

## UMBILICAL ARTERIAL AND VENOUS CATHETERS

### Table of Contents

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- [Critical Points](#)
- [Supplies](#)
- [Procedure](#)
  - [Catheter Placement](#)
  - [Fluid & Medication Administration](#)
  - [Safety & Maintenance](#)
  - [Blood Sampling From UAC & UVC Using The Closed Blood Draw Set](#)
  - [Removal of Catheter](#)
- [Troubleshooting](#)
- [References](#)
- [Appendix A: Hummi-Micro Draw Set for the ICN](#)
- [Appendix B: Closed Blood Draw Set for the PICU, PCICU, and PCTCU](#)

### Critical Points

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1. The recommended tip location for umbilical artery catheters (UAC) is between T6-T9. If a patient is transferred into UCSF with a lower catheter, or the catheter placed here at UCSF is not high enough after placement or adjustment, it is acceptable to keep the UAC between L3 and L4. The higher position is associated with longer use of the catheter and fewer complications.
2. The recommended tip position of an umbilical venous catheter (UVC) is in the inferior vena cava (IVC) just above the diaphragm. This reduces the risk of infusion into the portal circulation. A UVC that remains within the liver should not be used. In rare circumstances, a low-lying UVC (approximately 2-3 cm internal) might be used for short term emergency access (resuscitation) with isotonic or hypotonic fluids and medications.
3. Umbilical catheters will have x-ray confirmation for placement after insertion and this placement will be documented in the EMR. If repositioned, x-ray confirmation is required.
4. UAC and UVC are transduced at all times.
  - a. If the UVC catheter is a double lumen, the transducer is placed on the larger lumen.
  - b. The expected pressure range for a transduced UVC is 0 – 6 mmHg.
5. All UACs and UVCs have a Hummi T-Connector extension tubing with a clamp attached directly to the catheter. For a double lumen UVC, both lumens will have the Hummi T-Connector extension tubing with a clamp attached directly to the catheter.
  - a. Using the clamp will decrease risk of an air embolism in a UVC and decrease risk of bleeding with a UAC.
  - b. *Note:* The Hummi T-Connector extension tubing is considered as an extension to the umbilical catheter and not routinely changed.
6. **ICN Only:** The distal end of each extension tubing will have a MicroClave Clear needleless connector in place.
  - a. This product is acceptable to transduce through due to the clear fluid path allowed through this connector.
  - b. Use of needleless adaptors enhances protection against microbial ingress in central lines.

**UMBILICAL ARTERIAL AND VENOUS CATHETERS (UVC) (continued)**

7. Patients may be placed in the prone position or held (including skin to skin) if the umbilical catheter is secured with a transparent dressing and transduced.
8. Vasospasm and catheter thrombus resulting in a thromboembolic event are potential complications of the UAC and UVC.
  - a. Patients with UAC must have their lower body assessed for any discoloration (blue, purple, white, or mottled coloring), discolored toes, diminished lower extremity pulses or decreased capillary refill. If present, notify provider and discuss appropriate treatment.
9. During removal and immediately following removal of the UAC/UVC, a RN must remain at the bedside to assess for potential complications such as bleeding.
10. Infusions (as ordered):
  - a. UVCs may be used for infusion of most medications, blood products, and TPN.
  - b. UACs may be used for saline infusions or up to 12.5% glucose; they cannot be used for infusion of vasoactive medications (such as dopamine or epinephrine).
11. Dressings over umbilical catheters are transparent and not routinely changed unless adhesion is lost or the catheter needs to be repositioned.
12. RNs document the internal length (cm marking at the umbilicus) every 12 hours and prn. Changes in the cm marking at the insertion site are reported immediately to the provider.
13. Length of dwell time:
  - a. Line necessity will be reviewed every day during rounds. Increased dwell time of umbilical lines is associated with an increased risk of complications such as thrombus formation (UAC) and central-line associated blood stream infections (UAC and UVC).
  - b. Umbilical lines, in proper position, can be used for up to 7 days. If, after this time, no alternative access is obtainable, the dwell time may be extended per the discretion of the attending physician for up to 10 days.
14. Feeding:
  - a. Infants with a UVC in good placement may be given enteral feedings.
  - b. Infants with a UAC in place can be given trophic enteral feedings if determined by an attending physician. Trophic feeding is defined as less than or equal to 20 mL/kg/day.

