VASCULAR ACCESS

CVC Care: Connect and Disconnect - Scrub the Hub to Prevent Infection

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Hemodialysis Central Venous Catheter (CVC) Care

- [ ] **Assess or check the vascular access and surrounding area by physical exam prior to every CVC connection**
- [ ] **Use a catheter care protocol (e.g. such as CDC tool kit) for exit site and hub care to reduce the risk of catheter related bloodstream infection**
- [ ] **Use a catheter protocol for the treatment of catheter dysfunction**
- [ ] **Mask and use aseptic technique when manipulating, connecting or disconnecting the catheter**
- [ ] **Cleanse the catheter hub ("scrub the hub") with chlorhexidine**
    - **if chlorhexidine is not possible (e.g. allergy), use povidone-iodine (preferably with alcohol)**
- [ ] **Use a topical antiseptic or antibiotic barrier at the catheter exit site, in addition to cleansing, until the exit site is healed**
- [ ] **Dressing should be changed at least once per week (with greater frequency if clinically indicated)**
- [ ] **Catheter dressings should be protected against wet and dirty environments, especially if the exit site is not yet fully healed (i.e. patient should be educated to avoid swimming or showering)**

Available Tools

- CDC Tool kit is to be used by US based dialysis faculties & audited by CMS related inspections
- Nephrologists Transforming Dialysis Safety (NTDS)
  - Nephrologists act as team leaders to “target zero infections” by pursuing the elimination of preventable infections in dialysis facilities.
- CDC Infection Prevention Project https://www.cdc.gov/dialysis/
- https://www.asn-online.org/ntds/

KDOQI Aligns with and Supports CDC approach to preventing catheter-related infections (CPGs 11.9-11.16)

CPG 11.9-11.16

CDC Approach to BSI Prevention in Dialysis Facilities

(i.e., the Core Interventions for Dialysis Bloodstream Infection (BSI) Prevention)

1. Surveillance and feedback using NHSN
Conduct monthly surveillance for BSIs and other dialysis events using CDC's National Healthcare Safety Network (NHSN). Calculate facility rates and compare to rates in other NHSN facilities. Actively share results with front-line clinical staff.

2. Hand hygiene observations
Perform observations of hand hygiene opportunities monthly and share results with clinical staff.

3. Catheter/vascular access care observations
Perform observations of vascular access care and catheter accessing quarterly. Assess staff adherence to aseptic technique when connecting and disconnecting catheters and during dressing changes. Share results with clinical staff.

4. Staff education and competency
Train staff on infection control topics, including access care and aseptic technique. Perform competency evaluation for skills such as catheter care and accessing every 6-12 months and upon hire.

5. Patient education/engagement
Provide standardized education to all patients on infection prevention topics including vascular access care, hand hygiene, risks related to catheter use, recognizing signs of infection, and instructions for access management when away from the dialysis unit.

6. Catheter reduction
Incorporate efforts (e.g., through patient education, vascular access coordinator) to reduce catheters by identifying and addressing barriers to permanent vascular access placement and catheter removal.

7. Chlorhexidine for skin antisepsis
Use an alcohol-based chlorhexidine (>0.5%) solution as the first line skin antiseptic agent for central line insertion and during dressing changes.*

8. Catheter hub disinfection
Scrub catheter hubs with an appropriate antiseptic after cap is removed and before accessing. Perform every time catheter is accessed or disconnected.**

9. Antimicrobial ointment
Apply antibiotic ointment or povidone-iodine ointment to catheter exit sites during dressing change.***

* Povidone-iodine (preferably with alcohol) or 70% alcohol are alternatives for patients with chlorhexidine intolerance.

** If closed needleless connector device is used, disinfect device per manufacturer's instructions.

*** See information on selecting an antimicrobial ointment for hemodialysis catheter exit sites on CDC's Dialysis Safety website (http://www.cdc.gov/dialysis/prevention-tools/core-interventions.html#sites). Use of chlorhexidine-impregnated sponge dressing might be an alternative.

