Objectives

• Describe the elements of the **maintenance bundle** for the prevention of Central Line Associated Bloodstream Infections (CLABSI)

• Review additional **optional interventions** for the prevention of CLABSI

• Review successful initiatives that focused on improving the maintenance of central lines
CLABSI Prevention Focuses on

- Insertion
- Maintenance
- Removal
The Central Line Insertion Bundle

1. Hand hygiene
2. Maximum barrier precautions:
   • Mask, sterile gown, full barrier drape, cap, sterile gloves
3. > 0.5 % Chlorhexidine with alcohol prep
4. Optimal site selection (avoid femoral site)
5. Daily review of catheter necessity
Implementation of the Insertion Bundle Facilitated by

• Education
• Empowering the nurse to stop procedure in case of breach in sterile technique
• Procedure cart with all the needed supplies
• Use of an insertion checklist
• Daily goal sheet to facilitate the assessment of continued need for the central venous access
WHY IS A CENTRAL LINE MAINTENANCE BUNDLE NEEDED?
Sources of Central Line Colonization

- Skin organisms
  - Endogenous
  - Skin flora
  - Extrinsic
  - HCW hands
  - Contaminated disinfectant

- Contaminated catheter hub
  - Endogenous
  - Skin flora
  - Extrinsic
  - HCW hands

- Contaminated infusate
  - Extrinsic
  - Fluid
  - Medication
  - Intrinsic
  - Manufacturer

- Hematogenous from distant infection

- Fibrin sheath, thrombus

- Skin

- Vein

Catheter Colonization

- **<10 days:**
  - Extraluminal colonization more common
  - Origin of organisms: **SKIN**

- **>10 days-30 days:**
  - Intraluminal colonization > extraluminal colonization
  - Origin of organisms **HUB** of catheter contaminated by **HCW** hands

Not all catheter colonization leads to infection
Documentations

- Use a standardized protocol for sterile barrier precautions during central venous catheter insertion (checklist or note)

- Use a **standardized protocol to disinfect catheter hubs and injection ports before accessing the ports** (policy or protocol)
Central Line Maintenance Bundle

1. Hand Hygiene
2. Proper Dressing Change
3. Aseptic technique for accessing and changing needleless connector
4. Standardize tubing change
5. Daily review of catheter necessity
# Strength of the Body of Evidence

<table>
<thead>
<tr>
<th>Strength Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IA</td>
<td>Strongly recommended for implementation and strongly supported by well-designed experimental, clinical, or epidemiologic studies.</td>
</tr>
<tr>
<td>IB</td>
<td>Strongly recommended for implementation and supported by some experimental, clinical, or epidemiologic studies and a strong theoretical rationale; or an accepted practice (e.g., aseptic technique) supported by limited evidence.</td>
</tr>
<tr>
<td>IC</td>
<td>Required by state or federal regulations, rules, or standards.</td>
</tr>
<tr>
<td>II</td>
<td>Suggested for implementation and supported by suggestive clinical or epidemiologic studies or a theoretical rationale.</td>
</tr>
<tr>
<td><strong>Unresolved issue</strong></td>
<td>Represents an unresolved issue for which evidence is insufficient or no consensus regarding efficacy exists.</td>
</tr>
</tbody>
</table>
Hand Hygiene and Aseptic Technique (Category IB)

- Access the catheter to draw blood or administer medications
- Dressing change
- Change IV tubing and devices
- Palpating catheter insertion site
- Wear either clean or sterile gloves when changing the dressing on intravascular catheters (Category IC)

Clean hands with soap and water or waterless alcohol based gels or foams before and after
Hand Hygiene

As part of a hand hygiene intervention, consider:

• Ensuring easy access to soap and water and alcohol-based hand gels
• Education for Healthcare workers and patients
• Observation of practices - particularly around high-risk procedures (before and after contact with central catheter)
• Feedback – “Just in time” feedback if failure to perform hand hygiene observed

