



DURASPAN™ AND DURASPAN™ ULTRA LONG-TERM HEMODIALYSIS CATHETER INSTRUCTIONS FOR USE

PRODUCT DESCRIPTION

r4 Vascular's polyurethane Duraspan™ and Duraspan™ Ultra long-term hemodialysis catheter allows for flow rates exceeding 500 mL/min. The catheter includes a white retention cuff for tissue ingrowth to anchor the catheter. The Duraspan™ and Duraspan™ Ultra comes in two tip staggers; Duraspan™ has a 3.5 cm tip stagger and the Duraspan™ Ultra has a 7 cm tip stagger, each are available in multiple lengths for patient specificity.

To reduce recirculation and deliver high flow, r4 designed its Duraspan™ and Duraspan™ Ultra catheter to take advantage of cardiovascular blood flow dynamics. The distal endhole returns blood to the right atrium while the proximal opening draws blood from the superior vena cava.

USE OF LUMENS:

Use the proximal lumen, as signaled by red connector, for aspirating blood, and the distal lumen, as marked by the blue connector, for blood return.

INDICATIONS FOR USE

The r4 Duraspan™ and Duraspan™ Ultra long-term dialysis catheter is indicated for attaining short and long term (>30 days) vascular access for hemodialysis, hemoperfusion or apheresis therapy. Access is attained via the internal jugular vein, external jugular vein, subclavian vein or femoral vein. Catheters 40 cm and longer are for femoral vein insertion. The ability of the Biomimetic Coating to reduce platelet adhesion and thrombus accumulation is supported exclusively by in-vitro and animal testing.

DURASPAN™ and DURASPAN™ ULTRA CATHETER COATING

The Duraspan™ and Duraspan™ Ultra catheter's coating reduces thrombus accumulation, and platelet adhesion to the catheter. Flush catheter and immerse in saline to hydrate coating before placement.

GRADE PINCH-OFF WITH PROPER CHEST X-RAY AS FOLLOWS:

Grade	Severity	Recommended Action
0	No distortion.	No action.
1	Distortion present without luminal narrowing.	Take a chest x-ray every 1 to 3 months to survey progression of pinch-off to grade 2 distortion.
2	Distortion present with luminal narrowing.	Consider removing the catheter.
3	Catheter transection or break.	Remove catheter at once.

- Cardiac arrhythmias may result if the guidewire passes into the right atrium.
- Close all clamps only in the center of the extension legs. Extensions may develop cuts or tears if subjected to excessive pulling or contact with rough edges. Repeated clamping near or on the luer lock connectors may cause tubing fatigue and possible disconnection.
- Implant catheters carefully to avoid any sharp angles which could collapse the catheter lumens.
- To prevent air embolism and blood loss, place thumb over the sheath introducer opening.
- To avoid damage to vessels and viscous, infusion pressures should not exceed 25 psi (172 kPa). r4 recommends a 10 ml or larger syringe because smaller syringes produce more pressure than larger syringes. Note: A three-pound (13.3 Newton) force on the plunger of a 3 cc syringe produces more than 30 psi (206 kPa). The same three pound (13.3 Newton) force on the plunger of a 10ml syringe creates less than 15 psi (103 kPa) of pressure.
- Accessories and parts used with this catheter should incorporate luer-lock adaptors.
- Aspirate heparin out of both lumens immediately before using the catheter to prevent systemic heparinization of the patient.
- Failure to clamp extensions when not in use may lead to air embolism.
- In the rare event of a leak, clamp the catheter immediately. Take remedial action before resuming dialysis or infusion procedure.
- The risk of infection increases with femoral vein insertion.
- Do not resterilize the catheter or kit items.
- Percutaneously insert the catheter into the axillary-subclavian vein at the junction of the outer and midthirds of the clavicle lateral to the thoracic outlet. Do not insert the catheter into the subclavian vein medially, because such placement can lead to compression of the catheter between the first rib and clavicle and can lead to damage and embolization of the catheter. Fluoroscopic or radiographic confirmation of catheter tip placement should be helpful in confirming the first rib and clavicle are not pinching the catheter.²

SIGNS OF PINCH-OFF

CLINICAL:

- Difficulty with blood withdrawal
 - Resistance to infusion of fluids
 - Patient position changes needed for infusion of fluids or blood withdrawal
- ### RADIOLOGIC:
- Grade 1 or 2 distortion on chest X-ray.
 - Evaluate any pinching for degree of severity before explantation. Oversee patients showing any degree of catheter distortion diligently.

