

# Hemodialysis Central Venous CVC (CVC): Initiation of Dialysis

Updated October 4, 2024



## Vascular Access Guideline

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This procedure is posted on the BC Renal website – Health Professionals - Vascular Access - Resources – Central Venous Catheter Guidelines - [www.bcrenal.ca/health-professionals/clinical-resources/vascular-access](http://www.bcrenal.ca/health-professionals/clinical-resources/vascular-access).

### 1.0 Practice Standard

This guideline applies to In-centre and Community Dialysis Units (CDUs) in the majority of situations. If a site-specific protocol differs from this guideline, the site-specific protocol will take precedent.

This guideline does not apply to patients who are dialyzing at home.

#### Skill Level (Nursing): Specialized

*Nurses* who have completed the required hemodialysis (HD) specialty education and who provide nursing care in a BC In-Centre and/or Community Dialysis Unit.

Needle-less HD connector (e.g., Tego®) changes only:

1. *Nurses* working in critical care who are trained in Continuous Renal Replacement Therapy (CRRT), Sustained Low Efficiency Dialysis (SLED) and plasma exchange; and/or
2. *Nurses* who have received training in central venous catheter (CVC) care and maintenance working in intensive care, acute care, ambulatory care, or home care settings **IF** the connector is compromised or a scheduled change is required.

## Need to Know:

1. Air embolus is a potential catastrophic complication of CVCs and the relative risk while accessing a CVC is high. Ways to reduce the risk:
  - a) Use needle-less HD connectors at all times for all patients dialyzing with a CVC.
  - b) Clamp CVC limbs prior to flushing/connect/disconnect procedures (rationale: in case connector becomes loose or damaged).
2. When connecting CVCs, check the CVC is secure:
  - a) Non-tunnelled (temporary uncuffed): Secured by at least one suture for the entire time the CVC is in-situ. If not, notify the nephrologist.
  - b) Tunnelled (cuffed)<sup>1</sup>:
    - Neck incision sutures are removed on DAY 7 post insertion.
    - Exit site sutures (rarely present) are removed on DAY 7 post insertion.
    - Anchoring sutures are removed between WEEKS 6 - 10 post insertion.
      - If sutures fall out prior to 6 – 10 weeks, notify the nephrologist (sutures may require replacement or a securement device applied).
      - If history of CVC dislodgement or poor healing, sutures or securement device may be required for a longer time.
3. Tips for needle-less HD connectors:
  - a) Do not use needles to access connectors.
  - b) Access the connector straight on, not at an angle.
  - c) When injecting normal saline through the connector, leave a minimal amount of fluid in the tip of the syringe to avoid reflux or rebound effect.
  - d) Grasp the base of the connector and fully unthread luer lock when disconnecting from the connector.
4. Prior to patient contact, perform hand hygiene. Don appropriate PPE based on the patient's need for isolation precautions or the risk of exposure to body fluids. Refer to BCR guideline [Prevention of Disease Transmission in HD Units](#).

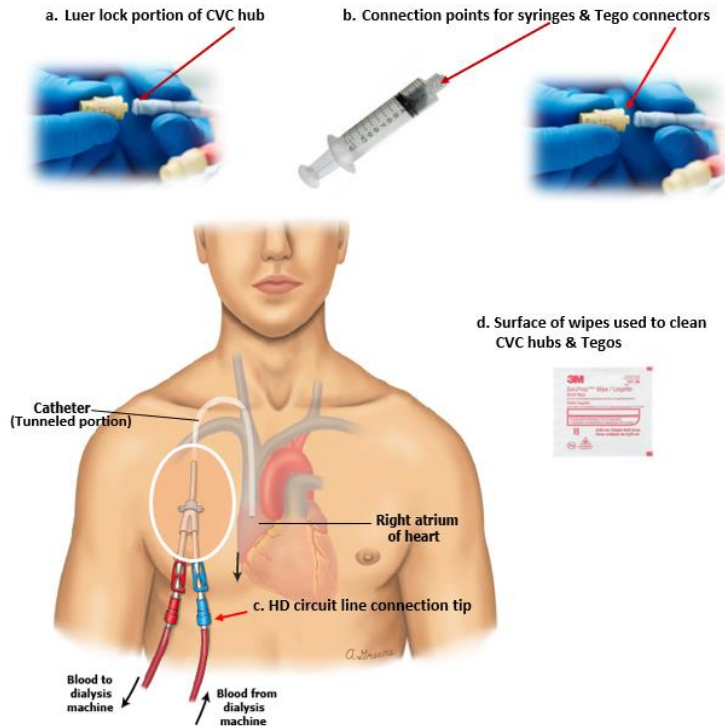
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<sup>1</sup> Refer to site-specific protocol re requirement for nephrologist's order to remove sutures.

