Intravenous (IV) Catheter Care: Peripheral & Central (Adult)

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I. **Purpose:**

To provide safe and effective care to all adult patients requiring intravenous therapy, regardless of the type of intravenous device.

II. **Scope:**

This policy applies to Aurora Health Care, Inc. and any entity or facility owned, in whole or in part, or controlled by Aurora Health care.

III. **Definitions:**

**Central Venous Access Device (CVAD):** Any intravenous device that is used to access the central venous system. CVADs are manufactured in a number of different configurations (e.g. single or multi-lumen); made from a variety of materials (e.g. silicone or polyurethane); made in a variety of gauges and lengths; may be open or closed-ended; may be power-injectable; or may have anti-infective properties (INS, 2011, p. S38).

**Peripheral Venous Catheter:** Commonly used IV access device designed for short-term use via insertion in the veins of the forearm or the hand. Catheters used for peripheral venous access only come in a variety of gauge sizes, winged or non-winged, and may be single or double lumen.

**Continuous subcutaneous infusion device:** A small gauge, short needle that is inserted into the subcutaneous tissue to administer medication via capillary diffusion (see Continuous Subcutaneous Medication Infusion policy #1012).

**Catheter obstruction or dysfunction:** Defined as the inability to infuse or inject fluid, inability to establish adequate IV flow rates (“sluggish” flow) or the inability to aspirate blood from the catheter; may be the result of mechanical obstruction or catheter damage (INS, 2011).

**Push-Pause Flushing:** Defined as a pulsatile method of instilling saline into the catheter which creates turbulence with a swirling effect within the catheter lumen. The turbulence prevents blood or residues of medication or other infusates from remaining in the interior of the catheter lumen.

**Aseptic Technique:** The use of added precautions, such as use of sterile gloves, mask or sterile supplies, during a patient care procedure to prevent or minimize contamination by microorganisms (See Perry & Potter, 2010).

**Licensed Independent Practitioner (LIP)** is defined as any individual permitted by law to provide care and services, without direction or supervision, within the scope of the practitioner’s license and privileges (Joint Commission, 2011).

IV. **Policy Statements Applicable for all IV THERAPY:**

**Note:** Additional catheter-specific policies are found in the section for each type of catheter. The system policy supersedes previous site or market policies. Perry and Potter (2010) is a reference for the procedure, but not for site prep solution or line flushing amounts or frequency.

**General IV Policy Statements**

A. Appropriate hand hygiene, aseptic technique, sterile products, and gloves will be used when performing infusion related procedures. Prior to any IV catheter care, disinfect hands per System Hand Hygiene Policy and Procedure. [Click here](#) for policy link.

B. A physician’s order is needed to initiate, monitor and discontinue IV fluids except in circumstances where there are existing emergency or procedural protocols (e.g. Rapid Response Team, emergency triage).

C. To assure the safety of staff, needleless systems should be utilized whenever possible.

D. All add-on devices and connectors will have a compatible Luer-lock design to ensure a secure junction and minimize leaks or breaks in the system (INS, 2011).
E. Needleless connectors will be changed if the connector is removed for any reason; if blood or debris is present within the connector; prior to drawing a blood culture sample; if contaminated; per organizational policies, procedures, and/or practice guidelines; or per manufacturer’s recommendations (INS, 2011).

F. The caregiver will minimize contamination risk by disinfecting the IV access ports and connectors using friction and the appropriate disinfectant (e.g. chlorhexidine or 70% alcohol) (INS, 2011).

G. Only sterile devices can be used to access IV ports or connectors (CDC, 2011; INS, 2011).

H. Infusion tubing will be labeled with the date and time initiated.

I. All infusion tubing should be traced back to the insertion site to ensure the route is accurate.

J. The infusion tubing or channel will be labeled with the medication being infused.

K. Clippers will be used to trim long or thick hair at an IV site prior to skin antisepsis.

L. Use an approved product containing chlorhexidine (>0.5%) with alcohol to perform skin antisepsis prior to:
   1. Peripheral IV insertion site skin preparation or dressing change (CDC, 2011)
   2. Central line dressing changes (CDC, 2011)
   3. Midline or PICC catheter insertion site skin prep and dressing changes (CDC, 2011).

M. Once the skin has been scrubbed for 30 seconds and allowed to dry for at least 30 seconds, the skin antisepsis is complete and the site cannot be touched unless a sterile glove is used (CDC, 2011).

N. Transparent dressing is the IV site dressing of choice (INS, 2011). Tape is not placed under or over a transparent dressing.

O. Catheter insertion sites and accessed ports will be visually inspected when changing the dressing, through a transparent dressing or by palpation through an intact dressing, 3 times per 24 hours (approximately every 8 hours) or more frequently at the nurse’s discretion (CDC, 2011; INS, 2011). Results of the visual inspection or palpation will be documented in the medical record.

P. Caregivers are responsible for changing and flushing the end caps in accordance with manufacturer’s recommendations based on the end cap design which may be positive pressure, negative pressure or neutral displacement.

Q. When an IV is discontinued the nurse will assess the catheter and site for signs of infection, catheter breakage or other IV catheter related complications and notify the physician if a suspected or actual complication is identified.

R. Do not use a peripheral line to infuse vesicant drugs, TPN, sclerosing agents or other drugs/liquids that require a central line unless it is an emergency or there is a physician order and the patient’s veins have been assessed and are acceptable for this use.

S. If signs of extravasation are noted, the nurse will notify the physician and implement nursing actions to minimize tissue injury.

T. A catheter stabilization device will be used to minimize catheter movement and prevent catheter dislodgment (CDC, 2011).

U. The use of a catheter stabilization device should not interfere with the assessment or monitoring of the IV access site, impede circulation, or prevent the patient from receiving the prescribed therapy.

V. Vascular access devices placed in an emergency situation shall be replaced as soon as possible and not later than 48 hours (INS, 2011, p. S57).
Table 1. Vascular Access Devices: Guidelines for Care

*Refer to the manufacturer’s recommendations for care and use of the device or components (e.g., end caps). Physician orders supersede information in this table.

