Preventing IV-Catheter-Associated Infections

Infection Prevention

This self-directed learning module contains information you are expected to know to protect our patients.

Target Audience: Clinical Area Teammates who insert and maintain peripheral lines and maintain central lines.

Contents

Instructions ........................................................2
Learning Objectives...........................................2
Module Content .................................................3
Posttest .............................................................10
Instructions:

The material in this module is an introduction to important general information and procedures on preventing IV catheter-associated infections. After completing this module, contact your immediate supervisor to obtain additional information specific to your department or work responsibilities.

- Read this module.
- If you have any questions about the material, ask your supervisor.
- Complete the online posttest for this module.

Learning Objectives:

When you finish this module, you will be able to:

- Describe how to prevent IV catheter-associated infections during insertion and maintenance.
Preventing IV Catheter-Associated Infections

References
- The CDC Guidelines for Prevention of Intravascular Catheter-Related Infections, 2011 (CDC website www.cdc.gov)
- Infusion Nursing Standards of Practice, 2011

Purpose
- Decrease patient risk for catheter associated bloodstream infections
- Reduce patient length of stay due to healthcare acquired infections
- Reduce use of unnecessary antibiotic therapy

Background
Healthcare-associated infections (HAIs) are infections that people acquire while they are receiving treatment for another condition in a health care setting. They are costly, deadly, and largely preventable. Approximately one in every twenty patients admitted to a hospital in the US will develop a (HAI ) healthcare-acquired infection during their stay. These infections include IV catheter-associated bloodstream infections (CA-BSI). An estimated 250,000 cases of catheter associated bloodstream infections occur annually with approximately 80,000 CA-BSI occurring in the Intensive Care Units (ICU). A single healthcare-acquired CA-BSI can:
- Cost thousands of dollars to treat - about $25,000 per episode
- Increase the length of stay – 6-22 extra days in the hospital
- Cause or contribute to permanent disability or death – estimated 12-25% mortality.

Patients can develop bloodstream infections (BSI) without having an IV device but the rate is much higher in those that have catheters. A central line is the source of almost half of BSIs in ICU patients. Central line catheters, including PICC lines, may be the source of bacteremia even if local signs of inflammation are not present. A BSI associated with a central line is called a catheter associated bloodstream infection (CLABSI). Patients at highest risk for CA-BSI have these characteristics:
- Intensive care stay
- Immunocompromised status
- Very young or old
- Prolonged hospitalization
- Prolonged duration of IV device use
- Receiving total parenteral nutrition

This policy reflects the current CDC recommendations and includes tables with specific information on each type of IV catheter. Levine’s: Please refer to the Pediatric Policy and Clinical Practice Manual for pediatric and neonatal specific information related to intravenous catheters.

Types of IV Catheters

- Peripheral venous catheters/prn devices
- Central catheters – short term
  - Peripherally inserted central catheters (PICC, PCVC)
  - Central venous
  - Pulmonary arterial
  - Hemodialysis – VasCath, PermCath
  - Umbilical (UAC, UVC)
- Central catheters – long term
  - Totally implanted: Port-A-Cath
  - Tunneled: Hickman, Groshong, Broviac

How Do Patients Get a CA-BSI?

- Contaminated healthcare worker (HCW) hands
- Contamination of the catheter during insertion
- Inadequate disinfection of catheter hub/port prior to accessing the line
- Patient’s skin organisms migrate through the insertion site
- Contaminated IV fluids (rare)

Hand Hygiene

*Hand hygiene is the most important thing a HCW can do to prevent healthcare-acquired infections.* To ensure patient safety, you should remind other HCWs when they fail to disinfect their hands prior to inserting, assessing or managing any IV device. Patients and visitors should be encouraged to wash their hands. Some key points about handwashing are:

- All HCWs should use alcohol foam before and after patient contact or contact with the patient’s immediate environment, unless hands are visibly soiled.
- If hands are visibly soiled, wash with soap and water for at least fifteen seconds.
- HCWs with direct patient contact cannot wear artificial nails, tips, wraps, gels, etc. Natural nails should be kept at ¼ inch in length.
- Wearing gloves is not a substitute for handwashing.
How You Can Help Prevent CA-BSI

Prevention of central line bloodstream infections can be achieved by implementation of a set of interventions known as the “central line bundle”. The central line bundle is a group of evidence based interventions when implemented together result in better outcomes for patients with central line catheters. The bundle includes:

- Hand hygiene
- Use of chlorhexidine/alcohol (ChloraPrep) as a skin site prep – (There may be exceptions in some neonatal populations)
- Maximal sterile barriers (cap, mask, sterile gown, sterile gloves, full body sterile drape)
- Optimal catheter site selection
- Daily review of line necessity

A central line insertion checklist should be completed for each central line insertion except in emergent situations. In addition, proper care and maintenance of the line after insertion will assist in the prevention of CR-BSIs.

