

Surgical Intensive Care Unit Practice Management Guidelines: Central Venous Access

I. Purpose:

Central lines are commonly used in the ICU setting for infusion of medications and invasive monitoring but are a significant cause of hospital acquired blood stream infections (CLABSI). Literature supports the adoption of several safety practices for the insertion and maintenance of these catheters in critically ill patients.

These practices are bulleted below and summarized in the table approved and VUMC institutional policy (<https://www.vumc.org/infectioncontrol/32960>).

II. Guideline:

Catheter selection: When available, antibiotic impregnated catheters should be utilized for all central line insertions in the ICU.

Insertion site: The subclavian position is the preferred site for insertion, as the infection risk is lowest for this site. Internal jugular (IJ) is the second alternative with the femoral position being the least preferred due to both infection and thrombosis risk. Other factors, such as potential for mechanical complication, risk for subclavian vein stenosis, and catheter-operator skill should be considered when deciding where to place the catheter.

Ultrasound guidance: If the IJ position is selected, ultrasound guidance prior to and during the procedure should be employed. Ultrasound may be useful for other sites in certain circumstances.

Insertion technique:

- Obtain consent for central line placement.
- Ensure continuous cardiac monitoring with QRS volume up and continuous pulse oximetry.
- Full barrier precautions should be utilized for all invasive catheters.
- This includes ALL of the following:
 - Mask
 - Cap
 - Sterile Gown
 - Sterile Gloves
 - Small blue towel drape x 4.
 - Large drape in addition to 4 “blue towels” that fully cover the head and torso of the patient.
- Skin should be free of debris and adequately and widely prepped with chlorhexidine or ChlorPrep and allowed to dry.

- Patient should be in Trendelenburg position to prevent air embolus, unless contraindication (particularly spontaneously breathing patients). A sufficient volume of air to cause mortality can travel through a 14-gauge needle in < 1 second.
- Transduce line using transducer in central line kit before dilating to ensure venous catheterization.

Replacement of central venous catheters:

- Evidence of local catheter infection such as purulence, erythema, tenderness, mandates a catheter change to a **new site**.
- Do not use guide wire exchanges to replace non-tunneled catheter suspected of being the source of bacteremia (i.e. + blood cultures).
- Do not routinely replace CVC (or change over guide wire) or pulmonary artery catheters to prevent catheter related infections.
- You may use change over guide wire to replace a mal-functioning catheter if no infection is suspected.
- For patients with SIRS and undergoing evaluation of possible line infection, the risk of line infection should be weighed against the risk of mechanical complications with new line insertion. Catheters exchanged over a wire with culture will limit the risk of mechanical complications and stenoses, but may increase the risk of subsequent colonization – **change over wire vs. new site**.
- Patients with evidence of bloodstream infection with hemodynamic instability, sepsis – **change line to new site**.
- No clinical evidence of infection – **do not change line**.

Peripheral infusion of vasopressors:

- The following vasopressors may be infused via a peripheral IV:
 - Norepinephrine ≤ 15 mcg/min
 - Phenylephrine ≤ 75 mcg/min
- Refer to Policy Tech “Infusing Vasoactive Medications Through a Peripheral IV - SICU” document for specific details

VUMC Standards for Non-emergent Insertion and Management of Central Venous Catheters (CVCs)

