### Purpose:

1. To evaluate efficiency and prevent complications of vascular hemodialysis access of Arteriovenous Fistula (AVF) and Arteriovenous Graft (AVG) used for hemodialysis therapy.

### Policy:

1. Registered Nurses and Licensed Practical Nurses in Dialysis, who have demonstrated competency to the renal educator or delegate, shall perform vascular access assessment (which includes a review of vascular issues from the chart) and a clinical assessment (which includes inspection, palpation and auscultation of AVF/AVG) each treatment prior to cannulation.

2. Urea based recirculation bloodwork may be used to assess AV fistulae. If recirculation is >15%, confirm needle position and repeat next hemodialysis treatment. If recirculation is >15% on 2 consecutive measurements notify Nephrologist and/or Vascular Access Nurse.

3. Dynamic Venous Pressure (DVP) monitoring will be done with each treatment for AVGs. If DVP are >125 mmHg or trending upwards on 3 consecutive treatments, notify Nephrologist and/or Vascular Access Nurse.

4. Fresenius recirculation is performed with each treatment and may be repeated during the same treatment if result greater than 20%. Notify the Nephrologist and/or Vascular Access Nurse.

5. Prolonged bleeding time post treatment and high venous pressures may indicate a stenosis. Notify Nephrologist and/or Vascular Access Nurse

### A. AVF/AVG Recirculation Bloodwork:

#### Equipment:

- 3 Alcohol swabs swabs
- 3 – 10 ml syringes
- 3 – blunt fill needles
- 3 Chemistry tubes
- 3 Chemistry requisitions
**PROCEDURE:**

1. Label each chemistry tube with the appropriate patient labels. Mark one of each of the tubes arterial, venous, and systemic.

2. Obtain blood samples 15-30 minutes after initiation of hemodialysis.

3. Press the UF Timer light off.

4. If the patient has Na and UF profiles, the 5008 reads: *Stop Both Profiles or Continue Treatment.*
   - Press Stop Both Profiles.

5. Swab the arterial (red) sampling port using an alcohol swab. Using the 10 ml syringe with a blunt fill needle, collect a minimum of 4.5 ml of blood. Place in chemistry tube labelled “arterial”.

6. Repeat step 5 using the venous port and place in chemistry tube labelled “venous”.

7. Lower the blood flow to 120 ml/minute.

8. After 10 seconds, turn the blood pump OFF.

9. Clamp the arterial bloodline between the sampling port and dialyzer.

10. Clamp venous blood line.

11. Swab the arterial sampling port. Collect a minimum of 4.5 ml of blood from the arterial port. Place in chemistry tube labelled “systemic”.

12. Unclamp the arterial and venous bloodlines and resume original blood flow.

13. If the patient has Na and UF profiles: Press the UF menu and reset the UF profile. Press the Na Profile menu and reset the Na profile.
   - If less than 2 hours of treatment remain, will not be able to reprogram the Na profile.

14. Press the UF Timer Light ON

15. The following formula is used to calculate the percentage of recirculation:

   \[ R(\%) = \frac{S-A \times 100}{S-V} \]

   - Elevated levels of access recirculation will be investigated for the presence of vascular access stenosis.

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**KEY POINT:**

- Each blood tube requires a separate lab requisition for urea level.

- This will stop Ultrafiltration and therefore eliminate convective transport

- If the profiles are not stopped, the dialysate flow will stop which will cause the arterial and venous samples to be the same as there will be no diffusion occurring. Pressing *Continue* will cause the UF to resume and give inaccurate results.

- This clears recirculated blood from the access.

- To prevent backflow from the dialyzer.

- To prevent introduction of venous blood into the systemic sample.

- Systemic sampling must be obtained within 15 seconds of stopping the blood pump.
B. **Dynamic Venous Pressure Monitoring for AVGs:**

1. Initiate hemodialysis with blood flow of 200 mL/min.  
   - Ensure 0.9% NaCl has cleared from the extracorporeal circuit.

