Second Edition

Standardizing Central Venous Catheter Care: **Hospital to Home**

Alegent Health at Home | Children's Home Healthcare, Children's Hospital & Medical Center | Home Nursing with Heart | InfuScience
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Introduction

This is the second edition of the guidelines for out of hospital care of central venous access devices (CVAD). The purpose of the guidelines is to standardize the out of hospital care of patients with central venous catheters in order to optimize safe medication administration across the continuum of care and improve patient outcomes.

The development of these guidelines has been a joint effort of the organizations listed below. In May 2011, this group convened and began developing the guidelines, assigning themselves and the project the acronym SCORCH – Standardizing Central Catheter Care in the Omaha Region: Care from Hospital to Home. We hope that the information in these guidelines will be useful in the provision of best practices to patients dismissed from hospital with central venous catheters in place. These guidelines are for guidance only and are not a substitute for physician or nursing judgment or consultation with experts with respect to individual patients.

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ACCESSING A CVAD	
Assessment	For peripherally inserted central venous catheters and midline catheters, verify external catheter length (i.e., exit site markings) before accessing (2). • Follow agency policy regarding accessing line if exit markings differ from information documented upon insertion (4).
	The assessment and treatment of phlebitis, infiltration or extravsation shall be established per agency policy (2).
Hand hygiene	Hand hygiene should be performed before and after accessing an intravascular catheter (1, 2, 3).
	Perform hand hygiene procedures either by washing hands with conventional soap and water or with alcohol-based hand gel (1).
	Glove use is required per standard precautions per Occupational Safety and Health Administration (4).
Scrub time for the access cap	In the absence of definitive data, we suggest scrubbing the access cap for a time of no less than 5 seconds, using 70% alcohol solution and vigorous scrubbing (1, 2, 4, 5).
Implanted Port Access – *in addition to all of the above*	Use aseptic technique and sterile gloves when accessing an implanted port (2). • The RN will wear a mask when accessing an implanted port (4). • Skin preparation for accessing the implanted port to be determined by agency policy (4).
	Cover the noncoring needle and access site of an implanted port with a transparent semipermeable membrane (TSM) dressing or gauze dressing (2). • If gauze is used to support the access needle and it does not prevent visualization of the needle insertion site under a transparent dressing, it can be considered a transparent dressing and changed every 7 days (2).
	Replace the noncoring needle at least every 7 days or if it becomes dislodged (2, 4).

FLUSHING (SEE TABLE AT END OF GUIDELINES FOR SCHEDULE OF FLUSHING AND/OR USE OF HEPARIN)	
General flushing	A single use syringe should never be used more than once (even on the same lumen) (4).
	A 10 ml syringe filled with normal saline should not be divided into several doses and used for multiple lumens (2).
Syringe size	To prevent catheter damage, and unless otherwise directed by the manufacturer, the minimum syringe size that should be used when flushing a CVAD and for subsequent flush (post-medication administration) is 10 ml (2).
Volume	A minimum volume of twice the internal volume of the catheter should be used to flush the CVAD (2). • In general, for the adult population, 10 ml is sufficient; for the pediatric population, 1-5 ml is sufficient for the majority of catheters (4).
Technique	Flushing technique will depend upon the type of catheter and type of connector valve being used. • For catheters with negative pressure connector valves, the catheter should be flushed vigorously using a pulsatile motion, maintaining pressure at the end of the flush to prevent reflux back into the catheter (positive pressure technique). – Positive pressure is maintained while flushing a catheter by clamping the extension tubing while still flushing the line (3, 6, 7). • For catheters with positive pressure connector valves, the catheter should be flushed vigorously using a pulsatile motion. – Disconnect syringe from injection port after flushing and then close the clamp (6, 7). • For catheters with neutral pressure connector valves, the catheter should be flushed vigorously using a pulsatile motion. – Clamp sequence is not required; clamping can be done before or after disconnection of syringe (6, 7).
Solution and frequency for CVAD in intermittent use and in maintenance mode	0.9% NaCl (normal saline [NS]) solution should be used to flush lines before and after each use (2). (SEE TABLE AT END OF GUIDELINES FOR SCHEDULE OF FLUSHING AND/OR USE OF HEPARIN)

