VANDERBILT UNIVERSITY MEDICAL CENTER

Policy: Central Venous Access Devices: Insertion and Maintenance, and Discontinuation

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Clinical Policy Number</th>
<th>Approval Date</th>
<th>Effective Date</th>
<th>Supersedes</th>
</tr>
</thead>
</table>

Applicable to
- VUH
- Children’s Hospital
- VMG
- VMG Off-site locations
- VPH
- VUSN
- VUSM
- Other:

Team Members Performing
- All faculty & staff
- Faculty & staff providing direct patient care or contact
- Other: All faculty, house staff, students, and staff inserting and maintaining central venous access devices.

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Specific Education: Yes

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Inquiries: Accreditation & Standards (615) 322-1117
I. Purpose:

To establish safe, consistent, and proven practices related to insertion and maintenance of central venous access devices (CVAD).

II. Policy:

Vanderbilt University Medical Center (VUMC) requires every clinician to adhere to practices that reduce the risk of harm, including infection, during insertion, care, and removal of central venous catheters.

III. Definitions:

A. Central Venous Access Devices (CVAD) - an intravascular catheter that terminates in the central veins. It is used for infusion, withdrawal of blood, or hemodynamic monitoring. Pacing wires and other non-lumened devices inserted into central blood vessels or the heart are not CVADs. Central venous access devices include:

1. Single and multi-lumen temporary catheters;
2. Introducers;
3. Peripherally Inserted Central Catheters (PICC);
4. Catheters placed in the umbilical artery or vein; and
5. Temporary dialysis and pheresis catheters.

B. The long-term devices below are inserted in designated procedural areas in compliance with standards applicable to those areas.

1. Cuffed, tunneled catheters; and
2. Implanted venous access (ports).

C. Emergent line placement: CVAD is placed under time-critical conditions in a patient with profound physiologic instability or undergoing active cardiopulmonary resuscitation.

IV. Specific Education:

A. CVAD insertion is performed independently by clinicians who have been deemed competent to perform the procedure.

1. Members of the Medical Staff whose core or separate clinical privileges include CVAD insertion.
2. The School of Medicine provides the Hospital with access to a list of house staff who have been determined by their program directors to have met competency requirements for device insertion.

B. Those without credentials to place CVADs must be directly supervised by a resident or affiliate staff with clinical privileges and/or documented competency to insert CVADs.

C. All clinicians responsible for insertion or maintenance of CVADs complete annual training.

D. Clinicians who have received device-specific training access dialysis and apheresis catheters.

E. Staff removing CVADs follow guidelines established relevant to the devices commonly seen in the area of practice.

V. Specific Information:

A. Insertion

1. The insertion practices described are followed for every non-emergent CVAD insertion, including guide wire exchange.

2. 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.

3. A nurse is present at the bedside before and during the procedure to facilitate timeout, to assist with procedure preparation, to assist with monitoring compliance with sterile technique, and to monitor the patient’s condition.

4. Maximal barrier precautions are used for every insertion and guidewire exchange. When lines are placed emergently, the proceduralist adheres to insertion practices to the extent possible, recognizing the stability of the patient takes precedence over compliance with practice guidelines.

5. A procedure time-out is performed to confirm correct patient, correct procedure, correct insertion site, and availability of correct supplies for the procedure (see
6. Skin antisepsis is performed at the selected site using chlorhexidine gluconate (CHG) unless contraindicated. Povidone iodine may be used for umbilical lines in neonates or for patients allergic to CHG. Allow antiseptic to dry completely.

7. With guidewire exchange, sterile gloves are changed prior to handling the new catheter to ensure continued sterility.

8. If blood cultures are obtained when the new line is placed, they are drawn by the proceduralist before removal of the drape.

9. An appropriate dressing is placed over the insertion site (see below), maintaining sterility of the site.

10. CVAD placement is confirmed and insertion-related complications are identified radiographically as appropriate.
    
    a. Confirmation of appropriate placement is made before use of the CVAD, except in emergent situations.
    b. PICC placement in adults may be verified through electrocardiogram assessment and does not require radiographic confirmation.
    c. Femoral line placement does not require radiographic confirmation.
    d. In the perioperative setting, radiographic confirmation may be deferred to the immediate postoperative period. If it is deferred, ultrasound, fluoroscopy, waveform analysis, or blood gas analysis may be used to confirm venous positioning before use.