**Supplies**

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- Umbilical Catheterization Tray
- Transducer cable
- Hummi T-connector (*PMM 24324*) – see [Appendix A](#)
- MicroClave™ needleless connector (*PMM 19165*)
- IV tubing
- Sterile filled normal saline syringes
- Arterial blood gas (ABG) syringes
- Infusion pump
- IV fluid(s) per order

**UMBILICAL ARTERIAL AND VENOUS CATHETERS (UVC) (continued)**

- Appropriate transducer
  - **All ICN** patients: use Neonatal 24" high flow transducer set. (*PMM 9522*)
  - **In PCICU:**
    - ♦ If infusing > 3 mL/hr. into the catheter, use Neonatal 24", high flow transducer set (30 mL squeeze flush). When using this transducer set also obtain IV tubing for fluids. (*PMM 9522*)
    - ♦ if infusing ≤ 3 mL/hr. for monitoring, use 60" disposable, low flow transducer tubing (3 mL squeeze flush, macrodrip, (*PMM 45348*))
- 3.5 or 5 Fr. Umbilical catheter, depending on weight: discuss with provider when setting up the tray.
  - Consider a double lumen UVC for critically ill neonates. (3.5 Fr for up to 1500 gm.; 5 Fr for over 1500 gm).
- Sterile gowns, sterile gloves, masks, and hats for each individual involved in catheter placement. All other individuals in the room must wear a hat and a mask.

**Procedure**

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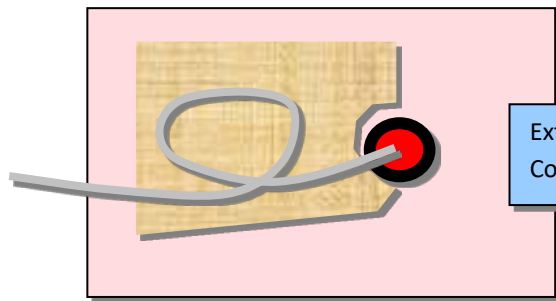
**CATHETER PLACEMENT**

1. During and after catheter placement the RN will:
  - a. Protect infant's eyes from bright exam light prior to turning it on.
  - b. Gently restrain all 4 limbs with soft restraints for procedural purposes only and remove after dressing is secure.
  - c. Monitor tolerance to procedure and notify provider for oxygen saturation decreases, significant change in heart rate, or any cardiac arrhythmias.
  - d. Immediately following insertion of UAC/UVC: assess peripheral perfusion.
    - i. Assess all areas of the body below the umbilicus including the toes, feet, legs, buttocks and genitalia for any blue discoloration, blanching, prolonged capillary refill time, unequal peripheral pulses, and temperature changes.
    - ii. Notify provider of any alterations in peripheral perfusion.
  - e. Document in EMR: time of line placement, type of line placed, cm marking at insertion site, tip location, and tolerance to procedure.
  - f. Assist in obtaining confirmation x-ray by removing all non-lucent objects from bed, positioning head of bed flat and placing patient in a non-rotated, supine position.
  - g. Once correct placement has been determined, and after suturing, prime and connect IV tubing with ordered fluids and secure catheter to abdomen using a small transparent dressing to include a loop under the dressing.
    - i. Keep lines flat on abdomen. Wipe off Betadine with saline wipe. Apply skin barrier and hydrocolloid dressing onto abdomen. Place as close to umbilicus as possible without covering umbilical stump. Loop umbilical catheter and place flat onto skin barrier. Cover catheter with transparent dressing.
    - ii. Do not place dressing over umbilical stump. If oozing at stump, cover with sterile gauze and notify provider. Once no longer oozing, remove gauze and leave open to air.

