EMORY
HEALTHCARE

POLICY TITLE: Central Venous Catheters - Guidelines for Use							
APPLICABLE FACILITIES:							
☒EHC	☒EDH	☒EHH	☐EHI	☐EHN	☒EJCH	☒ELTAC	☒ESJH
☒EUH	☒EUHM	☐EUHS	☒EUOSH	☒EWWH	☒RJV-ERH	☐RJV-ESOP	☐TEC/ESA
EFFECTIVE DATE: 01/25/2021					**ORIGINATION DATE:** 3/18/2003		

SCOPE:
This Emory Hospital guideline addresses the selection, insertion and maintenance of central venous catheters and related devices.

PURPOSE:
To guide proper central venous catheter management, care, and removal.

POLICY STATEMENT:
Intravascular catheters are essential components of contemporary medical therapy. However, use of these catheters is associated with infections and other complications. In addition, because of increased level of intensity of care in hospitalized patients, use of catheters has increased in recent years leading to an increase in infectious complications including bloodstream infections. This Emory Hospitals guideline addresses the selection, insertion and maintenance of central venous catheters and related devices.

PROCEDURE:

1. **Indications for Use**
   Central venous catheters (CVCs) have a significant associated risk of complications including bloodstream infections and should only be used when necessary. Indications for use of CVCs include:
   a. Need for hemodynamic monitoring
   b. Hemodynamic instability
   c. Need for infusion of > 3 incompatible continuous infusions or 2 continuous infusions plus blood products
   d. Use of medications that require central venous access, hemodialysis, continuous renal replacement therapy (CRRT) or apheresis
   e. Inability to get peripheral access and continued need for infusion therapy.

2. **Selection of Catheter**
   a. While individual patient specifics may dictate the optimal type of catheter used, the catheter selection algorithm offers a standard approach to line selection.

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Emory Healthcare Appropriateness Guide for Line Insertion

Device Type	Proposed Duration of Infusion			
	0-2 weeks	2-6 weeks	6-12 Weeks	>12 weeks
Peripheral IV	Consider ultrasound guidance for difficult access. Dwell time is as clinically indicated without complications.			
Midline catheter	For difficult access; ultrasound guidance required. Dwell time is as clinically indicated without complications.	If central venous access not needed. Dwell time is as is clinically indicated without complications		
PICC		PICC preferred over midline if anticipated duration 4-6 weeks or IV therapy requires central access.		
Non-tunneled/acute CVC	Preferred in critically ill patients or if hemodynamic monitoring needed.			
Tunneled CVC		Preferred for renal patients over standard PICC.		
Tunneled, cuffed CVC			Preferred if catheter stability is an issue.	Preferred for continuous infusion; long term TPN.
Port				Preferred for intermittent longterm infusion.

Appropriate

Acceptable but may be better options

Not Advised

PIV- peripheral intravenous catheter; PICC - peripherally inserted central catheter; US - ultrasound; CVC – central venous catheter; TPN- Total Parenteral Nutrition

b. PICCs pose a higher risk of DVTs in ICUs than traditional IJ/Subclavian catheters.

c. Use a fistula or graft instead of a CVC for permanent dialysis access.

d. For hemodialysis catheters, use a cuffed CVC if the period of access for hemodialysis or apheresis is anticipated to be > 3 weeks.

e. Intraosseous cannula is recommended for emergent use in the event of extreme emergent need for vascular access (See Intraosseous policy/procedure).

3. **Selection of Catheter Insertion Site**

a. In selecting the optimal insertion site for non-tunneled CVC, minimizing infection risk needs to be balanced with other considerations such as risk of complications from insertion and availability of ultrasound guidance to assist the inserter.

b. To minimize risk of infection, the preferred site for non-tunneled central venous catheters is a subclavian vein followed by an internal jugular and then femoral vein.

c. Because of the risk of subclavian vein stenosis, hemodialysis and apheresis catheters should be placed in an internal jugular (preferred) or femoral vein rather than a subclavian vein.

4. **Hand Hygiene and Glove Use**

a. Perform hand hygiene before and after palpating catheter insertion sites, as well as before and after inserting, replacing, accessing, repairing, or dressing any intravascular device.

b. The use of gloves does not replace the need for hand hygiene.

c. Clean, non-sterile gloves should be worn for removal of a dressing. Sterile gloves should be worn when inserting a central line, performing catheter site care and application of dressing.

