Hemodialysis: Flushing and Capping Central Venous Catheters

Site Applicability

SPH In-Centre Hemodialysis Unit and PHC Community Dialysis Units

Practice Level

Nurses who have completed the required education and provide care on a Nephrology/Urology Unit, Hemodialysis Unit, as well as Critical Care Unit and IV Therapy perform this procedure.

Need to Know

1. The HD CVC may be accessed by the code/trauma team or used in trauma or emergent situation when all other attempts for vascular access have been exhausted.
2. Sterile gloves, surgical mask, goggles or face shield should always be worn when it is due for Tego needle free connector and exit site dressing changes in order to maintain sterility and to protect from blood splatter.
3. Manipulating the HD CVC and accessing patient's bloodstream should be performed in a manner that avoids contamination.
4. Patient should always wear a surgical mask with Tego connector and exit site dressing changes (except for intubated patients in ICU)
5. Non-sterile gloves may be used when flushing CVC without changing TEGO connectors.
6. Prior to flushing and capping HD CVCs, the lock solution must be withdrawn and discarded.
7. A gentle friction, back and forth and up and down scrubbing motions should be used in cleaning CVC lumens with alcohol 70% swabs.
8. The risk of an air embolus while accessing a HD CVC is very high.
9. To prevent an air embolus from occurring, **opened HD CVC lumen ends must never be left unattended and open/exposed to air;** the lumen clamps must be closed when they are not being used to access the patient's bloodstream.
10. Sodium Citrate 4% is the lock solution medication of choice for the PHC Renal Program to "lock" a HD CVC when it is not in use. The amount of Sodium Citrate required is based on the internal volume of the catheter lumen plus **0.3 mL overfill.**
11. Alteplase 1 mg or 2 mg per lumen or antibiotic plus heparin solution may also be ordered as another lock solution agent.
12. The HD CVC may only be used for IV infusion if ordered by a nephrologist.
13. HD CVCs are flushed, locked and the site dressing change is done in the Hemodialysis Unit when the patient comes for routine dialysis (3 x /week).

14. The HD CVC is flushed and locked every 7days (weekly) if AVF/AVG is being used during HD, but the HD CVC is still in situ.
15. IV Therapy staff could be asked to flush HD CVCs for patients on general units (other than HD and Renal/Nephrology) when it is expected that a week will elapse before the patient will be treated in the Hemodialysis Unit. The order in Cerner is: Hemodialysis Catheter Flush
16. TEGO Connectors are changed every week.
17. **Nephrology Unit: 6B** RNs will flush the HD CVC every 7 days (once a week) if the patient's hemodialysis treatment is on hold. This also applies to post kidney transplant patients with HD CVCs that are not in use.
18. **Post Kidney Transplant Clinic**: For post-transplant outpatients, the HD CVC is to be flushed at the post-transplant clinic once a week. The HD CVC is then to be removed by the physician after one month if not clinically required for use.
19. **PD Clinic**: The HD CVC is to be flushed in PD clinic once a week if the patient's hemodialysis treatment is on hold.
20. **Critical Care Areas**: The HD CVC should be flushed once a week when not in use. Remove the HD CVC when no longer in use or clinically required. If the HD CVC is used for Continuous Renal Therapy without TEGO connectors, male/female port caps (dead-end, red caps) are used to keep the system closed.

Equipment and Supplies

Accessing HD CVC with Changing of TEGO connectors:	**Accessing HD CVC without Changing TEGO connectors:**
• Hemodialysis CVC Scrub Tray or major dressing tray • Mask (1) • TEGO connectors (2) • Male/Female Port Caps (red caps) (2) (Critical Care use only) • 10 mL syringes (4) for major dressing tray • Personal Protective Equipment (PPE) • Sterile gloves (1) • Non-sterile gloves (1) • 20 mL prefilled 0.9% Normal Saline (NS) syringes (2) or 10 mL prefilled 0.9% NS Syringes (4) • 2% Chlorhexidine Gluconate with 70% Isopropyl alcohol swabs (Solu-I.V.) (6 to 8 large) • Medication label for locking agent • Locking agent (3 mL Sodium Citrate Solution 4% x 2 [1 package] or Alteplase (TPA) or Antibiotic plus Heparin solution)	1. Blue pad 2. 4 x 4 gauze (3) 3. Non-sterile gloves (1) 4. Personal Protective Equipment (PPE) 5. 10 mL syringes (4) 6. 20 mL prefilled 0.9% Normal Saline (NS) syringes (2) or 10 mL prefilled 0.9% NS Syringes (4) 7. 2% Chlorhexidine Gluconate with 70% Isopropyl alcohol swabs (Solu-I.V.) (6 to 8 large) 8. Medication label 9. Lock solution (3 mL Sodium Citrate Solution 4% x 2 [1 package] or Alteplase (TPA) or Antibiotic plus Heparin solution)

