

local practices. Whether the benefit exists after exit sites are fully healed is unclear. However, it is important to recall that exit sites require re-healing after each CVC exchange. As with the use of any intraluminal solutions, any cleansing solution or antiseptic/antibiotic used topically should be compatible with the CVC material.

All dressing material should be applied using no-touch or aseptic techniques. No-touch technique means that all open ports and ends of CVCs are not touched with hands or gloves (see http://antt.org/ANTT_Site/home.html). Recent data indicate that there is no significant difference between transparent, semipermeable dressings, and standard gauze dressings with respect to CVC exit site colonization or CRBSI.³³⁷⁻³³⁹ This is also supported by the ERT. For example, 1 small RCT (n = 66) compared 2 dressings: a sterile transparent film and a traditional sterile gauze and hypoallergenic micropore dressing.³⁴⁰ No significant difference in CVC-related infection (12% intervention, 9% control; P = 0.69) was found.³⁴⁰

Both patient and environmental factors should be considered when selecting dressing type and the frequency of change (discussed earlier). Dressings should not be

submerged in water and should be changed when they become damp, loose, soiled, nonocclusive, or non-adherent, and only trained dialysis care providers (including patients) should change CVC dressings. Regular retraining is highly desirable to maintain competency and reduce the risk of infection.

Tables of studies, evidence quality, and risks of bias are provided in [Supplement 3, Tables S98-S109](#).

Assessment of CVC Patency

Routine flushing with 0.9% normal saline is used to maintain CVC patency and has become a standard of practice when accessing and de-accessing CVCs. Flushing of CVC lumens is intended to prevent the mixing of incompatible medications or solutions within the CVC lumen and assists in clearing the CVC of blood) or fibrin buildup.³⁴¹ Typically, a 5- to 10-mL syringe is used; given the lack of evidence for syringe size, the CVC manufacturer's instructions may be used as a guide. However, the clinician is expected to use his/her best clinical judgment and follow local CVC care protocols.

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. <i>Optional for Step 5:</i> 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. <i>Optional for Step 6:</i> 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.

^aIf 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).

^bIf line reversal is necessary to initiate dialysis treatment, follow unit protocols and practices for next steps. If patency is established, initiate dialysis.

^cFollow "scrub-the-hub" protocol.²⁹⁷

^dLocking 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.