Hemodialysis Catheter: Administering Fluids, Medications or Blood Products Using a Hemodialysis Catheter With and Without TEGO Connectors

Site Applicability

PHC SPH in-center and community hemodialysis units (Metro Vancouver and Coastal units)

Practice Level

Specialized:

- Nurses (RN and LPN) who have completed the required education and provide nursing care in a Providence Health Care Renal Program hemodialysis unit, intravenous (IV) therapy nurses and critical care nurses.

Need to Know

1. This procedure was developed for IV therapy nurses who manage hemodialysis catheters for patients admitted to general nursing units. Hemodialysis catheters are used for administration of medications and other products (e.g. IV fluids) only when no other venous access is possible.
2. Permission to use the hemodialysis catheter for the purposes cited above must be obtained from a nephrologist through a written physician's order.
3. LPNs cannot administer blood or blood products.
4. When accessing a hemodialysis catheter, 5 mL of blood must be withdrawn prior to instilling solutions. This amount of blood will contain the catheter blocking agent (e.g. heparin, citrate) that was instilled after the catheter was last used as well as any blood clots.
5. Upon completion of the intervention, the lumen(s) must be flushed with normal saline followed by the appropriate volume and concentration of the prescribed blocking agent plus overfill amount of 0.3 mL with TEGO connectors or 0.2 mL without TEGO connectors. The volume of each lumen is indicated on each lumen of the catheter or on the lumen clamps.
6. Chlorhexidine 2% with 70% isopropyl alcohol is preferred for cleansing hemodialysis catheters and exit sites. If the catheter is incompatible with alcohol (e.g. Quinton catheters) then Chlorhexidine 2% without alcohol should be used since alcohol based cleansing agents may cause the hemodialysis catheter lumens to become brittle or crack. (Tal Palindrome catheters are compatible with alcohol. Tal Palindrome catheters have arterial and venous lumens of equal volumes and have their name stamped on the clamps).
7. To prevent an air embolism from occurring, the catheter ports must never be left unattended and open to the air; the port clamps must be closed when the lumens are not being used to access the patient's blood stream.

8. Alcohol swabs (or Chlorhexidine 2% with 70% isopropyl alcohol swabs) are used to disinfect all TEGO connector tips. Repeat cleaning if tip is inadvertently contaminated. TEGO connector tips are disinfected with a new swab between EVERY access (allowing time for the disinfectant to air dry)
9. TEGO connectors are changed weekly by the hemodialysis nurse.
10. Nurses wear clean gloves when accessing TEGO connectors. Manipulating a catheter and accessing the patient's bloodstream must be performed in a manner that avoids contamination.
11. When attaching a syringe (or other product) to a TEGO connector, turn it clockwise until it stops (Do NOT over tighten). To disconnect turn counter clockwise.

Equipment and Supplies

2 – 10 mL syringe (luer lock)

2 – 20 mL syringe of 0.9% sodium chloride (luer lock) without preservative

Blocking agent (as prescribed)

Intravenous solution and tubing

1" paper tape

Medication label indicating volume, type and concentration of locking solution, date and initials. (Preprinted labels are available from the Hemodialysis unit)

Goggles

If CVC has TEGO connectors:	If CVC does not have TEGO connectors:
2 – blue pads	2 – sterile dressing trays
6 – Chlorhexidine 2% with 70% isopropyl alcohol swabs - large	7 – Chlorhexidine 2% with 70% isopropyl alcohol swabs - large
6 – Alcohol swabs	2 masks for each procedure (1 for nurse and 1 for patient)
1 – 4 x 4 gauze 1 mask for nurse for each procedure (connect/disconnect)	5 – 4 x 4 gauze
Clean gloves	Sterile gloves
	TEGO connector, if available (or other approved cap)

Assessment

Cerner Sites:

- Assess integrity and condition of CVC including placement, dressing, lumen and lumen clamps and exit site (e.g. bleeding, infection, cuff protrusion).
- Assess catheter blocking agent used (e.g. heparin, sodium citrate 4%, antibiotic lock solution) under dialysis management band –HD prescription on central line. The information can also be found on the medication label attached to the patient's hemodialysis catheter wrapped 4 x 4 gauze, and/or in iView dialysis management band-central line.