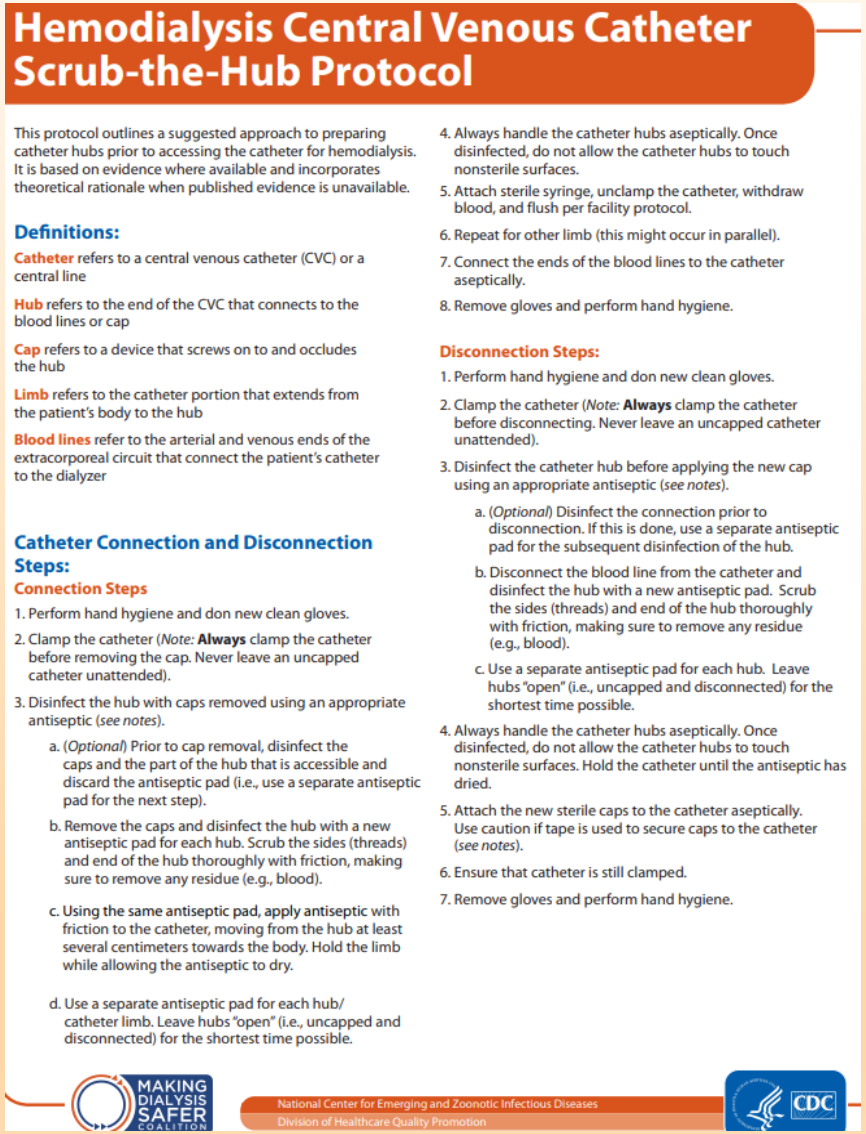
For more information about the Core Interventions for Dialysis Bloodstream Infection (BSI) Prevention, please visit http://www.cdc.gov/dialysis

National Center for Emerging and Zoonotic Infectious Diseases
Division of Healthcare Quality Promotion

CDC

KDOQI also suggests wearing a mask with catheter connect & disconnect

CPG 11.10



Hemodialysis Central Venous Catheter Scrub-the-Hub Protocol

This protocol outlines a suggested approach to preparing catheter hubs prior to accessing the catheter for hemodialysis. It is based on evidence where available and incorporates theoretical rationale when published evidence is unavailable.

Definitions:

Catheter refers to a central venous catheter (CVC) or a central line

Hub refers to the end of the CVC that connects to the blood lines or cap

Cap refers to a device that screws on to and occludes the hub

Limb refers to the catheter portion that extends from the patient's body to the hub

Blood lines refer to the arterial and venous ends of the extracorporeal circuit that connect the patient's catheter to the dialyzer

Catheter Connection and Disconnection Steps:

Connection Steps

1. Perform hand hygiene and don new clean gloves.
2. Clamp the catheter (*Note:* **Always** clamp the catheter before removing the cap. Never leave an uncapped catheter unattended).
3. Disinfect the hub with caps removed using an appropriate antiseptic (*see notes*).
   a. (*Optional*) Prior to cap removal, disinfect the caps and the part of the hub that is accessible and discard the antiseptic pad (i.e., use a separate antiseptic pad for the next step).
   b. Remove the caps and disinfect the hub with a new antiseptic pad for each hub. Scrub the sides (threads) and end of the hub thoroughly with friction, making sure to remove any residue (e.g., blood).
   c. Using the same antiseptic pad, apply antiseptic with friction to the catheter, moving from the hub at least several centimeters towards the body. Hold the limb while allowing the antiseptic to dry.
   d. Use a separate antiseptic pad for each hub/catheter limb. Leave hubs "open" (i.e., uncapped and disconnected) for the shortest time possible.
4. Always handle the catheter hubs aseptically. Once disinfected, do not allow the catheter hubs to touch nonsterile surfaces.
5. Attach sterile syringe, unclamp the catheter, withdraw blood, and flush per facility protocol.
6. Repeat for other limb (this might occur in parallel).
7. Connect the ends of the blood lines to the catheter aseptically.
8. Remove gloves and perform hand hygiene.

Disconnection Steps:

1. Perform hand hygiene and don new clean gloves.
2. Clamp the catheter (*Note:* **Always** clamp the catheter before disconnecting. Never leave an uncapped catheter unattended).
3. Disinfect the catheter hub before applying the new cap using an appropriate antiseptic (*see notes*).
   a. (*Optional*) Disinfect the connection prior to disconnection. If this is done, use a separate antiseptic pad for the subsequent disinfection of the hub.
   b. Disconnect the blood line from the catheter and disinfect the hub with a new antiseptic pad. Scrub the sides (threads) and end of the hub thoroughly with friction, making sure to remove any residue (e.g., blood).
   c. Use a separate antiseptic pad for each hub. Leave hubs "open" (i.e., uncapped and disconnected) for the shortest time possible.
4. Always handle the catheter hubs aseptically. Once disinfected, do not allow the catheter hubs to touch nonsterile surfaces. Hold the catheter until the antiseptic has dried.
5. Attach the new sterile caps to the catheter aseptically. Use caution if tape is used to secure caps to the catheter (*see notes*).
6. Ensure that catheter is still clamped.
7. Remove gloves and perform hand hygiene.

Recommendations on the use of specialized connectors have changed over the years due to changing evidence and practice patterns

CVC Connectors to Prevent CVC Dysfunction or Bacteremia

21.2 **KDOQI considers it reasonable to have an individualized approach to use special CVC connectors based on the clinician's discretion and best clinical judgment. (Expert Opinion)**

21.3 **KDOQI considers it reasonable to use an antimicrobial barrier cap to help reduce CRBSI in high-risk patients or facilities; the choice of connector should be based on clinician's discretion and best clinical judgment. (Expert Opinion)**

Notes/Discussion:

Antiseptic Use and Selection

As described in the 2011 CDC/Healthcare Infection Control Practices Advisory Committee (HICPAC) Guidelines for the Prevention of Intravascular Catheter-Related Infections, prior to accessing the catheter hub it should be disinfected with an appropriate antiseptic (greater than 0.5% chlorhexidine with alcohol, 70% alcohol, or 10% povidone-iodine). There is not enough evidence to recommend one antiseptic over the others. Generally, antiseptics should be allowed to dry for maximal effect.

If using 70% alcohol, sterile antiseptic pads should be used (sterile pads are labeled sterile and packaging for nonsterile pads often does not state whether the pads are sterile or nonsterile). For practical reasons, pads or similar products might be preferred over other forms of antiseptics (e.g., swabsticks) for disinfecting the catheter as they are malleable and allow for vigorous cleaning of small spaces.

If using an antiseptic that leaves a residue (e.g., chlorhexidine), avoid allowing large amounts of antiseptic to enter the lumen of the catheter to avoid potential toxicities to the patient.

If using chlorhexidine, removing all blood residue is particularly important to maximize the effect of the antiseptic.

Soaking Caps

The role of soaking caps in an antiseptic prior to removing them is not clear. It is not a CDC/HICPAC recommendation. This procedure is described in the 2000 National Kidney Foundation's Kidney Disease Outcomes Quality Initiative (KDOQI) Vascular Access Guidelines but was not included in the 2006 update.

Handling Catheter Hubs

Catheter hubs should always be handled aseptically. Once disinfected, the catheter hubs should not be allowed to touch nonsterile surfaces. This might be best performed by holding them until the antiseptic dries. During this time, the staff member performing the procedure should also ensure that the catheter remains clamped.