CAUTIONS

- Repeated over tightening of bloodlines, syringes and caps will reduce connector life and could lead to potential connector failure. In case of damage, clamp the catheter between the patient and the damaged area with a smooth-edged, atraumatic clamp.
- Sterile and nonpyrogenic only if packaging remains pristine.
- Read the instructions for use carefully before placing this catheter.
- Federal (USA) law restricts this device to sale by or on the order of a physician.
- Before inserting Duraspan™ and Duraspan™ Ultra catheters, ensure that you are familiar with the following complications and their emergency treatment should any of them occur. Review the relevant medical literature about these and other complications before placing the catheter. Only qualified clinicians knowledgeable of the risks involved, should place or care for Duraspan™ and Duraspan™ Ultra hemodialysis catheters.
- The use of an indwelling central venous catheter provides an important means of venous access for critically ill patients.

POSSIBLE COMPLICATIONS

The potential exists for serious complications including:

- Air embolism
- Bleeding
- Brachial plexus injury
- Cardiac arrhythmia
- Cardiac tamponade
- Catheter or cuff erosion
- Catheter embolism
- Catheter occlusion
- Catheter damage or hindered performance because of compression between the clavicle and first rib¹
- Catheter-related sepsis
- Endocarditis
- Exit site infection
- Exit site necrosis
- Extravasation
- Fibrin sheath formation
- Hematoma
- Hemothorax
- Hydrothorax
- Inflammation, necrosis or scarring of skin over implant area
- Intolerance reaction to polyurethane
- Damage to vessels or viscous
- Pneumothorax
- Spontaneous catheter tip malposition or retraction
- Thoracic duct injury
- Thromboembolism
- Venous thrombosis
- Ventricular thrombosis
- Vessel erosion
- Risks normally associated with local and general anesthesia, surgery, and postoperative recovery

CATHETER PLACEMENT PROCEDURE

INSERTION TECHNIQUE (1) PERCUTANEOUS PLACEMENT USING A SPLIT SHEATH INTRODUCER:

Insert the catheter through a sheath into the superior vena cava by the internal jugular vein, external jugular vein, or subclavian vein. Place the patient in Trendelenburg position with the head turned to the opposite side of the entry site.

A (COMMON STEPS).

INSERT CATHETERS UNDER STRICT ASEPTIC CONDITIONS.

1. Provide a sterile field throughout the procedure. Use proper gloves, masks, gowns, sterile drapes and equipment. Strictly comply with hand hygiene and wear a cap, mask, sterile gown, and sterile gloves. The cap should cover all hair and the mask should cover the nose and mouth tightly. The patient should also wear a mask and be covered with a sterile drape.
2. Prepare the access site using standard surgical technique and drape the prepped area with sterile towels.
3. (If applicable) Administer local anaesthesia to the insertion site and the path for subcutaneous tunnel.

4. Flush each lumen with normal or heparinized saline before insertion and clamp the extension legs.
5. Insert the introducer needle with an attached syringe to the wanted location. Aspirate gently during insertion.
6. After entering the vein, remove the syringe leaving the needle in place.
7. If using a micropuncture set, insert the flexible end of the guidewire into the needle. Advance the guidewire as far as suitable. Verify correct positioning, using fluoroscopy or ultrasound.
- Gently withdraw and remove the needle, while holding the guidewire in position.

CAUTION: If you must withdraw the guidewire, remove both the needle and wire as a unit to prevent the needle from damaging or shearing the guidewire.

- Advance the small sheath and dilator together as a unit over the guidewire, using a slight rotational motion. Advance the unit into the vein as far as suitable.
- Withdraw the dilator and guidewire, leaving the small sheath in place.