B. Maintenance

1. Assessment

   a. The site, surrounding skin, and dressing are assessed at least every shift and with each change in caregiver, or more often as unit standards specify.
   b. The multidisciplinary team evaluates continued need for the device daily.
2. CVAD Dressing Change
   a. Dressing changes are performed as a sterile procedure.
   b. Patient conditions are considered in selection of the appropriate dressing
      i. A transparent CHG-impregnated dressing is used unless contraindicated OR unless the patient has an implanted port.
      ii. Gauze is used when the patient is allergic to adhesives or where significant oozing is present.
      iii. For NICU patients and infants less than 2 months of age, a transparent dressing is used.
   c. Transparent dressings are changed every 7 days or per unit standard, and when damp, soiled, or non-occlusive.
   d. Gauze dressings and gauze under transparent dressings are changed every 2 days to allow site assessment.
   e. If a securement device is in use, it is changed with the dressing change.
   f. Place a label on the dressing with date of dressing change and initials. Do not write directly on the dressing.

3. Accessing the CVAD
   a. Perform hand hygiene before and after manipulating the line.
   b. Catheter access is minimized.
   c. Aseptic technique is utilized in accessing the catheter hub or injection caps for any reason.
   d. Scrub to disinfect access port with an alcohol or CHG prep pad using a twisting motion five times around the threads and scrubbing five times across the septum. Allow to dry before accessing.
   e. If needless connectors are removed for continuous infusion, the lumen/cap interface is cleaned and allowed to dry before removal.
   f. Lumens remain capped and protected at all times. If tubing is not in use, a sterile needleless connector is applied to the unprotected lumen to prevent contamination.
   g. Lumen patency is assessed each time the catheter is accessed. A 10 ml syringe or larger is required for accessing patency of central lines. If no resistance is met, use the syringe size that is appropriate for the med dose being given.
i. A sterile 10 milliliter syringe is connected to the lumen and aspirated to evaluate blood return. The lumen is flushed with normal saline using a pulsatile stop-start technique. Do not force if resistance is met.

ii. If no blood return, reposition the patient and retry. If unable to aspirate or flush, tape the cap and label the lumen, “DO NOT USE” and document the same. Notify the provider and/or the Vascular Access Team that the lumen is occluded to determine and order appropriate intervention.

4. Temporary and Long-Term Dialysis / Apheresis Catheter Management

a. Dressing changes
   i. Vanderbilt University Hospital (VUH): Dressings are maintained by trained nursing staff.
   ii. Monroe Carell Jr. Children’s Hospital at Vanderbilt (Children’s Hospital): If the patient is on dialysis, the Vascular Access Team changes the dressing. If the catheter is no longer used for dialysis, trained staff change the dressing.
   iii. A dressing that is damp, soiled or non-occlusive is changed as soon as possible by trained staff.

b. Access
   i. VUH: Dialysis and apheresis catheters that are managed by the Nephrology Team may not be accessed without permission unless emergent access is needed. When approved by the team managing the device, the catheter is accessed by staff who have completed training and competency requirements related to the devices. See CVAD Table.
   ii. Children’s Hospital: While the catheter is in use for dialysis, the device is accessed only with permission from the Nephrology. Once the patient no longer requires dialysis, long term devices may be managed following the guidelines for other tunneled devices.

   EXCEPTION: The designated clear infusion port on a triple-lumen dialysis catheter may be accessed by all nursing personnel who are authorized to access central venous access devices.

5. Implanted Port Management
a. Newly implanted venous ports or newly inserted Huber needles require new IV fluids and tubing.
b. Change the Huber needle infusion set every 7 days and as needed.
c. Change access cap every 7 days with Huber needle change and as needed.
d. Flush weekly and after use when accessed and heplocked.
e. Flush monthly when not in use.