Non-Cerner Sites:

- Assess integrity and condition of CVC including placement, dressing, lumen and lumen clamps and exit site (e.g. bleeding, infection, cuff protrusion).
- Assess catheter blocking agent used (e.g. heparin, sodium citrate 4%, antibiotic lock solution). This information is found on the medication label attached to the patient's hemodialysis catheter wrapped 4 x 4 gauze, on the previous hemodialysis log or on the hemodialysis care plan (Care guide).

Procedures:

If CVC has TEGO connectors:

STEPS	RATIONALE
1. Preparation: • Wash hands • Remove dressing from catheter lumens • Place blue pad under catheter limbs and prepare supplies	
2. Wash hands and don mask, goggles and clean gloves.	
3. Using 3 large chlorhexidine 2% with 70% isopropyl alcohol swabs, scrub the catheter (1 swab for the arterial limb, 1 for the venous limb, and 1 to clean the catheter from the hub to the catheter exit site)	To disinfect the catheter limbs and port caps. Performing a friction scrub will provide the best quality of cleaning for the catheter limbs and port connections.
4. Air dry the catheter limbs and ports	Must air dry for antiseptic to be effective.
5. Scrub TEGO connector tip with alcohol swab. Discard swab.	
6. Attach a 10 mL luer lock syringe to the TEGO connector on the limb to be accessed. Open clamp and withdraw 5 mL of blood. Close clamp. Remove and discard syringe. (Note: if unable to withdraw, attempt accessing second lumen. If unable to withdraw from both lumens, attempt to flush lumen with 20 mL normal saline as per step 10. If able to flush lumen, document that patient received blocking agent and notify physician).	

7. Scrub TEGO connector tip with alcohol swab. Discard swab.	
8. Attach 10 mL syringe, open clamp and check for adequate blood flow by using withdraw and instill motion. Close clamp. Remove and discard syringe.	To check patency of lumen.
9. Scrub TEGO connector tip with alcohol swab. Discard swab.	
10. Attach 20 mL syringe with normal saline, open clamp and forcefully flush lumen using a push/pause technique. Close clamp and Discard 20 mL syringe.	Push/pause flush technique increases turbulence within catheter lumen during flush thereby making the flush more effective.
11. Scrub TEGO connector tip with alcohol swab. Discard swab	
12. Connect IV tubing to lumen and open clamp. Set infusion at prescribed rate.	
Upon completion of infusion:	
13. Preparation: • Wash hands • Prepare blocking agent as per order and other supplies • Place blue pad under catheter limbs	
14. Wash hands and don mask, goggles and clean gloves.	
15. Using 3 large chlorhexidine 2% with 70% isopropyl alcohol swabs, scrub the catheter (1 swab for the arterial limb, 1 for the venous limb, and 1 to clean the catheter from the hub to the catheter exit site)	To disinfect the catheter limbs and port caps. Performing a friction scrub will provide the best quality of cleaning for the catheter limbs and port connections.
16. Air dry the catheter limbs and ports.	Must air dry for antiseptic to be effective
17. Close clamp and disconnect IV tubing.	
18. Scrub TEGO connector tip with alcohol swab. Discard swab.	
19. Connect 20 mL syringe with normal saline to lumen. Open clamp and flush lumen using	Sodium chloride flush prior to instilling blocking agent ensures no medication

push/pause technique. Close clamp. Remove and discard syringe	admixing or residual blood from transfusion remains in catheter.
20. Scrub TEGO connector tip with alcohol swab. Discard swab.	
21. Attach syringe with prescribed volume and concentration of blocking agent to lumen, open clamp and infuse. Close clamp. Remove and discard syringe.	Blocking agents (e.g. heparin, sodium citrate 4%) are used to prevent clot/fibrin formation within the catheter.
22. Wrap lumens in a 4 x 4 gauze and secure with tape. Attach appropriate medication label indicating the volume, type and concentration of locking solution, date and initials.	Patient comfort. Safety precaution to alert staff of blocking agent used to prevent accidental instillation.