DRAWING BLOOD FOR LABORATORY TESTING	
Pre-draw	For pediatric patients, draw blood samples per physician order. Drawing blood samples peripherally is the preferred method (4).
	When drawing blood for therapeutic drug levels, draw blood from a lumen other than the lumen being used for the drug infusion when possible (2). • Refer to and follow troubleshooting steps to the extent that time permits and the patient care situation allows if other lumen is problematic (4).
	Use caution in interpreting results when therapeutic drug levels are drawn from same lumen being used to administer the medications (2, 3). • If laboratory values appear to be grossly inaccurate, redraw a blood sample from a peripheral vein (2, 3).
	If CVAD is connected to an infusion, stop all infusates for at least one minute before drawing blood sample (3).
	For adult patients, flush CVAD with 10 ml NS before blood sample is drawn (2).
	For pediatric patients, flush CVAD with 3-5 ml NS or as directed by the physician before blood sample is drawn (4).
	If total parenteral nutrition (TPN) is infusing in the lumen from which blood is to be drawn, flush line with 20 ml NS before blood is drawn in adults (2, 3) and 5 ml NS in pediatric patients (4).
Discard	To avoid contamination and blood clot formation, do not reinfuse the discard specimen following blood draw (2).
	Discard 1.5 – 2 times the volume of the internal catheter lumen (5 ml is sufficient for adult patients; 3 ml is sufficient for pediatric patients) before drawing blood sample (3).
Post-draw	Following blood draw, flush CVAD with 20 ml NS for adults, and 3-5 ml NS or as directed by the physician for pediatric patients, using vigorous, pulsating technique (3, 4).

DRAWING BLOOD CULTURES	
General information	Use of blood drawn from a CVAD is not recommended for blood cultures, unless the CVAD is suspected to be the source of infection (4).
	There are two methods appropriate for drawing blood from a CVAD for blood cultures.
Pre-draw and obtaining specimen	A) Remove the access the cap, scrub the catheter hub vigorously with a 70% alcohol pad for a minimum of 5 seconds, and replace with a new access cap. Draw the blood culture specimen from the new access cap after scrubbing the access cap for a minimum of 5 seconds with a 70% alcohol pad (3).
	OR
	B) Remove the access cap, scrub the catheter hub vigorously with a 70% alcohol pad for a minimum of 5 seconds. Draw the blood culture specimen directly from the catheter hub (3).
Discard	Do not discard blood sample when obtaining specimen for blood cultures (4).
Post-draw	Replace with new access cap when blood draw is complete (unless new cap was placed immediately before specimen was drawn) (4).
	Following blood draw, flush CVAD with 20 ml NS for adults, and 3-5 ml NS or as directed by the physician for pediatric patients, using vigorous, pulsating technique (3, 4).
	Document the site (specifying lumen used, if multiple lumen CVAD) and the time when the blood culture specimen was drawn on the lab specimen container and/or on the specimen label (4).

DRESSING CHANGE	
General information	With a well-healed tunneled CVAD, consideration may be given to no dressing (2, 3).
	Assess every CVAD within 24 hours of insertion to verify integrity and assess for post insertion complications (4).
	Replace catheter site dressing if the dressing becomes damp, loosened, or visibly soiled (1, 2, 3).
	Replace catheter site dressing at least every 7 days for transparent dressings, and every 2 days for gauze dressings (1, 2) except in those pediatric patients in which the risk for dislodging the catheter may outweigh the benefit of changing the dressing (1).
	When guaze is placed under a transparent dressing, it should be considered a gauze dressing and therefore changed every 2 days (2). Placement of a gauze dressing under a transparent dressing should be considered a gauze dressing and changed every 2 days. • If gauze is used underneath a transparent dressing to support the noncoring needle in an implanted port and does not prevent visualization of the insertion site, it is not considered a gauze dressing (2).
Access cap change	Change the access cap at least every 7 days or per manufacturer's recommendations and in the presence of any of the following: • Access cap is removed to initiate an infusion or draw blood (4). • Blood cannot be completely flushed from the access cap after blood draw (2). • Signs of blood, precipitate, cracks, leaks, or other defects are noted (3). • Access cap septum is no longer intact (e.g., after multiple uses) (3, 4). – If access cap change is performed with dressing change, the provider should don a mask and have the patient don a mask during the access cap change unless the patient is able to turn their head away and maintain this position throughout the procedure (4). – There is conflicting evidence regarding wearing a mask when accessing a CVAD catheter hub or changing an access cap (2). If the access cap change is done at a time other than the time of a dressing change, the use of a mask should be compliant with agency policy (4).
Dressing change procedure	Perform hand hygiene (see hand hygiene guidelines) and don clean gloves to remove old dressing. • After the dressing is removed, remove gloves, perform hand hygiene. • Don a mask and have the patient don a mask unless the patient is able to turn their head away and maintain this position throughout the procedure (4). • Change dressing per sterile technique using sterile gloves (2, 4).
	Use chlorhexidine solution for skin antisepsis as part of CVAD site care, for patients older than 2 months of age (1, 2).
	When cleansing the insertion or exit site, use gentle friction for 30 seconds to ensure that the disinfectant has adequate skin penetration and contact time (3).
	Allow the antiseptic to air dry completely. Do not fan (4).
	There is conflicting evidence regarding the use of chlorhexidine in infants aged < 2 months (4).
	Use of chlorhexidine in infants younger than 2 months should comply with agency policy or physician order (4).
	If chlorhexidine is used with a patient younger than 2 months of age, clean the exit site for 30 seconds using gentle friction, allow to air dry completely. Wipe with sterile NS (4).
	Chlorhexidine solution is preferred for skin antisepsis as part of CVAD site care. If there is a contraindication to the use of chlorhexidine, there is no directive to use one specific product over another. One should preferentially, use: • A povidone-iodine with alcohol combination solution. If this is not available, – Iodophor (povidone-iodine), 70% alcohol, or one percent to two percent tincture of iodine may be used (2, 3). – Dried povidone-iodine used with infants younger than 2 months of age or with patients with compromised skin integrity should be removed with NS wipes or sterile water (2).