## UMBILICAL ARTERIAL AND VENOUS CATHETERS (UVC) (continued)



- Trim hydrocolloid dressing and transparent dressing to get dressing as close to stump as possible.
- DO NOT cover stump.



Extra Thin Hydrocolloid Dressing  
Covered with Transparent Dressing

- Note cm marking at umbilicus and document in EMR.
- Secure transducer at heart level.
- Zero transducer at level of right atrium. Landmarks used to identify the right atrium are referred to as the phlebostatic axis which is the midaxillary line at the fourth intercostal space.
- Maintain blood pressure and central venous pressure (CVP) monitor alarms "ON" at all times. Check alarms and alarm parameters every 12 hours and prn.

### FLUID & MEDICATION ADMINISTRATION

- UAC:** should be used primarily for blood pressure monitoring and laboratory blood analysis. Administration of medications and dextrose solutions should be avoided when other central access is available. Exceptions may include use in the delivery room and for emergencies.
- UVC:** medications and dextrose solutions may be infused only after verification that catheter tip is not in the portal circulation.
- Fluid and Medication Table 1:** provides guidelines for administration of fluid and medications through the UVC and UAC.

FLUID	UVC	UAC	SPECIAL CONSIDERATIONS
0.9 NaCl in H <sub>2</sub> O	Yes	Yes	
0.45 NaCl in H <sub>2</sub> O	Yes	Yes	
Sodium Acetate	Yes	Yes	Used for Extremely Low Birth Weight (ELBW)

**UMBILICAL ARTERIAL AND VENOUS CATHETERS (UVC) (continued)**

Ringers lactate	Yes	Yes	
Dextrose in H <sub>2</sub> O	Yes	Yes**	** ≤12.5% Dextrose only if there is no other access available
Total parenteral nutrition (TPN)	Yes	No	
Blood products	Yes	Yes**	**Emergency only
Electrolyte replacement, calcium gluconate, other medications	Yes	Yes**	**Only if there is no other access available
Continuous infusions of vasoactive medications	Yes	No	

**SAFETY & MAINTENANCE**

1. Inspect neonate's umbilicus for redness, tenderness, drainage, edema and/or foul odor every 12 hours with the initial nursing assessment.
2. Assess centimeter marking at catheter exit site and document initial number in EMR. Assess and document internal length (cm marking at the umbilicus) every 12 hours and prn. Notify provider if catheter has moved from initial documented placement as per EMR
3. Document circulation and pulses to lower extremities and buttocks every 3 to 4 hours and prn.
4. Notify provider for changes in perfusion or pulses. Consider obtaining an order for warming the contralateral extremity to produce reflex vasodilation. This can be achieved by placing a heel warmer on the unaffected extremity for 10-15 minutes. If there is no improvement in color of the affected extremity, notify provider.
5. Presence of a damped waveform may indicate decreased cardiac output, a disruption in the system, presence of air in the catheter or tubing, or presence of catheter thrombus. If a damped waveform exists perform the following steps:
  - a. Ensure there are no kinks, loose connections, or air throughout the system.
  - b. Gently aspirate at stopcock with a flush filled syringe.
  - c. Gently attempt to flush. If resistance is met, discontinue flushing.
  - d. If unable to aspirate or flush catheter easily, notify provider.
6. All maintenance solutions are prepared with heparinized fluid.
7. Flush solution for all patients with a UAC or UVC is a 10 mL pre-filled syringe of 0.9% sodium chloride.
8. Whenever possible, use 10 mL syringes to flush UAC/UVC.
9. Change UAC and UVC tubing every 96 hours.
10. Transducer should be zeroed every 12 hours and prn.
11. Prior to manually infusing any solution at the stopcock, always aspirate from catheter into the syringe, clearing any trapped air or fibrin/clot that may be present.
12. Transducer and tubing must be free of air at all times.
13. Double lumen UVC

**UMBILICAL ARTERIAL AND VENOUS CATHETERS (UVC) (continued)**

- a. Consider placing when neonate is likely to need multiple central access points.
- b. UVCs will be transduced.
  - i. For double lumen UVCs, the primary (larger) lumen is used for central venous pressure (CVP) monitoring,
- c. Place Hummi T-Connector extension tubing and clave on both lumens.
- d. Maintenance fluids and total parenteral nutrition (TPN) should be infused through a secondary (smaller) lumen to minimize risk of clot formation.

