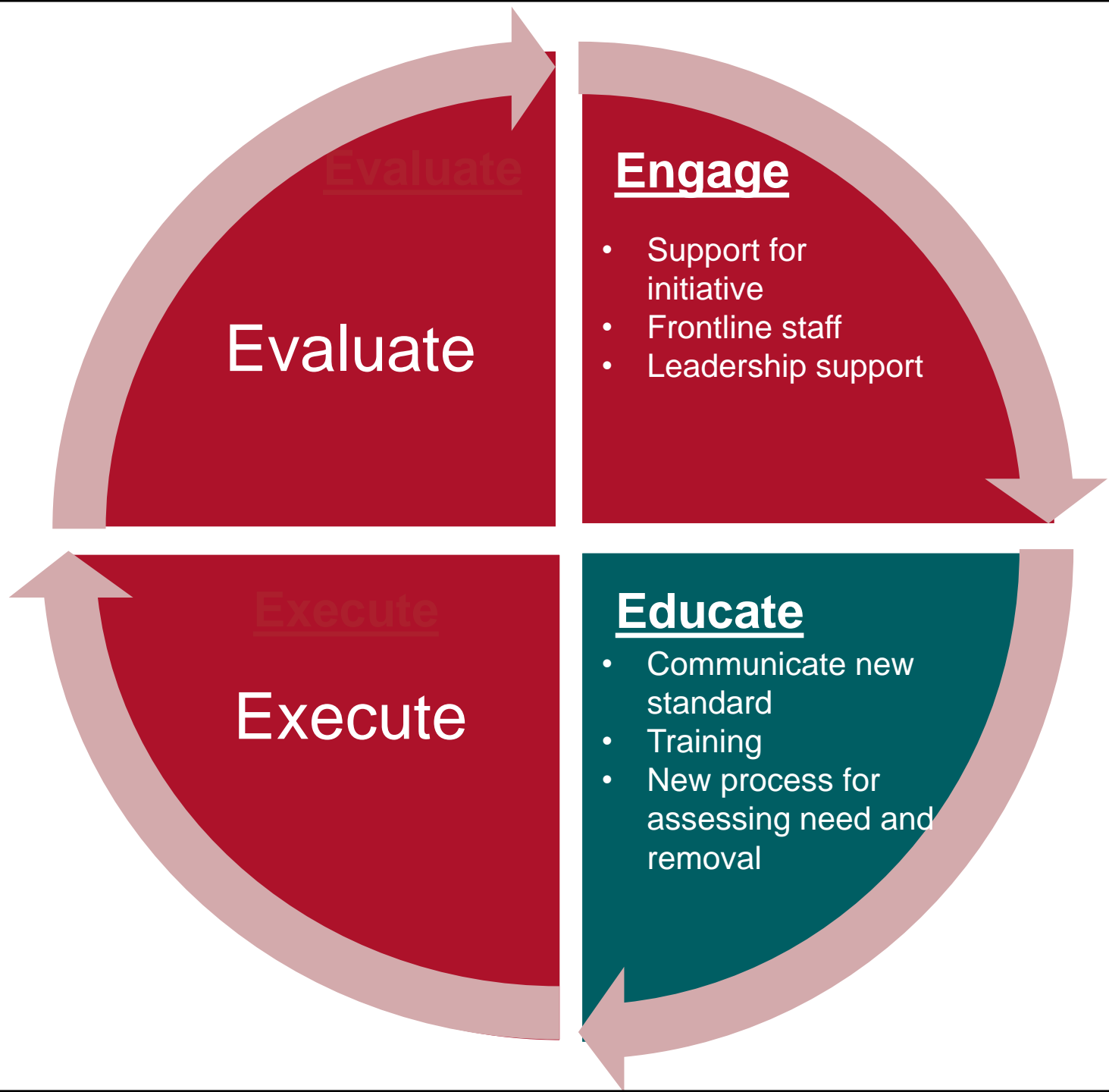
## Standardized tools

- Competency Checklist
- Algorithm
- Bundles

## Evaluate current compliance

- Audit
- Chart Review
- Data

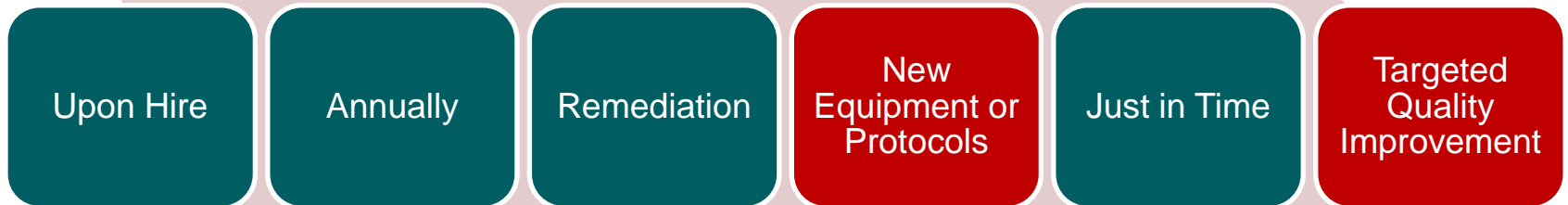




# Education and Training

What	Who
Policies & Procedures	Clinical Personnel