6. Blood Sampling from the CVAD

a. Blood for laboratory testing is drawn from the catheter minimizing waste and optimizing sample quality. Routine blood draws are scheduled together when possible.
   i. All infusions are paused or stopped and lumens clamped for at least one minute before aspirating blood.
   ii. A volume of 2 to 2.5 times the deadspace is drawn and discarded, unless blood cultures are to be drawn. The deadspace is the volume from tip of the catheter to the access cap, and may be indicated on the device. Specimens are obtained with vacutainer adaptor or with a syringe. Follow Vacutainer Order of Draw.

b. Tubes with additives must be thoroughly mixed by gently rocking the specimen 5-10 times immediately upon collection. Erroneous test results or rejection of specimen may occur when the blood is not thoroughly mixed with the additive.

c. After the required specimen is obtained, the lumen is flushed
   i. For adult patients a minimum of 10 ml normal saline is used.
   ii. For pediatric patients, 3-5 mL normal saline is used, unless volume restrictions prohibit.

d. Infusions are restarted, or the lumen flushed as indicated.

Note: Blood cultures are drawn from central lines only with a specific order to determine if the line is a source of bacteremia. Initial aspirate is included in sample; no discard is drawn.

*See Web References for CL 30-08.10, Collection of Blood for Laboratory Testing and CL 30-08.05, Blood Culture Collection.

7. Vascular access tubing changes:
a. Newly placed CVADs require new IV fluids and tubing.
b. Sterile needleless connectors, extension sets, filters, and stopcocks are replaced with tubing changes, and as needed.
c. Caps that are soiled, leaking, or potentially contaminated are changed.
d. New needle-free valve caps are primed with normal saline. The syringe remains attached for connection to the lumen. The lumen is clamped with the attached clamp. The old cap is removed and discarded. If the lumen is packed with anticoagulant or antibiotic solution, the lumen is aspirated and the contents discarded.
e. The new cap is attached, the clamp released, and the lumen aspirated to check for patency then flushed with remaining saline. Some catheters require heparin or antibiotic solution when not in use. See Central Venous Catheter Table.
f. Frequency of tubing changes is found in CL 30-07.01 Intravenous Access

C. Discontinuation

1. Central venous access devices are removed by licensed staff when it is within the scope of service to remove the devices commonly seen in the area.

2. An order to remove the device is obtained prior to discontinuation. Alternate vascular access is obtained prior to removal if indicated by patient condition or unit standards.


VI. Procedures:

A. Perform hand hygiene before any procedure involving the CVAD, including insertion, access, maintenance, and discontinuation.

B. All referenced maintenance and removal procedures are defined in the VUMC policies or Mosby Skills.

VII. Clinical Implications:

A. Any member of the team immediately notifies the proceduralist of any deviation from the critical steps of insertion, stops the procedure until the deviation is corrected if necessary, and assures compliance before procedure can proceed. If there are any concerns related to insertion, the attending physician is contacted.
B. For non-emergent CVAD placements, a second qualified operator is consulted after 3 unsuccessful sticks or before attempting insertion at a new site.

C. The patient is assessed daily by the multidisciplinary team to evaluate for continued need for the CVAD.

D. Use a 10 ml or larger syringe for establishing patency and for routine flushing.

E. Luer-lock connections are used for infusion lines on all CVADs.

VIII. Patient/Family Education:

Educate patient/family at the level of their understanding of the following:

A. Risks and prevention of central line associated blood stream infection.

B. Need to avoid manipulation of the device and dressing.

C. Importance of alerting care provider of any signs of infiltration, phlebitis or infection at the CVAD insertion site; including pain, redness, swelling, induration, disruption of flow or lack of blood return or a wet, soiled or loose dressing.

IX. Documentation:

A. The Proceduralist documents insertion procedure, including but not limited to:

   1. Adherence to hand hygiene;
   2. Use of components of barrier precautions;
   3. Type of skin preparation;
   4. Type and location of catheter; and
   5. Any complications of insertion known at the time of documentation.

B. Nursing documents:

   1. Patient/family education;
   2. Preprocedure verification and time-out;
3. Daily assessment of site;
4. Dressing changes; and
5. Discontinuation of catheter.

X. References:


Mosby Skills: Central Venous Catheter Insertion, Removal, Blood Sampling, Peripherally Inserted Central Catheter; Central Venous Access Devices: Declotting with Alteplase; Implantable Port Access, Deaccess, and Care.