Procedure

Steps

Steps	Rationale
Preparation: 1. Perform hand hygiene (wash hands using antimicrobial soap or 70% alcohol hand rub).	Reduce the risk of infection through touch contamination
2. Mask self and patient.	Prevention of droplet contamination
3. Put on non-sterile gloves. Remove wrapped gauze (4 x 4) from catheter lumens and discard. Verify volume of lumens. Perform hand hygiene.	
4. Prepare tray adding 20 mL NS syringes and syringes with lock solution (e.g. 5 mL sodium citrate) and TEGO connectors (if due change).	
5. Don sterile gloves; then prepare lock solution based on the internal volume of CVC lumens plus 0.3 mL overfill.	
6. With sterile gloves on, grasp the HD CVC lumen with one hand using sterile 4 x 4 gauze; then place sterile drape under the 4 x 4 gauze	
7. Using 2% Chlorhexidine with 70% alcohol swabs, clean each lumen using friction rub and back and forth, up and down motion for 1 minute. Allow to air dry	Air drying is required for antiseptic to be effective A friction rub provides the best quality of cleaning
8. Ensure that clamps on lumens are closed while TEGO connector is being removed from arterial lumen. Discard used TEGO connector and attach new one.	Risk of air embolus if the clamps are open when TEGO connectors are removed
9. Clean port hubs using 2% Chlorhexidine with 70% alcohol swabs. Allow to air dry	
10. Attach a 10 mL syringe to the arterial lumen. Open clamp and withdraw 5 mL of citrate/blood from arterial. Close clamp.	
11. Remove the syringe with citrate/blood from arterial lumen and discard.	

12. Attach new 10 mL syringe to arterial lumen. Open arterial limb clamp and check for adequate blood flow using a withdraw and instill motion. Close clamp.	Adequate blood flow is established if arterial pressure is less than negative 250 and blood pump flow rate is consistently equal to or more than 300 mL/min during dialysis.
13. Repeat steps 8 through 12 with venous lumen.	
14. Attach NS syringe to arterial lumen and flush with 20 mL of normal saline using "push/pause" method (short repetitive pushes on the plunger). Close clamp.	
15. Repeat with venous lumen.	
16. Remove empty NS syringe from arterial lumen and discard. Attach syringe with lock solution and instill the amount printed on the lumen catheter, **plus 0.3 mL for overfill** and immediately close clamp while pressure is exerted on syringe plunger (positive pressure locking technique). Close clamp.	This prevent possible catheter related thrombosis and/or dysfunction.
17. Repeat using venous lumen.	
18. Wrap both arterial and venous CVC limbs with 4 x 4 gauze and attach the medication label for the locking agent. Secure with tape.	Label will alert medical or nursing staff that the catheter lumens contain locking agent. Securing with tape promotes patient comfort and prevents catheter from pulling.

Documentation

1. CST Cerner (EHR)
   - Document procedure and patient response at the Nursing Narrative Notes and iView-Dialysis Management and intraprocedure
   - Central Line
   - Dialysis management, Central Line iView – volume of lock solution instilled.
2. Nursing care guide in chartlet – type, dosage and volume of locking agent to be instilled plus overfill; and date of dressing and TEGO connectors change

Patient and Family Education

1. Contact your nurse, hemodialysis unit or nephrologist on call after hours if you notice any of the following:

- Any drainage, redness, swelling, or pain around the catheter exit site.
- Excessive bleeding from the catheter exit site.
- Any chills or fever.
- If a cap becomes loose or falls off, make sure the catheter remains clamped. There is risk for infection or air entering the bloodstream, and urgent care is required.
- If the catheter has partially or completely been pulled out, apply pressure over the site with clean gauze.
- If any portion of the catheter develops a hole, leak or part separation, make sure that the catheter is clamped off between your body and the problem area. The catheter clamp is moveable and can slide along the catheter to close off the catheter. You may need to kink the catheter with your fingers to occlude the catheter if the clamp is damaged. You need immediate help to prevent serious injury.

2. Between dialysis treatments make sure:
   - The catheter clamps are closed. If a clamp opens, close the clamp immediately.
   - The catheter should only be used for hemodialysis treatments, unless authorized by the Nephrologist.
   - The TEGO connectors are secure, and should only be removed by nurses who have specialized education and training.
   - The dressing is dry and in place and the access site is clean and dry. Please do not remove the dressing. If the dressing falls off, replace it with a new dressing.
   - Avoid any activities that may irritate or cause harm to the catheter.
   - Do not shower or submerge your catheter in water. Hot tubs should be avoided.
   - Stitches must remain in place for as long as you have a catheter (temporary or non- cuffed catheter)
   - Stitches are removed once tunnelled cuffed catheter (permanent catheter) exit site is healed.

Related Documents

1. B-00-12-10152- Hemodialysis: Accessing a Central Venous Catheter (CVC) with and without TEGO Connectors,
2. B-00-12-10043 - Hemodialysis: Central Venous Access Dressing
3. B-00-07-13045 – Standard Infection Control
4. Occupational Health and Safety – Cytotoxic / Hazardous Drugs

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13. American Nephrology Nurses Association. Vascular access fact sheet.Published 2018. https://www.annanurse.org/download/reference/practice/vascularAccessFactSheet.pdf

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