If CVC does not have TEGO connectors:

STEPS	RATIONALE
1. Preparation: • Wash hands • Remove dressing from catheter lumens • Prepare sterile tray and add supplies to tray	Reduce risk of infection through touch
2. Wash hands. Mask self and patient. Don goggles and sterile gloves.	
3. Using sterile 4 x 4 gauze, grasp the catheter ports with one hand, and place sterile drape under ports. Discard used 4 x 4.	
4. Using 3 large chlorhexidine 2% with 70% isopropyl alcohol swabs, scrub the catheter (1 swab for the arterial limb, 1 for the venous limb, and 1 to clean the catheter from the hub to the catheter exit site) Place catheter limbs on a dry 4 x 4. Air-dry the catheter limbs and ports for 1 minute.	To disinfect the catheter limbs and port caps. Performing a friction scrub will provide the best quality of cleaning for the catheter limbs and port connections. Must air dry for antiseptic to be effective.
5. Ensure that clamp on lumen(s) is closed. Remove cap from lumen. Using a large chlorhexidine 2% with 70% isopropyl alcohol swabs, scrub the catheter hub.	Clean the hub as old blood may harbor and encourage the growth of organisms.

6. If available, attach a TEGO connector to hub and follow steps 5 to20 above.	
7. If no TEGO available: Attach a 10 mL luer lock syringe to the lumen that is to be accessed. Open clamp and withdraw 5 mL of blood. Close clamp. Discard syringe. (Note: if unable to withdraw, attempt accessing second lumen. If unable to withdraw from both lumens, attempt to flush lumen with 20 mL normal saline as per step 9. If able to flush lumen, document that patient received blocking agent and notify physician)	
8. Attach 10 mL syringe and check for adequate blood flow by using withdraw and instill motion. Close clamp. Discard syringe.	To check patency of lumen.
9. Attach 20 mL syringe with normal saline. Open clamp and forcefully flush lumen using a push/pause technique. Close clamp. Discard syringe	Push/pause flush technique increases turbulence within catheter lumen during flush thereby making the flush more effective.
10. Connect IV tubing to lumen and open clamp. Set infusion at prescribed rate	
Upon completion of infusion clamp lumen.	
11. Preparation: • Wash hands • Prepare blocking agent as per order • Prepare sterile tray and add supplies to tray	Reduce risk of infection through touch.
12. Wash hands. Mask self and patient. Don goggles and sterile gloves.	
13. Using sterile 4 x 4 gauze, grasp the catheter ports with one hand, and place sterile drape under ports. Discard used 4 x 4	Maintain a sterile field.
14. Using 3 large chlorhexidine 2% with 70% isopropyl alcohol swabs, scrub the catheter (1 swab for the arterial limb, 1 for the venous limb, and 1 to clean the catheter from the hub to the catheter exit site) Place catheter	To disinfect the catheter limbs and port caps. Performing a friction scrub will provide the best quality of cleaning for the catheter limbs and port connections.