**BLOOD SAMPLING FROM UAC & UVC USING THE CLOSED BLOOD DRAW SET**

1. Notify provider when the volume of blood drawn for a specific blood draw, exceeds 2 mL/kg.
2. For each blood draw, record blood volume removed and flush volume of flush administered in the EMR flowsheet I & O section.
3. All UACs will have a closed blood drawing set in line.

**PROCEDURE FOR ICN SEE [APPENDIX A](#)**

**PROCEDURE FOR PICU, PCICU, AND PCTCU SEE [APPENDIX B](#)**

**REMOVAL OF CATHETER**

1. Supply sterile gauze at bedside during removal process to apply pressure if bleeding occurs.
2. Perform hand hygiene and don gloves
3. Turn stopcock off to patient (fluid off to patient) and clamp the IV extension tubing.
4. Slowly withdraw catheter through the suture to the 5 cm marking. Notify provider if catheter cannot be removed without the sutures being cut.
5. Recheck stopcock to be certain it is OFF to patient and line clamped.
6. Wait 15 minutes with catheter remaining at the 5 cm marking. **DO NOT LEAVE BEDSIDE DURING THIS TIME.** Proceed by removing catheter 1 cm every 2 minutes. Verify catheter is intact after removal and document removal in EMR.
7. Notify provider if umbilical stump has drainage, swelling or erythema.
8. After catheter removal, patient must be supine for 1 hour. Do not cover umbilicus. This position allows for direct visualization of umbilicus and rapid assessment of complications such as hemorrhage.
9. If bleeding occurs after removal:
  - a. For UAC: hold pressure or pinch below umbilicus over the artery.
  - b. For UVC: pinch umbilicus.
  - c. If bleeding does not immediately stop notify provider.
10. Document blood loss and report to provider.

## UMBILICAL ARTERIAL AND VENOUS CATHETERS (UVC) (continued)

### Troubleshooting

Problem	Suspected issue	Action
Changes in perfusion or pulses	<ul style="list-style-type: none"> <li>Vasospasm or occlusion</li> </ul>	<ul style="list-style-type: none"> <li>Consider obtaining an order for warming the contralateral extremity to produce reflex vasodilation.</li> <li>This can be achieved by placing a heel warmer on the unaffected extremity for 10-15 minutes. If there is no improvement in color of affected extremity, notify provider.</li> </ul>
Dampened waveform	<ul style="list-style-type: none"> <li>Break or leak in tubing</li> <li>Air bubbles in catheter system or transducer</li> <li>Dwelling blood or clot in catheter system</li> <li>Abnormal position of catheter tip</li> </ul>	<ul style="list-style-type: none"> <li>Inspect tubing and tubing connections for leaks, incomplete connections, tubing disconnections, and kinking of tubing in between transducer and patient.</li> <li>Inspect tubing, transducer, and catheter system for air bubbles, clots, or dwelling blood. Remove air bubbles by pulling fluid and air bubbles through system if possible.</li> </ul>
Unable to draw from umbilical catheter	<ul style="list-style-type: none"> <li>Line occlusion</li> <li>Line malposition</li> </ul>	<ul style="list-style-type: none"> <li>Notify provider</li> </ul>