WARNING: Place a thumb over the sheath opening to reduce blood loss and risk of air aspiration.

8. Insert the guidewire into the needle hub and pass it through the needle. Advance the guidewire to the wanted location in the vessel.
9. If using a micropuncture, gently withdraw and remove the small sheath, while holding the standard guidewire in position.
10. Remove the needle while holding the guidewire in place. Wipe the guidewire clean and secure it in place.

CAUTION: Do not pull back guidewire over needle bevel as this could sever the end of the guidewire. Always remove the introducer needle first.

11. Make a small incision at the insertion site, and a second incision at the exit site for the catheter.
12. Go to B (Common Steps).

B (COMMON STEPS)

1. Create a subcutaneous tunnel by immersing the tunneler by the venous entry site and tunneling it to emerge at the catheter exit site. Attach the catheter to the tunneler so the catheter's venous tip slides over the barbed connection and rests next to the sheath stop. Slide any sheath found on the tunneler over the catheter tip until the sheath covers the catheter's proximal end hole. This will reduce the drag on the arterial tip in the skin tunnel. After positioning cuff, remove the tunneler by sliding sheath away from the catheter and pulling tunneler from venous tip. Do not force the catheter through the tunnel.
2. Position the white retention cuff about midway between the skin exit site and the venous entry site, about 3 cm minimum, from the venous entry site.

C (PERCUTANEOUS PLACEMENT)

1. Fill the catheters with heparinized saline or normal saline.
2. Advance the dilator sheath introducer assembly over the guidewire into the vessel.

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

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

CAUTION: Take care not to advance the split sheath too far into vessel as a potential kink would create an impasse to the catheter. **WARNING:** To prevent air embolism and blood loss, place thumb over the sheath introducer opening.

4. Remove thumb and feed distal section of catheter into the sheath introducer. Advance the catheter tip to the junction of the superior vena cava and right atrium.
5. With the catheter advanced, peel away the sheath by gripping the handle and breaking it apart with a downward and outward motion to cause separation and withdrawal of the sheath.

CAUTION: Only tear the introducer sheath externally. **CAUTION:** For best product performance, do not insert any portion of the cuff into the vein.

6. Go to D (Common Steps).

D (COMMON STEPS)

1. Check patency with normal saline to each lumen of the catheter. Release the catheter clamp and aspirate blood through each lumen. Once flow is satisfactory, flush both lumens with normal saline in amounts equal to the priming volume of each lumen. Clamp each lumen immediately.

WARNING: Failure to clamp can lead to air embolism.

2. For added security, suture the entry site, or use a StatLock® or similar product to anchor the catheter.
3. Manage the exit site following your institution's protocol.
4. Dress the catheter.

WARNING: Acetone and PEG-containing ointments can cause failure and should not be used with polyurethane catheters. Chlorhexidine patches or bacitracin zinc ointments are the preferred alternative.

5. Verify the catheter and tip location with x-ray or fluoroscopy.

INSERTION TECHNIQUE (2) SURGICAL CUTDOWN PROCEDURE:

Insert the catheter into the superior vena cava by the subclavian vein, external jugular vein or the internal jugular vein. For surgical cutdown procedure, place the patient in Trendelenburg position with the head turned to opposite side of the entry site.

1. Go to A (Common Steps).
2. Locate the needed vessel for insertion of the catheter with a small incision.

NOTE: If performing a jugular insertion and external vein size is unsatisfactory, use the internal vein. A purse string suture may help secure catheter in the internal vein.

3. Make a small incision at the planned exit site of the catheter, in the area between the nipple and right sternal border. Make the cut just large enough to accept the implantable cuff.

4. Go to B (Common Steps).
5. Insert the catheter through a small venotomy in the selected vein. Advance the catheter tip to the junction of the superior vena cava and right atrium.

CAUTION: For best product performance, do not insert any portion of the cuff into the vein.