- **Stop** and remind any HCW who fails to follow infection prevention guidelines while inserting an IV device and while touching or manipulating any IV device or attachments.

- **Hand hygiene** with an alcohol based hand rub is required by any HCW prior to insertion of an IV device and with any contact with the IV dressing, site, device or attachments.

- **Skin preparation** for insertions and site care should be done with an alcohol (70%) / chlorhexidine (> 0.5%) solution (i.e. ChloraPrep). This type of solution is recommended for site prep and site care by the CDC. Studies have shown this to be more effective in disinfecting the skin than betadine or alcohol alone. Always follow manufacturer’s instructions for use. The correct technique for skin disinfection with an alcohol / chlorhexidine solution involves performing a 30 second back and forth scrub and then allowing to air dry. For skin prep with an alcohol / chlorhexidine solution involving moist sites, such as the groin, a 2 minute back and forth scrub should be performed and then allow to air dry. If there is a contraindication to chlorhexidine (e.g. patient sensitivity or device manufacturer recommendations) and in some designated populations such as neonates, tincture of iodine, an iodophor, and/or 70% alcohol can be used as alternatives.

- **Maximal sterile barriers** should be used for all central line insertions, including PICC lines and guidewire exchange. Maximal sterile barriers include cap, mask, sterile gown, sterile gloves, and a full body sterile drape. Maximal sterile barriers (cap, mask, sterile gown, sterile gloves) should be worn by all personnel directly assisting in the catheter insertion procedure.
  - Peripheral IV insertions require gloves and PPE as needed.
• **Insertion site** should be one that has the lowest rate of infections for the type of IV device being inserted. In the adult, the preferred peripheral IV site is the dorsum of the hand. For adult central venous catheters, the subclavian is the preferred site over the internal jugular and femoral. See the Intravascular Catheter-Related Infection, A Guide for Prevention.

• **Transparent dressings** are used for both peripheral and central lines. For all patients (adults, pediatric and neonatal) peripheral IV dressings are left in place until the catheter is removed or if the dressing becomes damp, loosened, or soiled. All central line transparent dressings should be changed every 7 days and when the dressing becomes damp, loosened or soiled. Site care should be done at dressing change to clean and disinfect the skin and catheter hub.
  
  o Do not reinforce dressings unless the risk of dislodging the catheter outweighs the benefit of changing the dressing when alternative sites are not available.
  
  o Do not put antimicrobial ointment at the insertion site. Gauze can be placed on the site after central line insertion if bleeding or oozing occurs at the site, but the dressing should be changed and gauze removed in 24 hours.
  
  o Placement of a gauze dressing under a transparent dressing should be considered a gauze dressing and changed every 2 days.
  
  o A chlorhexidine impregnated sponge (BioPatch) should be placed on all central line insertion sites unless contraindicated, covered with a transparent dressing and changed every 7 days or when the integrity of the dressing is compromised.
    
    • Remember the blue side of the BioPatch goes face up.

See the policy in the IV Therapy section of the Policy and Clinical Practice manual for further information.

• **Necessity** for any IV catheter should be reviewed with the physician on a daily basis (or per facility policy). This will prevent unnecessary delays in the removal of lines no longer needed for the care of the patient. Prior to patient discharge, assess for the necessity of any intravascular lines or accessed ports. Contact physician for removal order if line no longer necessary.

• **Rotation of site:** Peripheral IVs in all patients (adults, pediatric and neonatal) are replaced promptly when the site is no longer functional or with signs of infiltration, phlebitis or infection. Central venous catheters and PICC lines should not be rotated to prevent infection. Purulence at any IV central catheter site should be immediately reported and the catheter should be removed by a qualified HCW with a physician’s order. Guidewire exchange can be used to replace the central line catheter if there is no evidence of infection at the exit site or no evidence of a tunnel infection. Ideally, a new catheter should be placed at a new site.
Hang time of IV fluids mixed by Pharmacy or Nursing is 24 hours (including parenteral nutrition) unless otherwise indicated. Premixed fluids for adults may hang up to 96 hours. See specific hospital policies on hang times for blood, blood products and lipids.