5. **Catheter Insertion**

a. Central Line Associated Bloodstream Infection (CLABSI) Prevention Bundle should be performed and documented with all central line insertions. Elements of the bundle include:
   i. Hand hygiene prior to insertion of central venous catheter.

   ii. Maximal barrier precautions on insertion (sterile gowns & gloves, mask, caps, large sterile drape).

   iii. Chlorhexidine gluconate scrub (2%) at site, scrubbing vigorously with friction in a side to side manner for 30 seconds. If a femoral line is placed CHG scrub is for two minutes. Allow it to dry prior to line insertion.

   iv. Optimal site selection, avoid femoral site when feasible.

   v. Daily review of need for central venous catheter with prompt removal of unnecessary lines.

b. Use sterile technique, including a cap, mask, sterile gown, sterile gloves, and a large sterile drape (i.e., maximal barrier precautions), for the insertion of central venous catheters including PICCs, or during guidewire exchanges.

c. Those directly involved must wear cap, mask with eye shield, sterile gown, and gloves. All others in the room must wear a mask and cap.

d. Use ultrasound, when possible, to guide catheter placement.

e. If CVC tip location is confirmed to be within the SVC or cavo-atrial junction the CVC may be used.

f. When PICC tip is confirmed to be in the SVC or cavo-atrial junction either by CXR or another approved tip confirmation technology, the line may be used per hospital policy. (A written order to use is not needed.)

g. *Note: If patient admitted with existing non-tunneled CVC confirm tip placement by chest x-ray.*

6. **Catheter Site and Catheter Hub Care**

a. Disinfect clean skin with a 2% chlorhexidine-based preparation before catheter insertion. 70% alcohol, povidone iodine or an iodophor are alternatives if chlorhexidine cannot be used. Allow the antiseptic to dry on the insertion site before placing catheter.

b. Apply sterile catheter site dressing per patient care procedure.

c. For temporary hemodialysis/apheresis catheters, apply sterile catheter site dressing per patient care procedures.

d. Non-dialysis nursing staff should not draw blood, administer medication, or fluids through hemodialysis catheters except during emergency conditions or with a nephrologist's order. However, if catheter is not used for dialysis it must be flushed Q72hr by bedside nurse.

e. After a CVC is inserted, place needleless devices on catheter hubs. Vigorously scrub the needleless device with antiseptic wipe for 5 seconds and allow to dry prior to accessing the catheter lumen. A mask is recommended and gloves are required when changing the needleless connectors. Alcohol caps are placed on lumens with IV needleless connectors and Y-sites of IV tubing for all patients with central lines except blood and blood products.

7. **Replacement of Catheter**

a. <u>If a catheter is properly inserted and maintained</u> (per above guidelines), do not routinely replace central venous catheters, PA catheters, hemodialysis catheters or PICCs as a method to prevent catheter-related infections.

b. When adherence to aseptic technique at time of insertion cannot be validated, replace all short-term CVCs within 48 hours including catheters inserted under emergency conditions and catheters inserted prior to transfer to Emory Hospitals. Consideration may be given to preserving/maintaining venous access in selected patients with limited access or if no evidence of local or systemic infectious complications is present.

c. Guidelines for catheter management for suspected CLABSI:

i. When bloodstream infection is suspected, obtain two sets of blood cultures prior to antimicrobial therapy.
ii. Both sets of blood cultures should be obtained percutaneously to minimize contamination.
iii. If unable to obtain two percutaneously, consider one peripheral culture and one line culture.

iv. If at all possible, do NOT draw blood cultures from lumen in use for central parenteral nutrition.

v. If at all possible, do NOT draw both blood cultures from the central line.

vi. Clinical indications for follow up blood cultures include bloodstream infections due to Staphylococcus aureus and Candida species, or when endovascular infection is suspected. Repeat blood cultures are not routinely indicated for gram negative bacteria such as *E.coli* or *Klebsiella species*.

d. The CVC should be removed if:

i. There is erythema or purulence at the catheter exit site.

ii. If the patient is hemodynamically unstable and there is no other obvious source of sepsis, and/or suspicion for catheter-related infection is high.

e. If the catheter is not strongly suspected as the source of a new fever, the catheter may be left in place pending blood culture results. Remove catheter if blood cultures are positive <u>and consistent with central line infection</u>. However, see catheter salvage guidelines below.