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<th>VASCULAR ACCESS DEVICE</th>
<th>DRESSING CHANGES TYPE/FREQUENCY</th>
<th>FLUSHING</th>
<th>CAP CHANGE</th>
<th>TUBING CHANGE</th>
<th>BLOOD WITHDRAWAL AND WASTE PRIOR TO LAB DRAW</th>
<th>SPECIAL INSTRUCTIONS</th>
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<td><strong>Peripheral Venous Catheter</strong></td>
<td>• Routine site care and transparent dressing changes are completed when dressing is soiled or no longer intact. (CDC, 2011; INS, 2011). • Gauze dressing changed every 48 hours and prn (CDC, 2011; INS, 2011) • No tape under a transparent dressing • Use &gt;0.5% chlorhexidine with alcohol for skin asepsis</td>
<td>• Flush IV catheter per manufacturer’s recommendations with preservative free normal saline (2 mL) every 12 hours or after any intermittent IV therapy or per physician order (Goode, et al., 1993; Gorski, Perucca &amp; Hunter, 2010). • If physician orders to flush with heparin use 2mL of 10 units/mL heparin every 12 hours • For positive pressure end cap flush until clear • Flush using SAS, Saline, Additive, Saline unless otherwise indicated.</td>
<td>• IV caps are replaced with a new sterile cap every time the cap is removed or disconnected or when visibly soiled • Vigorously scrub IV caps for 15 seconds with alcohol or an approved disinfectant and allow the cap to dry prior to accessing the IV</td>
<td>• Every 96 hours (4 days) or with any site change (CDC, 2011; INS, 2011) • Change needleless components including caps with administration tubing change every 96 hours • Intermittent IV tubing is changed every 24 hours • DO NOT connect the tubing to itself at another access side port (CDC, 2011)</td>
<td>• 5 mL discard</td>
<td>• Remove the IV catheter if patient develops signs of phlebitis, infection or catheter malfunctions. • Peripheral IVs are replaced after 96 hours (4 days) unless a physician order to maintain the site for a longer period of time is obtained. • Stopcocks are associated with an increased risk of infection and their use is not recommended. If a stopcock is in use, a closed system must be established and only sterile caps attached to the ports</td>
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<td><strong>Midline Catheter</strong> Considered peripheral IV access for drug administration; label as a midline catheter NO Vesicants may be administered via a Midline</td>
<td>• Transparent dressing change q 7 days and with catheter change (CDC, 2011; INS, 2011) • Use &gt;0.5% chlorhexidine with alcohol for skin asepsis • Use antimicrobial impregnated sponge dressing (e.g. Biopatch) at insertion site and change every 7 days or prn when soiled, wet, loose or blood soaked • Gauze dressing change every 48 hours and prn (CDC, 2011; INS, 2011) • No tape under a transparent dressing • Change catheter securement device every 7 days and with any dressing change (CDC, 2011)</td>
<td>• Use 5 mL preservative free normal saline every 12 hours or after any intermittent IV therapy (Goode, et al., 1993; Gorski, Perucca &amp; Hunter, 2010) or per manufacturer’s recommendations • For positive pressure end cap flush until clear • If physician orders to cap with heparin use 3mL of 10 units/mL heparin every 12 hours</td>
<td>• IV caps are replaced with a new sterile cap every time the cap is removed or disconnected or when visibly soiled • Vigorously scrub IV caps for 15 seconds with alcohol or an approved disinfectant and allow the cap to dry prior to accessing the IV</td>
<td>• Every 96 hours (4 days) or with any site change (CDC, 2011; INS, 2011) • Change needleless components including caps with administration tubing change every 96 hours • Intermittent IV tubing is changed every 24 hours • DO NOT connect the tubing to itself at another access side port (CDC, 2011)</td>
<td>• 5 mL discard</td>
<td>• DO not use a Vacutainer to draw blood from a midline catheter • Label catheter as a “midline” prior to use • Stopcocks are associated with an increased risk of infection and their use is not recommended. If a stopcock is in use, a closed system must be established and only sterile caps attached to the ports</td>
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<td>Central Venous Catheter (CVC) Non-tunneled (e.g. Arrow, Hohn)</td>
<td>Use &gt;0.5% chlorhexidine with alcohol solution to prepare the skin</td>
<td>Flush catheter lumen with 3 mL, preservative free normal saline every 24 hours or after lumen is used for intermittent therapy (INS, 2011; Newell-Stokes et al., 2001)</td>
<td>IV caps are replaced with a new sterile cap every time the cap is removed or disconnected or when visibly soiled</td>
<td>Every 96 hours (4 days) or with any site change (CDC, 2011; INS, 2011)</td>
<td>5 mL discard</td>
<td>Change dressing and examine site if there is tenderness at the insertion site, fever without an obvious source, or other symptoms of local or bloodstream infection (CDC, 2011)</td>
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<td>Dressing changes use aseptic technique (CDC, 2011; INS, 2011)</td>
<td>Flush with 10 mL preservative free Normal saline before and after blood administration or after a blood draw. (Weinstein, 2007)</td>
<td>Vigorously scrub IV caps for 15 seconds with alcohol or an approved disinfectant and allow the cap to dry prior to accessing the IV</td>
<td>Change needleless components including caps with administration tubing change every 96 hours</td>
<td>Do NOT connect the tubing to itself at another access side port (CDC, 2011)</td>
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<td>For new catheters, if dressing is soiled change after the first 24 hours</td>
<td>When infusing TPN, flush with 20 mL preservative free normal saline before drawing blood.</td>
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<td>Intermittent IV tubing is changed every 24 hours</td>
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<td>Transparent dressing change every 7 days and PRN</td>
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<td>Change antimicrobial impregnated sponge dressing (e.g. Biopatch) every 7 days and PRN when soiled, wet, loose, or blood soaked (CDC, 2011; INS, 2011)</td>
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<td>Use gauze dressing if site is oozing or bleeding or patient is diaphoretic; change gauze dressing every 48 hours and PRN (CDC, 2011; INS, 2011)</td>
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<td>Change catheter securement device every 7 days and with any dressing change (CDC, 2011)</td>
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<td>Central Venous Catheter (CVC) Tunneled with Open Tip (e.g. Hickman, Broviac, or Raaf catheters) used for long term access</td>
<td>• Use &gt;0.5% chlorhexidine with alcohol solution to prepare the skin  • Dressing changes use aseptic technique (CDC, 2011; INS, 2011)  • For new catheters, if dressing is soiled change after the first 24 hours  • Transparent dressing change every 7 days and PRN  • Change antimicrobial impregnated sponge dressing (e.g. Biopatch) every 7 days or when soiled, wet, loose or blood soaked (CDC, 2011; INS, 2011)  • Use gauze dressing if site is oozing or bleeding or patient is diaphoretic; change gauze dressing every 48 hours and PRN (CDC, 2011; INS, 2011)  • No tape under a transparent dressing  • Change catheter securement device every 7 days and with any dressing change (CDC, 2011)</td>
<td>• Flush with 5 mL, Heparin 10 units/mL per lumen per lumen 3 times weekly or after intermittent therapy  • Must use positive pressure cap (Gorski, Perucca, &amp; Hunter, 2010)  • Flush with 10 mL preservative-free normal saline before and after blood administration or after a blood draw (Weinstein, 2007)  • When infusing TPN, flush with 20 mL preservative free normal saline before drawing blood.</td>
<td>• IV caps are replaced with a new sterile cap every time the cap is removed or disconnected or when visibly soiled  • Vigorously scrub IV caps for 15 seconds with alcohol or an approved disinfectant and allow the cap to dry prior to accessing the IV</td>
<td>• Every 96 hours (4 days) or with any site change (CDC, 2011; INS, 2011)  • Change needleless components including caps with administration tubing change every 96 hours  • Intermittent IV tubing is changed every 24 hours  • DO NOT connect the tubing to itself at another access side port (CDC, 2011)</td>
<td>• 5 mL discard  • Catheter must be kept clamped  • May remain in place indefinitely if the patient has no complications  • Patients may be sent home with different instructions for care of a tunneled catheter  • Tunneled catheters can be removed only by a LIP.</td>
<td></td>
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<tr>
<td>VASCULAR ACCESS DEVICE</td>
<td>DRESSING CHANGES TYPE/FREQUENCY</td>
<td>FLUSHING</td>
<td>CAP CHANGE</td>
<td>TUBING CHANGE</td>
<td>SPECIAL INSTRUCTIONS</td>
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<tr>
<td>Tunneled CVC with a valve tip (e.g. Groshong valve)</td>
<td>See tunneled CVC with open tip</td>
<td>Flush with 5mL preservative free normal saline every week or after intermittent therapy (Weinstein, 2007)</td>
<td>See tunneled CVC with open tip</td>
<td>See tunneled CVC with open tip</td>
<td>No clamps are used with a Groshong tunneled CVC</td>
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<td></td>
<td></td>
<td>Flush with 10mL preservative free normal saline before and after blood administration or after a blood draw (Weinstein, 2007)</td>
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<td>Use a rapid flush method to open the side valve of the catheter</td>
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<td></td>
<td></td>
<td>When infusing TPN, flush with 20mL preservative free normal saline before drawing blood.</td>
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<td></td>
<td>Use 10mL or larger syringe for all IV injections</td>
<td></td>
</tr>
<tr>
<td>Peripherally inserted central catheter (PICC) with a valve - Groshong type</td>
<td>Use &gt;0.5% chlorhexidine with alcohol solution to prepare the skin</td>
<td>Flush with 5mL preservative free normal saline every week and after intermittent therapy (Weinstein, 2007)</td>
<td>IV caps are replaced with a new sterile cap every time the cap is removed or disconnected or when visibly soiled</td>
<td>Every 96 hours (4 days) or with any site change (CDC, 2011; INS, 2011)</td>
<td>5mL discard</td>
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<td></td>
<td>Transparent dressing change every 7 days, with every catheter change or prn if the dressing is soiled, wet, loose, or blood soaked (CDC, 2011; INS, 2011)</td>
<td>Flush with 10mL preservative-free normal saline before and after blood administration or after a blood draw (Weinstein, 2007)</td>
<td>Vigorously scrub IV caps for 15 seconds with alcohol or an approved disinfectant and allow the cap to dry prior to accessing the IV</td>
<td>Change needless components including caps with administration tubing change every 96 hours</td>
<td>DO NOT use a vacutainer</td>
<td></td>
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<tr>
<td></td>
<td>Use antimicrobial impregnated sponge dressing (e.g. Biopatch) at the insertion site and change every 7 days or if transparent dressing is changed. CDC, 2011; INS, 2011)</td>
<td>When infusing TPN, flush with 20mL preservative free normal saline before drawing blood.</td>
<td></td>
<td>Intermittent IV tubing is changed every 24 hours</td>
<td>No Blood pressure measurement or venipuncture in the extremity with the PICC line</td>
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<tr>
<td></td>
<td>Gauze dressing change every 48 hours and prn (CDC, 2011; INS, 2011)</td>
<td></td>
<td></td>
<td>DO NOT connect the tubing to itself at another access side port (CDC, 2011)</td>
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<tr>
<td>VASCULAR ACCESS DEVICE</td>
<td>DRESSING CHANGES TYPE/FREQUENCY</td>
<td>FLUSHING</td>
<td>CAP CHANGE</td>
<td>TUBING CHANGE</td>
<td>BLOOD WITHDRAWAL AND WASTE PRIOR TO LAB DRAW</td>
<td>SPECIAL INSTRUCTIONS</td>
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</table>
| Peripherally inserted central catheter (PICC) WITHOUT a valve (nonGroshong) | • Transparent dressing change every 7 days, with catheter change, or prn if dressing is soiled, wet, loose or blood soaked (CDC, 2011; INS, 2011)  
• Use antimicrobial impregnated sponge dressing (e.g. Biopatch) at the insertion site and change every 7 days or if transparent dressing is changed (CDC, 2011; INS, 2011).  
• Gauze dressing change every 48 hours and prn (CDC, 2011; INS, 2011)  
• No tape under a transparent dressing  
• Change catheter securement device every 7 days and with any dressing change (CDC, 2011) | • Flush with 5 mL of 10 unit/mL heparin every 24 hours and with intermittent therapy or blood draws (INS, 2009), physician order required for heparin flush  
• Flush with 10 mL preserved free normal saline before and after blood administration or after a blood draw (Weinstein, 2007)  
• When infusing TPN, flush with 20 mL preserved free normal saline before drawing blood.  
• Use SAS-H method when administering medication Saline/Additive/Saline (and Heparin if ordered)  
• Use Push-Pause pulsing method of flushing to prevent blood or fibrin adherence to lumen walls/tip | • IV caps are replaced with a new sterile cap every time the cap is removed or disconnected or when visibly soiled  
• Vigorously scrub IV caps for 15 seconds with alcohol or an approved disinfectant and allow the cap to dry prior to accessing the IV  
• IV caps are replaced with a new sterile cap every time the cap is removed or disconnected or when visibly soiled  
• Vigorously scrub IV caps for 15 seconds with alcohol or an approved disinfectant and allow the cap to dry prior to accessing the IV | • Every 96 hours (4 days) or with any site change (CDC, 2011; INS, 2011)  
• Change needleless components including caps with administration tubing change every 96 hours  
• Intermittent IV tubing is changed every 24 hours  
• DO NOT connect the tubing to itself at any other access side port (CDC, 2011)  
• DO NOT use a vacutainer with a PICC line | • 5 mL discard; for blood sampling use: discard blood, obtain sample, follow with saline flush; cap with heparin if ordered  
• DO NOT use a vacutainer with a PICC line  
• PICC may remain in place indefinitely if no complications (CDC, 2002)  
• Use a 10 mL or larger syringe for all IV injections  
• No Blood pressure measurement or venipuncture in the extremity with the PICC line  
• Measure upper arm circumference and monitor external catheter length |
| Power PICC without Valve | • See PICC without valve for dressing, and flushes  
• PowerPICC without Valve has clamps | • Flush with heparinized saline per manufacturers guidelines every 12 hours or after every use. Use 1 mL heparin (10 units/mL) solution per physician order per lumen.  
• Using a 10 mL or larger syringe flush with normal saline prior to and immediately following the completion of power injection studies followed by flushing each lumen with heparinized saline per manufacturer’s guidelines  
• Use Push-Pause pulsing method of flushing to prevent blood or fibrin adherence to lumen walls/tip | • IV caps are replaced with a new sterile cap every time the cap is removed or disconnected or when visibly soiled  
• Vigorously scrub IV caps for 15 seconds with alcohol or an approved disinfectant and allow the cap to dry prior to accessing the IV  
• IV caps are replaced with a new sterile cap every time the cap is removed or disconnected or when visibly soiled  
• Vigorously scrub IV caps for 15 seconds with alcohol or an approved disinfectant and allow the cap to dry prior to accessing the IV | • Every 96 hours (4 days) or with any site change (CDC, 2011; INS, 2011)  
• Change needleless components including caps with administration tubing change every 96 hours  
• Intermittent IV tubing is changed every 24 hours  
• DO NOT connect the tubing to itself at another access side port (CDC, 2011)  
• Use a 10 mL or larger syringe for all IV injections  
• No Blood pressure measurement or venipuncture in the extremity with the PICC line  
• Measure upper arm circumference and monitor external catheter length | • 5 mL discard; for blood sampling use: discard blood, obtain sample, follow with saline flush; cap with heparin if ordered  
• DO NOT use a vacutainer with a PICC line  
• Power PICC device is labeled by manufacturer to differentiate from other PICC devices  
• PICC may remain in place indefinitely if no complications (CDC, 2002)  
• Use a 10 mL or larger syringe for all IV injections  
• No Blood pressure measurement or venipuncture in the extremity with the PICC line  
• Measure upper arm circumference and monitor external catheter length |
<table>
<thead>
<tr>
<th>VASCULAR ACCESS DEVICE</th>
<th>DRESSING CHANGES TYPE/FREQUENCY</th>
<th>FLUSHING</th>
<th>CAP CHANGE</th>
<th>TUBING CHANGE</th>
<th>BLOOD WITHDRAWAL AND WASTE PRIOR TO LAB DRAW</th>
<th>SPECIAL INSTRUCTIONS</th>
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<tbody>
<tr>
<td>PowerPICC with Valve; Groshong type including PowerPICC Solo, PowerPICC Solo 2</td>
<td>Dressing and frequency of changes same as PICC Lines</td>
<td>Flush with 10 mL preservative free normal saline solution per lumen every 7 days or after each use</td>
<td>Follow guidelines for PICC lines</td>
<td>Follow guidelines for PICC lines</td>
<td>Follow guidelines for PICC lines</td>
<td>• Do not use heparin for flush solution per manufacturer’s recommendations.</td>
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<td>Use Push-Pause method of flushing to prevent blood or fibrin adherence to lumen walls/tip</td>
<td>Use a neutral or positive pressure cap.</td>
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<td>• If fluid volume is a concern, flush with 3 mL per lumen</td>
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<td></td>
<td></td>
<td>Do not use heparin for flush solution per manufacturer’s recommendations.</td>
<td></td>
<td></td>
<td></td>
<td>• Follow guidelines for PICC lines</td>
</tr>
<tr>
<td>Implanted Ports</td>
<td>Transparent dressing is changed every 7 days or gauze dressing changed every other day when needle is in place (CDC, 2002)</td>
<td>Obtain a physician order if port is flushed with heparin; use 5 mL of 10 unit/mL heparin every 24 hours while Huber needle is capped and after each intermittent therapy or blood draw</td>
<td>IV caps are replaced with a new sterile cap every time the cap is removed or disconnected or when visibly soiled</td>
<td>Every 96 hours (4 days) (CDC, 2011; INS, 2011)</td>
<td>5 mL discard</td>
<td>• Follow guidelines for PICC lines</td>
</tr>
<tr>
<td>(e.g. Mediport, Omega Port or PAS-Port [arm implanted] or PowerPort)</td>
<td>Each dressing change, prepare the skin over port with &gt;0.5% chlorhexidine with alcohol solution and use sterile technique and sterile gloves</td>
<td>Flush with 5mL of 100 unit/mL heparin prior to discontinuing the Huber needle and every 30 days (Weinstein, 2007)</td>
<td>Vigorously scrub IV caps for 15 seconds with alcohol or an approved disinfectant and allow the cap to dry prior to accessing the IV</td>
<td>Change needleless components including caps with administration tubing change every 96 hours</td>
<td>Do not use a vacutainer</td>
<td>• Incompatible medications should be separated by 10 mL normal saline flush before and after medication</td>
</tr>
<tr>
<td>Non-Groshong Type (open end)</td>
<td>Use antimicrobial impregnated sponge dressing (e.g. Biopatch) and change every 7 days or when soiled, wet, loose or blood soaked (CDC, 2011; INS, 2011)</td>
<td>Groshong ports are flushed with 5 ml of preservative free normal saline every week and after intermittent therapy</td>
<td>Groshong ports are accessed only with a noncoring Huber needle</td>
<td></td>
<td></td>
<td>• Ports may be accessed only with a noncoring Huber needle</td>
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<tr>
<td>Groshong Type</td>
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<td>• Note: PowerPort must be accessed using a PowerPort Needle</td>
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<td></td>
<td>• Change noncoring Huber needle every 7 days</td>
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<td></td>
<td>• Use 10mL or larger syringe for all IV injections</td>
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<td></td>
<td>• PowerPort may be used for high pressure CAT scan injection of contrast</td>
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<tr>
<td>VASCULAR ACCESS DEVICE</td>
<td>DRESSING CHANGES TYPE/FREQUENCY</td>
<td>FLUSHING</td>
<td>CAP CHANGE</td>
<td>TUBING CHANGE</td>
<td>BLOOD WITHDRAWAL AND WASTE PRIOR TO LAB DRAW</td>
<td>SPECIAL INSTRUCTIONS</td>
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</table>
| **Pheresis (e.g. Dura Flow Hickman Trifusion Catheter)** | • Use antimicrobial impregnated sponge dressing (e.g. Biopatch) with transparent dressing  
• Change transparent dressing every 7 days or gauze dressing every other day and PRN | • Obtain a physician order to flush each port with 5 mL of 10 units/mL heparin 3 times per week and after intermittent therapy or blood draws | • IV caps are replaced with a new sterile cap every 96 hours or if the cap is removed or disconnected or visibly soiled  
• Vigorously scrub IV caps for 15 seconds with alcohol or an approved disinfectant and allow the cap to dry prior to accessing the IV | • Every 96 hours (4 days) or with catheter change, or if cap is removed (CDC, 2011)  
• DO NOT connect the tubing to itself at another access side port (CDC, 2011) | • 5 mL discard | • Pheresis or oncology use only with a physician order. A pheresis catheter is not routinely replaced (CDC, 2011) |
| **Hemodialysis (e.g. Mahurkar or Permcath)** | • Change antimicrobial impregnated sponge dressing (e.g. Biopatch) and transparent dressing every 7 days or gauze dressing every 48 hours and PRN  
• Prepare the skin using >0.5% chlorhexidine with alcohol solution  
• Dressing changes require use of sterile technique and sterile gloves; use a central line dressing kit  
• Physician may order Povidone-iodine ointment for application at the insertion site (CDC, 2011) | • If physician orders specify to cap each port with a solution of 4% sodium citrate solution; use a volume equal to the catheter volume listed on the label plus an additional 0.1 mL (Moran, et al., 2008; Thomas et al., 2006)  
• If physician orders specify heparin, use high dose heparin (10,000 units/mL) as ordered to cap after each use: Flush each lumen only to the catheter volume PLUS 0.1 mL to fill the lumen.  
• For 3rd lumen: Treat as a CVC and follow manufacturers guidelines for flushing and fill the lumen plus an additional 0.1mL. | • IV caps are replaced with a new sterile cap every time the cap is removed or disconnected or when visibly soiled  
• Vigorously scrub IV caps for 15 seconds with alcohol or an approved disinfectant and allow the cap to dry prior to accessing the IV | • Every 96 hours (4 days) or with catheter change, or if cap is removed (CDC, 2011)  
• DO NOT connect the tubing to itself at another access side port (CDC, 2011) | • 5 mL discard prior to use to remove anticoagulant from the lumen  
• 3rd lumen: (clear or medial lumen) use CVC guidelines for blood withdrawal | • Only dialysis or pheresis-trained nurses may flush a hemodialysis catheter  
• All nurses are responsible for completing the dressing changes  
• 3rd lumen is used for infusion or blood draws  
• Catheter is not routinely replaced |
### Vascular Access Device

<table>
<thead>
<tr>
<th>Device</th>
<th>Dressing Changes Type/Frequency</th>
<th>Flushing</th>
<th>Cap Change</th>
<th>Tubing Change</th>
<th>Blood Withdrawal and Waste Prior to Lab Draw</th>
<th>Special Instructions</th>
</tr>
</thead>
</table>
| Hemodialysis Bard   | • Follow manufacturer's recommendations for skin preparation use povidone iodine or dilute aqueous sodium hypochloride only  
|                     | • No ointments containing polyethylene glycol or alcohol; may use bacitracin zinc or antibiotic impregnated sponge dressing at site. | • Use a positive displacement cap on the infusion port; use positive pressure technique before clamping | • See Mahurkar | • See Mahurkar | • See Mahurkar | • Only dialysis or pheresis-trained nurses may flush a hemodialysis catheter  
|                     |                                          |                                                                          |            |               |                                             | • All nurses are responsible for completing the dressing changes                       |

### Additional Information

See Perry and Potter (2010) for IV site care procedures and general aseptic technique. Camp-Sorrell (2010) for further information about lab draws. Refer to manufacturer’s information for specific types and brands of devices.

