BLOOD SAMPLING FROM HEMODIALYSIS CENTRAL VENOUS CATHETERS (HD-CVC) USING THE PULL-PUSH METHOD.

PURPOSE
Standards and procedure for blood sampling from hemodialysis catheters using the “pull-push” method.

POLICY STATEMENTS
The pull-push method is the preferred method of blood sampling from a Hemodialysis CVC but other methods can be used. Blood sampling from a hemodialysis catheter is done only after consultation with a renal unit nurse or nephrologist.

For hemodialysis catheters used outside the renal unit or PICU, the nephrologist on call must be contacted to obtain specific orders for any non-hemodialysis staff to access and care for the catheter. Clarification of any hemodialysis catheter-related procedures can be obtained by paging the renal nurse on-call (via hospital paging).

Required blood samples may be ordered by the most responsible prescriber (physician, NP, etc).

SITE APPLICABILITY
Applicable for blood sampling from hemodialysis catheters in the Renal Dialysis Unit and inpatient care areas.

PRACTICE LEVEL/COMPETENCIES
- Completed the Basics of Central Line self learning guide
- Attended the central line workshop and practiced blood sampling and locking procedure on mannequin
- Routinely performs blood sampling and heparin locking of non-hemodialysis central lines
- Able to differentiate a renal replacement CVC (hemodialysis, CRRT) from other types of CVCs
- Able to describe differences in procedures for a renal replacement CVC from other types of CVCs
- Practices the pull-push technique of blood drawing on mannequin and validates procedure with renal unit RN or unit CRN prior to performing procedure on patient

EQUIPMENT
- requisitions and computerized or addressograph labels for patient
- 70% alcohol & paper towel
- 2% Chlorhexidine Gluconate with 70% alcohol solution (CHG/alcohol) or large CHG/alcohol wipes (note expiration date on bottled solution - expires 1 month after opening)
- Masks x 2
- Sterile dressing tray
- Sterile gloves
- 5 ml syringe for discard
- 10 mL syringe for pull-push technique
- Syringe of appropriate size for blood specimens
- appropriate vacutainers (blood tubes)
- Sterile pre-filled 10 ml normal saline (NS) syringes x 2
- sterile dead-end cap if interrupting infusion
- 4 x 4 gauze
- Clear plastic tape

If locking CVC following, add:
- CVC locking solution as ordered
- Medication added label (Yellow- sodium citrate; Green - heparin; Orange - alteplase)
- Swabcap™ x 2

NOTE: 4% sodium citrate (Citralok®) is routinely used for locking hemodialysis CVCs but other solutions such as heparin or alteplase (t-PA) are also ordered on occasion. Add syringes/needles as needed to prepare and instill solutions.
<table>
<thead>
<tr>
<th>PROCEDURE</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. REFER to Bloodwork Test and Tubes quick reference guide or the Department of Pathology eLab Handbook to determine appropriate blood tubes and volumes and any special handling instructions. For blood culture instructions, REFER to Blood Culture Collection Protocol and recommended blood volumes for blood cultures chart to determine type of bottles and optimal volume of blood to add to each bottle.</td>
<td>Facilitates completion of task in timely manner.</td>
</tr>
<tr>
<td>2. IDENTIFY patient by comparing name on requisition and labels to patient identiband. If patient does not have identiband (i.e. Ambulatory care patients), ask patient/caregiver for identification information (name, birthdate).</td>
<td>Failure to correctly identify patients prior to procedures may result in errors.</td>
</tr>
<tr>
<td>3. EXPLAIN procedure.</td>
<td>Evaluates and reinforces understanding of previously taught information and confirms consent for procedure.</td>
</tr>
<tr>
<td>4. CLEAN surface with surface disinfectant wipe.</td>
<td>Routine infection control practices. Reduces transmission of microorganisms.</td>
</tr>
<tr>
<td>5. POSITION patient flat, masked with head turned away from the CVC.</td>
<td>Positioning patient flat reduces risk of air embolus. Masking the patient reduces transmission of microorganisms.</td>
</tr>
<tr>
<td>6. REMOVE gauze, bulldog clamp and bridging tape from lumen to be accessed.</td>
<td>To maintain optimal flow rates for hemodialysis treatments, use of the arterial lumen for non-dialysis interventions should be avoided if possible.</td>
</tr>
<tr>
<td><strong>NOTE:</strong> the venous (blue) lumen should be used for blood sampling unless it is being used for infusion, in which case the arterial (red) lumen may be accessed if it is not in use.</td>
<td></td>
</tr>
<tr>
<td>7. MASK and PERFORM hand hygiene for one minute.</td>
<td>Routine infection control practices; reduces transmission of microorganisms.</td>
</tr>
<tr>
<td>8. PREPARE equipment using aseptic technique.</td>
<td></td>
</tr>
<tr>
<td>9. CLAMP catheter. If second lumen infusing, CLAMP second lumen.</td>
<td>By clamping first, then stopping infusion, positive pressure is established.</td>
</tr>
<tr>
<td>10. PAUSE infusion pump or ACTIVATE the delay infusion feature if more than 2 minutes is required for blood sampling.</td>
<td>Both lumens must be clamped to ensure no contamination to blood samples.</td>
</tr>
<tr>
<td>11. REMOVE IV tubing and attach sterile dead-end cap to open end to keep covered.</td>
<td>Reduces transmission of microorganisms.</td>
</tr>
<tr>
<td>12. DON sterile gloves and PLACE sterile drape under CVC.</td>
<td></td>
</tr>
<tr>
<td>13. SCRUB the one-piece needleless connector for 60 seconds with a CHG/alcohol soaked gauze. With second soaked gauze, CLEAN up the line including clamp. Allow to dry for 1 minute.</td>
<td></td>
</tr>
<tr>
<td><strong>NOTE:</strong> DO NOT TOUCH THE AREA JUST SCRUBBED.</td>
<td></td>
</tr>
<tr>
<td>14. ATTACH 5 mL syringe to the one-piece needleless connector. UNCLAMP catheter and</td>
<td>Removes locking solution or infusate from catheter and prevents inadvertent administration of locking</td>
</tr>
</tbody>
</table>
### Blood Sampling from Hemodialysis Central Venous Catheters (HD-CVC) Using the Pull-Push Method