f. When catheters are removed for possible infection:

i. Place a peripheral IV

ii. Unless urgently needed, waiting 24-48 hours after antibiotics are started prior to insertion of t a new non-tunneled CVC, when needed, is prudent.

g. Attempted catheter salvage (usually tunneled cuffed catheters or implanted ports) when infection is present should be restricted to situations where:
i. Catheter replacement is not feasible or would pose risk to the patient

ii. The patient is hemodynamically unstable

iii. There is no exit site or tunnel infection

iv. The infecting organism is not Candida sp. or S. aureus (unless no alternative insertion sites)

8. **Guidewire Exchange**

   a. If no evidence of infection is present, guidewire exchange may be used to replace a malfunctioning non-tunneled catheter or to convert a PA catheter to a central venous catheter when invasive monitoring is no longer needed.

   b. Use a new set of sterile gloves prior to handling the new central catheter when guidewire exchanges are performed.

   c. Do not routinely use guidewire exchange to replace catheters for which there is a clinical suspicion for CLABSI. In the setting of suspected catheter infection, guidewire exchange with tip culture of removed catheter should be done only when catheter insertion at a new site is precluded by high risk of mechanical complications during reinsertion, coagulopathy, or anatomic problems. This new catheter will need to be removed if cultures of the removed catheter tip show significant colonization.

   d. Follow air embolism precautions as outlined in the Central Venous Catheter Removal procedure.
      > Refer to the Lippincott Procedures database to access the Central Venous Catheter Removal procedure.

9. **Antimicrobial Lock**

   a. Prophylactic antimicrobial lock solutions may be used in patients with long term catheters who have a history of multiple CLABSI despite optimal maximal adherence to aseptic technique or who are considered high risk for developing CLABSI, such as patients on TPN.

   b. Therapeutic antimicrobial lock solutions have a limited role in the management of CVC-related infections but should be considered when catheter salvage is attempted.

      > Refer to Lippincott Procedure to access the Antimicrobial and Ethanol Locks.

10. **Catheter Removal**

   a. Remove all central venous catheters when indications for use criteria (outlined in section) are no longer met.

   b. Pulmonary artery catheters, introducers and arterial lines should only be used in critical care patients, and should be discontinued before transferring the patient to the acute care areas.

   c. Air Embolism precautions:

      i. Place patient in supine position with head of bed flat or slight Trendelenburg

      ii. Have patient take a breath in and exhale or hum while you pull the line.

d. Hold pressure over the site with folded 4X4 gauze pad w/triple antibiotic ointment or sterile gel and maintain the patient's head position down while hemostasis of venous site occurs.

e. Place occlusive dressing over site by covering gauze completely with tape.

f. Monitor patient for signs or symptoms of air embolism:

   i. hypotension, tachycardia, tachypnea, cyanosis
   ii. confusion, neurological changes
   iii. chest pain, coughing, shortness of breath
   iv. cardiovascular arrest

g. Have patient lie flat or in chair position for 30 minutes after removal

h. Follow air embolism precautions as outlined in the Central Venous Catheter Removal procedure.
   > Refer to the Lippincott Procedures database to access the Central Venous Catheter Removal procedure.

RELATED DOCUMENTS AND LINKS:

Lippincott Procedure: Central Venous Access Catheter—Removal
http://procedures.lww.com/lnp/view.do?pId=652308

Lippincott Procedure: Multi-Lumen Catheter Insertion and Care-Central Venous Catheter
http://procedures.lww.com/lnp/view.do?pId=2750560

Lippincott Procedure: Central Venous Access Device—Declotting
http://procedures.lww.com/lnp/view.do?pId=652311

Lippincott Procedure: Central Venous Access Device Dressing Change
http://procedures.lww.com/lnp/view.do?pId=652310

DEFINITIONS:

N/A

REFERENCES AND SOURCES OF EVIDENCE:

Infusion Therapy Standards of Practice (2016) Journal of Infusion Nursing 39 S106-S108 (Level VII). Infusion Nurses Society (2016) Policies and Procedures for infusion therapy (5th edition). Infusion Nurses Society.

The Joint Commission. (2019). Standard NPSG.07.04.01, EPs 12, 13. Comprehensive accreditation manual for hospitals: The official handbook. Oakbrook Terrace, IL.

The Michigan Appropriateness Guide for Intravenous Catheters (MAGIC). Results from a multispecialty panel using the RAND/UCLA Method. Annals of Internal Medicine. 163:6 supplement. September 2015.