DRESSING CHANGE >> CONT'D	
Dressing change with chlorhexidine-impregnated dressings	There are no specific clinical indications or relevant studies that detail the need to change a soiled chlorhexidine-impregnated dressing before the seven-day dressing cycle ends (4).
	Change the chlorhexidine-impregnated dressing if it is approximately 2/3 saturated with organic matter (4).

TROUBLESHOOTING ACCESS BARRIERS

When a provider assesses for and identifies signs of CVAD occlusion, including the inability to withdraw blood, sluggish flow, and/or inability to flush or infuse through the device, the following steps should be taken:

1. Assess for potential causes of catheter occlusion;
2. Have the patient change position by lifting arm on the side of the body of the insertion site, turning from side-to-side, coughing, or other maneuvers to change body/CVAD position. If this does not alleviate the problem,
3. Remove the access cap and attempt to flush/withdraw blood using the direct method of connecting the 10 ml syringe to the catheter hub, and then replace with a new access cap. If it is an implanted port, consider changing the access needle. If steps in #3 do not alleviate the problem,
4. Consider changing the CVAD site dressing. If this does not alleviate the problem,
5. Consult with a physician for further orders, which may involve use of a fibrinolytic agent.
   - If a fibrinolytic agent is ordered, repeat x1 if first attempt is ineffective (for total of 2 doses). Leave 2nd dose of the fibrinolytic agent indwelling up to 24 hours before proceeding with next steps in troubleshooting. If the fibrinolytic agent is ineffective,
6. Consult with a physician and consider next steps in troubleshooting the occluded CVAD such as obtaining an X-ray to verify line integrity and/or a cathetergram (2, 4).

OTHER INFORMATION	
Equipment	Minimize connections (i.e., number of extension sets) in infusion administration sets (1, 4).
	Change the needleless components at least as frequently as the administration set (1).
	A new sterile compatible covering device (i.e., a new needleless connector) should be attached using aseptic technique to the end of the administration set after each intermittent use (2).
Primary continuous infusion administration sets	Primary administration sets used for continuous infusions that enhance microbial growth (i.e., lipids, TPN with lipids) should be changed every 24 hours after initiation of therapy (1, 2, 3).
	Primary administration sets used for continuous infusions that do not enhance microbial growth should be changed twice weekly and at least every 96 hours, unless contraindicated by medication being administered (1, 2, 3). • Scheduled weekdays of administration set change to be determined per agency policy (4).
Secondary continuous infusion administration sets	Primary administration sets used for intermittent infusions should be changed every 24 hours (2).
	A secondary administration set that is detached from the primary administration set is considered a primary intermittent administration set and should be changed every 24 hours (2).
Intravenous fat emulsions	When administering lipids intermittently, the administration set should be changed with each new container (2).
Heparin use	There is conflicting evidence regarding the use of heparin to maintain patency. • Consider individualized patient needs for indications for heparin use (2).
	If heparin is to be used, the least amount of heparin needed to maintain patency is desired (4).
	If heparin is being used, the preferred concentration is 10 units/ml for adults unless otherwise indicated or per physician order (3).