Identified opportunities and gaps	Physicians/ APP
New Algorithm	Contract Service/ Travel Staff
Competency Based dressing change education	

## When



# Education and Training Employee

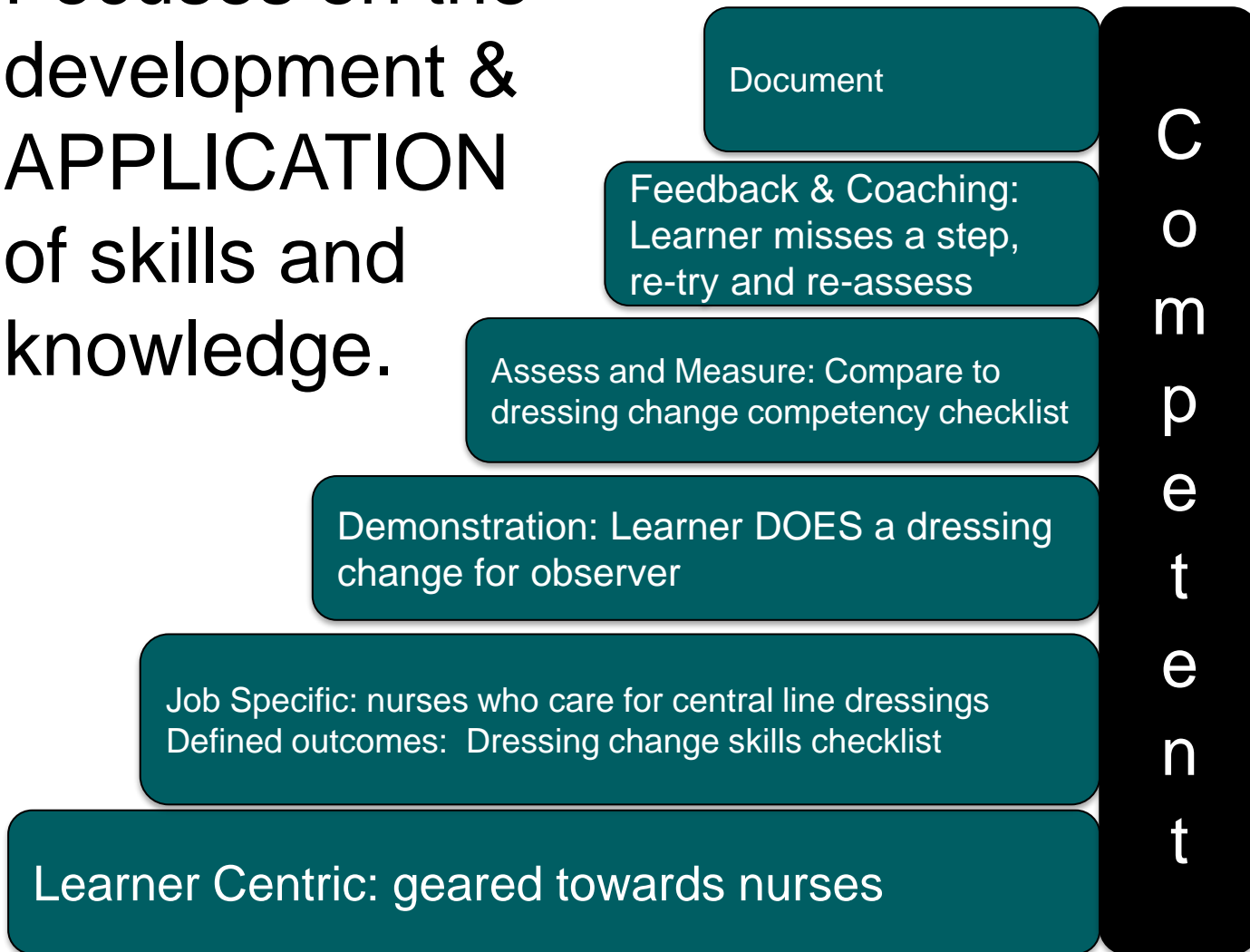
## Who performs the CLABSI intervention training?