6. Go to D (Common Steps)

INSERTION TECHNIQUE (3) SHEATHLESS PROCEDURE:

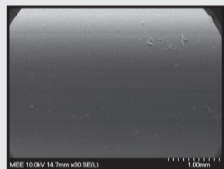
For sheathless placement, it is preferable to insert the catheter into the internal jugular vein. For the sheathless procedure, place the patient in Trendelenburg position with the head turned to the opposite side of the entry site.

1. Go to A (Common Steps).
2. Go to B (Common Steps).

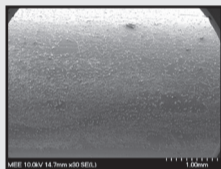
Duraspan™ and Duraspan™ Ultra Coating Test Summary

Testing proving r4 Vascular's Biomimetic Coating performance reduces platelet adhesion and thrombus accumulation includes:

- a) A 1-2 hour blood loop test using heparinized bovine blood with radiolabeled autologous platelets demonstrated an 87% reduction (p<0.0001) in platelet adhesion and thrombus accumulation compared to an uncoated catheter based on gamma counter measurements.
- b) The Biomimetic Coated Carbothane catheter was subjected to aging tests. The coating was confirmed effective post accelerated aging by platelet adhesion studies as shown in the following representative photos.



Aged, Coated Sample



Uncoated Sample

Supporting Bench Testing

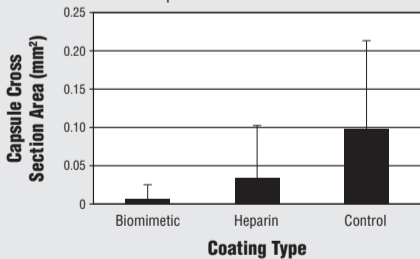
r4 Vascular showed the durability of its coating through the following:

- a) Shear Testing
Durability testing was performed on two hydrophobic surfaces. The first, polycarbonate, was a 4 hour, high shear test ranging from 122 dynes/cm² to 530 dynes/cm² representing a blood pump application. The second, Pellethane, simulating a catheter application at 5.4 dynes/cm², ran for 5 days continuously. Contact angle measurements were used to verify adherence of the Biomimetic Coating and demonstrated negligible coating removed.

Supporting Animal Testing

- a) Four-week rat studies of Biomimetic coated, Heparin coated and uncoated Carbothane catheters showed the Biomimetic catheters had little to no fibrin sheath formed on explantation, whereas the uncoated catheter had significant fibrin sheath formation:

Figure 1: Comparison of fibrous capsule thickness formed around the central venous catheter implanted for four weeks in rat's vena cava.



- b) A blood pump Porcine study of Biomimetic coated pumps and uncoated pumps following 6 hours of blood pump application showed qualitatively a significant reduction in platelet adhesion and thrombosis on the Biomimetic pumps. Epifluorescent analysis of platelet adsorption of the Biomimetic coated pump also found no evidence (<6 platelets/mm²) of platelet adhesion whereas on the uncoated pump significant 13000-14000 platelets/mm². In addition, no thromboembolic incidents occurred for the Biomimetic coated pumps compared to 2 thromboembolic incidents for the uncoated pumps.

CONTRAINDICATIONS, WARNINGS AND CAUTIONS

CONTRAINDICATIONS

r4 contraindicates its Duraspan™ and Duraspan™ Ultra catheter in patients presenting severe, uncontrolled thrombocytopenia or coagulopathy.

WARNINGS:

- Avoid prolonged or excessive contact with alcohol or alcohol-containing antiseptics (such as chlorhexidine).
- Acetone and PEG-containing ointments can cause polyurethane catheters to fail. Chlorhexidine patches or bacitracin zinc ointments are the preferred alternative.
- Follow Universal Precautions when inserting and accessing this catheter.