1. **For ALL IVs:** the transparent dressing must be made occlusive by pinching the dressing around the hub of the IV catheter or around the catheter itself in the case of a central line. If the dressing is loose over the extension and catheter hub area, the dressing should be changed, not reinforced with tape. When securing the IV tubing, do not overlap tape on top of the dressing. **Tape is not placed under the transparent dressing.**

2. **For CVC dressing changes:**
   a. Wear sterile gloves when changing central line catheter dressings (CDC, 2011, p. 30) or for implanted port needle and dressing changes.
   b. CVC dressing changes will be completed using sterile supplies and aseptic technique including wearing a mask to reduce the transfer of microorganisms. Ask patient to turn head away from dressing site or place face mask on patient.

3. **Use SAS-H method when administering medication** (Saline/Administer med/Saline – Heparin if used).

4. **Where indicated, use a Push-Pause method of flushing catheter lumens to create turbulence within the lumen.** Push-pauses are done in rapid succession, instilling 1 to 2 mL of flush solution each time force is exerted with a push on the syringe plunger ending with positive end pressure on the catheter lumen.

5. **For blood sampling use sequence:** Blood discard, Blood sampling, Saline flush – cap with Heparin if used.

6. Sterile gel should be used when probing for vascular access with ultrasound device.

7. Caregivers in acute care facilities will use positive pressure end caps on all lines with the exception of CVVH/CVP monitoring. In addition to positive pressure, negative pressure or neutral displacement end caps may be used with intravenous lines in clinic or home care settings.
# Table 2. IV Tubing / IV Fluids: Frequency of change and special instructions (CDC, 2002, 2011)

<table>
<thead>
<tr>
<th>IV Tubing</th>
<th>FREQUENCY</th>
<th>SPECIAL INSTRUCTIONS</th>
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<tbody>
<tr>
<td>Non-filtered primary tubing</td>
<td>Change every 96 hours (4 days).</td>
<td>Change add-on devices (including extension tubing, caps, secondary administration set, and stopcocks) when primary administration set is changed.</td>
</tr>
<tr>
<td>Non-filtered, intermittent administration set</td>
<td>Change every 24 hours if used intermittently or if detached from the primary administration set.</td>
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<tr>
<td>Filtered tubing</td>
<td>Change every 48 hours unless otherwise specified in guidelines (e.g. Albumin or Mannitol)</td>
<td>See Aurora System Medication Administration Guidelines for medications that require the use of an inline IV filter (e.g. Phenytoin, 20-25% mannitol and amiodorone) Consult with pharmacy if it is not clear whether a filter is required.</td>
</tr>
<tr>
<td>Blood tubing</td>
<td>Change every 24 hours Change filter tubing after a max time of 4 hours OR after a max of 2 units; or Change filter tubing if a change in ABO blood type in 2 consecutive transfusions.</td>
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<tr>
<td>TPN tubing: if only dextrose and amino acids</td>
<td>Change every 96 hours (4 days)</td>
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<tr>
<td>TPN tubing: with lipid emulsions, 3-in-1 admixture</td>
<td>Change every 24 hours</td>
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<tr>
<th>IV Fluid</th>
<th>FREQUENCY</th>
<th>SPECIAL INSTRUCTIONS</th>
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</table>
| TPN: if only dextrose and amino acids            | Change every 24 hours Complete infusion in 24 hrs | ▪ All parenteral nutrition is filtered with a 0.22 micron filter.  
▪ If a separate fat emulsion is ordered, the fat emulsion is filtered with a 1.2 micron filter. The fat emulsion may be piggybacked into the parenteral nutrition below the 0.22 micron filter or infused through a separate dedicated line.  
▪ No blood products, blood specimens, IV solutions, or medications should be administered or drawn from parenteral nutrition line unless other vascular access is not available.  
▪ If blood products or medications are given via a parenteral nutrition line, stop the TPN and flush the line per device guidelines. For blood sampling, stop the TPN and flush with 20 mL of saline before the blood is drawn.  
▪ The pharmacist will verify that the administration of drugs co-infused through the same intravenous tubing is safe, stable, and free from incompatibilities. |
| TPN: if contains lipid emulsions, 3-in-1 admixture | Change every 24 hours |  |
| Lipids alone                                    | Complete within 12 hours of initiation, unless 24 hours is needed due to volume. The fat emulsion is filtered with a 1.2 micron filter. |  |

## V. PERIPHERAL INTRAVENOUS (IV) CATHETER (Short length and Midline): Policy, insertion and removal

### A. POLICY:

1. A physician’s order is necessary to perform venipuncture, including insertion, capping, and discontinuation of peripheral IV catheters except in circumstances where there are existing emergency or procedural protocols (e.g. Rapid Response Team).
2. A peripheral IV must be removed if there are signs of infection, phlebitis, or catheter malfunctioning and reported to the physician.
3. A physician’s order is not required to restart an IV that has been discontinued because of infiltration, phlebitis, catheter dislodgment, infection or other adverse reaction.
4. Registered nurses or other caregivers with demonstrated competency may perform venipuncture. No more than two attempts at placing a peripheral IV cannula will be made by one individual.
5. Document the venipuncture site, type and gauge of needle or catheter, and placement attempts in the medical record.
6. Peripheral IVs should be inserted only in an upper extremity unless it is necessary to use the lower extremity as an alternative site. A physician order is necessary to use a lower extremity. Peripheral IVs inserted at an alternate site should be changed as soon as a satisfactory site can be established elsewhere (Camp-Sorrell, 2010).
7. A peripheral IV catheter with the exception of a midline may be left in place for a maximum of 96 hours (4 days) provided there are no IV-related complications (INS, 2011). A physician order is needed for a peripheral IV site without IV related complications to be used more than 96 hours (4 days).

8. All peripheral IV cannulas that are in place longer than 96 hours must have a documented assessment and rationale for leaving the IV device in place. The nurse must continue to document assessment of the site approximately every eight hours as long as the IV remains in that site.

9. Peripheral or capped IVs that have inadequate documentation (e.g. site preparation, catheter gauge, or start date) must be assessed and monitored by the nurse for signs of a catheter related complication (e.g. infection) and replaced within 48 hours (CDC, 2011).

10. Only RNs or caregivers with demonstrated competency may insert or remove a midline catheter.

B. PROCEDURES - INSERTING THE PERIPHERAL IV CATHETER OR NEEDLE

Reference Perry and Potter (2010)

1. All catheter insertions should avoid a dependent extremity with a dialysis fistula or graft; or the side with a mastectomy, axillary lymph node dissection, stroke, or prior radiation. Notify physician if the affected limb is the only available site.

Note: Select site opposite to an OR procedure site. If it is known the patient will be in the prone position, avoid an antecubital site.

2. Special considerations when choosing an IV type or size:
   a. It is preferred that a #18 to 20 gauge needle/catheter be used for blood administration.
   b. A #22 gauge may be necessary for elderly clients.
   c. A #18 to 20 gauge IV catheter is used for the surgical patient. If unable to insert IV prior to any procedure, notify the appropriate area/department.

3. Before placing a peripheral IV, the condition of the patient’s peripheral veins is assessed by the nurse. The assessment will include:
   a. Condition of veins is important so small, fragile veins are not acceptable
   b. Whether there have been multiple previous IV insertion attempts in the extremity
   c. Easy bruising or skin disruptions
   d. Impaired circulation, decreased sensation or parathesia that may impair the pain sensations
   e. Location of veins; avoid use of the antecubital fossa or lower extremities

The nurse will notify the physician if there are concerns about establishing peripheral IV access based on the assessment of the patient’s veins.

4. Central venous access is the preferred route to administer vesicant drugs (e.g., Dopamine, Dobutamine, chemotherapy), TPN, or sclerosing agents (INS, 2011). However, in an emergency or for short term peripheral infusion in consultation with a physician, a nurse may infuse vesicant drugs, TPN or sclerosing agents through a peripheral IV after performing an assessment of the patient’s veins. Ongoing assessment of the site is required, every 1 to 2 hours, to evaluate the peripheral site for pain, erythema or edema which may be signs of IV infiltration or extravasation. Assess for vein patency by using normal saline, not the infusing drip, to assess for blood return.

Note: Standard for oncology is to limit vesicant infusions to 1 hour due to required site monitoring by nurse. If an infusion of a vesicant will take more than 1 hour, a central line is used.

5. Use comfort measures for peripheral IV insertion:
   a. Transdermal analgesic (e.g. EMLA) may be applied to insertion site if ordered by the physician. Transdermal analgesics may increase patient comfort and decrease anxiety; to be effective, the cream must be applied 60 minutes prior to access. (See Appendix B).
   b. A saline or Lidocaine wheal may be injected subdermally near the insertion site to decrease insertion pain. Lidocaine wheal requires a physician order. (See Appendix C).
6. Site preparation:
   a. The skin at the preferred IV insertion site should be visibly clean. May use povidone-iodine swab or alcohol swab to remove debris.
   b. Cleanse peripheral IV site with an approved product containing chlorhexidine (>0.5%) with alcohol.
      1) Wipe side to side, then in one concentric circle from the intended puncture site working out 2-4 inches in diameter depending on the size of the patient. May also wipe up and down as well (basket weave) before using final concentric circle cleansing.
      2) Friction and multiple patterns swabbing allows the solution to penetrate the epidermal layer.
      3) Considerations for elderly or fragile skin: use a sponge and apply gentle pressure when wiping.
   c. The solution should be applied with friction for 30 seconds and allowed to completely dry. Fanning, blowing, or blotting the area to accelerate drying decreases the bacterial kill.
   d. Allow to dry before inserting catheter. **Once site has been prepped, do not palpate vein or area unless using a sterile glove.**
      Note: Chlorhexidine skin antisepsis has been shown to provide better skin antisepsis than other antiseptic agents such as povidone-iodine solutions.

C. UNSUCCESSFUL PERIPHERAL INTRAVENOUS INSERTION ATTEMPTS

It is recommended that any one competency tested nurse or caregiver attempt no more than two peripheral IV insertions. After two unsuccessful IV attempts, the nurse will contact a resource nurse to insert IV. After a total of four unsuccessful IV sticks, consider alternative IV access with appropriate agency resources (e.g. anesthesia, CRNA, PICC Service, etc.) If no vascular access is established, notify attending physician. All IV insertion attempts and nursing actions are documented in the medical record.

D. FOR PERIPHERAL CATHETER REMOVAL:
2. A band-aid may be used to cover the site once the catheter is removed.
3. Peripheral IV catheter removal may be delegated by the RN to an unlicensed staff member if the skill is included in the job standard for the unlicensed staff member’s position at the clinical site and the staff member has demonstrated competency.

E. IV BAG DISPOSAL:
1. In order to protect patient information, IV bag stickers will be disposed of per site specific procedures. If medication is present in the IV bag, the bag will be discarded following the pharmaceutical waste disposal process. IV bags that do not have patient information on the label or are medication free may be disposed of in a regular trash receptacle.

F. MIDLINE CATHETER:
1. Recommended for: (a) patients over the age of 80 with infusion expected to last longer than 4 days or (b) patients with fragile or difficult to cannulate veins after consultation with expert nurse.
2. A midline catheter is considered a peripheral catheter:
   - A physician order is not needed
3. A midline catheter is a peripherally inserted 3 to 8 inch catheter for intermediate duration (i.e., several weeks) of IV therapy. **May remain in place indefinitely if no complications** (CDC, 2002).
4. **Do NOT** infuse vesicant drugs, TPN, sclerosing agents or other drugs or fluids that should be administered through a central line unless it is an emergency or there is a physician order and the patient’s veins are acceptable for this use.
5. Label dressing as a midline catheter.
6. Midline catheter dressing and flushing is done per PICC procedure.
7. Do not place blood pressure cuffs or other restrictive devices above the midline insertion site.
8. Removal of midline catheters (caregivers must be competency tested to remove midline catheters):
   a. Remove dressing, antimicrobial impregnated sponge dressing and securement device; place sterile gauze over site (do not apply pressure) and gently pull catheter out 2-3 inches at a time.
   b. Apply pressure on site until bleeding stops. Cover with sterile gauze (4x4 or 2x2) and tape securely to form an occlusive dressing.

VI. CATHETER TUBING FOR IV INFUSIONS: SETTING UP, CHANGING AND USE OF SECONDARY TUBING (also referred to as nonfiltered, intermittent IV tubing) Reference Perry & Potter, 2010.