- ✓ IPC Program must facilitate learning and ensure required education is met
- ✓ Dressing change education:
  - ✓ CLABSI superuser
  - ✓ Certified PICC team nurse
- ✓ Algorithm education
  - ✓ Learning module
  - ✓ Physician/APP support

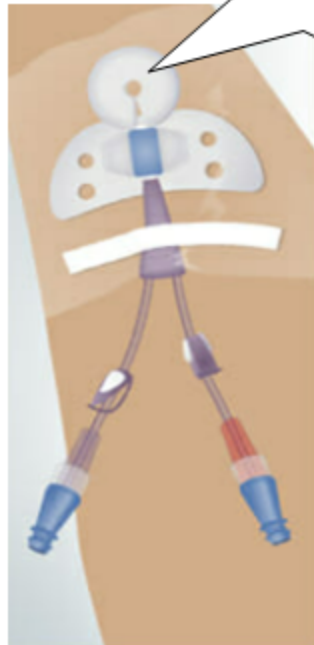


# Competency Based Training <sup>17</sup>

- Focuses on the development & APPLICATION of skills and knowledge.



Would you  
PLEASE date  
me?!



### Don't forget to date your dressings!

Transparent dressings every 7 days

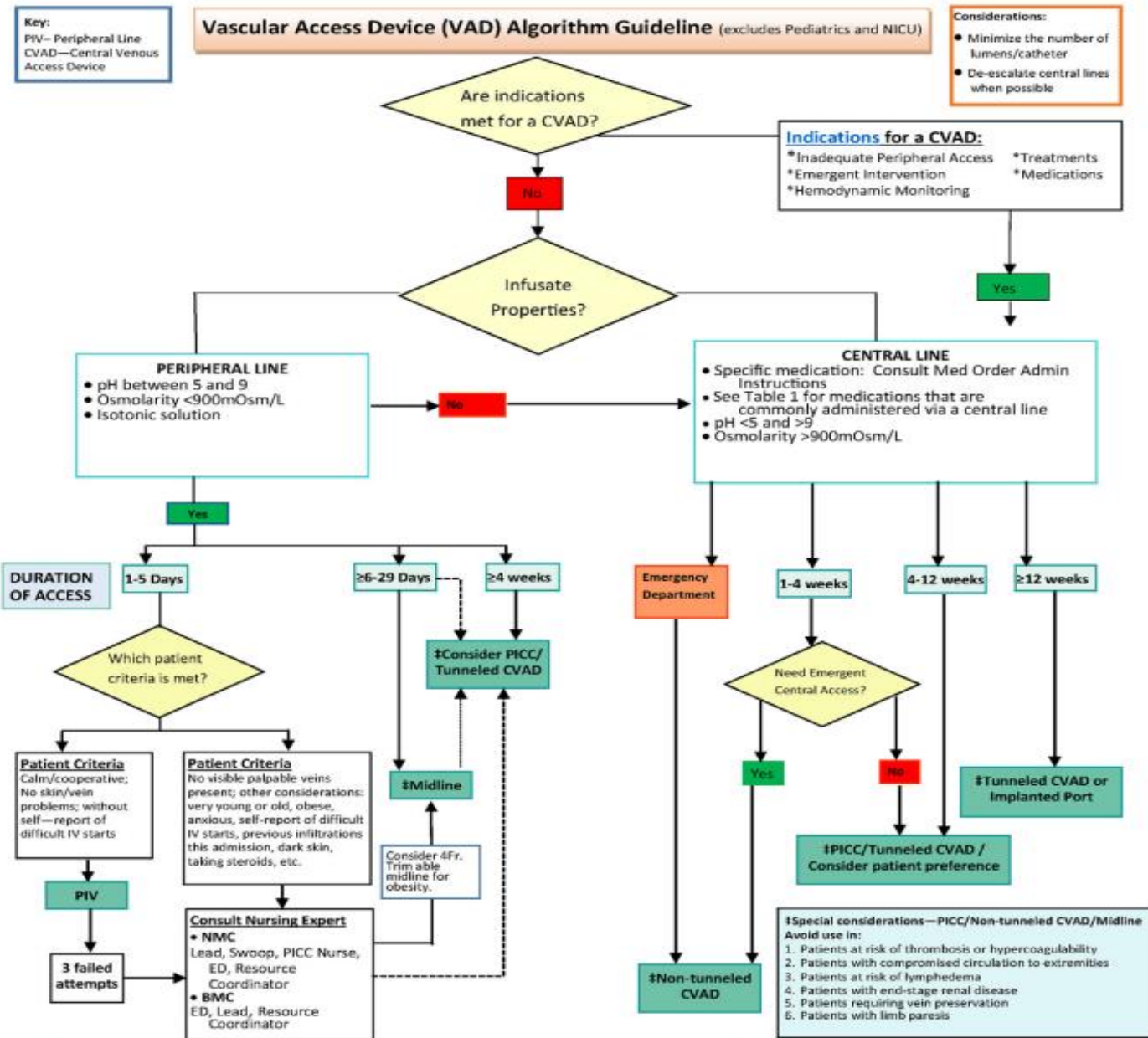
M	T	W	Th	F	S	S
1	2	3	4	5	6	7
Change						Change

Gauze dressings every 2 days

M	T	W	Th	F	S	S
1	2	1	2	1	2	1
	Change		Change		Change	







**Fig. 2.** Vascular access device algorithm guideline. Excludes pediatrics and the NICU. (From Cawcutt KA, Hankins RJ, Micheels TA, Rupp ME. Optimizing vascular-access device decision-making in the era of midline catheters. Infect Control Hosp Epidemiol. 2019;40(6):674-680; with permission.)



# More Education and Training



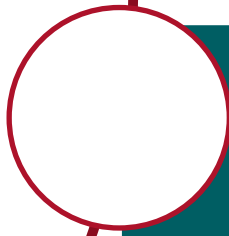
## Preparation

- Indication
- Hand Hygiene\*\*
- Skin Prep\*\*
- Considerations- anatomy, device choice, contraindications



