

Central Venous Catheter (CVC): Flushing and Locking

Table of Contents

1.0 Practice Standard.....	1
2.0 Equipment.....	2
3.0 Assessment & Interventions.....	2
4.0 Patient Education & Resources	3
5.0 Documentation	4
6.0 References.....	4
7.0 Developed & Approved by	4

This procedure is posted on the BC Renal website:
Health Professionals ► Vascular Access ► Resources

Direct link: www.bcrenalagency.ca/health-professionals/clinical-resources/vascular-access

IMPORTANT INFORMATION

This BC Renal guideline/resource was developed to support equitable, best practice care for patients with chronic kidney disease living in BC. The guideline/resource promotes standardized practices and is intended to assist renal programs in providing care that is reflected in quality patient outcome measurements. Based on the best information available at the time of publication, this guideline/resource relies on evidence and avoids opinion-based statements where possible; refer to www.bcrenalagency.ca for the most recent version.

For information about the use and referencing of BC Renal guidelines/resources, refer to
<http://bit.ly/28SFr4n>.

1.0 Practice Standard

Skill Level (Nursing): Specialized

1. RNs and LPNs who have completed the required hemodialysis (HD) specialty education and who provide nursing care in a BC In-Centre and / or Community Renal Program; &
2. RNs and LPNs who have received the appropriate training in central venous catheter (CVC) care and maintenance (e.g., RNs working in intensive care or home care settings; RNs and LPNs working in acute care or ambulatory care settings).

This guideline does not apply to patients who are on home hemodialysis.

Need to Know:

1. Use routine (also known as “standard”) precautions.
 - Perform hand hygiene.
 - Wear gloves (*non-sterile* to remove the dressing and *sterile* for the rest of the procedure), *non-sterile* gown and non-sterile mask/face shield during connect procedures. If institution policy is for a clean “no touch” procedure, then may wear non-sterile gloves throughout the procedure and change gloves as indicated.
2. Use clean (also known as “medical”) aseptic technique, with additional precautions as follows:
 - Use *sterile* equipment and supplies and a “no touch” technique when handling the catheter and catheter ports and caring for the exit site.

- Maintain a *sterile* drape under the catheter ports.
- Use an antiseptic wipe and vigorously apply mechanical friction to clean the hubs of the catheter ports (“hub scrubs”). If Tego connectors present, use antiseptic wipe and vigorously apply mechanical friction to clean the connectors.
- Use a separate antiseptic wipe for each clamp/ limb/port/Tego connector.
- Allow antiseptic to dry for maximal effect.
- Leave hubs “open” (i.e., uncapped and disconnected”) for the shortest time possible
- Use *sterile* normal saline in a syringe to flush the catheter lumens.

Notes re: antiseptics:

- The Center for Disease Control and Prevention guideline (CDC, 2011) suggests the use of the following antiseptic solutions: >0.5% chlorhexidine with alcohol, 70% alcohol or 10% povidone-iodine. They conclude there is not enough evidence to recommend one antiseptic over the others.
 - The Society for Healthcare Epidemiology of America (SHEA) and the Infectious Diseases Society of America (ISDA) joint guideline (Marschall, 2014) suggest that alcoholic chlorhexidine may have additional residual activity (up to 24 hours) compared with 70% alcohol for this purpose.
3. The volume of each lumen of the catheter is stamped on the port or port clamp (hemodialysis catheters are available in variable lengths and therefore the lumen volumes differ).
 4. If dialysis is being discontinued or the catheter is

not in use, a locking solution is instilled into each of the lumens after flushing the lumens with normal saline.

5. Sodium citrate 4% is the locking solution of choice. The amount that is required is equivalent to the internal volume of the lumen or as per unit policy.
6. For frequency of flushing if line is not in use, refer to unit policy.
7. Air embolus is a potential catastrophic complication of CVCs and the relative risk while accessing a CVC is high.

Ways to reduce the risk:

- **Never leave catheter ports unattended and open to the air; clamp ports when not being used.**
- Place the patient supine in as flat a position as the patient can comfortably tolerate (e.g., Semi-Fowler's position).