A. GENERAL INFORMATION about Tubing and IV Fluid/Drug Administration
   1. The nurse is responsible for monitoring IV infusions.
   2. All catheter tubing must be clamped before opening the system.
   3. The same tubing can be used for various added medications and backflushed between medications. The diluent solutions can be D5W or 0.9% Normal saline based on the condition of the patient, type of medication to be diluted, compatibility of solutions and primary IV fluid.
   4. Flush solutions should be on the primary tubing. If the main IV solution is used as hydration, it may be used as a flush solution. Medications should be hung on the secondary tubing. This allows for adequate priming/flushing of tubing between medications.
   5. Seek assistance from pharmacy when questioning drug incompatibilities.
   6. Intermittently used IV administration sets are changed every 24 hours (Hadaway, 2010). Intermittent IV tubing sets should be capped off with a new sterile cap each time it is disconnected from the patient’s IV site (Hadaway, 2010). To prevent contamination of the tubing, do not leave open to air or connect the tubing to itself at another access side port along its length (CDC, 2011).

B. INTERMITTENT IV INFUSION
   Equipment:
   - IV solution minibag
   - Secondary tubing
   - Luer-Lock cannula

C. PROCEDURE FOR USE OF SECONDARY IV
   1. If compatible IV fluids ARE running as PRIMARY:
      a. Connect and prime Secondary IV tubing set with the Secondary medication.
      b. Lower Primary IV fluid bag below point of Secondary bag with extension hanger fully extended
      c. Vigorously scrub the IV port for 15 seconds prior to accessing the port and aseptically connect the Secondary tubing to the Primary Y-port above IV pump.
      d. Program Secondary per Guardrail medications—include additional volume to account for bag overfills when programming the IV pump.
      e. If medication overfill remains in bag, the medication will be administered by the pump due to the fact that the higher-hung Secondary bag will empty prior to the Primary bag.
   2. If NO fluids running or Primary IV fluids are incompatible with Secondary IV medication:
      a. Override a 250mL 0.9 %NS bag in automated unit based cabinets (e.g. Pyxis) as a Flush
      b. Connect and prime Primary IV tubing set to flush bag.
      c. Connect the Secondary tubing to Y-port above IV pump
      d. Spike and prime Secondary IV
tubing set with the **Secondary** medication.

e. **Lower Primary/Flush** IV fluid bag below point of **Secondary** bag with **extension hanger** fully extended (See picture)
f. Program **Primary/Flush** with RATE that is the same as the medication, and VTBI of 30mL.

(This 30mL VTBI is to account for 10mL overfill and 20mL volume found within the tubing, thus ensuring that all medication is emptied from bag and line.)
g. Program **Secondary** medication per Guardrails. Adjust the volume, **not the rate**, to accommodate the bag overfill (Baxter bags have an estimated overfill of 10%).
h. **After Secondary** and **Primary/Flush** are administered, cap patient’s IV per orders.
i. Date, time and initial the tubing and flush bag. Flush bags and tubing are changed after 24 hours.

j. **Rationale for using Flush Bags:**
   - Ensure all ordered medication is administered
   - Prevents 18mL of medication from sitting in the line potentially for 24 hours
   - Prevents air from entering IV
   - Reduces amount of excess IV tubing
   - Facilitates multiple & serial medication administration
   - Reduces risk of incompatibility

**VII. INTRAOSSEOUS CATHETER**

**A. POLICY** for intraosseous catheter (IO):
1. Only RNs or caregivers with demonstrated competency may insert intraosseous catheter/vascular devices when there is an urgent or emergency need to establish vascular access and other access is not feasible.
2. Continued use of an intraosseous catheter/vascular device must be evaluated by the provider after 24 hours (INS, 2011).

**B. General Information**
1. Intraosseous access is an effective route for fluid resuscitation; bolus, drug, and blood and blood product administration; and lab evaluation.
2. Insertion site used most frequently in adults and children is the proximal tibia (INS, 2011).
3. Any drug or fluid that is appropriate for IV administration can be given via the IO route.
4. The volume of fluid given per minute is similar to the rate of fluids infused through a 21-gauge catheter.

**C. Contraindications to IO catheter placement:**
1. Bone fracture in area of IO needle placement
2. Cellulitis over insertion site
3. Artificial joints
4. **Specific diseases:**
   - Osteogenesis imperfecta
   - Osteoporosis
   - Osteopetrosis

**D. Care and Maintenance**
1. Follow manufacturer’s recommendations for length of use (may be restricted to use for 24 hours), and safety precautions (may require special labeling or patient wrist banding).
2. Once the device is inserted, it should be covered with a transparent, occlusive dressing.
3. Visually inspect catheter insertion site for signs and symptoms of infiltration 3 times per 24 hours – approximately every eight hours (CDC, 2011; INS, 2011); more frequent inspection at nurse’s discretion.
4. After discontinuation of the IO device, the site should be dressed daily until no drainage is present.
5. Document the site, type and gauge of needle or catheter in the patient record.
VIII. CENTRAL VENOUS CATHETERS (CVC): NON-TUNNELED CVC, SHEATH / INTRODUCER, PICCs, TUNNELED CVC (Hickman, Broviac, Leonard), and IMPLANTED VASCULAR DEVICES (implanted port, e.g. MediPort):

A. POLICY for all CVCs:
1. A physician’s order is needed to insert or remove a PICC catheter.
2. Only RNs and other designated caregivers that have completed PICC insertion training and have demonstrated competency may insert a PICC catheter.
3. Placement of a central line catheter tip in the superior vena cava must be verified by X-ray prior to beginning an infusion.
4. An IV pump with safety features (e.g. Alaris ™ Guardrails) should be used with all primary infusions via central line.
5. Any patient that is transferred from a non-AHC facility with a central line will have the central line site assessed and site care will be completed including central line dressing change with application of an antimicrobial impregnated sponge dressing and IV stabilization device, replacement of IV caps, and lumen flushing.
   If a central line was inserted without proper asepsis or if it was placed at another facility (non-AHC) without proper documentation, the physician is notified to determine if the central line requires replacement. If the catheter is replaced, all fluids and tubing are also replaced.
6. All patients discharged with an intravascular catheter in place must be assessed for any needed follow-up care and arrangements made for catheter care to be done either by the patient or another agency.
7. A positive pressure end cap access system (e.g. Max Clear, Flolink or PosiFlow) will be used on all central lines that are placed in acute care facilities.
8. Implanted ports (e.g. MediPort) require the use of noncoring Huber needle to access the port by puncturing the septum.
9. Use aseptic technique for all CVC dressing changes or port access.

B. Summary of Aurora Health Care approved processes to prevent central line infections:
Note: Best practice is to stop an invasive central line procedure if the procedural safeguards, including use of aseptic technique, are not adhered to during the procedure. A catheter checklist and standardized protocol will be used to guide the central venous catheter insertion process (Joint Commission NPSG 07.04.01 EP 6, 2010).
Summary of Key Components for central line placement:
1. Hand hygiene before an invasive procedure.
2. Use of maximal barrier precautions including: wearing a cap that covers all hair, wearing a tight fitting mask, using a sterile gown and sterile gloves, and an eye shield/eye protection during insertion procedure. For the patient, a maximal barrier precaution means covering the patient from head to toe with a sterile drape with a small opening for the site of insertion (Mermel et al., 1991; Raad et al.,1994).
3. Use of >0.5% chlorhexidine preparation with alcohol for site preparation.
4. Optimal catheter site selection with avoidance of the femoral vein for central access.
5. Daily review of line necessity with prompt removal of unnecessary lines.
6. Educate the patient and/or family members about the reason for the central line and prevention of catheter associated infection (Joint Commission NPSG 07.04.01 EP 2).

C. GENERAL INFORMATION FOR CENTRAL VENOUS CATHETERS
2. Catheter information:
   - Multi-lumen catheters have separate and distinct lumens.
   - Each lumen is a different length and has an individual exit port at a different side of the catheter.
   - Distal lumen of multi-lumen catheters is the only lumen used for CVP monitoring.
   - Incompatible solutions can be infused simultaneously through different lumens achieving therapeutic blood levels without adverse effects.
• If unsure about the catheter flushing protocol follow physician orders or manufacturer’s recommendations.

3. If at any time catheter damage is suspected (tear, cut or puncture), immediately apply a plastic toothless clamp close to body at the exit site and proximal to the damaged area. Notify the physician. See section J regarding Catheter damage or malfunctioning.

4. **SLIC (Single Lumen Infusion Catheter)** A SLIC is an infusion catheter that may be inserted through an introducer catheter immediately after the discontinuation of the Swan Ganz catheter for the purpose of IV access.
   - A physician’s order is necessary for a nurse to insert a SLIC using sterile technique. **Note:** Only a physician can insert a multi-lumen catheter.
   - Once the SLIC is placed, a posi-flow cap must be placed to prevent an air embolism and / or hemorrhage.
   - A chest X-ray is required to verify placement of a single or multi-lumen catheter.
   - A SLIC must be discontinued prior to the patient being transferred out of the intensive care unit.

Illustration of an Introducer Catheter with a SLIC:

![Illustration of an Introducer Catheter with a SLIC](image)

D. **Antimicrobial impregnated sponge dressing (e.g. BIOPATCH®)**

1. Foam dressing impregnated with chlorhexidine gluconate an antiseptic agent with antimicrobial and antifungal properties.
2. Applied to central venous catheters, PICCs, implanted ports, and midline catheters. Place at exit site for central lines and entrance site for PICCs and midlines to decrease infections (Crnich & Maki, 2002).
3. Use with implanted ports only if the Huber needle will remain in place greater than 24 hours.
4. Adhere to manufacturer’s recommendations for use.
5. Blue side or grid side is visible (or up) when applied.
6. The dressing must cover area around catheter; slit edges are under catheter and should be together.
7. The dressing is effective for 7 days; must be in contact with skin; covered with transparent dressing and everything is changed every 7 days or when soiled, wet, blood soaked or loose.
8. Can be pulled off while removing the transparent dressing; if the dressing sticks to the site, use alcohol to loosen.
E. ASPIRATING BLOOD SAMPLES FROM A CENTRAL LINE WITH EXTERNAL ACCESS
   • (See also instructions for obtaining blood cultures)

GENERAL INFORMATION:
1. See Perry and Potter (2010) for blood draw procedure
2. A physician order is not needed to draw off of a central, non-dialysis line
3. Do not use a Vacutainer for blood aspiration from a PICC.

EQUIPMENT LIST:
• 2-3 Vacutainers (19 to 21 gauge)
• 10 cc syringe
• Normal saline for flushing
• Gloves
• Tubes for specific blood tests

PROCEDURE:
Order of draw or order of filling blood tubes for evacuated tube system - See APPENDIX A or click on the ACL Laboratory Order of Blood Draw policy link.

<table>
<thead>
<tr>
<th>IMPORTANT STEPS</th>
<th>KEY POINTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Perform hand hygiene</td>
<td>Verify at least two forms of identification against the armband and verbally with the patient, when possible.</td>
</tr>
<tr>
<td>Fill two 10 mL syringes with normal saline and keep some 10 mL syringes empty for drawbacks and flushes.</td>
<td>See Table 1 for special instructions related to blood drawing and blood discard volumes. Use the proximal lumen if the device has more than one lumen (Perry &amp; Potter, 2010).</td>
</tr>
<tr>
<td>Put on non-sterile gloves</td>
<td>Prevents possibility of an air embolism or blood reflux into catheter</td>
</tr>
<tr>
<td>Identify the patient as specified in the Patient Identification Policy (#2003), match labels to patient.</td>
<td>Scrub the hub for a minimum of 15 seconds before accessing the lumen (CDC, 2011). Vigorous scrubbing removes contamintates and helps to prevent central line infections.</td>
</tr>
<tr>
<td>2. Place patient in comfortable position</td>
<td>If utilizing needleless system, may draw directly through cap. If the cap is removed to draw blood, the cap is replaced with a new cap at the end of the procedure.</td>
</tr>
<tr>
<td>3. Stop the IV solutions if line is in use. If a multi-lumen line, stop all IV infusions while drawing blood.</td>
<td>Use slow gentle suction to with draw blood with a syringe. Do not pull plunger more than 1 mL ahead of the blood flow.</td>
</tr>
<tr>
<td>4. Prepare the syringes by expelling air from the syringe(s) before drawing blood.</td>
<td>It is not recommended to draw blood samples off lines with TPN infusing unless no other access is available.</td>
</tr>
<tr>
<td>5. Clamp the catheter whenever system is open to air. Make sure that unused lumens are clamped as well.</td>
<td>If it is difficult to withdraw blood, have patient change position, or extend arm laterally, vertically, lean patient forward. May need to remove needleless cap and replace with a new cap. If unable to obtain blood samples from the line, a venipuncture may need to be performed.</td>
</tr>
<tr>
<td>6. Vigorously cleanse end of catheter (hub) for 15 seconds with alcohol or an approved disinfectant. Allow the hub to dry before accessing the lumen.</td>
<td>If present, the lab procedure or technician will determine the amount of sample necessary.</td>
</tr>
<tr>
<td>7. Attach sterile syringe and withdraw, using gentle pressure, appropriate amount of blood for discard. See Table 1 for recommended discard amounts. Note if drawing from a line with TPN infusing, flush with 20 mL normal saline prior to the discard draw. Clamp catheter, remove syringe and discard in sharps container.</td>
<td></td>
</tr>
<tr>
<td>Amount of blood needed for sampling is determined by amount needed for each tube. Add up amount for each tube and that is total amount of blood needed for drawback.</td>
<td></td>
</tr>
</tbody>
</table>

ASNA System Policy #1007 – Intravenous (IV) Catheter Care:
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8. Attach syringe to the end of catheter or to needleless cap. Pull back blood specimen. Aspirate necessary amount of blood using multiple syringes if needed.

9. Flush line with at least 10mL normal saline (20 mL for ports) or until clear.

10. Reattach IV line and resume IV infusion; or if line is capped change IV cap. See Table 1 for instructions to cap IV.

11. Open blood transfer device package. Attach blood transfer device to top of blood specimen syringe. (See Appendix A for appropriate order for filling).

