

# Hemodialysis: First Time Cannulation of an Arteriovenous Fistula (AVF) and Using a Hemodialysis Central Venous Catheter (CVC)

## Site Applicability

All PHC Renal Program Hemodialysis (HD) units (In-Centre and Community Dialysis Units)

## Practice Level

Specialized: RNs and LPNs who have completed the required education, and provide nursing care in a PHC Renal Program HD unit perform this procedure.

## Need to Know

1. Cannulation of an arteriovenous fistula/graft places the HD patient at risk for bacterial contamination. The process of cannulation has the potential of introducing bacteria directly into the patient's bloodstream. Bloodstream infections increase the morbidity and mortality rates in End Stage Renal Disease patients. An aseptic technique should be used with all cannulation procedures.
2. The cannulation of an AVF and concurrent use of a CVC is often referred to as the "one and one" method. Using the fistula as the arterial access for the first three treatments assists in the maturity of the vessel and also prevents infiltration by utilizing it as an outflow access. This will also lessen the risk of a severe and painful infiltration if blood is being returned into the tissues at the rate of 200 mL/min or higher.
3. Sodium Citrate 4% is the lock solution of choice for the PHC Renal Program to lock the CVC unless otherwise ordered to use heparin. The amount of Sodium Citrate 4% required is equivalent to the internal volume of the lumen plus 0.3 mL of overfill to account for the Tego™ connector. A notation of the volume of the CVC lumens is printed on the white lumen clamps.
4. Heparin stop time on the machine should be programmed to a minimum of 30 minutes when using the AVF/AVG.

## Guideline

1. All first time cannulations should be attempted with a 16g angiocath (containing 18 g stiletto.) If angiocath not available, use 17-gauge steel needle.
2. The first needle should be used as the arterial (outflow) to determine if the vessel has an adequate blood supply. The CVC is used as the venous (inflow).

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3. Using a 10 mL syringe, withdraw 5 mL of blood from the unused limb of the CVC. Check for patency. Flush limb with 20 mL of normal saline and lock with Sodium Citrate 4%.
4. For the first, second, and third treatments, 16 g angiocath (or 17 g steel if not available) should be used as the arterial (outflow). The CVC is used as the venous (inflow).
5. Closely monitor the arterial pressures for 3 consecutive treatments. If there is consistent arterial insufficiency or arterial pressures are lower than -150 mmHg at a blood pump speed of 200 mL/min, notify the Vascular Access RN.
6. If arterial needle is infiltrated, rest AVF for 2 weeks and then restart sequence from the first treatment.
7. For the fourth, fifth, and sixth treatments, 16 g angiocath (or 17-gauge steel needle if not available) should be used as the venous (inflow). The CVC is used as the arterial (outflow).
8. Closely monitor the venous pressures for 3 consecutive treatments. If venous pressures are higher than 150 mmHg at a blood pump speed of 200 mL/min are noted, notify the Vascular Access RN.
9. If venous needle is infiltrated, rest AVF for 2 weeks and then restart sequence from the fourth treatment.
10. For the seventh, eighth, and ninth treatments, 16 g angiocath (or 17-gauge steel needle if not available) should be used for both arterial (outflow) and venous (inflow).
11. Closely monitor the arterial and venous pressures for 3 consecutive treatments. If consistent low arterial and high venous pressures at a blood pump speed of 200 mL/min are noted, notify the Vascular Access RN.
12. If no issues are noted, the RN should perform Transonic Access flow measurement.
13. Inform Vascular Access RN of the access flow measurement and the Vascular Access Team will order removal of CVC if appropriate.
14. If any needle is blown, rest AVF for 2 weeks and then restart sequence from the seventh treatment.
15. For the tenth, eleventh, and twelfth treatments, 16-gauge angiocath should be used for both arterial (outflow) and venous (inflow), if possible.
16. After 4 weeks of complication free HD treatments using 16-gauge angiocaths, increase to 15-gauge, if possible.
17. If unable to increase needle size or blood pump speed, consult with Vascular Access Team.
18. Cannulation sites must be rotated using the rope-ladder technique to prevent the development of aneurysms and pseudoaneurysms (unless the patient is practicing buttonhole technique.)

## Documentation

1. Document the sequence of treatments using the form PHC-RU221 (see [Appendix A](#): Worksheet for First Time Cannulation of an AVF and Using a CVC).

2. Document any finding(s) from the assessment of the access that are unusual or not the normal baseline on the patient health record
3. Document any problem(s) with needle placement.
4. Document arterial and venous pressures at 200 mL/min blood pump speed on the HD log. Maximize the blood pump speed until arterial and venous pressures reach but do not exceed - 250 +/- 250 mmHg.