### References

Level of Evidence (FAME*)	Level*	Reference
	E4	Carter, B., Enzman-Hines, M., Gardner, S., & Hernandez, J. (2016). <i>Merenstein &amp; gardner's handbook of neonatal intensive care – 8<sup>th</sup> edition</i> . St. Louis, MO: Elsevier.
	E1	Gordon, A., Greenhalgh, M., & McGuire, W. (2017). Early planned removal of umbilical venous catheters to prevent infection in newborn infants. <i>Cochrane Database of Systematic Reviews</i> , 2017(10), Art. No.: CD012142. <a href="https://doi.org/10.1002/14651858">https://doi.org/10.1002/14651858</a>
	E4	Karlsen, K. (2013). <i>The S.T.A.B.L.E. program: Pre-transport/post-resuscitation stabilization care of sick infants, guidelines for neonatal healthcare providers – 6<sup>th</sup> edition</i> . Salt Lake City, UT: S.T.A.B.L.E, Inc.
	E2	Sulemanji, M., Vakili, K., Zurakowski, D.; Tworetzky, W.; Fishman, S. J., & Kim, H. B. (2017). Umbilical venous catheter malposition is associated with necrotizing enterocolitis in premature infants. <i>Neonatology</i> , 111(4), 337-343. <a href="https://doi.org/10.1159/000451022">https://doi.org/10.1159/000451022</a>
	E4	Verklan, M., & Walden, T. (2015). <i>Core curriculum for neonatal intensive care nursing – 5<sup>th</sup> edition</i> . St. Louis, MO: Elsevier Saunders.

\* FAME Scale details: See nursing policy [Policy, Procedure, & Competency Development, Review, & Approval](#)

## UMBILICAL ARTERIAL AND VENOUS CATHETERS (UVC) *(continued)*

### Procedure History

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Author:	Jody Farrell, RN, ANI; Kim Yost, RN, CNII; Kelly Connell, RN
Originated:	
Resources:	Mary Kay Stratigos, RNC; Jeannie Chan, RN, MS, CNS; Elizabeth Papp RN, MS, CNS
Reviewed:	
Reviewed / Revised:	2/96, 6/99, 4/01, 7/02, 7/03, 3/04, 3/06, 7/09
	2/14 Linda Lefrak, RN, MS, CNS
	6/15 Mary Kay Stratigos, RNC; Patricia Dillon, RN
	8/16 Susan O'Connor, RN, MS, NNP; Mary Kay Stratigos, RNC
	10/18 ICN NP3 Committee
	10/19 Jeannie Chan, RN, MS, CNS; Elizabeth Papp RN, MS, CNS; Mary Kay Stratigos RNC



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Inquiries to: Institute for Nursing Excellence at [UCSF.INEx@ucsf.edu](mailto:UCSF.INEx@ucsf.edu)