12. Insert blood tube into blood transfer device.

13. The vacuum of the tube will disperse the blood from the syringe into the blood tube.

14. Fill the blood tubes to the draw line.

15. Fill all blood tubes in this manner, switching blood tubes when full. Gently mix the tubes.

16. When all tubes are filled, label the tubes while in the presence of the patient.

Maintain integrity of the sample by ensuring that the patient identification process has been followed and the appropriate information is included on the label (Joint Commission (2011) NPSG 01.01.01)

17. Attach signed label below the rubber stopper on the tube, covering up the white manufacturers label on the tube.

18. Place blood tubes in specimen bag and send to lab immediately.

F. REMOVAL OF NON-TUNNELED CVCs (e.g. Arrow)

POLICY:
1. A physician order is needed to remove a non-tunneled central venous catheter.
2. When removing a non-tunneled central venous catheter, the nurse will reposition the patient so the insertion site is at or below the level of the heart to reduce the risk of air embolism.

EQUIPMENT LIST for Catheter removal:
- Gloves
- Suture removal supplies including alcohol pads
- Sterile Gauze
- Adhesive dressing

PROCEDURE:

<table>
<thead>
<tr>
<th>IMPORTANT STEPS</th>
<th>KEY POINTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assist patient to supine or Trendelenburg position.</td>
<td>If the patient can tolerate being repositioned, the Trendelenburg position is preferred. This is a key step to prevent an air embolus from entering the circulatory system. The risk of an air embolus increases when a CVC is removed while the patient is sitting upright due to increased intrathoracic pressure.</td>
</tr>
<tr>
<td>2. Use aseptic technique during this procedure, including hand hygiene and use of gloves.</td>
<td>If securement device (e.g. Stat Lock) is present, use alcohol pads to remove.</td>
</tr>
<tr>
<td>3. Remove sutures if present or other securement devices (e.g. Stat Lock).</td>
<td>If the patient is on a ventilator, withdraw the catheter during the expiratory cycle.</td>
</tr>
<tr>
<td>4. Instruct the patient to take in a deep breath and then hold while withdrawing the catheter.</td>
<td>The distal end of a multilumen catheter should be removed quickly, since the exposed proximal and medial openings could permit air entry.</td>
</tr>
<tr>
<td>5. Grasp the catheter with the dominant hand and steadily withdraw the catheter in one continuous motion while stabilizing the site with gauze in the other hand.</td>
<td>Apply pressure until the bleeding stops. Due to the size of the vein or use of anticoagulants, hemostasis may</td>
</tr>
</tbody>
</table>
| 6. Apply pressure with sterile gauze over the insertion point until bleeding has stopped. | }
7. Cover site with an occlusive dressing.

8. If the patient is ambulatory, instruct patient remain on bedrest for at least 30 minutes post catheter removal. Patient is instructed to notify staff if any bleeding is noted.

9. Evaluate catheter for length and signs of breakage.

10. Document removal and any significant findings.

G. **PICC CATHETER (PERIPHERALLY INSERTED CENTRAL CATHETER)**

For more information about Central Venous Access Devices, including PICC lines, see Perry and Potter (2010).

**GENERAL INFORMATION:**
PICC is a central venous catheter inserted via the brachial, basilic, or cephalic vein in the antecubital fossa. The catheter is silastic or other non-thrombogenic material. It may stay in place for several months.

While accessing a PICC line and/or when performing a PICC line dressing change, the nurse should assess for any changes in the external length of the catheter to determine if the catheter has migrated. If the catheter has pulled out from the insertion site, do not attempt to push back in or remove the catheter without notifying the physician. It is possible the PICC line can be exchanged without resticking the patient.

**PICC catheter sizes, volumes, and flow rates (generally):**

<table>
<thead>
<tr>
<th>French</th>
<th>Gauge</th>
<th>Gravity Drip</th>
<th>Prime Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.9 – 2.0</td>
<td>23</td>
<td>--</td>
<td>0.04 mL</td>
</tr>
<tr>
<td>2.8 – 3.0</td>
<td>20</td>
<td>100 – 240 mL/hr</td>
<td>0.11 – 0.33 mL</td>
</tr>
<tr>
<td>3.8 – 4.0</td>
<td>18</td>
<td>150 – 700 mL/hr</td>
<td>0.2 – 0.4 mL</td>
</tr>
<tr>
<td>4.8 – 5.0</td>
<td>16</td>
<td>200-1100 mL/hr</td>
<td>0.3 – 0.5 mL</td>
</tr>
</tbody>
</table>

3. **REMOVAL OF A PICC LINE**

**EQUIPMENT:**
- 4x4 gauze
- Gloves
- Tape
- Suture removal supplies or alcohol pads

**PROCEDURE:**

<table>
<thead>
<tr>
<th>IMPORTANT STEPS</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1. Place the patient’s arm perpendicular to their body to minimize bends in the catheter.</td>
<td>If securement device (e.g. Stat Lock) present, use alcohol pads to remove.</td>
</tr>
<tr>
<td>2. Remove the occlusive dressing, and any Steri-Strips, sutures, or other securement device (e.g. Stat Lock).</td>
<td>Venospasm may cause this resistance.</td>
</tr>
<tr>
<td>3. Place sterile gauze over the site (do not apply pressure).</td>
<td></td>
</tr>
<tr>
<td>4. Instruct the patient to take a deep breath and hold it as you gently pull the catheter out, 2-3 inches at a time. If resistance occurs during removal, <strong>DO NOT FORCE</strong> removal.</td>
<td></td>
</tr>
<tr>
<td>a. Wait 30 minutes and try again</td>
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</tr>
<tr>
<td>b. Apply heat to the upper arm, axilla, and hand</td>
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</tr>
<tr>
<td>c. Flush the catheter gently using a 10 mL normal saline flush</td>
<td></td>
</tr>
<tr>
<td>d. Try relaxation techniques, have the patient drink warm liquids</td>
<td></td>
</tr>
<tr>
<td>e. If these methods fail, notify the physician who will consult an interventional radiologist</td>
<td></td>
</tr>
</tbody>
</table>
5. Once the catheter is removed, apply pressure with the sterile gauze on the insertion site until the bleeding stops.
6. Cover the site with 4x4 occlusive gauze pressure dressing and tape securely.
7. Inspect the catheter tip for a ragged edge or tear, or other signs of breakage. If it appears that the catheter has been broken, have the patient lie still on their left side, notify the physician STAT.
8. Document procedure and any significant findings in the patient record.

H. TUNNELED CVC (e.g. Hickman®, Groshong®, Broviac®, Raaf®, Leonard®): Policy and General Information


POLICY:
1. A newly placed tunneled CVC may be used after insertion following verification of catheter tip placement in superior vena cava by chest x-ray or fluoroscopy (INS, 2011).
2. Only a LIP may remove a tunneled CVC catheter.

GENERAL INFORMATION:
1. Any IV solution, medication, or blood product may be infused through any lumen of these catheters.
2. Blood samples may be drawn from either lumen of a dual lumen catheter. Treat each line as a separate catheter when carrying out procedures. Discard drawback if there is any unintended drug in the line.
3. If resistance is met when flushing, stop and assess. Check to see that the catheter is not pinched or kinked, change patient’s position, roll patient on left side, raise or reposition the patient’s right arm, have patient deep breathe and cough.

I. IMPLANTED VASCULAR ACCESS DEVICES (implanted ports) (e.g. Mediport®, Omega®, Slim-port®):

Please reference Perry & Potter, 2010, for a description of an implanted port and side view of a Huber needle.

Policy:
1. The RN is responsible for assessing and troubleshooting the port/PICC line access and port/line site including issues related to drawing blood samples, flushing, or site redness, swelling, pain or irritation.
2. The RN is responsible for documenting the site assessment and actions taken to access and/or troubleshoot the port/PICC line.
3. If the patient is receiving any IV fluids via the port or PICC line, a RN must draw the labs.
4. In settings where implanted port/PICC line access for obtaining blood samples for lab testing and saline flushing may be delegated to competency tested staff including Nurse extern, Oncology MA/Tech or Oncology Phlebotomist, the RN must be present to provide supervision and be immediately available if problems arise. The nurse is responsible for heparinizing ports/PICC lines per physician orders after blood is drawn.
5. In settings where unlicensed staff are trained in port/line access and use of saline flushes, competency must be demonstrated upon hire and on an annual basis at their assigned work locations.

GENERAL INFORMATION:
1. Ports are accessed with a noncoring Huber needle. The noncoring Huber needle should be of a length that allows the needle to sit flush to the skin and securely within the port.
2. Noncoring Huber needles are required to prevent the septum from being damaged.
3. Power Port is a special type of port for high pressure injection of CAT contrast. Only available as a single lumen port. Same flushing procedure as a Mediport.
   - Use a Power Port needle if the Power Port will be used for high pressure injection of CAT scan contrast or if it is anticipated that the patient will be admitted to the hospital. For other uses of a Power Port, e.g., blood draws or IV antibiotics, a standard Huber needle may be used.
   - It is important to inform Radiology that the patient has a Power Port.
4. Frequent intermittent flushing of ports with heparin may influence the patient’s anticoagulant status and may require a change in capping solutions to minimize the amount of heparin administered.

5. Consult with physician for any changes in heparin concentration or using normal saline flush during the time of frequent intermittent capping.

6. Notify physician if an occluded port is suspected or subcutaneous leaking of fluid from port is suspected. **Do not force flushing/capping solution into the catheter.**

7. Only a LIP may remove a port.

**Implanted Port/PICC Access Procedure (Note: Steps for port access are applicable to all settings, including outpatient lab testing)**

**Equipment:**
- Implanted port **sterile** access supply kit or obtain equivalent supplies
- Noncoring Huber needle or Power Port needle (if appropriate)
- 2 sterile 10cc 0.9% Normal saline prefilled syringes for flushing
- One 5 ml heparin-filled syringe (100 u/mL)
- Sterile injection Cap
- Transparent dressing if needed
- 2 pairs of sterile gloves

**Port Access Supply Kit includes the following:**
- Mask
- 1 pair of sterile non-latex gloves
- chlorhexidine swab sticks
- 4-2x2 inch gauze pads
- roll of sterile paper tape
- sterile drape

**Procedure:**

**IMPORTANT STEPS**

1. A noncoring Huber needle is used to access a port and is available in ¼”, 1” or 1.5” lengths. The appropriate length is determined by palpating the port for depth and size. Check physician orders to clarify reason why port is being accessed (e.g., lab draw).

2. Explain the port access procedure to the patient. Make sure the patient understands the port access procedure and those additional procedures, such as drawing labs may also take place.

3. Perform hand hygiene prior to carrying out the procedure.

4. Prepare the area to set up the equipment for the port access procedure.

5. Position the patient in a semi-reclining position or with a pillow behind the shoulders.

6. Observe the site for redness, swelling, pain or irritation. Nonlicensed staff will notify the RN if any problems are present.

7. Don nonsterile gloves. Palpate the site to locate the implanted port and septum(s) and determine the length of the noncoring Huber needle to be used.

8. Determine if a topical anesthetic or topical refrigerant will be applied. If a topical anesthetic cream (e.g. EMLA) is applied to the site, it must be removed before prepping the skin over the port. If a topical anesthetic spray is used, it is applied after the skin is prepped and immediately prior to inserting the non-coring Huber needle.

9. Open the sterile port access kit and additional supplies (Huber needle, saline flushes, and end caps) and place it on a clean, flat surface. Don mask and sterile gloves from the port access kit; set up the sterile field and arrange supplies.

**KEY POINTS**

- The deeper the port, the longer the needle that is needed for access. Check to see if the port is a single or double lumen port.

- Make sure the patient understands the port access procedure and those additional procedures, such as drawing labs may also take place.

- See system hand hygiene policy

- Wipe down the flat surfaces with approved germicidal wipe before setting up the sterile field.

- Patient positioning is important to ensure accurate access to the port and ease of needle insertion.

- See appendix B for use of topical anesthetic cream (e.g. EMLA) or topical refrigerant use (e.g. Gebauer’s Pain Ease) for port access. An alternative to a topical application is use of ice packs for a cold effect to decrease discomfort at the site. Use caution to avoid causing localized skin damage due to cold application, especially in patients with poor circulation.

- Use aseptic technique during port access procedure.
10. Arrange the sterile drape to protect the patient’s clothing. Ensure that sterile technique is maintained during the access process.

11. Cleanse the port area with >0.5% chlorhexidine with alcohol swab using friction in an up and down and side to side motion for 30 seconds, cleansing an area 1 to 2 inches beyond the perimeter of the port on all sides.

   Chlorhexidine gluconate is used for skin asepsis. Friction assists in removing microorganisms. The area to be cleaned should extend far enough beyond the perimeter of the port so that all of the skin area under the sterile dressing has been cleansed.

12. Grasp the hub or clamp of the noncoring Huber needle and attach 1 syringe of the 0.9% Normal saline to the hub and prime the tubing and the needle. Clamp the extension set. Keep the needle on the sterile field.

   If using topical anesthetic spray, apply spray and then don new pair of sterile gloves before picking up the Huber needle off the sterile field. Avoid contaminating the equipment during access process.

   NOTE: Glove on the nondominant hand is no longer sterile.

13. Relocate the port septum by palpation and immobilize the port with the nondominant thumb, index, and middle finger. Insert the noncoring Huber needle perpendicular to the septum pushing firmly through the skin and septum until the needle tip contacts the back of the port.

   Needle placement is verified by blood return from the port. If unlicensed staff member, notify RN immediately if unable to aspirate blood or flush port. Do not leave blood sitting in the port. Positive pressure shall be maintained while clamping the tubing prior to withdrawing needle from the port to prevent reflux. Make sure the system is closed to prevent air embolism.

   In the clinic setting, temporarily cover site with gauze dressing while patient is waiting for physician orders for further treatment to be clarified by the RN. Once the orders are clarified, the next steps are undertaken (see options 1, 2, and 3).

14. Aspirate for blood return to confirm patency. Flush port with 10 mL 0.9% Normal saline then aspirate and discard 5 mL of blood.

15. Draw labs and then flush port with 10 mL 0.9% Normal saline using a push-pause and positive pressure technique while clamping the noncoring Huber needle tubing. Clamp tubing and remove the syringe. Apply sterile cap to end of extension tubing.

