CARE AND MAINTENANCE
The care and maintenance of the catheter requires well trained, skilled personnel following a detailed protocol. The protocol should include a directive that the catheter is not to be used for any purpose other than the prescribed therapy.

ACCESSING CATHETER, CAP CHANGES, DRESSING CHANGES*
- Expect some blood
- Use aseptic technique
- Place clean gloves on to access and remove dressing and sterile gloves for dressing changes
- Ensure catheter exit site is examined for signs of infection and dressings should be changed at each dialysis treatment.
- Catheter Luer-Lock Connectors with end caps attached should be sealed for 3 to 5 minutes in providone iodine and then allowed to dry before separation.
- Carefully remove the dressing and inspect the exit site for inflammation, swelling and tenderness. Notify physician immediately if signs of infection are present.

EXIT SITE CLEANSING
- Use waterless technique (as outlined above)

WARNING: Alcohol should not be used to lock, seak or decont polulyre-
thane Catheters because alcohol is known to degrade poly-
urethane catheters over time with repeated and prolonged exposure.

Hand cleaner solutions are not intended to be used for disinfecting our dialysis catheter Luer-Lock Connectors.

POST DIALYSIS
The catheter should be clamped and removed immediately and aseptically, if there is no significant bleeding. 

Dialysis-risk damage to vessels and viscous infusion pressures must not exceed 25 psi (172 kPa). The use of a 10 mL or larger syringe is recommended because smaller syringes generate more pressure than larger syringes.

3. Inject heparin solution into both the arterial and venous lumens of the catheter. The appropriate heparin solution concentration and flushing frequency should be based on hospital protocol. Heparin solution of 1,000 to 5,000 units/mL has been found to be effective for maintaining the patency of catheters. When injecting heparin solution, immerse and clamp clasper under positive pressure. Heparin solution does not lock to each lumen must be equal to the pressure volume of each lumen. Priming volumes are marked on the catheter.


STERILE CATHETER REMOVAL
Evaluate the patient and routinely remove any nonessential catheter per physician’s orders. After removing the catheter, apply nonadhesive, conforming, woven vascular closure devices to the lumen exit sites so for 15-15 minutes until no signs of bleeding are present. Then apply sterile, transparent, semipermeable dressing or per hospital protocol.

REFERENCES

WARNING: Acute and FEG-containing ointments can cause failure of this device and should not be used with polyurethane catheters. Chlorhexidine patches or bacitracin ointment (eg, Polysporin*) are the preferred alternative.

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REFERENCES
INSERTION TECHNIQUE

For percutaneous placement, the catheter is inserted through a sheath introducer into the superior vena cava via the internal jugular vein (preferred), external jugular vein, or subclavian vein. The patient should be placed in Trendelenburg position with the head turned to the opposite side of the entry site.

CATHETERS MUST BE INSERTED UNDER STRICT ASECt CONDITIONS.

WARNING: Canalization of the left internal jugular vein was reportedly associated with a higher incidence of complications compared to catheter placement in the right internal jugular vein.

CAUTION: Left sided catheter placement may provide unique challenges due to the right angles formed by the innominate vein and at the brachiocephalic junction with the SVC.

A. Sterile Field and Skin Preparation

1. Provide a sterile field throughout the procedure. Use sterile gloves, masks, caps, sterile gowns, and use a large sterile drape to cover the patient. If hair removal is needed use clippers or depilatories.
2. Prepare the access site using standard surgical technique and shape the prepared area with sterile towels.
3. If applicable administer local anesthesia to the insertion site.

B. Pre-flush the Catheters

4. Irrigate, prime, and clamp both catheter lumens with heparin solution or according to hospital protocol.
5. With catheter full of fluid, clamp each catheter using Slide Clamp or Thumb Clamp between the proximal end of the catheter and the 50 cm marking or use plug.

C. Perform Venipuncture

6. Insert the J-end of the standard guidewire through the introducer needle hub that will permit passage of a 0.038 in. (0.97 mm) guidewire into the standard guidewire to the desired location in vessels.

WARNING: Cardiac arrhythmias may result if the guidewire is allowed to pass into the right atrium.

WARNING: Do not advance guidewire or catheter if unusual resistance is encountered.