## Insertion protocol

- Anatomical considerations
- Ultrasound
- Maximal barrier Precautions\*\*



## Maintenance protocol

- Dressings\*\*
- Bathing\*\*
- Assessment



## Removal protocol

- Daily assessment for need



# Patient & Family Education

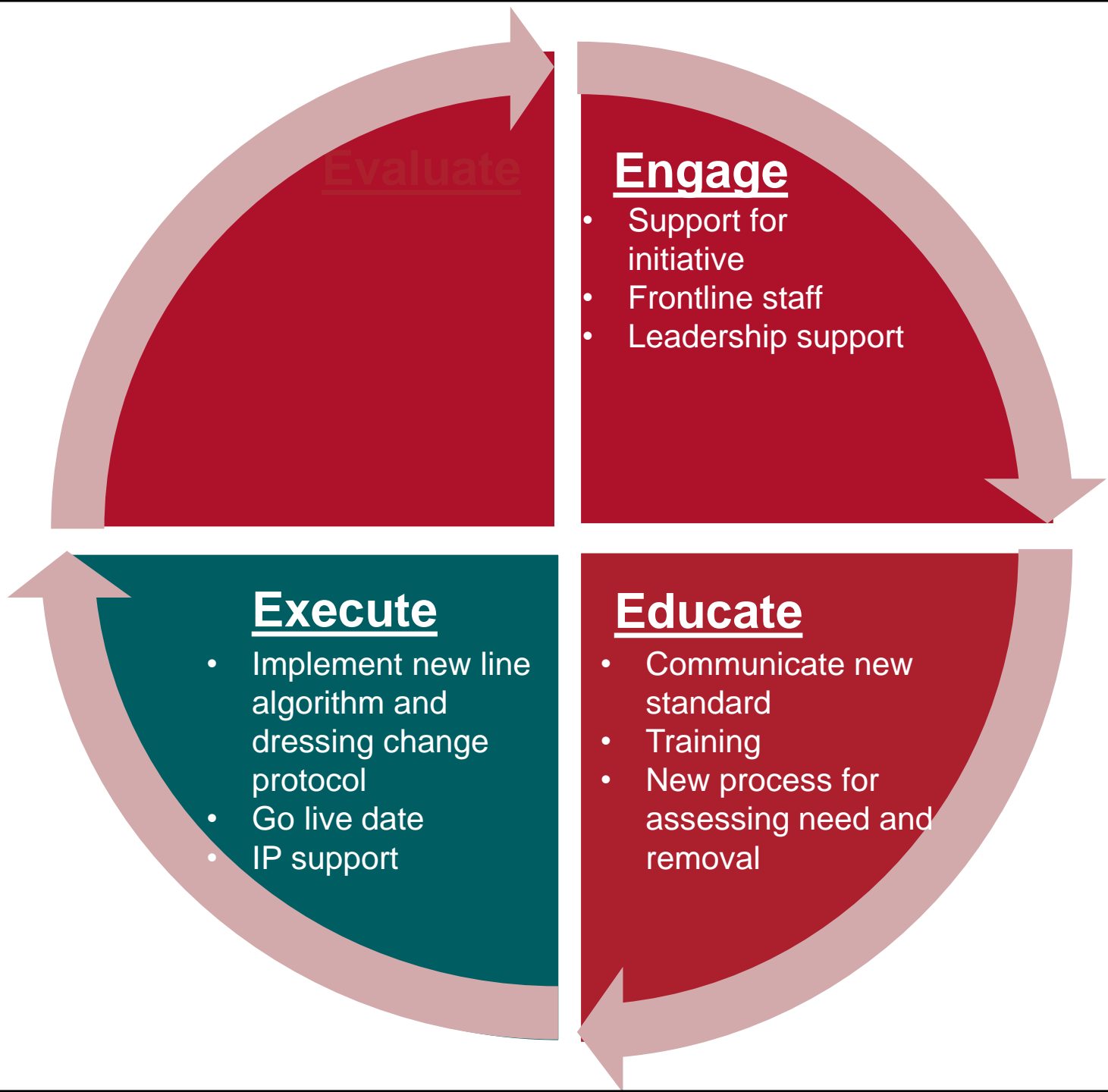
## Patient and caregiver education

- What Central Line Education did they receive?
  - Prevention of infection
  - Signs and symptoms of infection
- Dressing site assessment
- Advocate for removal

## Instructional Materials

- Educational level
- Language comprehension
- Diversity





## Evaluate

- Set a time-frame
- Audit
- Review Data
- Report
- Did we meet our goals?