## UMBILICAL ARTERIAL AND VENOUS CATHETERS (UVC) (continued)

### Appendix A: Hummi Micro-Draw Set in the ICN













## Hummi Micro-Draw **UAC** Blood Draw Guidelines with Self-Venting Syringes

Step 1	Prep Split-septum T-connector	Step 2	Open and inspect Hummi-Micro Draw Device
	<p>Wearing appropriate protective attire, prep the split-septum T-connector according to institutional policy.</p> 		<p>Open the Hummi Micro-Draw device and inspect. Make sure vent plug is in place on extension with Blue clamp. Make sure vent plug is in place on extension with Red clamp.</p> <p>The protective cover should be on the Hummi Micro-Draw blunt tube.</p> 
	<p><b>Step 3 Close Both Red and Blue Clamps</b></p> <p>Clamp both extension tubing clamps on the Hummi Micro-Draw.</p> <p>Close Red Clamp. Close Blue clamp.</p> 		<p><b>Step 4 Close T-connector with Slide Clamp</b></p> <p>Also clamp the split-septum T-connector tubing at this time using the attached slide clamp.</p> <p>This will stop the line flow into the arterial catheter and T-connector.</p> 
	<p><b>Step 5 Remove Blue clamp vent plug &amp; attach syringe</b></p> <p>Remove White vent plug from extension set with Blue clamp.</p> <p>Attach self-venting syringe, pre-set to required clearance/waste volume. (0.5mL should be sufficient for UAC)</p> 		<p><b>Step 6 Remove Red clamp vent plug &amp; attach syringe</b></p> <p>Remove White vent plug from extension set with Red clamp.</p> <p>Attach self-venting syringe, pre-set to desired volume for blood collection.</p> 
	<p><b>Step 7 Fully Insert Blunt Tube to Catheter Hub</b></p> <p>Remove the protective cover on the Hummi blunt tube.</p> <p>Hold the T-connector hub securely and SLOWLY insert the blunt tube into the T-connector split-septum at a 90 degree angle to the septum. (Keep straight on insertion)</p> 		<p><b>Step 8 Unclamp Blue clamp..so blood can flow to syringe</b></p> <p>Holding the Hummi in an upright position, Unclamp the Blue clamp on the extension tubing with the self-venting clearance/waste syringe. Hold syringe in upright position and allow pre-set clearance volume to fill syringe. 0.5mL to 1.0mL will be sufficient for most umbilical catheters.</p> 
	<p><b>Step 9 Close Blue clamp. Do not detach waste syringe</b></p> <p>After clearance blood fills self-venting syringe, immediately close Blue clamp on the line extension.</p> <p>Leave the syringe with clearance/waste blood attached to extension tube.</p> 		<p><b>Step 10 Unclamp Red clamp so blood can flow to syringe</b></p> <p>Unclamp the Red clamp on the extension tubing with sample syringe.</p> <p>Hold syringe in upright position and allow blood to flow into the syringe.</p> <p>Re-clamp the Red clamp.</p> 
	<p><b>Step 11 Return waste / clearance to patient</b></p> <p>Go to waste/clearance extension with Blue clamp. Holding the syringe in an upright position, open/release the Blue clamp.</p> <p>Slowly return the waste/clearance blood to the patient over a 15 second period. Close Blue Clamp.</p> 		<p><b>Step 12 Remove Hummi from T-Connector &amp; flush line</b></p> <p><b>Hold T-connector hub securely</b>, Slowly remove Hummi from T-connector. (picture top)</p> <p>Unclamp the T-connector and flush the catheter with 0.3mL to 0.5mL to clear the catheter. Flush administered through a stopcock attached to the T-connector. (picture bottom)</p> 
	<p><b>Step 13 Remove Hummi From T-connector and Flush</b></p> <p>Remove sample syringe from the female luer on the extension tubing with Red clamp.</p> <p>Cap the blood sample syringe and set aside for testing.</p> 		<p><b>Step 14 Clean T-connector Split-septum</b></p> <p>Discard the Hummi-Micro Draw device with waste syringe in appropriate sharps container.</p> <p>Clean the T-connector split-septum with appropriate anti-microbial and resume normal arterial monitoring.</p> 

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UMBILICAL ARTERIAL AND VENOUS CATHETERS (UVC) (continued)

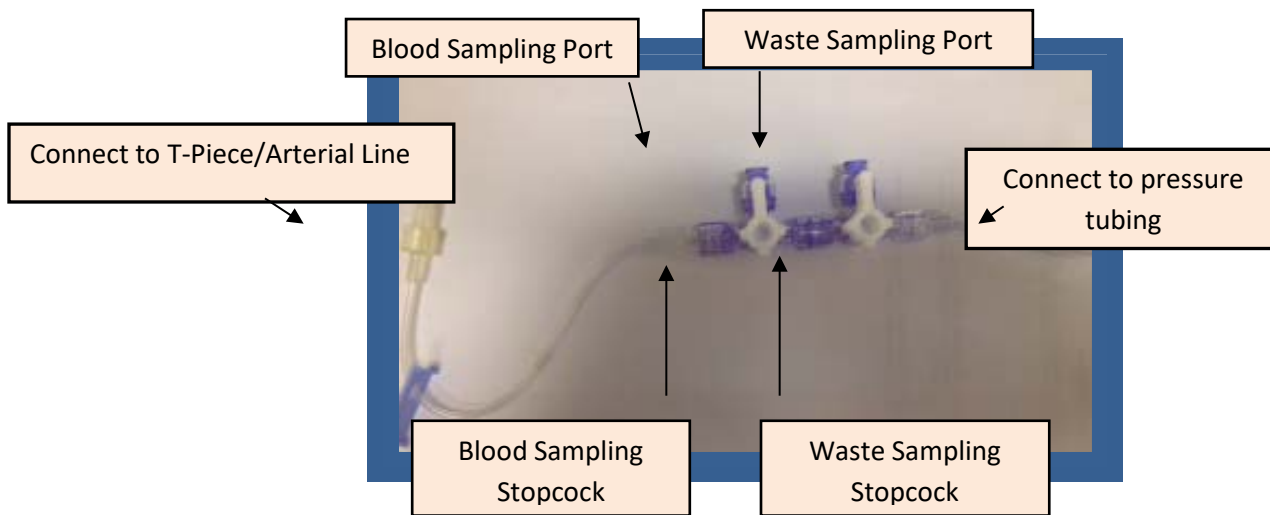
## Hummi Micro-Draw **UAC** & **UVC** Blood Draw Guidelines with Aspirating Syringes.