7. Insert the flexible J-end of the standard guidewire through the introducer needle hub that will permit passage of a 0.038 in. (0.97 mm) guidewire into the standard guidewire to the desired location in vessels.

CAUTION: The guidewire must be withdrawn while the needle is inserted, remove both the needle and guidewire as a unit to prevent the needle from damaging or perforating the wall.

8. Remove the needle while holding the guidewire in place. Wipe the exposed guidewire clean and secure it in place.

WARNING: Cardiac arrhythmias may result if the guidewire is advanced into the right atrium.

CAUTION: The guidewire must be withdrawn while the needle is inserted, remove both the needle and guidewire as a unit to prevent the needle from damaging or perforating the wall.

B. Pre-flush the Catheters

9. Repeat steps 8-10 above to introduce second needle and guidewire into same or a different target vein approximately 1-2 cm adjacent to the first incision site.

10. After second wire has been placed, make a small incision at each venous insertion site to remove any dermal bridge and ease insertion.

D. Insert Sheath and Advance Catheter

11. Advance the dilator to dilate the exposed guidewire into the vessel.

CAUTION: Care should be taken NOT to force the dilator sheath introducer into the vessel during insertion as vessel damage may result.

WARNING: Cardiac arrhythmias may result if the guidewire is allowed to pass into the right atrium.

12. Withdraw the dilator and guidewire, leaving the sheath introducer in place.

CAUTION: Care should be taken not to advance the split shoth sheath too far into vessel as a potential kink would create an impedance to the catheter.

WARNING: To prevent air embolism and/or blood loss, plug the exposed end of the sheath introducer.

13. Remove sheath introducer and guidewire. Insert sheath introducer into the catheter introducer until tip is completely positioned. Ensure that the catheter introducer is torn.

WARNING: Do not advance guidewire or catheter if unusual resistance is encountered.

14. With the catheter advanced, peel away the sheath introducer by gripping the "T" handle and breaking it apart with a downward and outward motion to initiate separation and withdrawal of the sheath introducer.

CAUTION: Ensure that the guidewire introducer is only torn externally. Catheter may need to be further pushed into the vessel as sheath introducer is torn.

15. Repeat steps 11-14 above for second catheter.

16. Verify catheter position under fluoroscopy and make necessary adjustments.

The venous (infusion) tip should be located at the level of the caval atrial junction or into the right atrium and approximately 4 cm past the arterial withdrawal catheter tip.

CAUTION: Catheter tips must be staggered by 4 cm to minimize recirculation.

E. Subcutaneous Tunneling of Catheters and Cuff Placement

17. Identify desired tunnel location and exit site to insert the catheter into the subcutaneous tissue. Ensure the catheter to the desired length and to read lengths/priming volumes.

18. Make note of the desired location at which the cuff will reside in the tunnel.

19. If applicable) administer local anesthesia to the tunnel tract.

20. Make an incision at the catheter entry site (Figure 1).

21. Using the metal tunneler provided, create a subcutaneous tunnel from the insertion site to emerge at the catheter exit site (Figure 2b).

WARNING: Do not tunnel through muscle.

22. Once metal tunneler emerges from catheter exit site, place tapered end of tunneler over tip of tunneler and anchor site. While holding end of metal tunneler, expand tunnel tract from insertion site to half way through the tunnel to desired cuff location or within 2 cm of the catheter exit site using a back-and-forth motion (Figure 3a and 3b).

F. Assembly of Catheter and Extensions

23. Remove tunnel slide dilator while holding metal tunneler in place. If used, remove plug.

24. Attach catheter to tunneler so that catheter’s proximal end slides over barbed end of metal tunneler.

25. Remove Slide Clamp or Thumb Clamp. WARNING: The Slide Clamp, Thumb Clamp, and Plug are provided for use during catheter placement only. Do not reuse.

26. Pull metal tunneler carefully until catheter emerges from catheter exit site.

The catheter should not be forced through the tunnel.

CAUTION: Do not create a sharp angle in the catheter tunnel as this may cause kinking and impact flow.

27. Engage Slide Clamp between desired cut length and catheter exit site to prevent blood loss and air embolism.

28. Remove tunneler by cutting catheter squarely at desired pre-printed mark to produce a clean, smooth surface (Figure 5).