16. Stabilize the Huber needle using sterile tape from the kit. Apply sterile 2x2 gauze dressing and tape all of the free edges of the gauze dressing. Label the dressing with the date, time, initials, and needle gauge/length or communicate that the port is accessed using a site specific communication form (e.g., Outpatient Oncology's Port Access Communication Sheet).

17. Label the blood samples in the presence of the patient to ensure correct patient identification of the specimens.

   NOTE: At this point in the procedure the Registered Nurse/LPN will complete one of three processes with the patient depending upon the physician orders.

---

<table>
<thead>
<tr>
<th>#1: The patient needs an IV infusion (i.e. clinic setting)</th>
<th>#2: The patient is not receiving any additional treatment once labs have drawn. RN/LPN will heparinize the port and discontinue the noncoring Huber needle access.</th>
<th>#3: The patient is being discharged for home infusion with an ambulatory IV pump or requires other long term port access (e.g. inpatient admission). The RN/LPN will maintain port access and apply a transparent dressing.</th>
</tr>
</thead>
<tbody>
<tr>
<td>The RN/LPN will verify that port access is available and sterile gauze dressing is in place.</td>
<td></td>
<td>Use this procedure where short term access is needed such as in an oncology clinic setting for chemotherapy administration. Make sure the system is kept closed to prevent air embolism. Keep site covered to prevent clothing from being in contact with the noncoring Huber needle.</td>
</tr>
</tbody>
</table>

#1: Maintaining Port Access for short term use e.g. IV infusion:

a. Make sure port access is available and the system is closed.

b. Make sure the site is covered with a sterile gauze dressing while the patient is in the clinic.

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#2: Heparinizing the Port

a. When the port no longer needs to be accessed, the RN or LPN will heparinize the port using the 5 ml Heparin solution (100 Units/mL) using the push, pause, and pressure method. Consult the physician if there are any contraindications to using a heparin flush.

b. Stabilize the noncoring Huber needle with the thumb and forefinger of the nondominant hand. Remove the needle from the septum by pulling perpendicular to the site until the click of the locking device is heard. Discard needle in the appropriate receptacles.

c. Cover the site with a sterile band aid or gauze dressing. Monitor for wound healing

#3: Long Term Port Access:

a. Insert antimicrobial impregnated dressing under needle and cover with a sterile transparent dressing. While port access is being maintained, the noncoring Huber needle, antimicrobial impregnated dressing, and transparent dressing will be changed every 7 days using aseptic technique. Site will be labeled with date, and time of access. Use this procedure if patient will need to maintain port access (e.g. home with chemotherapy infusion or inpatient admission)

b. At the conclusion of therapy when port access is no longer necessary, the nurse will follow the steps to heparinize the port.

Documentation:
RN or LPN will document port care in the EHR including: date needle inserted, needle size and length, date needle removed, assessment of port site, flushing solutions with volumes noted, and any difficulties noted with site. Ensure that a complete record of the port care and assessment is documented in the EHR.

J. CVC DAMAGE OR MALFUNCTION: ACTUAL OR SUSPECTED (Perdue, 2001; Camp-Sorrell, 2010)

Policy:
If a CVC catheter is visibly damaged (e.g., tear, cut or puncture) or the patient exhibits signs of a CVC catheter malfunction (e.g., embolized into the vascular system) the nurse must immediately notify the physician.

Procedure:
1. A CVC that is visibly damaged or is malfunctioning is an emergency situation. Upon discovery, the first nursing action is to prevent air from entering the system by immediately applying a plastic toothless catheter clamp close to body at the exit site and proximal to the damaged area.
2. Reposition the patient with their head below the level of the heart, if tolerated.
3. If the catheter is in an extremity, put a tourniquet around the affected limb proximal to the catheter insertion site.
4. Monitor patient for signs of distress or cardiac arrest. If catheter embolism is suspected, observe patient for cyanosis, chest pain, hypotension, increased central venous pressure, tachycardia, fainting, or loss of consciousness.
5. Notify the site specific emergency response team, if indicated.
6. A chest radiograph may be ordered.
IX. DE-CLOTTING CENTRAL LINES (CVCs): (NON-TUNNELED, TUNNELED AND IMPLANTED VASCULAR ACCESS DEVICES [PORTS]) and MIDLINES

POLICY:
A. A registered nurse or caregiver with demonstrated competency may declot a catheter per physician order using the Alteplase (r-tPA) procedure.
B. Depending upon the level of catheter obstruction, more than 1 attempt may be necessary to declot the CVC. If a second attempt to declot the catheter is not successful, notify the physician.

GENERAL INFORMATION:
1. Before contacting the physician, rule out common causes of possible mechanical obstruction before attempting to declot using Alteplase. Causes of mechanical obstruction that the nurse should consider include:
   a. IV tubing is clamped or kinked
   b. Sutures are too tight at the catheter exit site
   c. Catheter has kinked, twisted, or slipped out of place (malpositioning)
   d. For a port, the Huber needle has not been placed correctly
   e. Drug precipitate or lipids are present in the IV line
2. If the CVC obstruction is caused by intraluminal or extraluminal thrombus or fibrin sheath, then Alteplase, a form of recombinant tissue plasminogen activator, can be used to reestablish patency of central venous catheters. Alteplase dissolves clots and fibrin by triggering fibrinolysis. If the obstruction is caused by other forms of mechanical obstruction or catheter damage, Alteplase will not be effective.
3. If the patient has ongoing issues with lack of blood flow from a central access device that is not resolved with repeated doses of Alteplase, consult with the attending physician (e.g., oncologist) prior to starting this procedure.

EQUIPMENT:
- Gloves
- Sterile needle
- Alcohol wipes
- 2 empty 10 mL syringes
- Plastic toothless catheter clamp (for use with silicone plastic type catheters)
- 10 mL syringe containing 10mL sterile NS flush
- Luer Lock injection cap (2)
- Drug from pharmacy: Alteplase (r-tPa) 1 mg/mL; need 2 mL for procedure.
  - Note: Reconstitute per manufacturer’s guidelines with preservative free sterile water.
  - Pharmacy may send dose already reconstituted and frozen in syringe; thaw before use.

PROCEDURE:
1. The alteplase declotting procedure is dependent upon whether the obstruction is complete or you can infuse but there is no blood return. Do NOT flush the catheter against resistance.
2. For a complete obstruction, obtain order for alteplase installation, and then repeat alteplase installation x 1 if first attempt is not successful.
3. It is important to overfill the catheter with alteplase. For most catheters, 2 mL of solution is a sufficient volume. If the lumen volume is greater than 2 mL (e.g., dialysis catheter), add more preservative free sterile water to overfill the lumen approximately 0.2 mL greater than the lumen volume.
4. If the catheter has multiple lumens (e.g. Dual Lumen Hickman or Raaf), the fibrinolytic agent should be instilled only into that lumen which seems to be clotted. The other lumen may be capped or used for infusion of solutions.
### IMPORTANT STEPS

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>If fluids are not infusing or flow rate is sluggish, or if unable to withdraw blood from the catheter, the nurse will rule out common causes of possible catheter obstruction.</td>
</tr>
<tr>
<td>2.</td>
<td>Perform hand hygiene. Apply clean gloves.</td>
</tr>
<tr>
<td>3.</td>
<td>Clamp the catheter, and then disconnect IV tubing or cap from catheter.</td>
</tr>
<tr>
<td>4.</td>
<td>Vigorously cleanse the hub with alcohol or an approved disinfectant for 15 seconds. Allow hub to dry.</td>
</tr>
<tr>
<td>5.</td>
<td>Attach 10 mL saline flush to hub of catheter.</td>
</tr>
<tr>
<td>6.</td>
<td>Gently draw back on the plunger to assess for blood return from each lumen. If blood return is obtained, attempt to gently flush the line with sterile NS. <strong>STOP</strong> if resistance is met; do not flush against resistance.</td>
</tr>
<tr>
<td>7.</td>
<td>Notify physician of abnormal findings and obtain physician order to declot with alteplase. Check order for alteplase dosage and number of declotting attempts.</td>
</tr>
<tr>
<td>8.</td>
<td>Obtain Alteplase from pharmacy (1mg/mL). If the drug is reconstituted prior to sending, make sure the medication is in a 10 mL syringe. If the drug requires reconstitution, follow instructions for mixing with sterile water. Gently mix the vial until all of the contents are dissolved. Inspect reconstituted Alteplase for crystals/precipitate. Draw up 2 mL of reconstituted Alteplase in a 10 mL syringe. Standard dose of alteplase is 2 mg in 2 mL and is the drug of choice for declotting central venous access devices (Gorski, Perucca, &amp; Hunter, 2010, p. 508).</td>
</tr>
<tr>
<td>9.</td>
<td>Vigorously scrub the luer lock injection cap. Attach the syringe, unclamp the catheter and instill the drug SLOWLY and gently into the catheter lumen. Clamp the lumen and wait 30 minutes.</td>
</tr>
<tr>
<td>10.</td>
<td>At the end of 30 minutes, vigorously scrub the luer lock injection cap, attach a 10 mL syringe, and unclamp the catheter. Draw back gently on the syringe and attempt to aspirate the drug and residual clot.</td>
</tr>
<tr>
<td>11.</td>
<td>If no blood return or clot removed, allow the Alteplase to remain the catheter for a longer dwell time; follow procedure to access the catheter lumen and reassess catheter function after another 90 minutes of dwell time (<strong>total dwell time 120 minutes</strong>). If blood return is present, see step 13, otherwise continue to step 12.</td>
</tr>
<tr>
<td>12.</td>
<td>If no blood return or clot removed, aspirate the first dose of Alteplase (r-tPa) from the lumen, discard and instill a second dose of the Alteplase. Repeat the procedure to access catheter lumen and reassess catheter function. If blood return is present, see step 13. If unable to reestablish catheter patency after second dose of alteplase, notify physician. Proceed to step 16.</td>
</tr>
<tr>
<td>13.</td>
<td>If blood return from the lumen is established, aspirate drug and residual clot, remove 5mL of blood and discard. Assures patency and removes residual drug and clot from catheter. Do not return the blood to the patient.</td>
</tr>
</tbody>
</table>

### KEY POINTS

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Assess for possible causes of mechanical obstruction (e.g. drug precipitate, kink in tubing) before contacting the physician. The alteplase declotting procedure differs depending on whether the obstruction is complete (see Step 13) or if fluid infuses but there is no blood return.</td>
</tr>
<tr>
<td>2.</td>
<td>REMEMBER: Any time the catheter hub is open to air the line must be clamped. If clamping is not possible, instruct patient to exhale and then hold breath during the time that the catheter is open. Do not clamp Groshong or PICC lines.</td>
</tr>
<tr>
<td>3.</td>
<td>Resistance to flushing is a sign of fluid sluggishness or obstruction in the lumen.</td>
</tr>
<tr>
<td>4.</td>
<td>Check order for alteplase dosage and number of declotting attempts.</td>
</tr>
<tr>
<td>5.</td>
<td>When reconstituting, do not shake the vial. All of the contents should be dissolved within 2 minutes. Use within 8 hours of reconstitution when stored at 2° to 30° C.</td>
</tr>
<tr>
<td>6.</td>
<td>It is important to overfill the catheter with alteplase. For most catheters, 2 mL is a sufficient volume. If the lumen volume is greater than 2 mL, add more preservative-free sterile water to overfill the lumen approximately 0.2 mL greater than the lumen volume. This allows the drug to surround and dissolve the clot.</td>
</tr>
<tr>
<td>7.</td>
<td>The residual clot is aspirated from the catheter along with the drug.</td>
</tr>
<tr>
<td>8.</td>
<td>If blood cannot be aspirated after 120 minutes of dwell time, a partial clot may remain.</td>
</tr>
<tr>
<td>9.</td>
<td>If unable to declot the catheter, consult with the physician to rule out other causes of catheter obstruction and establish plan for IV access.</td>
</tr>
</tbody>
</table>

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14. Flush catheter gently with 10mL normal saline using a push-pause-push technique. 

A push-pause-push technique causes turbulence in the catheter and flushes out blood and drug more effectively.

15. Reconnect IV tubing or replace injection cap and flush with appropriate solution.


**X. CULTURING FOR SUSPECTED IV CATHETER-RELATED INFECTION**

**POLICY:**

A. The physician must be notified of symptoms of an IV catheter-related infection or if the IV system is suspected of contamination.

B. A physician’s order is necessary to draw blood cultures (e.g. Isolator culture tubes or culture bottles) or to perform any testing of the IV site, catheter tip or IV solution.

C. If a catheter related infection is suspected, blood cultures must be drawn prior to initiating physician orders for antimicrobial therapy.

D. If the IV solution is suspected of contamination, the entire IV fluid system (bag, solution, administration set and catheter/needle) must be discontinued and sent for culture. DO NOT take the system apart.

E. RNs or other competency tested caregivers may obtain blood cultures or perform additional testing of the IV site, catheter tip or IV solution.

**GENERAL INFORMATION:**

A. Use aseptic technique when collecting samples to culture for line infections in order to achieve optimal results. Inadequate cleansing of the site or improper technique will result in inaccurate or contaminated results.

B. When an infection is suspected at the IV site of any catheter, change the IV catheter and tubing; change IV fluid only if suspected as the source of the infection.

C. This procedure includes all forms of culturing (insertion sites, catheters/needles and IV fluid systems). However, it is only necessary to culture the suspected source of infection.

D. Blood cultures may be drawn when an IV line is present and there is suspected sepsis, a fever of undetermined origin, or suspected contamination of IV fluid. Blood cultures must be drawn from two independent sites.

E. For a patient with one central line, one blood culture should be obtained from the line and the other from a peripheral venipuncture. If the patient has more than one central line (e.g. PICC and a port), a specimen should be collected from each line and then another from a peripheral venipuncture.

F. All blood cultures must be drawn prior to the administration of antibiotics. (See ACL policy 141—Blood Culture Collection—Venipuncture) Notify the physician if you are unable to obtain the required blood samples.

1. **BLOOD CULTURE BOTTLES:**

A. A blood culture set, consisting of one aerobic and one anaerobic bottle, is used when routine adult blood cultures are ordered. Optimal amount of blood is 10 mL per blood culture bottle for an adult patient.