<p><b>Step 1 Prep Split-septum T-connector</b></p> <p>Wearing appropriate protective attire, prep the split-septum T-connector according to institutional policy.</p> 	<p><b>Step 2 Open and inspect Hummi-Micro Draw Device</b></p> <p>Open the Hummi Micro-Draw device and inspect. Make sure vent plug is in place on extension with <b>Blue</b> clamp. Make sure vent plug is in place on extension with <b>Red</b> clamp.</p> <p>The protective cover should be on the Hummi Micro-Draw blunt tube.</p> 
<p><b>Step 3 Close Both Red and Blue Clamps</b></p> <p>Clamp both extension tubing clamps on the Hummi Micro-Draw.</p> <p>Close <b>Red</b> Clamp.</p> <p>Close <b>Blue</b> clamp.</p> 	<p><b>Step 4 Attach Blood Holding Syringe and Blood Sample Syringes to Appropriate Extension</b></p> <p>Remove the white vent plug and attach Aspirating Syringe for collection of holding/clearance blood to the <b>Blue</b> clamp extension.</p> <p>Remove white vent plug on <b>Red</b> Clamp extension and attach Aspirating Syringe for collection of blood sample.</p> 
<p><b>Step 5 Close T-connector with Slide Clamp</b></p> <p>Clamp the split-septum T-connector tubing at this time using the attached slide clamp.</p> <p>This will stop the line flow into the arterial catheter and T-connector.</p> 	<p><b>Step 6 Fully Insert Blunt Tube to Catheter Hub</b></p> <p>Remove the protective cover on the Hummi blunt tube.</p> <p>Hold the T-connector hub securely and <b>SLOWLY</b> insert the blunt tube into the T-connector split-septum at a 90 degree angle to the septum. (Keep straight on insertion)</p> 
<p><b>Step 7 Unclamp Blue Clamp and Aspirate Required Volume of Clearance Blood</b></p> <p>Unclamp the <b>Blue</b> clamp on the extension tubing and aspirate the required holding /clearance blood volume (<b>minimum 0.5mL</b>) and re-clamp / close the <b>Blue</b> clamp.</p> 	<p><b>Step 8 Unclamp Red Clamp and Aspirate Required Blood Sample Volume</b></p> <p>Unclamp the <b>Red</b> clamp with the blood sample syringe and aspirate the required appropriate blood sample volume, then re-clamp / close the <b>Red</b> clamp.</p> 
<p><b>Step 9 Return Holding / Clearance Blood to Patient</b></p> <p>Go to Holding /clearance extension with <b>Blue</b> clamp. Holding the syringe in an upright position, open the <b>Blue</b> clamp and Slowly return the holding /clearance blood to the patient over a 15 second period and re-clamp/close <b>Blue</b> clamp.</p> 	<p><b>Step 10 Remove Hummi Device From T-connector</b></p> <p>Hold the T-connector hub securely and remove Hummi micro-Draw device slowly from T-connector.(picture top)</p> <p>Unclamp the T-connector and flush the line with <b>0.3mL</b> of flush solution to clear the catheter. (picture bottom)</p> 
<p><b>Step 11 Remove Sample Syringe from Hummi Extension</b></p> <p>Remove sample syringe from extension tubing with <b>Red</b> clamp.</p> <p>Cap the blood sample syringe and set aside for testing.</p> 	<p><b>Step 12 Clean T-connector Split-septum</b></p> <p>Clean the T-connector split-septum with appropriate anti-microbial and resume normal arterial monitoring.</p> <p>Discard the Hummi-Micro Draw device in appropriate sharps container.</p> 

