Providers Leading to Zero for Better Outcomes

Central Line Associated Blood Stream Infection (CLABSI)
# Disclosure

<table>
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<tr>
<th>CLABSI</th>
<th>Activity no: EM2015-012</th>
<th>Credit: 1.0</th>
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Estimated time to complete activity: 60 minutes
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Objectives

1. Identify the risks associated with CLABSIs.

2. Identify resources available for management of patients with central lines.

3. Recognize the importance of bundle compliance in preventing CLABSIs.

4. Identify proper line insertion dressing standards.
Physician leaders and clinical directors from across our system are committed to reducing central line association blood stream infections (CLABSI). Additional leadership support, resources and efforts have been mobilized to accelerate a positive change. With a focus on standardized best practices, education, and barrier removal we feel confident that we will have a positive impact.

The computer-based training module is designed for the clinical provider to educate them on the important work being done around CLABSI reduction. As a leader of the patient care team, your commitment and participation is critical to success and better patient outcomes.
Outline

◆ Overview of HACs, CLABSI and current trends
◆ CLABSI Prevention
  o Line necessity
  o Central line insertion bundle
  o Dressing standards
  o Hand hygiene
◆ Patient Hygiene
◆ Complications of central lines
◆ Culture of culturing
◆ Resources
  o Vascular Access Team
  o Physician Order Set
Overview of HACs, CLABSIs and Current Trends
What the heck is a HAC?

HAC: Healthcare Acquired Condition

• 2010 Patient Protection and Affordable Care Act (ACA) established the HAC Reduction Program to encourage hospitals to reduce HACs.

• HACs are a group of reasonably preventable conditions that patients did not have upon admission to a hospital but developed during the hospital stay.
HACs at Children’s

- Adverse drug events (ADE)
- Catheter-associated urinary tract infections (CAUTI)
- Central line-associated blood stream infections (CLABSI)
- Injuries from falls and immobility
- Pressure ulcers
- Surgical site infections
- Ventilator-associated pneumonia (VAP)
- Preventable readmissions
- Venous thromboembolism
- Serious safety events (SSE)
- PIV Infiltrates and Extravasations (PIVIE)
CLABSI: The Burning Platform

• CLABSI is our most common HAC.
• Attributable mortality per CDC is 12-25%.
• CLABSI contributes to increased morbidity, length of stay and cost.
• Some peer hospitals have achieved lower CLABSI rates through standardization of care, prompt removal of lines, attention to culturing practices and “bundle” compliance.
CLABSI: Surveillance and Clinical Definition

Clinical Disagreement?

<table>
<thead>
<tr>
<th></th>
<th>Surveillance Definitions</th>
<th>Clinical Diagnoses</th>
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<tbody>
<tr>
<td>Purpose</td>
<td>Identify trends within a population for prevention and research</td>
<td>Identify disease in, and treatment needs for, individual patients</td>
</tr>
<tr>
<td>Components</td>
<td>Limited predetermined data elements</td>
<td>All diagnostic information available</td>
</tr>
<tr>
<td>Clinical judgment</td>
<td>Excluded if possible</td>
<td>Valued</td>
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Bottom Line: At times clinical judgment and surveillance determinations will not match. Surveillance determinations always “trump” in epidemiologic surveillance. (Use of the comments section in event form can be useful for internal quality improvement discussions)

# CLABSI Attributable Causes

<table>
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<tr>
<th>Category</th>
<th>Causes</th>
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<tbody>
<tr>
<td><strong>Dressing Related:</strong></td>
<td>• Non-occlusive dressing not being changed urgently</td>
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<tr>
<td></td>
<td>• Reinforced dressings</td>
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<tr>
<td></td>
<td>• New supplies</td>
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<tr>
<td><strong>Hygiene/Body Fluid Contamination:</strong></td>
<td>• Environmental impacts-room cleanliness</td>
</tr>
<tr>
<td></td>
<td>• Routine bathing/oral care of ALL patients</td>
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<tr>
<td></td>
<td>• Hand hygiene-before, after, during</td>
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<tr>
<td><strong>Line Malfunction:</strong></td>
<td>• Requires medical staff involvement-line occlusion, breaks</td>
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<tr>
<td><strong>Pathogen Distribution:</strong></td>
<td>• GI-Intestinal Flora = 37% (protect hub, hygiene)</td>
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<tr>
<td></td>
<td>• Skin Flora = 27% (scrub hands, patient, hub)</td>
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<tr>
<td></td>
<td>• Oral Flora = 17% (mouth care)</td>
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CLABSI Prevention:

- Line necessity
- Central line insertion bundle
- Dressing standards
- Hand hygiene
Line Necessity

• The BEST way to prevent a CLABSI is to get the line OUT

• Fewer line days = fewer infections

• Have a robust conversation each day about whether you can convert meds to PO, push the child to full feeds, etc

• Use PIV’s if possible, especially with non-vesicant medications
Criteria for Line Necessity

Criteria built into EPIC nursing documentation to review necessity daily:

• Receiving ECMO/CVVH/Oscillator Therapy
• Receiving high risk drugs, vesicants (Promethazine, Antibiotics) especially fluid restricted and using a more concentrated drug (Ammonul, Calcium, bolus/drips)
• Receiving vasopressors (epinephrine, dopamine, etc.), TPN (especially with high dose concentration), chemotherapy
• Poor peripheral venous access (eg. Multiple documented failed attempts or documented history of poor peripheral access in a high risk patient)
• Needed upon discharge for long term use
• Requires multiple simultaneous IV infusions that would otherwise necessitate multiple peripheral IVs
What is a Bundle?

- A structured set of evidence-based practices, that when performed *collectively* and *reliably*, have been proven to improve outcomes.

- The power of a bundle is that if *all* elements are performed as a package 100% of the time, it can reduce the incidence of the HAC by 90% or greater.

- **3 CLABSI bundles**
  - Central Line Insertion bundle
  - Central Line Dressing bundle
  - Line access bundle
Central Line Insertion Bundle

- Central Line Insertion Bundle
  - Hand hygiene
  - Maximum barrier protection
  - Sterile technique
  - CHG skin prep (unless contraindicated)
  - Appropriate dressing

- Other Insertion Considerations
  - Pre-insertion CHG bath by bedside RN when possible
  - If suturing, suture loosely so BioPatch can still fit under catheter. If possible, suture phalanges 1 inch from insertion site
  - Apply dressing according to policy
Line Insertion Dressing Standards

- No gauze on incision site
- Incisional adhesive with antimicrobial patch or Steri-strips with antimicrobial patch acceptable on incision site
- Bio-occlusive, transparent dressing, or bordered transparent dressing are acceptable occlusive dressings
- When possible, direct catheter away from dirty areas

Properly accessed port dressed with antimicrobial patch between access needle and the skin
Line Insertion Dressing Standards

- Tunneled, cuffed catheters (Broviacs, Perm caths, etc.)
  - Antimicrobial patch at insertion site
  - Transparent dressing (plain or transparent dressing with border)
  - No gauze.
On temporary, sutured lines (CVL/Vascaths), leave enough room between the hub of the catheter and the sutures to place Antimicrobial patch under line circumferentially.
Line Insertion Dressing Standards

PICC dressed appropriately:
• PICC line with Statlock and Biopatch
• Antimicrobial patch with 360 degree coverage around line
• Directed away from dirty areas (up and over the shoulder if possible)
• Suturing of PICC line not recommended
NICU Line Insertion Dressing Standards

- No Antimicrobial patch on babies under 28 weeks gestation.
- No Antimicrobial patch on new CVL’s in NICU babies - wait 24 hours prior to placing Antimicrobial patch.
Central Line Dressing Bundle

Central line dressings are changed weekly with 2 caregivers.

• **Central Line Dressing Bundle**
  – Hand hygiene
  – Regular assessment of dressing integrity
  – Dressing changes using sterile technique every 7 days or when non-occlusive, soiled, or damp
  – Use of CHG skin prep (unless contraindicated)
  – Appropriate dressing

• **Other Considerations**
  – Dressing integrity is crucial
  – Central line dressings should never be reinforced
  – Best Practice: Dressing changes performed under sterile technique with 2 nurses:
    • Ensures sterile technique
    • Protects the catheter from being dislodged
  – Consider dressing alternatives for difficult skin
Occlusive vs. Non-Occlusive Dressings