B. Unlike the isolators, pediatric blood culture bottles cannot be used for patients greater than 12 years of age as the culture formula in the pediatric bottle is optimal for organisms commonly found in a pediatric population which are different from an adult population. Optimal amount of blood for a pediatric culture bottle is 4 mL.
C. Inadequate blood sample volumes can lead to false negative results. **Collecting an adequate volume of blood is the single more important factor for the detection of sepsis.** Too much blood in the blood culture bottles can also lead to false negatives due to an improper ratio of blood to broth.

**Equipment for Blood Culture Draw**
- 1 aerobic blood culture bottle (blue)
- 1 anaerobic blood culture bottle (purple)
- 3 sterile 10 mL syringes
- Site approved cleansing product to scrub the IV cap/hub (e.g. chlorhexidine swab)
- Alcohol pads for scrubbing the tops of the specimen bottles
- 1 sterile Angel Wing blood transfusion device with female adaptor

**Procedure:**

1. Remove the caps from the blood culture bottles. Visually inspect bottles for damage, contamination, or deterioration. Check the expiration dates on the bottles. Blood culture bottles contain an internal sensor at the bottom of the bottle. The color should be blue-green color. **DO NOT USE** if the sensor is yellow.

2. Hold the bottle upright and locate the 5 mL graduation marks on the side. Make a mark on the bottle to indicate 10 ml above the broth level. Indicates optimal amount of blood per bottle

3. Using aseptic technique, prepare the blood bottles by scrubbing the top of the bottle for a full 60 seconds, using 1 alcohol pad per bottle. Rest the alcohol pad on top of the bottle to avoid airborne contamination. Allow the top of the bottle to air dry. Do not use iodine pads to cleanse the top of the bottles. This is a crucial step in the preparation for drawing blood cultures as the tops of the bottles are not sterile under the cap. Do not touch the tops of the blood culture bottles or collection site after cleansing. Inadequate cleansing of the site or improper technique can result in inaccurate or contaminated results. Remember to change the end caps prior to drawing blood cultures if drawing through the port.

4. Vigorously cleanse the hub with site approved cleansing product for 15 seconds. Allow hub to dry. Inadequate cleansing of the site or improper technique can result in inaccurate or contaminated results. Remember to change the end caps prior to drawing blood cultures if drawing through the port.

5. Attach a 10 mL syringe to the hub of the central line lumen. Draw back and discard 5 mL of blood. Always fill the AEROBIC bottle first. If you are unable to draw more than 10 mL of blood from the patient, only use the aerobic bottle. If you are able to draw 11 to 20 mL of blood from the patient, place the first 10 mL in the aerobic bottle and the remainder of the blood in the anaerobic bottle.

6. Attach a second 10 mL syringe to the central line lumen and fill with 10 mL blood. Obtain cultures from peripheral venipuncture site, if ordered. Adhere to process for filling to avoid contaminating the broth.

7. Attach a third 10 mL syringe to the central line lumen and fill with 10 mL blood. Make sure the label includes the source of the sample (central line versus peripheral site) and a specific description of the type of catheter and location so the source of the blood sample is fully described (e.g. Right upper arm PICC from purple port).

8. Once blood samples are obtained, attach a new needleless cap to the hub and flush per guidelines. Make sure the label includes the source of the sample (central line versus peripheral site) and a specific description of the type of catheter and location so the source of the blood sample is fully described (e.g. Right upper arm PICC from purple port).

9. Fill the blood culture bottle by attaching the 10 mL syringe to the sterile angel wing blood transfusion device with female adaptor. Remove the alcohol wipe from the AEROBIC bottle. Keep the culture bottle on a flat surface and use the transfusion device to add the 10 mL of blood to the aerobic bottle.

10. Follow the same procedure to transfer the 10 mL blood sample to the ANAEROBIC bottle.

11. Label bottles in the presence of the patient. Include information about the type of catheter and location of the catheter, initials, time and date on the label. Place the label vertically on the bottles. **DO NOT COVER THE BARCODES ON THE BOTTLES WITH THE LABEL.**

12. Transport the blood culture bottles to the lab as soon as possible.
2. **WAMPOLE ISOSTAT ISOLATOR BLOOD CULTURE TUBES**

General Guidelines:

A. Wampole Isostat Isolator blood culture tubes may be used only when specifically ordered by the physician.

B. Wampole Isostat Isolator blood culture tubes are used for adult blood draws and for blood cultures in patients over age of 12 years. Optimal volume is 10 mL and minimum volume is 5 mL.

C. For difficult adult blood draws, use the Wampole Isostat Isolator blood culture tube for pediatric patients. Optimal volume is 1.5 mL and minimum volume is 0.5 mL.

D. See ACL Policy Spec 194—Blood Culture Collection Utilizing Wampole Isostat System Isolator 10 and Isolator 1.5 Microbial Tubes.

Equipment needed for line draw:

- Wampole Isostat Isolator blood culture tubes
- 2 sterile 10 mL syringes,
- Site approved cleansing product (e.g. chlorhexidine swab) to scrub the IV cap/hub
- Sterile blood transfer device
- Sterile Iodine swab or chlorhexidine swab or other approved disinfectant

**Procedure:**

1. Use sterile iodine or chlorhexidine swab to clean top of Wampole Isostat isolator blood tube. Allow prep to dry completely.

2. Vigorously cleanse the hub with site approved cleansing product (e.g. chlorhexidine swab) for 15 seconds. Allow hub to dry.

3. Attach the 10 mL syringe to cleaned line. Draw back and DISCARD 5 mL of blood.

4. Attach another 10 mL syringe and withdraw 10 mL of blood.

5. Attach a new needleless cap to the hub and flush per guidelines.

6. Attach the blood filled syringe to transfer device and use to transfer blood to isolator tube.

7. Label tube in the presence of the patient. Include information about the type of catheter, location of the catheter, initials, time and date on the long label. Transport to lab immediately. A specific description of the type of catheter and location of the catheter helps to further describe the source of the blood sample (e.g. Right upper arm PICC from purple port).

3. **Procedure for Obtaining IV Site, Catheter Tip or IV Solution Cultures:**

**EQUIPMENT:**

- Sterile disposable instrument tray (if sutures present: have one tray to remove sutures and a second pair or sterile scissors to cut catheter tip)
- 4” x 4” sterile gauze sponges
- Appropriate lab requisitions
- Plastic specimen bags
- Sterile gloves
- Alcohol swabs
- Patient Identification Label
- Sterile specimen container
- Culture swab

**PROCEDURE:**

<table>
<thead>
<tr>
<th>IMPORTANT STEPS</th>
<th>KEY POINTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Culturing IV Insertion Site:</td>
<td></td>
</tr>
<tr>
<td>1. The insertion site is cleansed with an alcohol wipe and allowed to air dry. Don sterile gloves.</td>
<td>Cleaning the exit site with alcohol will decrease the amount of skin flora present.</td>
</tr>
<tr>
<td>2. Culture the exit site by inserting the swab gently into the exit site. Be sure to include purulent drainage. Replace culture swab in its protective sleeve.</td>
<td>The transport tube contains a wet sponge at the bottom.</td>
</tr>
</tbody>
</table>
3. Label culture swab in presence of the patient per lab policy. Include information about the type of catheter and location of the catheter, initials, time, and date on the label.

4. Send culture swab in plastic biohazard specimen bag to laboratory with appropriate requisitions.

**Culturing Non-Tunneled Central Line IV Catheters**

1. Obtain a physician order to remove the non-tunneled central line IV catheter and to culture the IV catheter tip. Follow the procedure for removal of a non-tunneled central line.

2. Remove the central line dressing.
3. Open sterile disposable instrument tray.
4. Open sterile specimen container, maintaining sterility.
5. Don sterile gloves.
6. If stabilizing sutures are present, remove sutures using sterile scissors.
7. Cleanse skin around the central line insertion site with alcohol. Allow to dry. Then use a sterile forceps to withdraw the catheter/needle. Apply pressure to the insertion site using sterile gauze.
8. Once the catheter has been removed, have the second caregiver cut the tip of the catheter (5cm or approximately 2 inches) with sterile scissors and place in sterile specimen container labeled “distal portion.”
9. Include on the specimen label information about the type of catheter and location of the catheter, initials, time, and date.

10. Apply a sterile gauze dressing to the site; fold gauze in quarters and tape tightly to apply pressure to the site.

**Culturing Peripheral IV catheters/needles:**

1. Remove dressing and cleanse insertion site with an alcohol wipe. Then disconnect catheter from IV tubing at hub, using sterile hemostat/forceps.
2. Place entire catheter into sterile specimen container.
3. Label specimen with the type and size of the peripheral catheter, location of the catheter, initials, time and date in the presence of the patient per lab policy.
4. Dress site with 4”x4” gauze, folded in quarters and tape tightly to apply pressure to site.
5. Send labeled container(s) in plastic biohazard specimen bag to laboratory with appropriate requisitions.

**Culturing IV Fluid Systems:**

1. Obtain a physician’s order to discontinue the IV fluid system entirely and obtain blood cultures. DO NOT disconnect IV tubing from IV fluid container or catheter/needle.
2. Immediately notify the pharmacist and infection control if the physician orders a culture of the IV fluid.
3. Package entire IV fluid system in plastic biohazard specimen bag and send for Pharmacy. Use caution if needles are present.
4. Obtain STAT peripheral blood cultures from 2 separate sites. This shall be done as soon as possible during/after the patient’s reaction (i.e. while febrile).

A specific description of the type of catheter and location of the catheter helps to further describe the source of the IV insertion site culture.

**Do not attempt to do this procedure without another caregiver present** to assist with the site preparation, catheter removal, and collection of the IV catheter tip for culture.

Be sure to complete culturing of the insertion site prior to this step, if appropriate
Keep the external portion of the catheter/needle directed upward, away from skin surface to avoid contamination of the tip.
Do not reuse scissors that were used to remove sutures. Use new pair of sterile scissors. Maintain sterile technique.
A specific description of the type of non-tunneled central venous catheter and location of the catheter helps to further describe the source of the IV insertion site culture.

Cleaning the exit site with alcohol will decrease the amount of skin flora present
A specific description of the type of peripheral IV catheter and location of the catheter helps to further describe the source of the IV insertion site culture

Maintaining an intact system is the single most important step in the culturing procedure when IV fluid contamination is suspected.

Ideally, DO NOT obtain blood cultures through the IV system that is suspected of contamination.
Blood cultures must be drawn prior to initiating a new IV system or any antimicrobial therapy.
XI. VASCULAR ACCESS LINES FOR ALTERNATE ROUTE: HEMODIALYSIS/PHERESIS (e.g. Mahurkar, Bard, Perm-cath)

POLICY:
A. The use of pheresis and hemodialysis catheters for purposes other than hemodialysis or pheresis must be approved by the nephrologist or pheresis-credentialed physician.

B. Only a dialysis access trained nurse or individual approved by a nephrologist may access or flush a hemodialysis or pheresis catheter with a nephrology or pheresis-credentialed physician order

GENERAL INFORMATION:
A. When accessing hemodialysis lines, use a 10 mL or larger syringe to aspirate heparin from the lumens prior to use.

B. Dialysis catheters differ from regular central lines.
   i. Except for emergency access, a dialysis catheter is a dedicated vascular access line. It can only be accessed for nonemergency use if approved by the nephrologist.
   ii. Some dialysis catheters may have a 3rd lumen that is clear or located medially; this lumen may be used (e.g., infusion or blood draws) and cared for as a CVC (e.g., flushes).

C. Clamps located on pheresis and dialysis catheters must remain closed at all times when not in use to prevent air embolism.

D. A femoral line may be temporarily placed for dialysis use. Patients with a temporary femoral line should be kept in a supine position with the HOB no greater than 30 degrees to prevent the line from kinking internally, unless otherwise ordered.

PROCEDURE:
A. Short-term vascular catheters (e.g., Mahurkar-Vascular catheters):
   1. Large bore catheters designed for dialysis or pheresis use to access the venous and arterial systems.
   2. Capped with high dose heparin that must be aspirated from the lumens prior to use.
   3. May be removed by a dialysis or pheresis trained nurse or competency trained nurse if site is no longer needed or there is evidence of infection. If the Mahurkar is a femoral line, apply pressure for 15 to 20 minutes to prevent a hematoma from forming after removal.
   4. May be cleaned with povidone iodine, chlorhexidine, sodium hypochlorite or hydrogen peroxide solutions per manufacturer’s guidelines.
   5. Ointment may be used at the exit site per manufacturer’s guidelines.

B. Long-term vascular catheters (Hemo-Split/PermCath)
   1. The Perm-cath, with central lumen and vas-cath, are subclavian catheters with a Y-type end. This type of catheter is surgically implanted, tunneled catheter designed for extended use.
      • The cannula and Y-piece are joined by silastic rubber, which can develop cuts or tears easily. DO NOT allow any sharp edges or objects to come in contact with the tube.
      • Clamp carefully using plastic toothless clamps.
      • Must be removed by a LIP.
      • Catheter may be cleaned with a povidone iodine solution. Use of ointments with polyethylene glycol (PEG) can cause device failure.
      • Chlorhexidine patch or bacitracin zinc in petrolatum base is preferred for site exit care.
   2. Staff nurse will document care of catheter insertion site each shift and condition of dressing.
   3. Patients may not shower while hemodialysis catheters are in place, unless specifically ordered by the nephrologist.
XII. END CAPS/NEEDLELESS CONNECTORS:

General Guidelines:

A. In the acute care facilities, positive pressure IV access end cap will be used for all IV catheters: central lines, midline catheters, PICCs and peripheral catheters. When using a positive pressure IV access end cap for a peripheral catheter, an extension set should be used.

B. Positive pressure devices (e.g. FLOLINK (Baxter) and Posiflow (Becton Dickenson)) are used to minimize fluid back flow into the IV catheter and help to maintain catheter patency.

C. When flushing a positive pressure connector, disconnect the syringe first, then clamp the catheter or extension set. The catheter or extension set must be clamped when changing the end cap or when the cap is removed.