2.0 Equipment

- Non-sterile gloves
- Non-sterile gown
- Non-sterile mask(s)/eye protection
- Sterile gloves
- Sterile dressing tray or equivalent
- Sterile drape/gauze (or sterile 4x4)
- Antiseptic wipes (several)
- 2x 10 mL sterile syringes to withdraw locking solution
- 2x10 mL sterile syringes to check blood flow
- 4 x 10 mL syringes or 2x 20 mL syringes filled with normal saline for flush
- 4 safety needles if syringes not pre-filled (2 if using 20 mL syringes)

- 2 x 3 mL syringes with locking solution
- 2 caps (one per lumen)
- Locking agent labels
- Tape
- Garbage receptacle

3.0 Assessment & Interventions

Preparation:

1. Place the patient supine in as flat a position as the patient can comfortably tolerate (e.g., Semi-Fowler's position).
2. Perform hand hygiene.
3. Gather supplies, including preparing 4x10 mL or 2x20 mL *sterile* syringes filled with normal saline and 2x3 mL *sterile* syringes filled with locking solution.
4. Don *non-sterile* gown (staff).
5. Don *non-sterile* mask (staff and patient) and eye protection (staff).
6. Don *non-sterile* gloves (staff).
7. Place a *non-sterile* drape under the catheter.
8. Remove wrapper from catheter lumens and discard. Verify volume of lumens.
9. Remove *non-sterile* gloves. Wash hands with antimicrobial soap.
10. Don *sterile* gloves or, if using no-touch technique, clean gloves.
11. Using a dry *sterile* 4x4 gauze, grasp the catheter ports/Tegos with one hand and place a *sterile* drape or *sterile* 4x4 gauze under the ports/Tegos with the other hand. Discard 4x4 gauze used to grasp the ports/Tegos.

Cleanse ports/Tegos, clamps and lumens:

12. Using an antiseptic wipe, cleanse each port/Tego, clamp and limb using friction scrub for 30 seconds. Un-clamp, move clamp, clean under clamp segment, and re-clamp. Use new wipes for each port/Tego.
13. Place catheter limbs on a fresh, dry, *sterile* 4x4 drape/gauze. Air-dry.

Withdraw locking solution:

14. Ensure clamps are closed. If Tego connector not used, remove arterial port cap and discard.
15. Hub-scrub the arterial port/Tego with an antiseptic wipe. Scrub the sides (threads) and end of the hub thoroughly with friction, making sure to remove any residue (e.g., blood) for 30 seconds. Discard wipe.
16. Attach an empty 10 mL syringe to arterial port/Tego.
17. Open arterial port/Tego clamp and withdraw locking solution, blood and/or clots (total 5 mL). Close clamp. Discard syringe.
If drawing pre-dialysis blood work: Withdraw locking solution, blood and/ or clots (total 10 mL instead of 5 mL). Draw blood work using unit protocol.

18. Assess patency by attaching a new 10 mL syringe to the arterial port/Tego and aspirate 3 – 5 mL of blood to check for clots and the flow of the lumen. If no clots are noted, repeat aspiration/instillation (irrigation motion) 3 times to evaluate lumen flow. Clamp port/Tego.
19. If resistance is noted and Tegos are present, consider removing Tegos to see if flow improves. Repeat steps 14 - 19 using the venous port/Tego.

Flush lumens with normal saline:

20. Attach a 20 mL (or 10 mL) prefilled normal saline syringe to the arterial port/Tego. Flush lumen using a forceful flush method. Repeat if using 10 mL syringe. Clamp lumen (total: 20 mL per lumen).
21. Repeat step 20 for venous lumen.

Instil locking solution:

22. Attach 3 mL syringe with locking solution to arterial port/Tego.
23. Slowly instill locking solution (amount is determined by the volume printed on the catheter ports or clamp + overfill, as per unit policy). Immediately close the clamp while continuing to exert pressure on syringe plunger. Remove syringe from arterial port/Tego and discard. If Tego connector not used, attach cap to lumen.
24. Repeat steps 22 and 23 using the venous lumen.

Label and wrap:

25. Wrap lumen together with a 4x4 gauze and secure with tape to outside of the dressing.
26. Attach a label with the locking solution and lumen volume to the gauze wrap.

4.0 Patient Education and Resources

- Do not open your catheter (if part of the home HD program, doctor or nurse will provide specific instructions). Both the end caps and clamps of catheter should be kept tightly closed. Only a dialysis nurse or physician should remove the caps or clamps.
- Notify kidney doctor (nephrologist) or dialysis unit

for any of the following:

- Redness, warmth, or pain along the catheter.
- Oozing or drainage from catheter exit site.
- Noticeable swelling or itching around catheter or neck.
- Feverish and any of the above symptoms.
- Part of the catheter that is outside the skin seems to be getting longer.
- Catheter is accidentally pulled and there is bleeding around the exit site.