Catheter Site Dressing Change

• > 0.5 % chlorhexidine based preparation with alcohol is the preferred agent (Category IA)
• Scrub for 30 seconds using back and forth motion
• Allow to dry completely

If contraindication to chlorhexidine alternatives include:

• Tincture of iodine
• Iodophor
• 70% alcohol
Catheter Site Dressing

• Use either sterile gauze or sterile, transparent, semipermeable dressing to cover the catheter site (Category IA)

• Replace transparent dressing at least every 7 days (Category IB)
Catheter Site Dressing

• If the patient is diaphoretic or if the site is bleeding or oozing, use gauze dressing until this is resolved (Category II)

• Replace gauze dressing every 48 hours (Category II)
Catheter Site Assessment

Assess Insertion Site every shift

- For redness, site tenderness, pain or exudate every shift (Category IB)

- Assess dressing integrity: Change dressing if compromised, loose, or damp (Category IB)
Improving Compliance with Dressing Change Standards

• Education

• Use “kits” with all the necessary materials

• Devise a method to identify next dressing change

• Use a **checklist** and/or perform **audits** of dressing integrity and documentation of dressing change date
Additional Options: Chlorhexidine Dressing

If the CLABSI rate is not decreasing despite adherence to basic prevention measures:

• Use **chlorhexidine-impregnated sponge** for temporary short-term catheters (Category IB)

• No recommendation is made for other types of chlorhexidine dressings. Unresolved issue
Additional Options:
Sutureless Securement Device

• Use a *sutureless securement* device to reduce the risk of infection for intravascular catheters (Category II)

• Removal and replacement of the securement device should be done with dressing changes
Additional Options: Chlorhexidine Wash

Patient Cleansing

• Use a 2% chlorhexidine wash for daily skin cleansing to reduce CLABSI (Category II)
Needleless Connectors

Hub

Needless Connector
Needleless Connectors

- **Simple:** split septum with no internal mechanism
- **Complex:** luer lock mechanical valve with various internal mechanism
- Need to be knowledgeable about the function of the connector to reduce the risk of blood reflux upon discontinuation
- **3 categories:**
  - Negative fluid displacement
  - Positive fluid displacement
  - Neutral design
Catheter Hubs and Needless Connectors

• Known sources of CLABSI and recognized sites of bacterial contamination

• Minimize contamination risk by scrubbing the access port with an appropriate antiseptic (chlorhexidine, povidone iodine, an iodophor, or 70% alcohol) and accessing the port only with sterile devices (Category IA)

• The optimal technique or disinfection time frame has not been identified

Infusion Nursing Standards of Practice  http://www.ins1.org/i4a/pages/index.cfm?pageid=3310
Accessing the Needleless Connector

• Performing proper hand hygiene

• Vigorously scrubbing the needleless connector or hub for **15 seconds** with chlorhexidine, povidone iodine, an iodophor or 70% alcohol every time you make or break a connection

• Allowing equal time for drying
Changing the Needleless Connector

• Change needleless connectors no more frequently than every 72 hours or according to manufacturers’ recommendations for the purpose of reducing infection rates (Category II)

• Unanswered questions:
  – Prior to drawing blood
Example Posters

Remember to “Scrub the Hub”
For 15 Seconds!

You can help prevent central line-associated blood stream infections!

Here’s how you can prevent Catheter Line Associated Bacteremia (CLAB) in your patient!

Make sure you thoroughly scrub the injection port with alcohol before injecting IV medications.

Don’t forget to “Scrub the Hub.”

http://www.ihi.org/knowledge/Pages/Tools/ScrubtheHubPosters.aspx
SAVE THAT LINE!