CAUTION: Cutting the catheter anywhere but the pre-printed marks will result in the inability to read the catheter length and priming volumes.

29. Recheck tip positioning using x-ray or fluoroscopy.

30. Repeat steps 17-27 for second catheter (Figure 4).

31. [A applicable] using a scalpel or scissors, cut catheter squarely at desired pre-printed mark to produce a clean, smooth surface (Figure 5). Ensure at least 6 cm of catheter extend from exit site to allow for connection.

WARNING: Cutting the catheter anywhere but the pre-printed marks will result in the inability to read the catheter length and priming volumes.

32. Hold unclamped Extension Leg Assembly and attach sterile 10 mL syringe and prime with normal saline solution, leaving syringe attached (Figure 6). WARNING: To avoid damage to vessels and viscous, infusion pressures must not exceed 25 psi (172 kPa). The use of a 10 mL or larger syringe is recommended because smaller syringes generate more pressure than larger syringes.

33. With catheters cut per Step 31, slip Female Connector over catheter visually confirming Blue Compression Sleeve remains inside Female Connector (Figure 7).

NOTE: Attach the appropriate color-coded blue-venous, red-arterial) Extension Leg assembly.

34. Slide proximal end of catheter over metal cuff on the Extensy Leg Body, ensuring that catheter is attached entire length of metal cuff and no metal is visible (Figure 10).

35. Slide Female Connector towards Extension Leg Body and assemble the two together until the two are fully seated (Figure 11).

WARNING: The Blue Compression Sleeve is a necessary component of the Extension Leg Assembly. Always visually confirm that the Compression Sleeve remains in the Female Connector during assembly (Figure 7 and Figure 11).

36. After Extension Leg Assembly is on catheter, ensure catheter length and priming volume printing is visible.

37. Grasping the connector in one hand, and the catheter tubing in the other, gently tug on the connector to test the security of the connector. If the connector pulls out of catheter, repeat the attachment procedure. A connection failure may be due to one, or a combination of the following:

- The Extension Leg Connector metal cuff is not fully inserted into the catheter.
- Missing blue compression sleeve in female connector.
- With the 10 mL syringe attached to the Extension Leg Assembly, remove Slide Clamp from catheter.

WARNING: The Slide Clamp, Thumb Clamp, and Plug are provided for use during catheter placement only. Do not reuse.

39. Verify catheter function by aspirating to ensure adequate blood flow. Note that extension clamps must be unclamped to aspirate.

40. Once flow is satisfactory, flush catheter with a minimum of 10 mL of sterile saline.

WARNING: To avoid damage to vessels and viscous, infusion pressures must not exceed 25 psi (172 kPa). The use of a 10 mL or larger syringe is recommended because smaller syringes generate more pressure than larger syringes.

41. Inject heparin solution of 1,000 to 5,000 units/mL in amounts equal to the priming volume as denoted on the catheter.

42. Attach a sterile end cap. WARNING: Failure to clamp extensions when not in use may lead to air embolism, bleeding, and possible occlusions.

43. Repeat steps 31-42 for second catheter (Figure 12).

G. Placement Verification and Securement

44. For additional security, suture the insertion site, or if preferred, use a StatLock® Catheter Stabilization Securement device to anchor the catheter.

45. Manage the exit site per hospital protocol.

46. Dress the catheter per hospital protocol.

WARNING: Aureomycin and Polysporin* bacitracin zinc ointments (e.g., Polysporin* ointment) are the preferred alternatives.

47. Record indwelling catheter length and insertion site on patient’s chart.

PERFORMANCE GUIDELINES

Priming Volumes

Refer to individual catheters for priming volume information printed at pre-defined centimeter markings.

As suggested by Intra data

<table>
<thead>
<tr>
<th>Flow Rate vs Lumen Pressure</th>
<th>35 cm Length (400 mL/min)</th>
<th>50 cm Length (350 mL/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Venous</td>
<td>199 mmHg</td>
<td>229 mmHg</td>
</tr>
<tr>
<td>Arterial</td>
<td>-208 mmHg</td>
<td>-235 mmHg</td>
</tr>
</tbody>
</table>

Note: Reverse flow will result in higher recirculation.