When disinfecting catheter hubs, clean, nonsterile gloves can be used if aseptic technique is maintained.

Bloodline Disinfection

When accessing the line, disinfecting the ends of the sterile blood lines is not required if care has been taken not to contaminate the ends of the blood lines (i.e., through careful aseptic technique). Blood lines can become contaminated during connections and disconnections, as well as during the priming process. Contact with contaminated prime waste in prime buckets that have not been properly cleaned and disinfected or through backflow from waste handling ports must be avoided. Disinfecting the bloodlines does not address this issue.

Disconnection and Line Reversals

Catheter hubs should be disinfected again after disconnecting from bloodlines and before replacing a new cap at the end of a treatment. This should be done in a manner similar to that used when disinfecting the hub prior to accessing. Disinfecting the catheter hub and the end of the extracorporeal blood line should also be performed if, during a treatment, a patient must be disconnected and their blood is re-circulated. Anytime a patient's circuit is disconnected this should be done aseptically and the number of times a patient's catheter is disconnected from the blood lines should be minimized to the extent possible.

Securing Caps with Tape

Caution should be used if taping caps on to hubs between treatments. Tape can leave residue on the hubs that might make disinfecting them more difficult.

Use of Masks

Although data supporting the use of masks during catheter accessing/deaccessing to prevent vascular access infections is lacking, this practice is recommended for patients and staff in the 2000 KDOQI guidelines and is included in the Centers for Medicare and Medicaid Services (CMS) End Stage Renal Disease Program Conditions for Coverage Interpretive Guidance.

Personal Protective Equipment (PPE)

Proper PPE should always be worn by staff to avoid exposure to potentially infectious blood and body fluids when connecting/disconnecting catheters.

Aseptic Technique

This includes practices that prevent the contamination of clean/sterile items and surfaces. Once tasks requiring aseptic technique have been started, care must be taken to avoid contamination of gloves and other clean/sterile items that can occur when touching dirty surfaces (e.g., positioning patient, using computer keyboard).

Selected References:

1. National Kidney Foundation. KDOQI Clinical Practice Guidelines and Clinical Practice Recommendations for 2006 Updates: Hemodialysis Adequacy, Peritoneal Dialysis Adequacy and Vascular Access. *Am J Kidney Dis* 2006; 48 (suppl 1):S1-S322.
2. National Kidney Foundation. KDOQI Clinical Practice Guidelines for Hemodialysis Adequacy, 2000. *Am J Kidney Dis* 2001; 37 (suppl 1):S7-S64.
3. O'Grady NP, Alexander M, Burns LM, et al. Guideline for the prevention of intravascular catheter-related infections. *Clin Infect Dis* 2011; 52:e162-e193.

Sample Steps for Catheter Connect/Disconnect (CPG 11.9-11.16)

Table 11.2. Example of CVC Connect and Disconnect Procedures

Suggested Method to Access CVC
Step 1: Explain the procedure to the patient. Ask him/her to minimize talking and turn the head the opposite direction of the CVC.
Step 2: Perform hand hygiene. Remove any gauze or tape securing the CVC or covering CVC limbs.
Step 3: Ensure that both limbs of the CVC are clamped. Place clean or sterile pad/towel under the CVC so that the limbs are on top of the pad/towel.
Step 4: Perform hand hygiene and prepare supplies, maintaining sterility. Put on gloves.
Step 5: Ensure clamp on CVC is closed. Remove the Luer lock cap and clean the hub ("scrub the hub")[297] with chlorhexidine (or povidone if chlorhexidine not tolerated). Ensure that the disinfected hub does not touch nonsterile surfaces. If closed system, high-flow, needleless-style caps are used; follow the manufacturer's recommendations and CVC care for cleaning and changing of caps. Repeat with the second port. *Optional for Step 5:* Before removing the Luer lock cap, disinfect the caps and part of the hub with an antiseptic pad, using a separate antiseptic pad for each hub or catheter limb.
Step 6[a]**:** Attach syringe, unclamp CVC, and aspirate 2 to 5 mL of blood and CVC locking solution from lumen. Reclamp CVC. Detach syringe and attach to dialysis circuit. Repeat with second port. *Optional for Step 6*: If no resistance is felt with aspiration of blood and CVC locking solution, attach a 5- to 10-mL syringe of 0.9% normal saline and flush lumen using turbulent flushing technique.
Step 7[b]**:** Initiate dialysis.
Step 8: Discard the syringe and used materials.