D. If negative fluid displacement or neutral displacement end cap/needleless connector devices are in use, caregivers should follow manufacturer’s recommendations for flush technique. May be found in use in clinic or home care settings.

E. A positive pressure flush technique is not necessary if a positive pressure displacement cap is used.

F. Properties for positive pressure devices at AHC:
   a. Non-latex, Non-DEHP material
   b. High flow rate (Avg. 10.4 liters per hour)

G. Practice considerations:
   1. Do not use needles. If accessed with a needle, the cap must be changed
   2. Do not clamp extension set prior to detaching syringe
   3. Avoid excessive force during Luer-slip attachment.

H. Procedure to attach end cap:
   1. Remove end cap from packaging.
   2. Attach to catheter hub or extension set.
   3. Prime the extension set, including the end cap; flick to remove bubbles.
   4. Vigorously cleanse the hub with alcohol or an approved disinfectant for 15 seconds. Allow hub to dry prior to use.
   5. Attach a syringe or primed IV set
   6. Firmly push Luer tip and rotate until a secure connection is made.

XIII. SECUREMENT DEVICES

General Guidelines:

A. Securement device or catheter stabilization device is an external apparatus to secure a catheter (e.g. Stat Lock) and prevent catheter movement at the hub or displacement. A securement device is not applied to a subclavian line or a PICC that is sutured in place or with a tunneled central venous access device.

B. Securement devices are the recommended alternative to using tape or sutures to stabilize a catheter. However, a securement device may not be necessary if the catheter is placed for short term use (e.g., outpatient GI procedure).

C. Monitor securement devices daily and replace when clinically indicated, at least every 7 days and with every dressing change per manufacturer’s recommendation.

D. Follow manufacturer’s recommendations for application and removal.

XIV. KEEP OPEN RATE

General Guidelines:

The standard keep open rate (may be designated as TKO, KO or KVO rate - To Keep Open, Keep Open or Keep Vein Open) will be 10 mL per hour unless otherwise specified in the physician order (Aurora Health Care collaboration).
Cross References:
Continuous Subcutaneous Medication Infusion (#1012)
Patient Identification (#2003)
Hand Hygiene (#183)
Blood Culture Collection (ACL 141)
Wampole Collection System (ACL 194)
Lab Draw Order (ACL 110)

Owner: System Nursing Practice Council

References:
Joint Commission (2010). Hospital Standards, NPSG 07.04.01, EP2 and EP6 and 01.01.01.
INS [Intravenous Nurses Society], (2011). Infusion nursing standards of practice. Journal of Intravenous Nursing, 34 (Supplement 1S), S1-S100.


**Review Dates:** 08/07; 05/12
Appendix A: Order of Draw or Order of Filling Tubes for Evacuated Tube System (Recommended)

General Guidelines:
1. The order of draw during venipuncture is important so additives from one tube do not contaminate the specimen in subsequent tubes. Problems can occur when blood is collected into a tube containing an additive just before a non-additive tube. Problems can also occur with contamination between different additive tubes.

2. Do not shake the tubes. Mix gently, inverting the tube to ensure thorough mixing. See recommendations for inverting on table. If not properly mixed, fine clots may form in tubes containing anticoagulants that may seriously interfere with all testing.

3. Tubes should be filled from the bottom up. Transfer blood slowly and gently, filling along the side of the tube to avoid foaming.

4. A blood transfer device should always be used instead of a needle for routine blood draws from a line.

<table>
<thead>
<tr>
<th>Blood Tubes / Color</th>
<th>Additive</th>
<th>Order / Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Blood Culture</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blue/purple topped bottles</td>
<td>109M (3.2%) Sodium Citrate</td>
<td>2nd Coagulation Tests Invert gently 4 times after filling to mix in the Sodium Citrate</td>
</tr>
<tr>
<td><strong>Coagulation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blue top</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Serum</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Red/yellow top</td>
<td>Clot Activator Clot Activator</td>
<td>3rd Serum Chemistry Profiles Invert gently 5 to 7 times to mix in the clot activator.</td>
</tr>
<tr>
<td><strong>Heparin</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Green top</td>
<td>Lithium Heparin Lithium Heparin</td>
<td>4th Plasma Chemistry Profiles Invert gently 10 times to mix in the anticoagulant</td>
</tr>
<tr>
<td>Sodium Heparin</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>EDTA</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lavender/pink top</td>
<td>K$_2$EDTA K$_3$EDTA</td>
<td>5th EDTA for whole blood hematology determinations</td>
</tr>
<tr>
<td><strong>K$_3$ EDTA</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lavender/pink top</td>
<td>Potassium Oxalate Sodium Fluoride</td>
<td>6th Blood Bank</td>
</tr>
<tr>
<td><strong>Lactic acid</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grey top place on ice</td>
<td></td>
<td>7th Place on Ice</td>
</tr>
<tr>
<td><strong>Other Tubes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sodium Heparin Non-Additive</strong></td>
<td></td>
<td>8th Trace Elements</td>
</tr>
<tr>
<td>Red/black top</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Adapted from Greiner Bio-One, 4238 Capital Drive, Monroe, NC 28110. Phone: 888-286-3883
Email: info@us.vacette.com

Order of lab draw hyperlink link
Appendix B: Methods for Topical Anesthesia

Two basic types of topical anesthetics:

1. **Topical Lidocaine / Prilocaine (EMLA®) Cream** is a topical anesthetic for peripheral vascular access or implanted port access. This product requires a physician order to use.

2. Topical anesthetic skin refrigerant (e.g., Gebauer’s Pain Ease) is a non-drug, nonflammable product that can be applied to temporarily control the pain associated with needle procedures such as peripheral venipuncture or implanted port access. **This product is not approved for use in preparation for central line access.** Use with caution with diabetics or patients with impaired circulation. Do not use if skin irritation develops. Advise patient that thawing of the skin after use may cause discomfort.

**Purpose/Outcome:** Reduce pain during venipuncture

**CONTRAINDICATION:** Lidocaine/prilocaine is contraindicated if the patient is allergic to the drug, if there is known hypersensitivity to local anesthetics, or if there is an open wound around the access site; do not apply around the eye or ear.

**A. Procedure For Application of a Topical Lidocaine Cream:**
1. A physician’s order is necessary to apply topical lidocaine.
2. Choose site(s) for procedure. Wash site with soap and water and dry area.
3. Apply 2.5g of lidocaine / prilocaine (EMLA®) cream as a thick coating (quarter size area) to each access site: primary site and possible alternative site: phlebotomy, venipuncture, or implanted port site 60 minutes prior to procedure to ensure anesthetic effect.
4. Do not rub cream into skin.
5. Apply occlusive dressing to enhance absorption and prevent accidental ingestion or unintended exposure to other areas. Do not press down or spread out cream below the dressing.
6. Document site(s) and time of application on MAR.
7. Document time of application on occlusive dressing.
8. Remove cream using gauze and perform procedure within 1 to 2 hours.
9. Prepare site according to appropriate procedure being performed.

**B. Procedure for Application of Topical Anesthetic Skin Refrigerant:**
1. A physician’s order is not necessary to apply a topical skin refrigerant spray.
2. Choose site(s) for procedure. Wash site with soap and water and dry area.
3. Instruct the patient that they will feel a sudden onset of cold.
4. Disinfect the skin as directed and allow to dry. Apply the product by spraying the area for 4 to 10 seconds. Hold the spray can 3 to 7 inches away from the injection site and cover an area about the size of a quarter. Do not use a circular or side to side motion when applying the spray. Stop spraying when the skin begins to turn white or 10 seconds has elapsed, whichever comes first. The anesthetic effect is complete at this time.
5. Once the skin is anesthetized, perform the needle stick procedure (e.g., port access with Huber needle). The cold effect lasts up to one minute. The spray may be reapplied if necessary.
6. Document site care. Document any adverse effects or skin irritation secondary to use of the topical anesthetic skin refrigerant.

Manufacturer’s website for Gebauer’s Pain Ease is: [http://www.gebauerspainese.com](http://www.gebauerspainese.com)

**References**


Appendix C: Intradermal Normal Saline or Lidocaine For IV Insertion

**Purpose/Outcome:** Reduce pain during venipuncture.

**General Guidelines:**
1. Caregivers with demonstrated competency in starting peripheral IVs may perform this technique.
2. This procedure is contraindicated for patients on Antabuse therapy, as there may be a reaction to the alcohol preservative in normal saline solution.
3. Utilization of this procedure is optional, but recommended, and may be indicated when:
   a. Using the large bore needle (20 gauge or larger)
   b. The patient is a child/young adult (skin tougher, making entry more difficult).
   c. The veins are deep.
4. It is not recommended for use when:
   a. Veins are small and thin
   b. Patient has fragile, thin skin

**Procedure:**

**Equipment**
- Bacteriostatic 0.9% normal saline bottle (not preservative free normal saline)
- Tuberculin syringe with 27-gauge needle
- Exam gloves
- Chlorhexidine swab

**IMPORTANT STEPS**

<table>
<thead>
<tr>
<th>STEPS</th>
<th>KEY POINTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Explain procedure to allay anxiety.</td>
<td>Anxiety can trigger vasoconstriction, making venipuncture more difficult</td>
</tr>
<tr>
<td>2. Use tuberculin syringe with 27-gauge needle to draw up 0.1 – 0.2 mL bacteriostatic normal saline using aseptic technique.</td>
<td>1% Lidocaine may be used to form a wheal instead of bacteriostatic normal saline if ordered by the physician.</td>
</tr>
<tr>
<td>3. Swab area to be injected with chlorhexidine swab or approved agent</td>
<td>To desensitize the site prior to venipuncture.</td>
</tr>
<tr>
<td>4. Apply gloves.</td>
<td></td>
</tr>
<tr>
<td>5. Inject the normal saline into the epidermis using a 5 to 15 degree angle of insertion and to a depth of approximately 3mm.</td>
<td>Inject normal saline beside or over the vein; do not inject into the vein.</td>
</tr>
<tr>
<td>6. Inject normal saline slowly forming a wheal under the skin. Discard syringe in needle box.</td>
<td>The wheal tends to shrink quickly.</td>
</tr>
<tr>
<td>7. Perform the venipuncture inserting the catheter through the intradermal wheal.</td>
<td></td>
</tr>
</tbody>
</table>

**References**


## Appendix D: POTENTIAL COMPLICATIONS OF CENTRAL VENOUS CATHETERS
(See Perry and Potter, 2010 for additional information)

<table>
<thead>
<tr>
<th>Complications</th>
<th>Signs/Symptoms</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. EMBOLUS-CATHETER, THROMBUS, AIR.</strong> An embolus can be caused by catheter shearing; dislodgment of a thrombus, air drawn into circulation during tubing disconnection or catheter removal.</td>
<td>Dyspnea, tachycardia, hypotension, cyanosis.</td>
<td><strong>EMERGENCY SITUATION</strong> Notify physician STAT • For a catheter embolus, apply tourniquet to upper arm. • For thrombus, anticoagulants and thrombolytic agents are ordered. • For air embolus, position patient on left side in Trendelenburg position and give patient oxygen.</td>
</tr>
<tr>
<td><strong>B. MECHANICAL PHLEBITIS</strong> at the insertion site is very common during the first week after insertion. Redness at the IV site usually appears within the first 48 hours after insertion and may last the first week. The incidence is between 12.5-23%.</td>
<td>Redness along the catheter line without induration, warmth, tenderness, or inflammation. The clinical signs will occur anywhere between the insertion site and the catheter tip location. Other complications (infection, infiltration, or loss of catheter integrity) should be ruled out.</td>
<td>• Warm moist compresses for 60 minutes TID to the affected area for 72 hours. • Rest and elevation of the extremity. • MD prescription for PO anti-inflammatory drugs, unless contraindicated. For mechanical phlebitis, the catheter may continue to be used for IV therapy. <strong>OBSERVE FOR IMPROVEMENT WITHIN THE FIRST 24 HOURS.</strong> Continue heat application until complete resolution occurs, usually within 72 hours. Restrict to mild arm activity.</td>
</tr>
<tr>
<td><strong>C. CATHETER-RELATED INFECTIONS</strong> result from contamination during insertion and/or maintenance; seeding from another site; migration of microorganisms along catheter.</td>
<td>Elevated temperature, drainage from site, pain, warmth, redness, chills.</td>
<td>Follow procedure to obtain Blood culture from catheter and a peripheral site; remove catheter; warm moist compresses.</td>
</tr>
<tr>
<td><strong>D. THROMBOSIS</strong> may be caused by malposition of catheter, intima damaged on insertion, irritating drugs; venous stasis, increased blood viscosity.</td>
<td>Edema of the entire extremity, upper chest and neck; tenderness in affected extremity; inability to aspirate blood and/or infuse through the catheter; discoloration of extremity.</td>
<td>Venogram to establish diagnosis; fibrinolytics, anticoagulants; elevate extremity.</td>
</tr>
<tr>
<td><strong>E. CATHETER OCCLUSION</strong> may occur as a result of clot or precipitate formation; catheter tip positioned against vein wall or valve; kinked catheter; fibrin sleeve; improper flushing, activity.</td>
<td>Inability to infuse and/or aspirate.</td>
<td>Repositioning the patient or Alteplase instillation for clot with MD order. Follow procedure for declotting if ordered.</td>
</tr>
<tr>
<td><strong>F. CATHETER TIP MIGRATION</strong> can happen because of coughing, vomiting or excessive activity.</td>
<td>Referred pain in jaw, ear or teeth, distended veins on side of malposition; flushing or sense of fullness in head during rapid infusions.</td>
<td>Begins with x-ray verification per MD order.</td>
</tr>
<tr>
<td><strong>G. DAMAGED CATHETER</strong> causes: small syringe used with excessive force; use of pins or scissors near catheter; needle puncture; hemostat use.</td>
<td>Fluid leak from catheter; ruptured catheter; “pop” sound heard while flushing; burning or pain with flush or infusion.</td>
<td>Notify MD if catheter is visibly damaged or may be internally ruptured. If damage is external, clamp catheter proximal to tear and apply sterile dressing over tear.</td>
</tr>
</tbody>
</table>