S – Scrupulous hand hygiene
A – Aseptic technique during catheter insertion and care
V – Vigorous friction to catheter hub prior to entry
E – Ensuring patency of the device

Example Posters

http://www.avainfo.org/website/article.asp?id=4
Replacement of Administrative Sets

• In patients not receiving blood, blood products or fat emulsions, replace administration sets that are continuously used, including secondary sets and add-on devices, no more frequently than at 96-hour intervals, but at least every 7 days (Category IA)

• No recommendation can be made regarding the frequency for replacing intermittently used administration sets. Unresolved issue

• Includes: needleless access device, stopcocks, etc...
Replacement of Administrative Sets

- **TPN/Intralipids** every 24 hours
- **Blood/blood products** administration no more than 24 hours or more frequently per hospital policy
- **Chemotherapy** tubing after each administration
- **Propofol** every 6-12 hours, when vial changed
Assessing the Need for Continued Vascular Access

• Perform a daily review of the necessity of the central catheter (Category IA)
• Document that the review has been performed
• Remove the catheter if no longer needed
SUCCESS STORIES
The Rochester CLABSI Collaborative

- Project funded by NYSDOH since 2008
- Focus on CLABSI surveillance and prevention outside the ICU
- 6 hospitals- 37 units
- Education of nurses on line care maintenance
Line Care Maintenance Bundle
Focused on

1. Hand Hygiene
2. Aseptic access of needleless connector
3. Proper dressing change technique
4. Standard IV tubing change
5. Regular CVC need assessment
Survey of Nurses Knowledge Regarding CLABSI Prevention
Survey of Nurses

- Change access port every 96 hrs: 80% positive response
- Change trans. dressing every 5-7 days: 60% positive response
- Clean insertion site with 2% CHG: 40% positive response
- Scrub access port for 15 seconds: 20% positive response
Education

• Nursing Grand Rounds
• Workshop:
  – Presentations by local and national experts
  – Presentations by nurses
  – Q and A
Audits of Care and Maintenance

• Observed nurses:
  – Dressing change
  – Accessing needleless connector

• Audited:
  – Compliance with frequency of dressing change, needleless connector and administrative sets
  – Dressing integrity
Nursing Audits Post Maintenance Bundle Education

Scrub access port for 15 sec
IV tubing dated
Scrub insertion site 30 sec, let dry
Dressing dated
Trans. dressing changed every 7 days

Percent Compliance
Survey of nurses for Needleless Connector Access

Scrub the hub for 15 sec

Percent positive response

Pre-education | Post education
Rate per 1,000 line days

Pre-Intervention

Intervention

Post-Intervention

44% reduction
CLABSI Rate per 1,000 line days

- Specialty
- ICU Stepdown
- Medical/Surgical
Statewide NICU Central-Line-Associated Bloodstream Infection Rates Decline After Bundles and Checklists

Joseph Schulman, Rachel Stricof, Timothy P. Stevens, Michael Horgan, Kathleen Gase, Ian R. Holzman, Robert I. Koppel, Suhas Nafday, Kathleen Gibbs, Robert Angert, Aryeh Simmonds, Susan A. Furdon, Lisa Saiman and the New York State Regional Perinatal Care Centers

*Pediatrics* 2011;127;436-444; originally published online Feb 21, 2011;
DOI: 10.1542/peds.2010-2873
CLABSI rates stratified by birth weight and maintenance checklist use.

Reducing PICU Central Line–Associated Bloodstream Infections: 3-Year Results
Marlene R. Miller, Matthew F. Niedner, W. Charles Huskins, Elizabeth Colantuoni, Gayane Yenokyan, Michele Moss, Tom B. Rice, Debra Ridling, Deborah Campbell, Richard J. Brilli and the National Association of Children’s Hospitals and Related Institutions Pediatric Intensive Care Unit Central Line—Associated Bloodstream Infection Quality Transformation Teams
Pediatrics 2011;128;e1077; originally published online October 24, 2011;
DOI: 10.1542/peds.2010-3675
Plot of CLA-BSI rates and insertion and maintenance compliance rates (and 95% CIs) in the preintervention baseline and intervention periods for the 29 PICUs.
Central Line Maintenance Bundle

Hand Hygiene
☐ Wash hands with conventional soap and water or with an alcohol-based hand rub (ABHR) prior to and after accessing (Cat. IB):
  √ The central line
  √ The dressing
  √ The needleless access device (including hubs, connectors and ports)