Suggested Method to Disconnect CVC

Step 1: Explain the procedure to the patient, retransfuse patient's blood as per unit protocol, perform hand hygiene, and prepare supplies for CVC locking.
Step 2: Close the clamp on the CVC lumens and bloodlines. Disconnect 1 bloodline from 1 CVC lumen and clean the CVC hub.[c]
Step 3: Attach a 5- to 10-mL syringe with 0.9% normal saline to CVC lumen, unclamp CVC, and flush lumen.
Step 4: Remove normal saline syringe from lumen, attach syringe with CVC locking solution to lumen, and instill locking solution volume as per unit CVC care protocols.[d]
Step 5: Close clamp on lumen, remove syringe, clean the hub, and apply sterile Luer lock cap.
Step 6: Repeat steps with second lumen.
Step 7: Discard used supplies.

Abbreviation: ANTT, aseptic no touch technique; CVC, central venous catheter.
[a]If limbs do not aspirate or flush freely, ensure clamps are open and rule out external causes of resistance (kink in CVC limb or patient position).[342] If problems persist, the CVC may indicate fibrin or thrombus formation or CVC tip malposition (Guidelines 22 and 24). A gentle back-and-forth motion (irrigate) may promote CVC patency. After irrigation, flush lumen (eg, with 10 mL of normal saline) using turbulent flushing technique to ensure that blood is cleared from the CVC lumen (optimize line patency). Observe for bleeding if anticoagulant (locking) solution cannot be removed (aspirated).
[b]If line reversal is necessary to initiate dialysis treatment, follow unit protocols and practices for next steps. If patency is established, initiate dialysis.
[c]Follow "scrub-the-hub" protocol.[297]
[d]Locking solutions may include anticoagulants, antiseptic/antibiotic, or thrombolytic locks and their combinations. Caps must be replaced every time the catheter is accessed and de-accessed. If closed-system, high-flow needleless caps are used, follow unit protocols and manufacturer's recommendations.

Checklist: Hemodialysis catheter connection

- [ ] Wear mask (if required)
- [ ] Perform hand hygiene
- [ ] Put on new, clean gloves
- [ ] Clamp the catheter and remove caps
- [ ] Scrub catheter hub with antiseptic agent
- [ ] Allow hub antiseptic agent to dry
- [ ] Connect catheter to blood lines aseptically
- [ ] Remove gloves
- [ ] Perform hand hygiene

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MAKING DIALYSIS SAFER COALITION

Checklist: Hemodialysis catheter disconnection

- [ ] Wear mask (if required)
- [ ] Perform hand hygiene
- [ ] Put on new, clean gloves
- [ ] Clamp the catheter
- [ ] Disconnect catheter from blood lines aseptically
- [ ] Scrub catheter hub with antiseptic agent
- [ ] Allow hub antiseptic agent to dry
- [ ] Attach new caps aseptically
- [ ] Remove gloves
- [ ] Perform hand hygiene

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MAKING DIALYSIS SAFER COALITION

CDC Dialysis Collaborative

Facility Name:_____ Date:_____ Start time:_____ AM/PM

Day: M W F Tu Th Sa Shift: 1st 2nd 3rd 4th

Observer:_____ Location within unit:_____

Audit Tool: Catheter connect/disconnect observations

(Use a "√" if action performed correctly, a "Φ" if not performed. If not observed, leave blank)

Procedure observed, C=connect D=disconnect	Discipline	Mask worn properly (if required)	Hand hygiene performed	New, clean gloves worn	Catheter removed from blood line aseptically (disconnection only)	Catheter hub scrubbed	Hub antiseptic allowed to dry	Catheter connected to blood lines aseptically (connection only)	New caps attached aseptically (after disconnecting)	Gloves removed	Hand hygiene performed

KDOQI also suggests wearing a mask with connect & disconnect

Discipline: **P**=physician, **N**=nurse, **T**=technician, **S**=student, **O**=other

Duration of observation period =___minutes

Number of procedures performed correctly =_____

Total number of procedures observed during audit =_____

ADDITIONAL COMMENTS/OBSERVATIONS

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