## Related Documents

1. [B-00-11-10191](#) - Hand Hygiene (Corporate Policy)
2. [B-00-07-13027](#) - Face Protection: Masks, Goggles and Face Shields – Infection Control
3. [B-00-07-13038](#) - Spills: Blood and Body Fluids (Infection Control)
4. [B-00-13-10055](#) - Hemodialysis: Heparin Protocol
5. [B-00-12-10029](#) - Hemodialysis: Removal Of Fistula Needles from AV Fistula or Graft
6. [B-00-13-10058](#) - Hemodialysis: Patient Assessment Pre, Intra and Post Dialysis
7. [Blood and Body Fluid Exposure Protocol](#) Occupational Health and Safety

## References

1. BC Provincial Vascular Access Services Team (2013). Cannulation of AV Fistulas and Graft, BC Provincial Renal Agency Vascular Access Recommendations.  
<http://www.bcrenalagency.ca/professionals/VascularAccess/ProvGuide.htm>
2. Counts, C. (Ed.) (2008). Core Curriculum for Nephrology Nursing. American Nephrology Nurses' Association. Anthony Jannetti, Inc.; Pitman, NJ. (pp 752-762).
3. Marticorena, R. M., Dacouris, N., & Donnelly, S. M. (2018). Randomized pilot study to compare metal needles versus plastic cannulae in the development of complications in hemodialysis access. *The Journal of Vascular Access*, 19(3), 272–282.  
<https://doi.org/10.1177/1129729817747535>
4. National Kidney Foundation. K/DOQI Clinical Practice Guidelines for Vascular Access, 2006.  
[http://www.kidney.org/professionals/kdoqi/pdf/12-50-0210\\_JAG\\_DCP\\_Guidelines-VA\\_Oct06\\_SectionC\\_ofC.pdf](http://www.kidney.org/professionals/kdoqi/pdf/12-50-0210_JAG_DCP_Guidelines-VA_Oct06_SectionC_ofC.pdf)
5. National Kidney Foundation. Clinical Update, Needles and Cannulas for Arteriovenous Access: More Options Promote Better Outcomes, 2021.  
[https://www.kidney.org/sites/default/files/Fistula%20Bulletin\\_0.pdf](https://www.kidney.org/sites/default/files/Fistula%20Bulletin_0.pdf)

**Persons/Groups Consulted:**

Nurse Educators, PHC Renal Program

Renal Clinical Practice Group

Vascular Access RN, PHC Renal Program

CNS IVT, Vascular Access, Chemotherapy Heme/Onc

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# Appendix A - Worksheet for First Time Cannulation of an AVF and Using a CVC



## WORK SHEET FOR CANNULATING A NEW AVF WHILE STILL USING A CVC

Nephrology Procedure  
Note

Date access created: \_\_\_\_\_

Date for start of first sequence cannulation: \_\_\_\_\_

Date for second sequence cannulation (if required): \_\_\_\_\_

Legend - Needle Gauge

17 S = 17 g steel needle

16 A = 16 g angio cath

### Treatments 1, 2, and 3 (ARTERIAL) – USE AVF as Arterial and CVC as Venous

Treatment date:			
Needle placement	Arterial	Arterial	Arterial
Needle gauge:	17 S / 16 A	17 S / 16 A	17 S / 16 A
Blood flow:	/250 max	/280 max	/280 max
Initials:			

- If consistent arterial insufficiency, have Vascular Access nurse order fistulogram
- If arterial needle blown, rest AVF for 2 weeks and then restart sequence from the beginning

### Treatments 4, 5 and 6 (VENOUS) – USE AVF as Venous and CVC as Arterial

Treatment date:			
Needle placement	Venous	Venous	Venous
Needle gauge:	17 S / 16 A	17 S / 16 A	17 S / 16 A
Blood flow:	/250 max	/280 max	/280 max
Initials:			

- If consistent high venous pressures, have Vascular Access Nurse order fistulogram
- If venous needle blown rest AVF for 2 weeks and then restart sequence from treatment 4

### Treatments 7, 8 and 9 (ARTERIAL and VENOUS) – USE AVF for Arterial and Venous

Treatment date:			
Needle placement	Arterial/venous	Arterial/venous	Arterial/venous
Needle gauge:	17 S / 16 A	17 S / 16 A	17 S / 16 A
Blood flow:	/250 max	/300 max	/300 max
Initials:			

- If any needle blown, rest for 2 weeks and then restart sequence from treatment 7
- If consistent high arterial or venous pressures, have Vascular Access Nurse order fistulogram
- Inform Vascular Access Nurse of Transonic Access Flow measurement
- Inform Vascular Access Nurse of Access flow, to have Vascular Access Nurse order CVC to be removed

### Treatments 10, 11 and 12 (ARTERIAL and VENOUS)

Refer to protocol procedure to increase needle size. If in doubt, consult with Vascular Access Nurse.

Treatment date:			
Needle placement	Arterial/venous	Arterial/venous	Arterial/venous
Needle gauge:	17 S / 16 A	17 S / 16 A	17 S / 16 A
Blood flow:	/250 max	/300 max	/350 max
Initials:			

To achieve higher pump speeds, increase needle size to 15 gauge.

COMPLETE ADDITIONAL DOCUMENTATION (e.g. complications) IN PATIENT HEALTH RECORD.

If you initial this form, you must complete the Interdisciplinary Signature Sheet at the front of the patient chart.

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