5. Sterility of “key parts” must be maintained when initiating dialysis and providing CVC care.

5.1 “Key parts include:

- a) Luer lock portion of CVC hubs
- b) Sterile connection points for syringes and connectors
- c) HD circuit arterial & venous line connection tips
- d) Surface of antiseptic wipes used to clean CVC hubs and connectors



5.2 Aseptic non-touch technique may be used IF sterility of “key parts” can be maintained.

5.3 Sterile supplies are used as needed to maintain sterility of “key parts.” Do not open supplies in advance of the procedure.

5.4 Aside from handwashing, the single most important way to prevent infection is to scrub the hub/connector (connection surface and sides), clamp and limb using a friction scrub for a full 30 seconds. Allow the antiseptic to air dry completely.

After the initial 30 second scrub and prior to each connection, wipe the connector with an antiseptic wipe to lubricate and prevent damage to the connector. Use a new antiseptic wipe each time.

6. Recommended antiseptic for cleansing CVC clamps and limbs, connectors and CVC hubs during connector changes:

- 2% chlorhexidine (CHG) with 70% alcohol
  - Application time: 30 seconds

OR

- 70% alcohol
  - Application time: 30 seconds

**NOTES:**

1. *Application time (contact time) is important to ensure the antiseptic contact time is long enough to achieve the desired “kill” time).*
2. *After applying the antiseptic, allow to air dry completely.*
  - *Adequate dry time allows the antiseptic to work AND, if using CHG, reduces the risk of CHG sensitivity and sensitization.*
  - *Amount of dry time depends on amount used, presence or absence of hair, humidity, body site, etc.*
  - *Dry time for preparations without alcohol is longer.*
3. *If skin is sensitive to chlorhexidine, utilize an alternative antiseptic until the sensitivity resolves. Assuming no previous anaphylactic reaction to chlorhexidine, consider a second trial after sensitivity resolves, ensuring adequate dry time after application.*
4. *DO NOT use normal saline:*
  - *As the primary cleaning solution as it does not have antimicrobial properties.*
  - *To rinse off the skin/CVC after applying an antiseptic. Antiseptics have residual antimicrobial action which lasts beyond the initial application.*
5. *Use single-use antiseptic preparations when available.*

## 2.0 Equipment

- Personal protective equipment (gloves, gown, mask/eye protection)
- Clean gloves
- Sterile drape/gauze (or sterile 4x4)
- Antiseptic wipes (several)
- 2x5 mL or 2x10 mL sterile syringes (for aspiration)
- 2x10 mL sterile syringes (optional, for irrigation)
- 4 x 10 mL syringes or 2x 20 mL sterile syringes prefilled with normal saline (for flushing)
- If connectors due for change:
  - a. Two connectors (one per lumen)
  - b. Sterile gloves (see #5 under “need to know” section)
- Patient specific dressing if due for change

Note: To prevent contamination, do not open supplies until needed.

## 3.0 Assessment & Interventions

**Preparation:**

1. Gather supplies. Perform hand hygiene.
2. Place patient in a comfortable position and expose the CVC access site. Perform hand hygiene.
3. Don clean gloves.
4. Place clean or sterile pad (as per KDOQI, 2020) under CVC limbs.