- A dressing is non-occlusive if:
  - Two or more corners up, even if occlusive around insertion site
  - One or more sides up, even if occlusive around insertion site
  - Open from edge to insertion site

- Biopatches should be on all central lines in patients meeting the following criteria:
  - If born before 26 weeks gestation, must be 26 weeks AND 10 days gestation
  - Must have a thorough skin assessment
  - *Neo-PICCs excluded
Examples of Occlusive Dressing
Examples of Non-Occlusive Dressings

- Dressings should never be reinforced
- Non-occlusive dressings should be changed immediately
- Notify the nurse if you find a dressing to be non-occlusive
Central Line Access Bundle

• **Line Access Bundle**
  - Hand hygiene
  - Use of gloves
  - Site scrub for 10 seconds and allow to dry or use of Curos®
  - Connect without contamination
  - Limit line entries

• **Other considerations**
  - Prioritizing IV care – Complete clean tasks before dirty tasks when possible
    - Ex. Administer IV medication before diaper change
  - Use of mask with open lines
  - New product trials
    - Ex. Site Scrub
Wash Your Hands and Your Things

• Proper HAND HYGIENE is the single most important means of preventing infection.
• Friction is the most important part of cleansing.
• If feasible, give your phone to another healthcare provider to answer while you are providing patient care.
• If your phone rings while performing patient care, don’t answer it if possible.
• If you MUST answer your phone: perform hand hygiene before resuming patient care.
• Disinfect with cloth any items used on patients between patient encounters.
Hand Hygiene - When to Perform

Gloves are NOT a replacement for hand hygiene!

- Before using PPE
- After contact with blood, body fluids, secretions, contaminated items
- Immediately after removing PPE
- Before and after patient contact
- After contact with the patient’s environment
- Between “dirty and clean” tasks
Patient Hygiene
Partner with Patients and Families

- Physician discussion of hygiene practices and line care expectations with patients and families improves compliance and collaboration.
  - Hand hygiene
  - Patient hygiene practices
  - Room cleanliness
  - Identifying clean versus dirty areas of bed and room
  - Dressing integrity
  - Scrubbing the hub
  - Speak up message
Inpatient Hygiene Expectations

• Basic hygiene expectations when a central line is present
  – Hand hygiene of patients and families
  – Oral hygiene
    • With teeth, brush teeth and gums twice daily
    • Without teeth, swab cheeks and gums daily
    • Additional oral care (swabbing/suctioning) or rinses may be necessary per patient condition
  – Daily baths
    • All patients with central lines are to have daily CHG bath, unless exclusions apply (age or sensitivity)
    • Traditional soap and water baths if CHG baths are contraindicated
  – Daily linen changes
Complications of Central Lines
Complications of a Central Venous Line

- Infection
- Phlebitis
- Thrombosis
- Catheter occlusions
- Catheter migration
- Catheter rupture
- Hemorrhage
- Nerve damage
- Arterial access
- Stuck guidewire
- Inability to remove PICC
Suspected Infection

- Fever presentation – consider the line as the source
  - In an immunocompetent host, is it reasonable to check peripheral cultures first?
- Is there another site for infection (wound, abscess, etc.)?
  - Consider culturing the site
- Primary infections need to be identified and treated
  - Sort out line colonization and CLABSI
- Before obtaining a culture, think about how the culture will be used in care of the patient.
  - “Think Before you Culture” culture
  - Consult your epidemiologist for help
Ethanol or Antibiotic Locks

- Eligibility for antibiotic lock or ethanol lock therapy
  - Confirmed or suspected infection related to a central venous line (CVL), including implanted port
  - Ethanol locks may be used prophylactically in patients with a history of CVL infections, despite optimal aseptic technique.

- Order should read... “Instill a volume of lock equal to the catheter volume with antibiotic lock or ethanol lock solution (specific type) into (specific type) catheter (include number of ports), and allow to dwell for (specify time) for ____ total of days of therapy. “

- See [Children’s Policy 4.20 Line Lock Guidelines](#) for details
Occluded lines

• Sluggish or occluded lines increase the risk for a blood stream infection.

• TPA may be used to break down blood clots that occlude the central venous line.

• When ordering TPA, order a second dose if line does not have a blood return and remains nonfunctional.