Tubing change for adults is every 7 days for continuous infusions and every 24 hours for intermittent infusions, unless otherwise indicated (e.g. Propofol). TPN/PPN tubing is changed every 24 hours (refer to the Nursing TPN/PPN policy). For blood and blood components refer to the Nursing Blood/Blood Component Administration policy. Any tubing that is contaminated or otherwise compromised should be changed immediately. Positive displacement devices or caps should be changed along with the tubing change and prn.

Flush - Refer to the IV Therapy section of the Policy and Clinical Procedure Manual for specific flush guidelines for each type of catheter.

Remove and replace any IV catheter when adherence to aseptic technique cannot be ensured (i.e. catheters inserted during a medical emergency) and patient condition allows. Remove and replace the IV catheter once the patient’s condition stabilizes and if another site is available.

Before you connect or inject, disinfect ports, hubs and stopcocks by vigorously scrubbing with Chlorhexidine (CHG) or alcohol (recommended scrub time ≥15 seconds) and let dry. Clean visible blood from all ports, tubing, stopcocks and connections.

Maintain a closed sterile system
- Use sterile end caps.
- No “looping” of IV back into the hub when disconnected for intermittent infusions.
- Minimize breaks into the tubing system.

Palpate, visually assess, and document the site at least every four hours or per policy and as needed, looking for signs of infection or malfunction. Assess patient for complaints of pain at the site, redness, warmth, swelling, tenderness, oozing of fluid or blood, skin discoloration, red streaks, palpable cord or pus. A peripheral IV with these signs needs to be removed immediately and re-sited. A central line with these signs should be reported to the physician immediately.

Report any local signs of infection and systemic symptoms such as fever, chills, tachycardia, hypotension, malaise or confusion to the physician and document your observations. Central line catheters with purulence at the site should always be removed as soon as possible, but only by qualified personnel and with a physician’s order.
Educate patients, and their families as needed, about care of the central line and how to prevent infections related to them. This education should take place prior to the insertion of the central line. Document education provided on the Education Teaching Record.

Arterial Lines

- **Stop** and remind any HCW who fails to follow infection prevention guidelines while inserting an arterial line and while touching or manipulating any line component or attachments.

- **Hand hygiene** with an alcohol based hand rub is required by any HCW prior to insertion of an arterial line and with any contact with the arterial line dressing, site, device or attachments.

- **Skin preparation** for insertions and site care should be done with an alcohol (70%) / chlorhexidine (> 0.5%) solution (i.e. ChloraPrep). This type of solution is recommended for site prep and site care by the CDC. Studies have shown this to be more effective in disinfecting the skin than Betadine or alcohol alone. Always follow manufacturer’s instructions for use. The correct technique for skin disinfection with an alcohol / chlorhexidine solution involves performing a 30 second back and forth scrub and then allowing to air dry. For skin prep with an alcohol / chlorhexidine solution involving moist sites, such as the groin, a 2 minute back and forth scrub should be performed and then allow to air dry. If there is a contraindication to chlorhexidine (e.g. patient sensitivity or device manufacturer recommendations) and in some designated populations such as neonates, tincture of iodine, an iodophor, and/or 70% alcohol can be used as alternatives.

- **Maximal sterile barriers** should be used for all arterial line insertions. Maximal sterile barriers include cap, mask, sterile gown, sterile gloves, and a full body sterile drape. **Note:** for radial artery line insertion, a smaller drape may be used. Maximal sterile barriers (cap, mask, sterile gown, and sterile gloves) should be worn by all personnel directly assisting in the catheter insertion procedure.
If a CA-BSI Is Suspected

After you have discussed your observations with the physician, decisions about how to proceed if a catheter-related infection is suspected can be made. The following information is helpful to know:

- Generally, blood cultures should be drawn from two peripheral sites. A blood draw may consist of a single bottle for pediatric patients due to volume constraints. Avoid using a central line for drawing blood cultures; however, this may not be possible with children, neonates, and patients without adequate sites. Multiple bottles from one venipuncture are considered one culture. As a last resort, one blood culture may be drawn through a catheter optimally in conjunction with another draw from a skin/peripheral site.
- Prep skin and culture bottle tops according to the Lab procedure “Collection of Blood Cultures.” This helps prevent false positive results and unnecessary use of antibiotics.
- Draw blood cultures as soon as possible after the onset of fever and chills.
- In general, blood cultures can be repeated in 24 hours, but no more frequently than every 72 hours after that.
- Replace the line and rotate site if clinically feasible. Replace the catheter if purulence is present at the exit site. This is done only by qualified personnel and with a physician’s order.
- A guidewire exchange can be done if the patient’s clinical condition does not allow changing a central line to a new site. The physician performing the exchange must use maximal sterile barriers.
- If the catheter is moved to a new site, there is no need to culture the catheter tip.