5. Unwrap the gauze covering the CVC limbs and discard. Check that the cuff of the CVC is not visible. Doff gloves.

**If scheduled for a dressing change:**

6. Refer to procedure [CVC: Exit Site Care & Dressing Change](#).

**Cleanse connectors, clamps, and limbs:**

7. Perform hand hygiene, don clean gloves.
8. Using antiseptic wipe, scrub each connector (connection surface and sides), clamp, and limb using a friction scrub for a full 30 seconds. Allow the antiseptic to air dry completely.
  - Un-clamp, move clamp, clean under clamp segment, and re-clamp.
  - Use a new antiseptic wipe for each connector/clamp/limb.
9. Place CVC limbs/connectors on a fresh, dry, sterile 4x4 drape/gauze. Allow to dry.

**If scheduled for connector change:**

10. Lift the CVC. Ensure clamps are closed.
11. Remove connector with gloved hand. Using an antiseptic wipe, scrub the sides (threads) and end of the hub thoroughly using a friction scrub for a full 30 seconds. Allow to air dry. Attach a new connector.
12. Repeat steps 10 and 11 on the other side.

**Withdraw blood and locking solution, assess patency, and flush lumens:**

13. Starting with the arterial port side (or venous port side, if indicated):
  - a) Ensure clamp on CVC limb is closed.
  - b) Cleanse CVC limbs and connector with antiseptic wipe. Discard wipe.
  - c) Attach a sterile empty 5 or 10 mL syringe to connector.
  - d) Open clamp on CVC limb.
  - e) Aspirate 3 – 5 mL blood and locking solution.
  - f) Close clamp. Remove syringe and discard.

If no resistance is felt, and pre-dialysis bloodwork is ordered, draw blood using unit protocol.

- g) If no resistance is felt with aspiration of blood and locking solution:
  - i. Ensure clamp on CVC limb is closed.
  - ii. Cleanse connector with antiseptic wipe. Discard wipe.
  - iii. Attach a sterile 10 mL syringe to connector.
  - iv. Open clamp on CVC limb.
  - v. Irrigate (i.e., aspirate, then flush) lumen 3 times while continuing to assess patency.
  - vi. Close clamp. Remove syringe and discard.
  - vii. Cleanse connector with antiseptic wipe. Discard wipe.

- viii. Attach a sterile 10 or 20 mL pre-filled NS syringe to connector.
- ix. Flush lumen with NS using a turbulent flushing technique. Repeat if using 10 mL syringe (total: 20 mL per lumen).
- x. Close clamp. Leave syringe attached to the connector until it is replaced with the dialyzer tubing connector.

**Note: Steps 13g(i - vi) are optional.**

- h) If resistance is felt with aspiration of blood and locking solution:
  - i. Ensure clamp on CVC limb is closed.
  - ii. Cleanse connector with antiseptic wipe. Discard wipe.
  - iii. Attach a sterile 10 mL pre-filled NS syringe to connector.
  - iv. Open clamp on CVC limb.
  - v. Irrigate (i.e., aspirate, then flush) the lumen while assessing patency. Close clamp. Remove syringe and discard.
  - vi. If patency is established:
    - Cleanse connector with antiseptic wipe. Discard wipe.
    - Attach a sterile 10 or 20 mL pre-filled NS syringe to connector.
    - Open clamp on CVC limb and flush lumen with a turbulent flushing technique. Repeat if using 10 mL syringe (total: 20 mL per lumen).
    - Close clamp. Leave syringe attached to the connector until it is replaced with the dialyzer tubing connector.
  - vii. If resistance continues, consider replacing the connector and see if flow improves.
  - viii. If patency cannot be established, contact MD and/or follow HA-specific protocols.

14. Repeat with venous lumen and hook up to dialysis machine.

Note: If line is not in use, refer to unit-specific protocol for frequency of flushing.