## Engage

- Support for initiative
- Frontline staff
- Leadership support

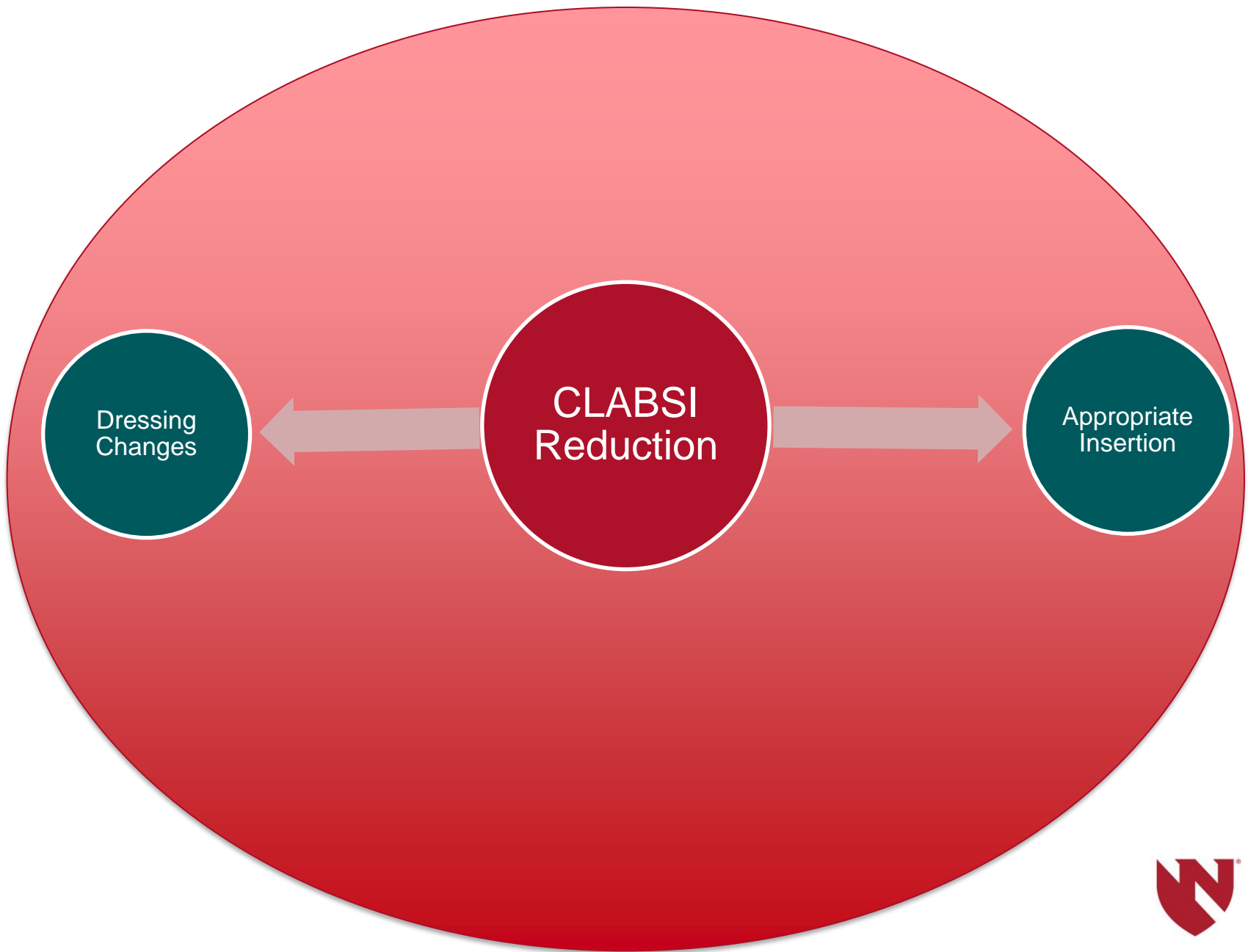
## Execute

- Implement new line algorithm
- Go live date
- IP support

## Educate

- Communicate new standard
- Training
- New process for assessing need and removal





# Evaluate Audit and Feedback

Targeted audit  
with the same  
audit tool

Timeline

Same audit  
process

- Direct observation
- Chart/record review

Feedback

# Celebrate Successes!



Recognize key players



Acknowledge the hard work



Celebrate achievements

- SUR reduction
- Sustained dressing change compliance







**Join us next month for a deeper  
dive into Injection Safety  
Programs**

**March 21, 2024**



# Questions



# Resources

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# Office Hours

- If you have a questions
  - Raise hand and our admin will take you off mute OR
  - Enter your question into the chat
- If you have additional questions that are not answered, you can email us at [ipslice.nebraskamed.com](mailto:ipslice.nebraskamed.com)



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