Important Note:

The Infection Prevention policy *Intravascular Catheter-Related Infection, A Guide for Prevention* does not pertain to any other devices except those in the policy. Chloraprep and Biopatch cannot come into contact with neural tissue. These products cannot be used with devices like epidural catheters or procedures like lumbar punctures. Do not use either of these products unless there is a hospital approved policy and procedure describing safe and appropriate usage.
Posttest

Name: ______________________________________________________________

Date: ______________________________________________________________

Circle the correct answer.

1. Which of the following best describes the hand hygiene you should perform before working with an IV?
   a. Use alcohol foam before touching IV site, dressing or tubing.
   b. If hands are visibly soiled, wash with soap and water, dry thoroughly.
   c. If wearing gloves, use alcohol foam following patient contact but not before.
   d. A and B

2. A physician is starting a femoral arterial line on your patient. He is using all the maximal sterile barriers except the large sterile drape. What do you do?
   a. Say nothing because the physician will get mad.
   b. Ask him/her if you can get a large sterile drape before continuing.
   c. Wait till the procedure is over and you both are away from the patient, and then tell them about the large sterile barrier.
   d. Say nothing and report this to your manager for follow-up.

3. Alcohol / chlorhexidine (ChloraPrep) is the preferred skin disinfectant for prepping IV catheter insertion sites and for site care because:
   a. It is colorless, odorless, and cheaper.
   b. The CDC recommends use of a chlorhexidine solution.
   c. Studies have shown ChloraPrep is more effective in disinfecting the skin than betadine or alcohol alone.
   d. B and C

4. The correct technique for skin disinfection with ChloraPrep at the insertion site is:
   a. Performing a 30 second back and forth scrub
   b. Employing the bulls eye technique
   c. Performing a one minute circular scrub
   d. Quickly swiping the insertion site
5. Your patient’s peripheral IV site is red and painful. The appropriate action to take is change the IV site:
   
   a. Every 96 hours  
   b. Every 72 hours  
   c. Immediately if signs of infiltration, phlebitis or infection are present  
   d. Wait for the IV team rounds to change the IV

6. The central line bundle must be completed for placement of all (non-emergent) central lines.
   
   a. True  
   b. False

7. The central line bundle consists of:
   
   a. Use of Chlorhexidine (ChloraPrep) as a skin site prep  
   b. Maximal sterile barriers (cap, mask, sterile gown, sterile gloves, large sterile drape)  
   c. Optimal catheter site selection (avoid femoral)  
   d. Hand Hygiene  
   e. Daily review of line necessity  
   f. All of the above

8. Prior to each IV access, disinfect the hub/port by vigorously scrubbing with either alcohol 70% or chlorhexidine > 0.5% / alcohol 70% (Chlorascrub).
   
   a. True  
   b. False

9. Which of the following are true about blood cultures:
   
   a. Multiple bottles from one venipuncture are considered one culture.  
   b. Should be drawn from two separate peripheral sites  
   c. The skin and bottle tops should be prepped following the Lab policy  
   d. Can be repeated in 24 hours, but not recommended more than every 72 hours after that  
   e. All the above
10. The optimal site for central line insertion in adults is:
   a. Femoral
   b. Internal Jugular
   c. Subclavian
   d. Dorsal side of the hand

11. You are directly assisting the physician with inserting a central line. What type of protective barriers should you wear?
   a. Mask
   b. Cap
   c. Sterile gown
   d. Sterile gloves
   e. All of the above

12. You patient has an order to be discharged to a rehabilitation center. The patient currently has a PICC line in place with no order to discontinue. All fluids and IV medications have been discontinued. What should you do?
   a. Make sure the accepting facility has instructions on the care of a PICC line.
   b. Leave it in- they may need it in the future in case they get an infection.
   c. Contact the physician for an order to discontinue the PICC and have it pulled prior to discharge by competent staff.
   d. Just pull it- no special training is needed.