Flushing Frequencies and Use of Heparin

CVAD TYPE and Approximate Priming Volume (8)	Heparin Use/NS Flushing Frequency for CVAD in Intermittent Mode	Heparin Use/NS Flushing Frequency for CVAD in Maintenance Mode
Implanted port **Pediatrics:** approximate priming volume (8) **Internal Diameter (I.D.)** **0.8 mm I.D. 0.8 ml** **1.0 mm I.D. 1.1 – 1.2 ml** **1.1 mm I.D. 1.2 ml** **1.4 mm I.D. 1.7 ml** **1.6 mm I.D. 2 ml**	**Adults:** • For implanted port (open and closed) being used a minimum of every 8 hours, flush with 10 ml NS after each use or every 24 hours (or per mfr. recommendations) (4). **Pediatrics:** • For implanted port (open and closed) flush with 3-5 ml NS (or amount specified per physician order) before and after each use (8). – After flushing with NS (for implanted port open and closed), flush with heparin (10 units/ml) after each use or every 24 hours (or per physician order) (8, 9) ^#*.	**Adults:** • For implanted port (closed), flush with 10 ml NS every 4 weeks (or per physician order) (2, 3, 4). • For implanted port (open) flush with 10 ml NS followed by 5 ml of heparin (100 units/ml) administered via 5 ml syringe every 4 weeks (or per physician order) (2). **Pediatrics:** • For implanted port (open and closed) flush with 3-5 ml NS (or amount specified per physician order) every 4 weeks (8, 9). – After flushing with NS (for implanted port open and closed), flush with heparin (100 units/ml) every 4 weeks and prior to de-accessing (or per physician order) (8, 9) ^#*.
Centrally tunneled open end (i.e., Hickman, Broviac) **Pediatrics:** approximate priming volume (8) **2-3 F 0.12 - 0.15 ml** **4 F 0.3 ml** **5 F 0.5 ml** **6 F 0.6 - 0.8 ml** **7 F 0.6 - 0.9 ml** **9 F 0.6 - 1.3 ml**	**Adults:** • If being used a minimum of every 8 hours, flush with 10 ml NS after each use or every 24 hours (or per mfr. recommendations) (4). – If line is being flushed with NS every 24 hours only, flush with heparin (10 units/ml) following NS flush (3,4) ^#*. Heparin is not needed if flushing line every 8 hours with NS (4). **Pediatrics:** • Flush with 1-3 ml NS (or amount specified per physician order) before and after each use (8). – After flushing with NS, flush with heparin (10 units/ml) after each use or every 24 hours (or per physician order) (8, 9) ^#*.	**Adults:** • Flush with 10 ml NS once weekly (or per physician order) (3). – After flushing with NS, flush with 3-5 ml of heparin (10 units/ml) once weekly (3). **Pediatrics:** • Flush with1-3 ml NS (or amount specified per physician order) every 24 hours (or per physician order) (8). – After flushing with NS, flush with heparin (10 units/ml) every 24 hours (or per physician order) (8, 9) ^#*.
Centrally tunneled closed end (i.e., Groshong) **Pediatrics:** approximate priming volume (8) **2-3 F 0.12 - 0.15 ml** **4 F 0.3 ml** **5 F 0.5 ml** **6 F 0.6 - 0.8 ml** **7 F 0.6 - 0.9 ml** **9 F 0.6 - 1.3 ml**	**Adults:** • Flush with 10 ml NS before and after each use or every 24 hours (or per physician order or mfr. recommendations) (3). **Pediatrics:** • Flush with 1-3 ml NS (or amount specified per physician order) before and after each use (8). – After flushing with NS, flush with heparin (10 units/ml) after each use or every 24 hours (or per physician order) (8, 9) ^#*.	**Adults:** • Flush with 10 ml NS once weekly (or per physician order or mfr. recommendations) (3, 4). **Pediatrics:** • Flush with 1-3 ml NS (or amount specified per physician order) every 24 hours (or per physician order) (8). – After flushing with NS, flush with heparin (10 units/ml) every 24 hours (or per physician order (8, 9) ^#*.
Central non-tunneled open end (PICC, SC) **Pediatrics:** approximate priming volume (8) **1.9 F 0.06 ml** **3-3.5 F 0.2 - 0.5 ml** **4 F 0.6 ml** **5 F 0.4 - 0.8 ml** **6 F 0.5 - 0.6 ml**	**Adults:** • If being used a minimum of every 8 hours, flush with 10 ml NS before and after each use or every 24 hours (or per or mfr. recommendations) (4). **Pediatrics:** • If PICC > 2FR flush with 2-3 ml NS (or amount specified per physician order) before and after each use or every 12 hours (or per physician order) (8). – After flushing with NS, flush with heparin (10 units/ml) after each use or every 12 hours (or per physician order) (8, 9) ^#*.	**Adults:** • Flush with 10 ml NS every 24 hours (or per physician order or mfr. recommendations) (3, 4). **Pediatrics:** • If PICC > 2FR flush with 2-3 ml NS (or amount specified per physician order) every 12 hours (or per physician order) (8). – After flushing with NS, flush with heparin (10 units/ml) every 12 hours (or per physician order) (8, 9) ^#*.