**Connect blood lines:**

*If using the "direct method":*

- 15. Remove syringe from the connector on the arterial side. Ensure there is no air in the arterial blood line.
- 16. Cleanse connector with an antiseptic wipe. Discard wipe.
- 17. Connect the arterial blood line to the connector on the arterial side, avoiding touching key parts to maintain tip to tip sterility. Ensure connections are secure.
- 18. Repeat steps 15 – 17 for the venous side. Go to step 24.

*If using the "indirect method" (BC Children's Hospital):*

19. Remove syringe from the arterial line. Ensure there is no air in the arterial blood line.
20. Cleanse connector with an antiseptic wipe.
21. Connect the arterial blood line to the arterial port/connector, avoiding touching key parts to maintain tip to tip sterility. Ensure connections are secure. Open arterial clamp (ensure saline line is clamped).
22. Turn on blood pump at 100 - 150 mL/min and allow blood to fill arterial chamber, dialysis line, dialyzer, and venous chamber. Pump will stop automatically once blood is detected in the venous chamber.
23. Remove syringe from venous port/connector. Ensure there is no air in the venous blood line. Connect the venous blood line to the venous port/connector. Ensure connections are secure. Open venous clamp.

**Initiate dialysis:**

24. Start blood pump at 100 - 150 mL/min. Initiate dialysis as per HD orders.
25. Unless contraindicated, increase blood pump speed to 200 mL/min. Wait two minutes and then record arterial and venous pressures and pump speed on the HD record.
26. Loop the tubing from the access and secure the blood lines to the patient with a spring clamp.



- The clamps on the HD blood lines should be on the patient side of the spring clamp that is attached to the patient's clothing.
- Allow for adequate range of motion. Ensure luer lock connections are tight.
- Do not secure the blood lines to an object such as the dialysis chair, blanket, or bed rail.
- Refer to Staff Information Sheet: [Prevention of Vascular Access Disconnection/Needle Dislodgement](#).

27. Adjust dialysis parameters to obtain maximum dialysis adequacy.

## 4.0 Patient Education & Resources

1. Try not to touch the CVC (can lead to infection).
2. Keep dressing clean and dry – a tub bath is the best way to wash.
3. If the dressing peels off or gets wet, wash hands well and remove what is left of the dressing. Put on a clean, dry 4x4 gauze and tape in place or put on a new dressing if instruction has been

provided. Come to the dialysis unit to have a new dressing applied if instruction has not been provided.

4. Do not use sharp objects like scissors or a razor near the CVC tubing.
5. If the CVC develops a hole or leak or the cap falls off, make sure that the CVC is clamped off between the problem area/CVC tip and the body (move the CVC clamp up the CVC towards the body; if no clamp, kink the CVC with fingers to close the CVC off). Call 911.
6. If the HD CVC falls out or slips partially out, apply firm pressure with a clean piece of gauze and go to the hospital Emergency Department immediately.
7. Do not open your CVC (if part of the home HD program, doctor or nurse will provide specific instructions). Only a dialysis nurse or physician should remove the caps or clamps.
8. Notify kidney doctor (nephrologist) or dialysis unit for any of the following:
  - Redness, warmth, or pain along the CVC.
  - Oozing or drainage from CVC exit site.
  - Noticeable swelling or itching around CVC or neck.
  - Feverish and any of the above symptoms.
  - Part of the CVC that is outside the skin seems to be getting longer.
  - Shortness of breath, coughing, chest pain, low blood pressure, wheezing.
  - CVC is accidentally pulled and there is bleeding around the exit site.
  - Sutures fall out of a recently inserted CVC.

*Patient Resources (BCR Website):*

- [Your CVC](#)
- [What to do for HD CVC emergencies](#)
- [Help us keep you SAFE \(needle dislodgement\)](#)
- [Changing your own CVC dressing](#)
- [Showering with a HD CVC](#)

## 5.0 Documentation

- CVC hook-up, dressing change and exit site status, presence or absence of the anchor suture and observations requiring attention (e.g., redness, bleeding, infection, or blockages in either or both lumens) as per site-specific protocol.
- Needle-less HD connector changes (if completed).



## 6.0 References

The following references were considered in the development of this guideline.

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## 7.0 Sponsors

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