**WITHDRAW** 3 mL blood for discard.

**NOTE:** If unable to withdraw blood, ensure lumen is not kinked, have patient cough, re-position patient – if still no blood return, attempt to “milk” as much of the locking solution from the lumen. If still unable to withdraw solution from either lumen, page the nephrologist on call. Do not attempt to flush CVC.

**15. CLAMP** catheter. **REMOVE** syringe and **DISCARD**.

**16. WIPE** connector with CHG/alcohol gauze or **REMOVE** Swabcap™ if present. **ATTACH** 10 mL syringe to needleless connector and perform pull-push technique:
  a. **UNCLAMP** and aspirate 6 mLs of blood
  b. **PUSH** back into catheter
  c. **REPEAT** this process 2 more times and clamp catheter
  d. **DISCARD** syringe, wipe connector with CHG/alcohol soaked gauze and attach new syringe
  e. **WITHDRAW** required amount of blood for sampling

**Pull-Push technique requires the “mixing” of blood back and forth in a syringe several times to eliminate contaminants from infusates or locking solution in the catheter.**

**17. CLAMP** catheter and remove syringe.

**18. WIPE** connector with CHG/alcohol soaked gauze and **ATTACH** a 10 mL sterile pre-filled NS syringe. **UNCLAMP** catheter and with thumb on plunger of syringe and other hand on clamp, give 2 quick pushes, then with a continuous motion, **FLUSH** with normal saline. **CLAMP** catheter as syringe plunger approaches the 1 mL mark. **REMOVE** syringe and **WIPE** connector with CHG/alcohol soaked gauze and repeat with second pre-filled syringe.

**By clamping while infusing flush solution, positive pressure is established.**

**19. For continuous infusion:**
  a. **WIPE** connector with CHG/alcohol soaked gauze
  b. **CONNECT** tubing to one-piece needleless connector
  c. **TURN** infusion pump **ON** and **UNCLAMP** catheter
  d. **PERFORM** site to source check of infusion system.

**Site to source check is necessary to ensure correct solution is infusing via correct vascular access at the correct rate.**

**20. For capped line:**
  a. **WIPE** connector with CHG/alcohol soaked gauze
  b. **ATTACH** syringe with locking solution to needleless connector
  c. **UNCLAMP** catheter and with thumb on plunger of syringe, and other hand on clamp, **give 2** quick pushes and then with

**Locking the CVC using a positive pressure technique and appropriate solution helps maintain catheter patency.**
continuous motion, **inject** solution amount equal to the volume of the lumen + 0.2 mL.

d. **CLAMP** catheter while plunger of syringe is still moving forward (some citrate should remain in syringe).

e. **REMOVE** syringe.

f. **LABEL** CVC with appropriate medication label stating the dosage, amount/volume instilled and date/time of procedure and **ATTACH** to lumens with clear plastic tape.

g. **ATTACH** Swabcap™ to needleless connector.

21. If second lumen is in use, **UNCLAMP** second lumen and **RESUME** infusion to second lumen.

22. Gently **AGITATE** sample syringe then **TRANSFER** blood into appropriate blood tubes using a blunt needle or blood transfer device.

23. **LABEL** specimen tubes at the patient's bedside. Label must include MRN, first and last name, date of birth, date and time sample drawn and RN initials. May use computerized or addressograph labels if available except for Group and Screen and Crossmatch.*

**NOTE:** *Group & Screen and Crossmatch collection procedure: National Standards for safe transfusion practice require specimen labeling at the bedside*

- Confirm patient identification - name, DOB, MRN on patient ID band matches with the requisition. Resolve any discrepancies prior to collection.
- When possible, ask patient his/her name and DOB.
- Specimen MUST be hand labelled at the bedside only by the person who collected the specimen. Computer generated labels are not to be used.
- Label must contain patient name, DOB, MRN, date and time of collection and RN initials.
- Sign requisition and record date and time of collection. **Note:** signing requisition confirms you have correctly identified the patient.

24. **COMPLETE** appropriate laboratory requisitions indicating the site where blood sample was obtained, RN initials, and date and time. On the transfusion medicine requisition: sign, date and time the requisition in the appropriate space. Your signature MUST include full last name, and first name or first initial. Person who collects sample

*Communication to additional members of the health care team*
BLOOD SAMPLING FROM HEMODIALYSIS CENTRAL VENOUS CATHETERS (HD-CVC) USING THE PULL-PUSH METHOD.

must be the person who signs the requisition.

NOTE: Indicate on culture bottles and requisitions which lumen the sample was drawn from and indicate patient's weight on requisition.

25. **ATTACH** bulldog clamp to tape tab on lumens. **Add security.**

26. **WRAP** lumens in gauze and secure with clear plastic tape. **Routine infection control practices; reduces transmission of microorganisms.**

27. **REMOVE** equipment and **DISPOSE** appropriately. **PERFORM** hand hygiene.

28. **PLACE** specimens in transport bags and **ARRANGE** for transport to lab.

**DOCUMENTATION**

**DOCUMENT** on appropriate record(s):
- procedure and time
- patient's response to procedure if unusual

**REFERENCES**