Clinical Chapter:
Universal Protocol - Identification of Correct Patient, Procedure, Site/Side
Blood Culture Ordering and Collection
Safety Chapter:
*Bloodborne Pathogen Exposure Control Plan*

**VUMC Recommendations for Insertion and Management of Central Venous Access Devices.** March 2014.

**XI. Endorsement:**

Institutional Critical Care Committee  
Children’s Vascular Access Safety Committee  
Vascular Access Safety Committee  
Children’s Policy and Practice Committee  
Clinical Practice Committee  
Medical Center Medical Board  
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Chief Nursing Officer  
Monroe Carell Jr. Children’s Hospital at Vanderbilt  
Robin Steaban, RN, MSN  
Chief Nursing Officer, VUH and Clinics  

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Deputy Vice Chancellor for Health Affairs  
Senior Associate Dean for Clinical Affairs  
CEO of the Vanderbilt Health System  

**XIII. Appendix: Adult CVAD Management**
## Adult Central Venous Access Device Management

*(Last Revised September 2014)*

<table>
<thead>
<tr>
<th>Type of catheter</th>
<th>Temporary Central Venous Catheters</th>
<th>Peripherally Inserted / Midline Catheters</th>
<th>Tunneled Catheters</th>
<th>Implanted ports</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Other names</strong></td>
<td>single, double, triple lumen catheters, introducers</td>
<td>PICC, Midline catheters</td>
<td>Broviac, Hickman, Groshong</td>
<td>Infusaport, Powerport, Portacath, Excela port</td>
</tr>
<tr>
<td><strong>Special Considerations</strong></td>
<td>PA Catheter guidelines: <a href="#">CL 30-18.08</a></td>
<td>Midlines are NOT considered a Central Venous Device <strong>Use 10 mL syringes only to establish patency</strong></td>
<td><strong>Use 10 mL syringes only to establish patency</strong></td>
<td><strong>Use 10 mL syringes only to establish patency</strong></td>
</tr>
<tr>
<td><strong>Flushing frequency</strong></td>
<td>Flush lines daily and after each use</td>
<td>Flush lines daily and after each use</td>
<td>Flush each lumen after use, and at least daily</td>
<td>Flush after each use and weekly when accessed. Flush monthly when not in use.</td>
</tr>
</tbody>
</table>

### Flushing and Packing of catheters

#### After Blood Product Administration/ Blood draws

<table>
<thead>
<tr>
<th>Type of catheter</th>
<th>Dialysis Catheters</th>
<th>Apheresis Catheters</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Other names</strong></td>
<td>Mahurkar, Vascath, Cannon, Hickman Trifusion, Trialysis, Palindrome, Permacath</td>
<td></td>
</tr>
<tr>
<td><strong>Flushing frequency</strong></td>
<td>Flush after dialysis, infusion, medication or blood drawing</td>
<td>Flush after apheresis, infusion, medication or blood drawing to maintain patency Pack* post pheresis procedure or upon discharge as necessary based on treatment schedule Requires packing* at least every 30 days.</td>
</tr>
<tr>
<td><strong>Flushing and Packing of catheters (Use 10 mL syringes only to establish patency)</strong></td>
<td>Flush with 10mL normal saline With a provider order instill gentamicin 900 mcg/3mL mixed in 4% Na citrate; 3mL or volume indicated on each port.</td>
<td>• During daily use, flush with 10 mL normal saline and 5 mL of heparinized saline 100units/mL** • Following pheresis, pack each catheter lumen that will not be used for several days with sufficient volume to length of lumen, using independent single use 10mL syringes for each lumen • With a provider order instill gentamicin 900 mcg/3mL mixed in 4% Na citrate; 3 mL or volume indicated on each port</td>
</tr>
</tbody>
</table>

*Preservative free 0.9% sodium chloride should be used, if 0.9% sodium chloride with preservatives is used, the volume should not exceed 30 mL per day*
### Central Venous Access Devices: Insertion and Maintenance