- Sequentially dilate (guiding dilators over the guidewire), the venous puncture site to allow the catheter (dilate vessel to at least the same French size as the catheter, and preferably to 1.5 Fr. larger).
 - After removing the dilator, keep the guidewire in place while applying digital compression at the puncture site to preserve hemostasis.
 - Insert the proximal end of the guidewire into the end hole of the distal-most tip, and out the slit in the side of that same limb. Then thread the guidewire into the end hole of the proximal tip, passing through this lumen until the guidewire extends out the connector.
 - To reduce the risk of air embolism, clamp the extension leg with the red luer connector.
 - Advance the catheter over the wire, until the tip reaches the junction of the superior vena cava and right atrium. Note the soft tissues may resist catheter passage, but this should subside once the catheter tip is intravascular.
- CAUTION:** For best product performance, do not insert any portion of the cuff into the vein.
- Remove the guidewire while applying forward pressure on the catheter so it does not withdraw.
 - Go to D (Common Steps).

INSERTION TECHNIQUE (4) FEMORAL PLACEMENT PROCEDURE:

For femoral placement, position the patient supine, and insert the catheter tip to the junction of the iliac vein and inferior vena cava.

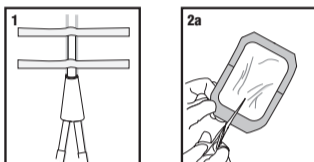
WARNING: The risk of infection increases with femoral vein insertion.

NOTE: Catheters 40 cm and longer are for femoral vein insertion.

- Assess the right and left femoral areas for fitness for catheter placement. Ultrasound may be helpful.
- Have the patient flex the knee on the same side as the insertion site, with the thigh abducted and the foot placed across the opposing leg.
- Locate the femoral vein, posterior and medial to the femoral artery.
- Go to A (Common Steps).
- Go to B (Common Steps), directing tunnel laterally to decrease the risk of infection.
- Go to 1.C (PERCUTANEOUS PLACEMENT USING A SPLIT SHEATH INTRODUCER, Section C: Percutaneous Placement).

RECOMMENDED DRESSING TECHNIQUE

- Secure the catheter to the skin using one or two sterile tape strips. Optional: Place a precut gauze dressing over the exit site, fitting it snugly around the catheter. Place a 2 in. x 2 in. (5 cm x 5 cm) gauze over the precut gauze and catheter.



- Apply a cover dressing, leaving the extension legs exposed. If using an occlusive or film-style dressing:

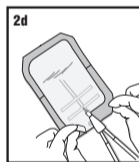
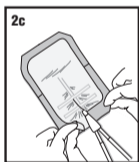
- Cut a 1-2 inch (3 - 5 cm) slit in the short side of an occlusive dressing using sterile scissors.

Remove the backing sheet.

- View catheter site through the dressing on the skin so the slit is over the catheter hub. Press one side of dressing into place while holding the other side off the skin.

- Partially remove the frame portion of the dressing near the secured catheter hub.

- Overlap the unsecured side of the dressing slightly over the secured side to seal dressing under catheter hub. Carefully remove the frame from the dressing while firmly smoothing down the edges. Smooth down the entire dressing. Do not use acetone and PEG-containing ointments, as they can cause polyurethane catheters to fail. Chlorhexidine patches or bacitracin zinc ointments are the preferred alternative.



CATHETER REMOVAL

The white retention cuff promotes tissue in-growth. Remove the catheter surgically, by freeing the cuff from the tissue and pulling the catheter gently and smoothly. After use, the catheter and accessories may be a potential biohazard. Handle and dispose of under accepted medical practice and all applicable laws and rules.

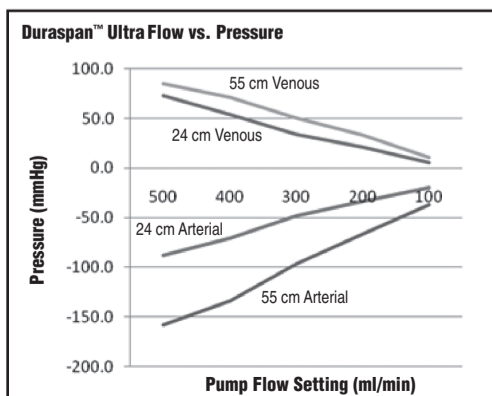
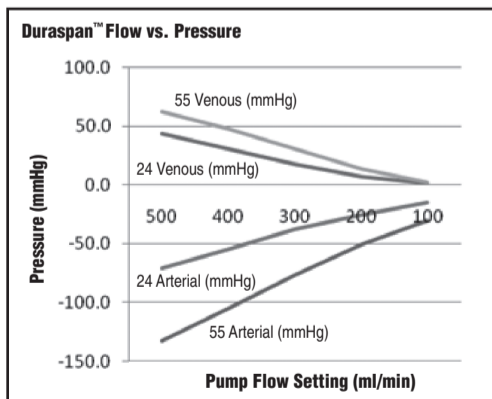