CVC Insertion		Insertion Site Care	CVC Access	CVC Discontinuation
Preparation	Procedure			
Educate Patient/Family about CLABSI prevention and obtain informed consent.	Prep site with chlorhexidine (CHG); allow to dry before procedure starts.	Assess insertion site and catheter each shift.	Minimize CVC access; bundle the collection of multiple lab tests to a single CVC access when possible.	Remove CVC when no longer medically necessary and when an alternative IV access (e.g. peripheral IV) can serve the patient's needs.
Obtain all supplies.	Place sterile full body drape over patient.	Report abnormal findings to physician or designee.	Perform hand hygiene before accessing CVC.	Daily evaluation by primary care team re: CVC necessity.
Perform hand hygiene before procedure.	After insertion, a transparent CHG-impregnated dressing is placed, maintaining sterility of the insertion site.	Daily evaluation by primary care team re: CVC necessity.	Scrub to disinfect access port with an alcohol or CHG prep pad using a twisting motion 5 times around the threads and scrubbing 5 times across the septum. Allow to dry before accessing.	Guidewire exchange of CVC follows same procedures as CVC insertion.
Perform time-out.	Confirm CVC placement radiographically, as appropriate.	Change dressings at regular intervals (Q7d for transparent, q24hrs if gauze).		Trained providers discontinue CVCs.
Proceduralist(s) wears cap, mask, sterile gloves, sterile gown.	When adherence to aseptic technique cannot be ensured (i.e., when catheters are inserted during a medical emergency), replace all catheters as soon as possible and after no longer than 48 hours. Lines placed at outside facilities are considered for replacement.	Change dressing if damp, soiled or non-occlusive.	Only draw blood cultures from CVC with physician order for collection from CVC.	Routine CVC replacement is not recommended for prevention of CLABSI.
Nursing personnel is present in room; wears cap and mask if not in contact with sterile field.		Perform dressing changes as a sterile procedure.	Collect blood cultures from CVC only to determine if CVC is source of bacteremia.	Avoid guidewire exchange to replace CVCs in patients suspected of having catheter-related infection.
Site selection is based on patient needs and condition. Subclavian site is preferred; femoral placement in adults is avoided.	After 3 attempts at placement or before changing sites, a second proceduralist is consulted.		Change soiled, leaking, potentially contaminated hub caps.	
Ultrasound should be used for guidance prior to or during IJ placement, and may be useful to evaluate other vessels prior to line placement.			Change tubing, needleless devices, and fluid as specified by policy (CL 30-07.01).	
<p>Monitor compliance with elements of insertion, care, access, and discontinuation.</p> <p>Any member of the team is obligated to identify and ensure correction of any deviation or potential deviation from these standards.</p>				

For more detail see PolicyTech: CL 30-07.11

III. References

Guideline for prevention of intravascular device-related infections. Part II. Recommendations for the prevention of nosocomial intravascular device-related infections. Hospital Infection Control Practices Advisory Committee. Am J Infect Control 1996; 24:277-293.

Marschall J, Mermel LA, Classen D et al. Strategies to prevent central line-associated bloodstream infections in acute care hospitals. Infect Control Hosp Epidemiol 2008; 29 Suppl 1:S22-S30.

Pearson ML. Guideline for prevention of intravascular device-related infections. Part I. Intravascular device-related infections: an overview. The Hospital Infection Control Practices Advisory Committee. Am J Infect Control 1996; 24:262-277.

Mermel L, Allom M, Bousa E, et al. Clinical Practice Guidelines for the Diagnosis and Management of Intravascular Catheter-Related Infection: 2009 Update by the Infectious Diseases Society of America. CID 2009;45: 1-45.

O'Grady NP, Alexander M, Burns LA et al. Summary of recommendations: Guidelines for the Prevention of Intravascular Catheter-related Infections. Clin Infect Dis 2011; 52:1087-1099.

Healthcare Infection Control Practices Advisory Committee (HIPAC). 2011 Guidelines for the Prevention of Intravascular Catheter-Related Infections. <http://www.cdc.gov/hicpac/BSI/03-bsi-summary-of-recommendations-2011.html#rpmc>

Cobb DK, High KP, Sawyer RG et al. A controlled trial of scheduled replacement of central venous and pulmonary-artery catheters. N Engl J Med 1992; 327:1062-1068.

Cook D, Randolph A, Kernerman P et al. Central venous catheter replacement strategies: a systematic review of the literature. Crit Care Med 1997; 25:1417-1424.

IV. Revised March 21, 2024:

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V. Endorsement:

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