**Policy Number** CL 30-07.11

**Type of catheter**

<table>
<thead>
<tr>
<th>Special Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dialysis Catheters</strong></td>
</tr>
<tr>
<td>Dialysis and apheresis catheters may be used for all related forms of Hemodialysis and/or Apheresis by trained Dialysis or Hematologic/Transplant Nurses.</td>
</tr>
<tr>
<td>Dialysis Catheter: Red and Blue ports may be used for infusion, medication and blood drawing by trained non-dialysis nurses ONLY with specific permission from the Nephrology Team. Blue lumen is the preferred lumen if accessed for purposes other than dialysis.</td>
</tr>
<tr>
<td>The designated clear infusion port on triple-lumen dialysis catheters may be accessed by all Nursing Personnel who are authorized to access central lines. This lumen is to be cared for according to the policy regarding central line catheter care.</td>
</tr>
<tr>
<td>Masks are worn when accessing dialysis and apheresis catheters.</td>
</tr>
<tr>
<td><strong>Apheresis Catheters</strong></td>
</tr>
</tbody>
</table>

**NOTE:** Packing of lines is the instillation of an anticoagulant when the line will not be accessed and used for a significant duration or time, (e.g., 5-7 days or longer.) If heparin is contraindicated, flush with Gentamycin Citrate 4%.

XIV. Appendix: Pediatric CVAD Management

Pediatric Central Venous Access Device Management
(Last Revised September 2014)

<table>
<thead>
<tr>
<th>Normal Saline/ Heparin Dosing</th>
<th>NS</th>
<th>Heparin</th>
<th>NS</th>
<th>Heparin</th>
<th>Normal Saline/ Heparin Dosing</th>
<th>NICU Lines: Normal Saline Flush Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt; 5 KG</td>
<td>10u/ml</td>
<td>&gt; /= 5 KG</td>
<td>10u/ml</td>
<td></td>
<td>Saline Locked: 0.5 ml</td>
</tr>
<tr>
<td></td>
<td>&lt; 5 KG</td>
<td>10u/ml</td>
<td>&gt; /= 5 KG</td>
<td>10u/ml</td>
<td></td>
<td>PIV: 1ml</td>
</tr>
<tr>
<td>PIV</td>
<td>1 ml</td>
<td>N/A</td>
<td>1 ml</td>
<td>N/A</td>
<td></td>
<td>PIV: 1ml</td>
</tr>
<tr>
<td>PICC</td>
<td>2 ml</td>
<td>0.5 ml</td>
<td>2 ml</td>
<td>2.5 ml</td>
<td></td>
<td>1 ml</td>
</tr>
<tr>
<td>Tunneled or Non-tunneled CVLs</td>
<td>2 ml</td>
<td>0.5 ml</td>
<td>2 ml</td>
<td>2.5 ml</td>
<td></td>
<td>1.5 ml</td>
</tr>
<tr>
<td>Port-a-cath</td>
<td>2 ml</td>
<td>1.5 ml</td>
<td>2 ml</td>
<td>5 ml</td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>Umbilical Lines (UVC or UAC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Flush with 1ml normal saline</td>
</tr>
</tbody>
</table>

Critical Care and Acute Care

- Flush with NS first, then heparin (except PIV), after each use
- Pulsatile flush all lines.
- Flush all lines with 10 ml syringe
- Flush all lines at least once every 6 hours and PRN
- All heparin flushes for CVL’s, Ports, and PICCs are 10 units/ml
- Do not re-infuse “waste” blood
- Do Not flush lines with continuous infusions.
- Ports: if de-accessing, flush with 100 units heparin/ml NS.
- Ports: Flush every 24 hours if not in use.

NICU

- Routine heparin flushes should Not be used
- Flush only with normal saline after use.
- Flush saline locked PIV at least every 4-6 hours.
- Central lines are rarely saline locked in the NICU; flush per provider order.
- PICC and Broviac lines are flushed with a 10 ml syringe.
- Umbilical lines should be flushed slowly at a rate of no more than 1ml/min; DO NOT use pulsatile technique. “Waste” blood should only be re-infused with umbilical lines at a rate of no more than 1ml/min
- Continuously infusing lines should not be flushed prior to intermittent medication administration, except for medication incompatibilities or to assess patency.
- Do Not flush lines infusing continuous critical medications; notify provider if unable to obtain alternative access for medication administration.