Table 1: Duraspan™ Flow vs Pressure

Pump Setting	500 ml/min		400 ml/min		300 ml/min		200 ml/min		100 ml/min	
Catheter Length (cm)	Blue (mmHg)	Red (mmHg)	Blue (mmHg)	Red (mmHg)	Blue (mmHg)	Red (mmHg)	Blue (mmHg)	Red (mmHg)	Blue (mmHg)	Red (mmHg)
24	43.3	-70.5	30.5	-54.2	17.7	-37.6	7.3	-25.1	1.3	-14.5
28	57.2	-75.9	40.7	-58.8	23.9	-41.0	9.9	-27.5	1.1	-16.7
32	47.3	-87.3	34.2	-68.1	20.2	-47.7	8.3	-32.2	1.8	-19.0
36	60.3	-86.2	43.5	-67.9	25.6	-48.2	10.6	-32.6	2.4	-20.3
40	54.1	-95.3	39.6	-75.8	24.1	-54.2	24.1	-54.2	2.1	-22.5
55	62.6	-132.8	47.4	-104.8	31.0	-76.7	13.7	-50.7	1.9	-30.3

Table 2: Duraspan™ Ultra Flow vs Pressure

Pump Setting	500 ml/min		400 ml/min		300 ml/min		200 ml/min		100 ml/min	
Catheter Length (cm)	Blue (mmHg)	Red (mmHg)	Blue (mmHg)	Red (mmHg)	Blue (mmHg)	Red (mmHg)	Blue (mmHg)	Red (mmHg)	Blue (mmHg)	Red (mmHg)
24	73.0	-87.7	53.5	-70.5	34.4	-48.6	20.9	-33.2	5.1	-19.8
28	76.4	-97.8	56.6	-77.0	37.1	-54.2	22.7	-37.0	5.7	-22.0
32	80.4	-105.4	61.9	-86.9	40.7	-60.7	24.8	-42.2	6.7	-24.2
36	76.0	-113.1	59.3	-94.5	38.8	-66.7	23.5	-45.6	5.5	-27.1
40	80.7	-119.5	64.1	-100.2	42.3	-70.1	26.1	-48.2	6.5	-28.6
55	85.4	-157.7	71.0	-134.2	50.3	-97.0	33.2	-66.3	10.3	-37.0

Table 3: Priming Volume

Catheter Length (cm)	Duraspan™		Duraspan™ Ultra	
	Red (ml)	Blue (ml)	Red (ml)	Blue (ml)
24	1.9	2.1	1.8	2.1
28	2.1	2.3	2.0	2.3
32	2.3	2.5	2.1	2.5
36	2.5	2.7	2.4	2.7
40	2.7	2.9	2.6	2.9
55	3.3	3.6	3.2	3.6

CATHETER CARE

SUGGESTED CATHETER MAINTENANCE

- Povidone iodine, dilute aqueous sodium hypochlorite solution, chlorhexidine gluconate 4%, or chlorhexidine gluconate 2% solution are the suggested antiseptics to use. **WARNING:** Do not use acetone or PEG-containing ointments as they can cause polyurethane catheter failure. Chlorhexidine patches or bacitracin zinc ointments are the preferred alternative.
- 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.
- Monitor the catheter sites visually or by palpation through the intact dressing on a regular basis, depending on the clinical situation of individual patients. If patients have tenderness at the insertion site, fever without obvious source, or other manifestations suggesting local or BSI, the dressing should be removed to allow thorough examination of the site. Sterile technique, including facemask, hand washing and sterile gloves must be used for these procedures.
- Carefully remove the dressing and inspect the exit site for inflammation, swelling and tenderness. Notify physician immediately if signs of infection are present.
- Clean the exit site with an antimicrobial solution following your institution's protocol. Clean from the catheter working outward in a circular motion.
- Dress the catheter as described above under "D (Common Steps)."