• If after two doses of TPA the line remains sluggish or nonfunctional, strongly consider removal of the line.
Line Breaks

• When lines break, the goal is for the line to be repaired in 1 to 2 hours of breakage.
  – For outpatients whose lines break, direct families to come in immediately for repair.

• The CVL repair team can assist with repairs.
  – CVL repair team services both inpatient units and the ED department.
  – CVL repair team contact information is available at the nurses station.
  – If CVL repair team is not available, contact surgery attending or fellow on call.
Culture of Culturing
The Culture of Culturing – When

“Will the result of this blood culture impact management?”

• If yes, then obtain the culture.
  – Alter antimicrobial choice, dose, duration
  – Remove or replace venous access
  – Concern that clinical change is due to a bloodstream infection

• If no, then the culture is not necessary.
  – Patient receiving broad spectrum therapy and result will not impact antimicrobial choice, dose, duration
  – Patient receiving palliative or end of life comfort care
The Culture of Culturing – What

**Initial presentation or change in clinical condition**

– Preferable Gold Standard: Obtain a peripheral culture simultaneously with vascular access device culture to determine time to positivity.

– At a minimum, the goal is to get at least 2 Blood cultures of adequate volume.

**Subsequent or follow up**

– Repeat blood culture from site(s) of positive culture(s) until 3 successively negative daily results.

– Ideally obtain first set of repeat blood cultures from positive source as soon as source is deemed to be positive and ideally prior to initiation of antimicrobials if patient is stable.
The Culture of Culturing – Why Obtain Peripheral Cultures?

*Differential Time to Positivity (DTP) facilitates differentiation of a catheter-related bloodstream infection from an isolated bloodstream infection*

- Peripheral and catheter specimens of identical volume obtained within 15 minutes of each other.
- >120 minutes between time that peripheral and catheter cultures become positive suggests that infection is related to catheter and is not an isolated bloodstream infection.
- DTP has implications for management including catheter retention.
Data suggests there is a direct relationship between the volume of blood collected and detection of BSI’s in the pediatric population.

*Volume of blood obtained is critical and should be maximized according to patient weight.*

< 5 cc of blood per draw = Peds Plus blood culture bottle

> 5 cc of blood per draw = Divide between aerobic and anaerobic blood culture bottles
Drawn Blood Volumes

• Obtain optimal blood volume for blood cultures
  – Max blood volume/day = 3-4 ml/kg
• Ideal blood volumes:
  – Children less than 20kg – 5ml/bottle inoculated into pediatric blood culture bottle (pink cap)
  – Children great than or equal to 20kg – 10ml/bottle inoculated into adult aerobic (grey cap) and/or anaerobic (purple cap) culture bottles
• No less than 1ml/bottle should be inoculated into pediatric blood culture bottle (pink cap) regardless of the size of the patient.
• Use aerobic (grey cap) and anaerobic (purple cap) culture bottles when volumes permit.
  – Minimum 3ml in each bottle
Resources:

• Vascular Access Team
• Physician Order Set
## Other Resources – Vascular Access Team

### PICC Team
- Assess vasculature for appropriate vascular device placement and vein preservation
- Place PICC lines
- Trouble shoot vascular access devices
- TPA administration
- CVL line repair
- Difficult CVL dressings
- Line monitoring/Quality audits
- Port access
- Infiltration management
- Assess new products
- Education

### IV Team
- Assess vasculature for appropriate vascular device and vein preservation
- Place PIVs
- Place ultrasound guided IVs
- PIV assessment
- Infiltration management
- Port access
- Assess new products
- CVL repair
- Line monitoring/quality audits
- Education
Other Resources – Physician Order Sets

• Use the Central Venous Access Order Set when placing a cvl, port vascath or picc, or providing care for patient with central venous access.

• Order set will include:
  – CHG Bathing - Chlorhexidine gluconate 2% towelette
  – Catheter Care (use of Biopatch)
  – IV NS/Hep Lock – CVL, PICC, Port
  – TPA - Alteplase (CATHFLO ACTIVASE)
CME Credit and Bibliography
Evaluation and CME Credit

Click the following link to complete the evaluation and receive your certificate of participation.

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Bibliography and Additional Resources

Ann Scheck McAlearney, Jennifer L. Hefner, Julie Robbins, Michael I. Harrison and Andrew Garman