limbs on a dry 4 x 4. Air-dry the catheter limbs and ports for 1 minute	Must air dry for antiseptic to be effective
15. Ensure that clamp on lumen(s) is closed.	
16. Disconnect IV tubing.	
17. Connect 20 mL syringe with normal saline to lumen and open clamp. Flush lumen using push/pause method. Close clamp. Remove and discard syringe	Sodium chloride(0.9%) flush prior to instilling blocking agent ensures no medication admixing or residual blood from transfusion remains in catheter
18. Attach syringe with prescribed volume and concentration of blocking agent to lumen, open clamp and infuse. Clamp lumen.	Blocking agents (e.g. heparin, sodium citrate 4%) are used to prevent clot/fibrin formation within the catheter.
19. Attach a TEGO connector (or other approved cap) to lumen. Wrap lumens in a 4 x 4 gauze and secure with tape. Attach appropriate medication label indicating volume, type and concentration of locking solution, date and initials.	Patient comfort. Safety precaution to alert staff of blocking agent used to prevent accidental instillation.

Documentation

For Cerner Sites:

- Document the date, time, procedure performed, catheter patency, rate of infusion, patient response to procedure, and locking solution used (volume, concentration, and type) in iView pre, intra and post hemodialysis catheter…

For Non-Cerner Sites:

- Document the date, time, procedure performed, catheter patency, rate of infusion, patient response to procedure, and locking solution used (volume, concentration, and type) on the appropriate record (e.g. intravenous therapy clinical record, hemodialysis log, interdisciplinary notes)

Patient and Family Education

- Explain procedure and rationale to patient.
- Educate the patient regarding:
    - The potential harm of air entering the circulation.
    - Signs and symptoms of air embolism and need to seek immediate medical attention (call 911). Signs and symptoms of air embolism include:
        - sensation of air rushing into the circulation (e.g. hearing the “sound of a train” or “rushing air”)

        - chest pain, dyspnea, shortness of breath, coughing, cyanosis and visual disturbances
        - neurological deficits such as confusion, coma and hemiparesis
        - loss of consciousness, convulsions or death
    - If a cap becomes loose or falls off, ensure the catheter remains clamped and contact the hemodialysis unit as soon as possible. Urgent care is required due to risk for infection or air entering the bloodstream.
    - If the catheter has partially or completely been pulled out, apply pressure over the site with clean gauze and seek medical attention.
    - If any portion of the catheter develops a hole, leak or partial separation, ensure the catheter is clamped off in between the body and the problem area. The catheter clamp is moveable and can be slid up the body of the catheter. If necessary the catheter may be kinked with your fingers to occlude the catheter. Seek medical attention to help prevent serious injury. Call 911.
    - Between dialysis treatments make sure that:
        - The catheter clamp is closed. If the clamp opens, close the clamp immediately.
        - The catheter should only be used for hemodialysis treatments unless authorized by a nephrologist.
        - The end caps are secure. These caps should only be removed by nurses with specialized education and training.
        - The dressing is dry and in place and the access site is clean and dry. 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 the catheter in water. Hot tubs should be avoided.
    - Seek medical advice if you notice any of the following:
        - redness, drainage, swelling or pain around the catheter exit site
        - excessive bleeding from the catheter exit site
        - fever or chills
    - For non-cuffed catheters, the stitches must remain in place for as long as you have a catheter.
    - For cuffed catheters the stitches are removed once the catheter is healed (approximately 4 to 8 weeks).

Related Documents

1. B-00-12-10032 - Hemodialysis: Initiating Using a Central Venous Catheter (CVC) with and without TEGO Connectors
2. B-00-12-10144 - Hemodialysis: Flushing and Capping Central Venous Catheters
3. B-00-12-10058 - Hemodialysis: Alteplase (t-PA, CATHFLO) Instillation into Blocked Central Venous Catheter
4. B-00-12-10065 - Blood/Blood Product Administration
5. B-00-13-10068 - Blood/Blood Products: Transfusion Reaction Identification and Management
6. B-00-13-10130 - Hemodialysis: Anaphylaxis

References

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3. Daugirdas, J.T., Blake, P.G., & Ing, T.S. (Eds.). (2007). Handbook of dialysis (4th ed.). Philadelphia, PA: Lippincott Williams & Wilkins.
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Persons/Groups Consulted:

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