Patient Handout: Care of Your Catheter:

www.bcrenalagency.ca/resource-gallery/Documents/Your%20hemodialysis%20catheter.pdf

5.0 Documentation

- Document procedure and patient response as per unit protocol.

6.0 References

1. BC Renal Guideline, Prevention, Treatment, & Monitoring of VA Related Infection in HD Patients (March 2008). www.bcrenalagency.ca/health-professionals/clinical-resources/vascular-access; Accessed Dec 20, 2016.
2. BC Renal Patient Teaching Pamphlet, Your Catheter (2015). www.bcrenalagency.ca/resource-gallery/Documents/Your%20hemodialysis%20catheter.pdf ; Accessed Dec 20, 2016.
3. Camins, BC. (2013). Understanding and preventing infectious complications in dialysis. *Seminars in Dialysis*. 26: 4 (July-August), 476-481. <http://onlinelibrary.wiley.com/doi/10.1111/sdi.12117/full>; Accessed Dec 20, 2016.
4. Canadian Society of Nephrology Guidelines: Vascular access. (2006). *Journal of American Society of Nephrology*, 17: S18 - S21.
5. Centre for Disease Control and Prevention. Hemodialysis central venous catheter scrub-the-hub protocol (based on 2011 CDC Guidelines for the prevention of intravascular catheter-related infections). www.cdc.gov/dialysis/PDFs/collaborative/Hemodialysis-Central-Venous-Catheter-STH-Protocol.pdf; Accessed Dec 5, 2015.
6. icumedical. Tego Needlefree Connector. www.icumed.com/products/specialty/renal-systems/tego-connector.aspx. Accessed June 12, 2017.
7. Institute for Healthcare Improvement. (2012). How-to-Guide: Prevent Central Line-Associated Bloodstream Infections. Accessed Dec 20, 2016.
8. Lok, CE et al. (2014). Catheter-related infection and septicemia: Impact of seasonality and modifiable practices from the DOPPS. *Seminars in Dialysis*, 27:1 (Jan-Feb), 72-77. <http://onlinelibrary.wiley.com/doi/10.1111/sdi.12141/full>; Accessed Dec 20, 2016.
9. Marshall, Jet al. (2014). Strategies to Prevent Central Line-Associated Bloodstream Infections in Acute Care Hospitals: 2014 update, *Infection Control and Hospital Epidemiology*, 35: p.p., 753 - 771. www.jstor.org/stable/10.1086/676533; Accessed Dec 20, 2016.
10. Napalkov, P et al. (2013). Incidence of catheter-related complications in patients with central venous or hemodialysis catheters: a health care claims database analysis. *BMC Cardiovascular Disorders*. 13:86, 1-10. www.biomedcentral.com/1471-2261/13/86. Accessed Dec 20, 2016.
11. National Kidney Foundation (2006). *KDOQI Clinical Practice Guidelines and Clinical Practice Recommendations for 2006 Updates: Hemodialysis Adequacy, Peritoneal Dialysis Adequacy and Vascular Access*. *Am J Kidney Dis* 48:S1-S322, 2006 (suppl 1).
12. O' Grady et al. (2011). *Guidelines for the prevention of intravascular catheter-related infections*. Centre for Disease Control (US). 51 (RR-10): 1-26. www.cdc.gov/hicpac/BSI/BSI-guidelines-2011.html; Accessed Dec 20, 2016.
13. Registered Nurses Association of Ontario, Care and Maintenance to Reduce VA Complications. (2005). <http://rnao.ca/bpg/guidelines/care-and-maintenance-reduce-vascular-access-complications>. Accessed Dec 20, 2016.

7.0 Developed & Approved by:

Developed by:

- BC Vascular Access Educators Group (VAEG)
- Renal Educators Group (REG)

Approved by:

- BC Renal Hemodialysis Committee (reviewed 2011 version; only minor changes in 2017 version)
- BC Renal Medical Advisory Committee (reviewed 2011 version; only minor changes in 2017 version)

For information about the use and referencing of BC Renal provincial guidelines/resources, refer to the Table of Contents.