CVC Infections: Locking Them Up!

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The ThriveRx Team

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Kristi has 25 years experience as a registered nurse, with 17 of these years in home nutrition support. Kristi has been a part of the ThriveRx team since 2012 and her areas of clinical interest are disorders of mitochondrial metabolism and the medically fragile pediatric population. Kristi holds national certification in nutrition support.
Objectives

1. Define and discuss the diagnostic criteria of a Central Line Associated Blood Stream Infection-(CLABSI)
2. Review CLABSI incidence rates in the various settings
3. Discuss the various central venous catheter lock options
What is a CLABSI?

Central Line Associated Blood Stream Infection-(CLABSI)-

A laboratory confirmed blood stream infection-(BSI) in which a central venous catheter-(CVC) was in place for 48 hours prior to the development of the BSI.

The BSI cannot be associated with an infection at another body site.
High Cost of CLABSI’s

• Central line-associated bloodstream infections-(CLABSI’s) result in thousands of deaths each year and billions of dollars in added costs to the U.S. healthcare system.

• Of all health care associated infections, CLABSIIs are the most costly at approximately $46,000 per case.


Most Vulnerable Population

- Incidence of BSI’s in children receiving home parenteral nutrition- (HPN) highest in the first month after discharge from the hospital.
- This requires CVC care and HPN administration teaching start prior to/immediately after hospital discharge.

Identification and Initial Treatment of CLABSI

- Draw blood cultures from all lumens of the central venous catheter and a peripheral blood culture prior to the initiation of antimicrobial therapy.
- Empirically treat patients with broad spectrum antibiotics until preliminary blood culture results are available.
- Removal of a patient’s CVC depends on the severity of illness, affecting organism, resistance to treatment, and presence of infection at another site such as endocarditis or osteomyelitis.

Clinical Presentation of a CLABSI

- Fever (greater than 100.5 F)
- Rigors/Chills
- Hypotension
- Altered mental status
- Lethargy/Fatigue

Handwashing is Key in Prevention of Infection

- Hands should be washed if they are visibly soiled or after known or suspected exposure to infectious organisms.
- World Health Organization-(WHO) guidelines recommend a 40-60 second scrub when using soap and water to cleanse the hands.

An alcohol-based hand sanitizer is preferred in the following situations

- Before and after direct patient contact
- Before donning sterile gloves to insert an invasive device
- Before handling a patient’s medication
- After removing gloves
- Before & after handling respiratory devices, urinary catheters, and intravascular catheters
- After contact with blood, body fluids, mucous membranes, and nonintact skin-(if hands not visibly soiled)
- When moving from a contaminated body site to a clean body site
- After contact with objects in patient’s immediate environment

Best Practices for CLABSI Prevention

• Perform a vigorous mechanical scrub prior to each CVC access and allow to air dry.

• Scrub time depends on the design of the needleless connector and the properties of the disinfecting agent.

Best Practices for CLABSI Prevention

• Healthcare professionals should always wear gloves for any manipulations/entries into the catheter.
• Patients or caregivers should follow their institution’s guidelines for wearing gloves when manipulating the catheter or preparing parenteral nutrition or intravenous fluids.
• A prefilled saline flush should not be used for multiple doses or used for multiple lumens of a CVC.
• Change needleless connectors no more frequently than every 96 hours or per institution guidelines-(Also changed after lab draws).
• Use a CVC with the minimal number of ports or lumens essential for the management of the patient.

Catheter Removal vs. Salvage

- There is an increase in financial costs associated with the replacement of tunneled central lines, as a surgical procedure is needed to place the new catheter.
- The probability of adverse outcomes increases with catheter replacement.
- Loss of vascular access.
- Adverse outcomes and increased costs could be diminished if catheters can be salvaged.
- Antimicrobial lock therapy is one technique used in salvaging infected catheters.

Anderson, Breanna, "Ethanol lock therapy in the treatment and prevention of catheter-related bloodstream infections" (2012). HIM 990-2015. 1245
Central Venous Catheter (CVC) Lock Usage

CVC locks are a solution instilled into the catheter for the purpose of:

• Decreasing the risk of infections
• Dissolving a clot that is occluding the CVC

Antibiotic Lock Therapy (ALT)

• Utilized for the prevention and management of CVC infections.
• Involves administering an antibiotic solution into the lumen of a CVC that is not in use.
• Higher success rates when used in conjunction with the systemic administration of antibiotics for CLABSI’s.

Guidelines for ALT in Treatment of CVC Infections

ALT is recommended by current guidelines as a part of the management of catheter-related infections in the following circumstances:

• Uncomplicated – Defined as a resolution of bloodstream infection and fever within 72 hours, that does not have intravascular hardware, endocarditis, or suppurative thrombophlebitis.
• Non-metastatic infections.
• Salvage of the catheter is highly required.

ALT for Prophylaxis

ALT is not recommended as a routine technique to prevent catheter-related infections due to concerns of the possible emergence of antimicrobial resistant bacteria.

Centers for Disease Control and Prevention (CDC) guidelines recommend ALT to prevent CVC infections in only a few special circumstances:

- Patients with long-term central venous access.
- Patients with a history of multiple CRBSI in spite of adherence to strict aseptic technique.

Infusion Nurses Society (INS) Recommendations for ALT

- For therapeutic and prophylactic purposes
- Long-term Central Venous Access Devices (CVADs)
- History of multiple CRBSIs
- High-risk patient populations
- Important to aspirate solutions from catheter to avoid antibiotic resistance—(Do not flush the lock solution into the patient’s bloodstream).

Ethanol Lock Therapy (ELT)

• Used for patients with a history of CVC infections or patients at increased risk due to long term CVC use.

• Prevents unnecessary use of antibiotics.

• Compatible with CVC’s made of silastic material.

• Monitor for thrombotic lumen occlusion as ELT has no anticoagulant activity.

ELT Treatment Protocols

• Concentration ranges: 25–70%
• Dwell times: 4–12 hours
• Frequency: 3–7 days per week
• Aspiration vs. push-through

ELT as a Treatment Modality

Shown to be effective as an active treatment in eradicating biofilms of organisms that frequently cause catheter-related blood stream infections, including:

• Staphylococcus epidermis
• Staphylococcus aureus
• Klebsiella pneumonia
• Pseudomonas aeruginosa
• E. coli
• Candida albicans

Taurotidine Lock Solution (TLS)

- Used in Europe, but currently not available in the U.S.
- An antimicrobial agent showing broad spectrum antimicrobial activity against both bacteria and fungi.
- TLS appears to reduce the incidence of CRBSI’s without obvious adverse effects and bacterial resistance.
- No adverse effects have been reported.

Tetrasodium EDTA & Trisodium/ETOH

• Currently being researched for both their antimicrobial and anticoagulant properties.
• Have been used with success in hemodialysis catheters.
• Ethanol has been shown to have a synergistic effect with several other antimicrobial agents.

Taurolidine-Citrate Lock Solution

• It has been shown that this combination is effective in preventing both CRBSI and catheter occlusion in patients with cancer, parenteral nutrition, and hemodialysis.

• Appears to have optimal characteristics in terms of efficacy, safety, and cost effectiveness in the antibacterial lock category.

Neutrolin

• Is a non-antibiotic anti-infective developed to prevent CRBSIs and thrombosis.
• Approved for use in Europe.
• Currently in Phase 3 of clinical trials in the United States.
• Formulation of the following products:
  - Taurolidine
  - Citrate
  - Heparin

http://www.cormedix.com/neutrolin