TROUBLESHOOTING

PATIENT WITH FEVER

Unusual signs or symptoms (i.e., fever, chills) occurring immediately following the procedure may indicate septic thrombosis. If this does result, the catheter should be removed.

INADEQUATE FLOW

Excessive force should not be used to flush an obstructed lumen. Insufficient blood flow may be caused by occluded arterial tip resulting from a clot or by contacting the wall of the vein. If manipulation of the catheter or reversing arterial and venous lines does not help, then the physician may attempt to dissolve the clot with a thrombolytic agent (e.g., TPA). Physician discretion advised.

CATHETER EXCHANGE

It may become necessary to exchange the indwelling catheter due to infection or a persistent rise pressures or decrease of flow rates which cannot be rectified through troubleshooting.

FLUSHING AND LOCKING THE CATHETER

PROCEDURE (Table 3)

Supplies you will need:

- Alcohol or povidone iodine wipe.
- 10ml syringe with attached 1 inch (2.5 cm) needle filled with 2.5 ml of heparinized saline.
- Tape

The steps in the procedure are:

- Collect your supplies in a convenient place.
- Strictly comply with hand hygiene and wear a cap, mask, sterile gown, and sterile gloves. The cap should cover all hair and the mask should cover the nose and mouth tightly. The patient should also wear a mask and be covered with a sterile drape.
- Remove the tape that is around the injection cap.
- Clean the cap with an alcohol or povidone iodine wipe. If you use the iodine wipe, allow the cap to air-dry for two minutes – be sure not to touch the cap during this time. Do not blow on the area or allow the clean cap to dangle since this increases the chance of contamination of the area with germs.
- Connect the syringe to the cap.
- Release the clamp.
- Inject saline if flushing or heparin if locking into the catheter. As you inject the last 0.5 ml of solution, withdraw the needle from the injection cap. If flushing the catheter of a small patient, do not flush too rapidly. A small patient's circulatory system may be sensitive to rapid changes in volume and pressure. Remove the syringe from the cap.
- Use a separate syringe to flush each lumen with sterile saline or to lock with a heparin solution.

CHANGING THE CATHETER CAP

Supplies you will need:

- Sterile injection cap.
- Catheter clamp
- Tape
- Chlorhexidine or povidone iodine wipe.

The procedure to change the cap:

- Strictly comply with hand hygiene and wear a cap, mask, sterile gown, and sterile gloves. The cap should cover all hair and the mask should cover the nose and mouth tightly. The patient should also wear a mask and be covered with a sterile drape.
- Open the package of the new injection cap and prepare according to your instructions. Be sure the cap does not touch the outer surface of the package. Note: you may need to fill cap with saline or heparin.
- Remove the old tape from around the cap by unpeeling the tape. NEVER try to cut the tape with scissors as you may damage the catheter.
- Clean the cap with an alcohol or povidone iodine wipe. If you use the iodine wipe, allow the cap to air-dry for two minutes – be sure not to touch the cap during this time. Do not blow on the area or allow the clean cap to dangle since this increases the chance of contamination of the area with germs.
- While holding the catheter connector below the heart, unscrew the old cap and discard. (The fluid level in the catheter should drop partway into the catheter if you hold the connector above the heart.)
- Pick up the new cap only by the top and remove the sterile tip protector. Attach the new cap by firmly screwing it onto the catheter connector.
- Cut a 5 cm piece of tape and make tabs on each end by folding back 1 cm. Apply the sticky part of the tape around the cap and catheter connection and fasten securely.

Press ends of the tape together. The tabs on the end of the tape will enable you to remove it easily.

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