2. Ensure patient’s bed/chair is set to the lowest possible level.  
   - Assess at same level for all measurements for all treatments. DVP will fluctuate at different elevations.

3. Measure and record the venous pressure from the hemodialysis delivery system during the first 2 – 5 minutes of every hemodialysis treatment.  
   - Pressure will vary depending on the gauge of the fistula needle. If venous pressure >125 mmHg on 3 consecutive treatments or increasing progressively, notify Nephrologist and Vascular Access Nurse.

4. Increase blood flow (Qb) to desired rate.

C. **Fresenius Recirculation Measurement (On-Line Recirculation):**

1. The nurse must document and interpret the results using the following guidelines:

   - If recirculation is low (< 10 %), it is probably a case of inevitable cardiopulmonary recirculation.

   - If recirculation is high (> 20 %), there is probably a considerable recirculation in the fistula. First check whether the needles are well positioned and whether the blood lines have not been reversed before being connected. If the fault cannot be ascertained here, the fistula should be further examined for possible stenosis.

   - If the recirculation is between 10 and 20 %, the patient might have a very high cardiopulmonary recirculation or additional fistula recirculation might be present. To distinguish between both possibilities, increase or decrease the blood flow by 100 mL/min and repeat recirculation measurement. If there is only a minor recirculation change, this is an indicator for cardiopulmonary recirculation. If there is a considerable change (>10 %), it is more likely a case of fistula recirculation.

   - If the patient has a recirculation value that is normally between 10-20%, the repeat test is not required.

2. To repeat the recirculation measurement, touch the Recirculation I/O button

3. Notify Nephrologist and/or Vascular Access Nurse with results greater than 20%.

   - The Fresenius 5008 measures access recirculation using the thermo dilution method of the blood temperature monitor (BTM). The result is displayed on the “treatment” and “BTM” option pages approximately 15 minutes into treatment.

   - Please observe that recirculation measurement impacts dialysis efficiency. A prolongation of the treatment should therefore be considered.
D. **Vascular Access Assessment:**

1. **INSPECTION**

   a. Compare arms looking for ecchymosis, erythema, discoloration of skin or any breaks in the skin.

   b. Inspect access arm for aneurysms, hematomae, curves or flattening of the vessel, presence of accessory vessels, signs of steal syndrome, and previous puncture sites.

2. **PALPATION**

   a. Assess the thrill to determine patency of fistula

   - Felt only at the anastamosis and disappears with compression of anastamosis. (If strong blood flow through the vessel, you may feel the thrill up the entire length of the fistula.) Should start out strong and diminish as you go up the fistula.

   - No thrill indicates clotted fistula. Therefore do not cannulate.

   b. Assess for the following:
      
      (i) Aneurysms
      (ii) Temperature – increased temp may indicate infection
      (iii) Decreased temperature to distal extremity may indicate steal syndrome
      (iv) Pain may also indicate steal syndrome
      (v) Capillary refill <3 seconds is normal
      (vi) Assess vessel length for two needles
      (vii) When palpating the vessel roll your fingers over the vessel to gauge vessel diameter

3. **AUSCULTATION**

   a. Using a stethoscope listen for the bruit beginning at the anastamosis and following the entire length of the access, including the outflow veins of the upper arm.

   - Flow of blood in the vessel should be consistent in sound that diminishes along the vessel

   - Pulse like sounds or high-pitched sounds could mean a stenosis.

4. **REPORT**

   a. Notify vascular access nurse and/or nephrologist of any abnormal findings

**DOCUMENTATION:**

- Hemodialysis Treatment Record
- Vascular Access Record
- Integrated Progress Notes
- Hemodialysis Flow Sheet
REFERENCES:


ESRD network 1 October 11, 2007 Av Fistuole: Creation thru Decades-Long Performance! Janet Holland, RN, CNN director, Da Vita Vascular Access Management