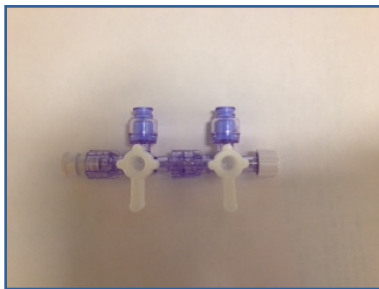
## UMBILICAL ARTERIAL AND VENOUS CATHETERS (UVC) *(continued)*

### Appendix B: Closed Blood Draw Set for the PICU, PCICU, and PCTCU

#### 1. Closed Blood Draw Set: Components and Arterial Line Placement

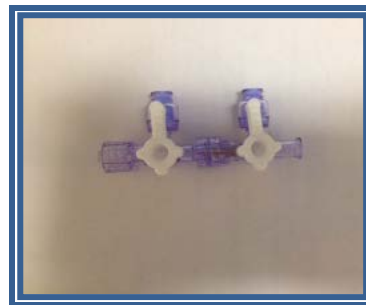


#### 2. Stopcock Positions



**Open Position**

- \*Sample ports open
- \*Used for priming line, flushing line, drawing waste



**Off Position**

- \*Sample ports closed
- \*Used for monitoring pressure

#### 3. Transducer Line Setup

- Attach Closed Blood Draw Set to end of pressure tubing closest to patient.
- Tighten all tubing connections.
- Spike bag of flush solution with transducer tubing set.
- Connect IV tubing to the transducer and pressure tubing AFTER tubing has been flushed with pressure line solution.



**UMBILICAL ARTERIAL AND VENOUS CATHETERS (UVC) (continued)**

- Verify both stopcocks on Closed Blood Draw Set are in the open position (white stopcock handles are turned 180° away from blue blood sampling ports).
- Flush the entire system with the flush solution ensuring it is free of air bubbles.
- Return both stopcocks on the Closed Blood Draw Set to the *closed* position (white stopcock handles are parallel to the blue blood sampling ports).
- Replace vented caps with non-vented caps.
- Connect transducer cable to monitor, set appropriate alarm limits and set alarm ON.
- Zero the transducer with initial set-up.

**4. Blood Sampling**

- Using the Closed Blood Draw Set, identify the blood sample port and stopcock and the blood waste port and stopcock.
- Clean the waste port with alcohol wipe and attach a 3 ml or larger luer-lock syringe
- Turn the blood sample stopcock to open position and the waste stopcock off to the transducer.
  - Slowly pull back 1-1.5ml of waste; leave syringe attached to the waste port.
- Turn the blood sample stopcock off to the transducer and clean the blood sample port with an alcohol wipe.
- Attach a 3ml or larger syringe to blood sample port and slowly withdraw desired amount of blood.
- When drawing coagulation studies, always draw the sample last after all other labs using a separate syringe.
  - Six times the dead-space of the arterial line catheter plus the “T- Connector” plus the stopcock should be withdrawn prior to obtaining coagulation studies. (Ex: 24 gauge angio + T connector + stopcock dead space = 0.5mL, 6 X 0.5 mL = 3 mL)
  - If patient is receiving anticoagulation therapy, i.e.: heparin infusion, write on lab requisition, and do not use HEPAbSORB
- Remove syringe from blood sample port; turn blood sample stopcock to *open* position
- Using syringe attached to the waste port, slowly return blood to patient. Discard syringe.
- Clean the waste port with alcohol wipe and attach 3 ml NS prefilled syringe of flush solution. Slowly flush tubing to clear the line.
- Return the blood and waste stopcocks to *closed* position.
- Check waveform and arterial blood pressure
- Apply patient label to the arterial specimen.
- For infants  $\leq 2.5$  kg document the volume of blood withdrawn and the volume of flush given