Flushing Frequencies and Use of Heparin <cont'd>

CVAD TYPE and Approximate Priming Volume (8)	Heparin Use/NS Flushing Frequency for CVAD in Intermittent Mode	Heparin Use/NS Flushing Frequency for CVAD in Maintenance Mode
Central non-tunneled closed end or valved (i.e., Bard Solo Power PICC) **Pediatrics:** approximate priming volume (8) **1.9 F 0.06 ml** **3-3.5 F 0.2 - 0.5 ml** **4 F 0.6 ml** **5 F 0.4 - 0.8 ml** **6 F 0.5 - 0.6 ml**	**Adults:** • Flush with 10 ml NS before and after each use or every 24 hours (or per mfr. recommendations) (4). **Pediatrics:** • If PICC > 2FR flush with 2-3 ml NS (or amount specified per physician order) before and after each use or every 12 hours (or per physician order) (8). – After flushing with NS, flush with heparin (10 units/ml) after each use or every 12 hours (or per physician order) (8, 9) ^#*.	**Adults:** • Flush with 10 ml NS once weekly (or per physician order or mfr. recommendations) (3, 4). **Pediatrics:** • If PICC > 2FR flush with 2-3 ml NS (or amount specified per physician order) every 12 hours (or per physician order) (8). – After flushing with NS, flush with heparin (10 units/ml) every 12 hours (or per physician order) (8, 9) ^#*.
Non-Centrally Inserted Venous Access Device and Approximate Priming Volume (8)	**Heparin Use/NS Flushing Frequency for Device in Intermittent Mode**	**Heparin Use/NS Flushing Frequency for Device in Maintenance Mode**
Midline catheter open or closed end, or valved **Pediatrics:** approximate priming volume (8) **3 F 0.16 ml** **4 F 0.19 ml** **5 F 0.22 ml**	**Adults:** • If being used a minimum of every 8 hours, flush with 10 ml NS before and after each use or every 24 hours (or per mfr. recommendations) (4). **Pediatrics:** • If Midline > 2 FR flush with 2-3 ml NS (or amount specified per physician order) before and after each use or every 12 hours (or per physician order) (4, 8). – After flushing with NS, flush with heparin (10 units/ml) after each use or every 12 hours (or per physician order) (8, 9) ^#*.	**Adults:** • Flush with 10 ml NS every 24 hours (or per physician order or mfr. recommendations) (3, 4). **Pediatrics:** • If Midline > 2 FR flush with 2-3 ml NS (or amount specified per physician order) every 12 hours (or per physician order) (4, 8). – After flushing with NS, flush with heparin (10 units/ml) every 12 hours (or per physician order) (8, 9) ^#*.

^ When administering pediatric medications the SASH technique should be used: Saline, Antibiotic/Medication, Saline, Heparin. If dextrose is to be used in place of 0.9% NS, for compatibility, pharmacy should have instructions on label(s) (4, 9).

 # Heparin volume should be determined by physician order (4). Consideration must be given to approximate priming volume of device and tubing configurations when determining appropriate heparin volume to be administered (8, 9).

***** In an effort to avoid systemic anticoagulation of the patient during use of heparin flushes in pediatric patients, multiple doses of heparin over a short time period (defined here as 4 hours), that result in an average total of heparin dosage greater than 25 units/kg/hour may constitute systemic anticoagulation. All administrations of heparin must be considered when calculating total heparin dosage: heparin in running IV lines, and administration through all lines and lumens of central lines being flushed (4, 9).