Dressing Change
☐ Dressing is clean, dry and intact (IB)
☐ Transparent dressing changed q 7 days (IB)

  OR
☐ If gauze dressing used, gauze dressing changed q 48 hours (II)
☐ Site cleaned with chlorhexidine-based preparation using a back and forth motion for 30 seconds (IA)

Scrub the Hub
☐ Catheter hubs, needleless connectors and injection ports are cleaned before accessing the catheter with chlorhexidine, iodine or 70% alcohol (IA) and a twisting motion used for at least 15 seconds.

Tubing and Devices
☐ Administration sets not used for blood products or lipids are changed no more frequently than 96 hours (IA)
☐ IV tubing and devices for TPN and blood/blood products are replaced within 24 hours of starting the infusion (IB)
☐ Needleless access devices are changed using aseptic technique, no more frequently than 72 hours (II)

Removing the Line When No Longer Needed
☐ The need for daily intravascular access with a central line is assessed daily to determine if the line is still indicated and documented in the medical record (IA). If not indicated, the central line is removed.

Optional
☐ If applicable, Chlorhexidine-impregnated sponge dressing in place (IB) or chlorhexidine-impregnated dressing used. If a chlorhexidine-impregnated sponge dressing is used, it is oriented correctly and changed at the same time as the transparent dressing
☐ If applicable, A sterile, suture-free securement device for catheter stabilization is used and changed at the same time as the transparent dressing (II)
☐ If applicable, Patient bathed daily with 2% chlorhexidine (II)
Central Line Maintenance Bundle Daily Checklist

Date: ____________

Hand Hygiene
- I washed my hands with conventional soap and water or with an alcohol-based hand rub (ABHR) prior to and after accessing (Cat. IB):
  - The central line
  - The dressing
  - The needleless access device (including hubs, connectors and ports)

Dressing Change
- I checked (daily or every shift) the site to ensure that dressing is clean, dry and intact. I promptly change dressing if dampened, loosened or visibly soiled (Cat. IB)
- I changed the transparent (with or without chlorhexidine impregnated) dressing every 7 days (Cat. IB)
  - date changed __/__/___
OR
- If a gauze dressing is used, I changed it every 48 hours (Cat. II)
  - date changed __/__/___
- I cleaned the site with chlorhexidine based preparation using a back and forth motion for 30 seconds (Cat. IA)
- If chlorhexidine impregnated sponge is used (Cat. IB), I made sure it is applied correctly and changed at the same time as the transparent dressing
- If the catheter is stabilized by a suture-free securement device (Cat. II), I changed it at the same time as the transparent dressing

Scrub the Hub
- I thoroughly cleaned catheter hubs, needleless connectors and injection ports before accessing the catheter using chlorhexidine, iodine or 70% alcohol (Cat. IA) and used a twisting motion for at least 15 seconds.

Tubing and Devices
- I changed administration sets not used for blood products or lipids no more frequently than 96 hours (Cat. IA)
  - date changed __/__/___
- I replaced the needleless access devices, using aseptic technique, no more frequently than 72 hours (Cat. II)
  - date changed __/__/___
- If TPN and blood/blood products are infusing, I replaced IV tubing and devices for within 24 hours of starting the infusion (Cat. IB)
  - date changed __/__/___

Removing the Line
- I assessed daily with the clinician the need for continued intravascular access and documented the need in the medical record (Cat. IA). If no longer needed, the line is removed.

Chlorhexidine Baths
- If appropriate, I bathed my patient with chlorhexidine wash daily (Cat. II)

Staff Completing Checklist (Print & Sign): _____________________________
CLABSI Prevention Guidelines

• SHEA and IDSA Compendium on CLABSI: http://www.jstor.org/stable/10.1086/591059
• Infusion Nursing Standards of Practice: http://www.ins1.org/i4a/pages/index.cfm?pageid=3310