

# Hemodialysis: Transonic Monitoring for Access Flow and Recirculation

## Site Applicability

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

## Practice Level

Specialized: Nurses who have completed the required education and who provide care in the PHC Renal Program Hemodialysis specialty.

## Need to Know

1. Transonic Access Monitoring uses ultrasound dilution to determine access flow, delivered blood (pump) flow, recirculation, and cardiac output.
2. Access flows should be monitored:
  - Every 4 weeks for arteriovenous grafts (AVGs)
  - Every 6 weeks for arteriovenous fistulas (AVFs)
  - Within 1 week of any radiological intervention. Problematic accesses should be monitored more frequently.
3. Access flows should be measured in the first 90 minutes of a hemodialysis session and the patient should be placed sitting/lying upright at a 45 degree angle. Placing the patient at a 45 degree angle for transonic monitoring helps promote consistency between readings by eliminating the variable of patient position.
4. Access flows of less than 600 mL/min or a drop of greater than 25% from baseline values require a recirculation study and must be reported to the vascular access team and/or nephrologist for further investigation.
5. If flow results are less than 400mL/min, perform a recirculation study and report your findings to the vascular access team and/or nephrologist immediately.
6. Hemodialysis Central Venous Catheters (CVCs) should be tested for recirculation if the access is dysfunctional and/or the patient exhibits signs/symptoms of inadequate dialysis (e.g. low clearance value on the HD machine or signs of hyperkalemia.)

## Equipment and Supplies

1. HD03 hemodialysis flow QC monitor and sensors
2. Ultrasound conducting gel or alcohol swabs
3. Non-sterile gloves
4. 10 mL prefilled normal saline (0.9%) syringe
5. Blue pad

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## Procedures:

### Recirculation

#### Steps

1. Ensure the HD03 hemodialysis flow QC monitor is plugged into an electrical outlet.
2. Apply a layer of ultrasound conducting gel in the sensing cavity of the flow/dilution sensors or wipe the sensors with alcohol swabs.
3. Place the sensors on the blood lines 5 to 10 cm (2 to 4 inches) from the needle/blood line connections. Ensure the sensors' directional arrows correspond to the blood flow pathway.
4. When tubing is secured within the sensor cavity, close the sensor lid.
5. On your HD03 machine, select 'Measure Patient.'
6. Ensure correct dialysis tubing has been selected.
7. Press **Recirculation** on HD03.
8. Follow directions on the computer screen. Press "OK Wait" for green traffic light on the computer screen before beginning the procedure. Follow the instructions on the screen.
9. Put on gloves
10. Clean the venous port of your hemodialysis machine with an alcohol swab.
11. Connect a 10 mL normal saline syringe to the venous injection port.
12. Expand venous and arterial pressure limits.
13. Inject normal saline into the venous injection port over 5 to 6 seconds.
14. Monitor venous and arterial pressures.
15. Record your results.
16. Remove sensor devices and clean with alcohol swabs.

### Access Flow Measurement

#### Steps

1. Ensure HD03 hemodialysis flow QC monitor is plugged into an electrical outlet.
2. Apply a layer of ultrasound conducting gel in the sensing cavity of the flow/ dilution sensors or wipe the sensors with alcohol swabs.
3. Place the sensors on the blood lines 5 to 10cm (2 to 4 inches) from the needle/blood line connections. Ensure the sensors' directional arrows correspond to the blood flow pathway.
4. When tubing is secured within the sensor cavity, close the sensor lid.
5. On your HD03 machine, select 'Measure Patient.'
6. Ensure correct dialysis tubing has been selected.
7. Press **Access Flow** on HD03.
8. Enter parameters and follow directions on the HD03 monitor.
9. Put on gloves.
10. Place the blue pad underneath your patient's access site to catch any drops of blood.
11. Stop the blood pump.
12. Clamp arterial and venous fistula needles and arterial and venous tubing clamps (4 clamps).
13. Disconnect arterial and venous lines. Reverse and create recirculation by attaching your arterial dialysis line to the venous needle and the venous dialysis line to the arterial needle.
14. Open the 4 clamps you previously closed.

15. Resume the blood pump speed to 300 mL/min.
16. Clean your venous injection port with an alcohol swab and attach a 10mL normal saline syringe.
17. Wait for the green traffic light on the HD03 monitor before beginning the procedure.
18. When the traffic light turns green, inject the normal saline into the venous injection port over 5-6 seconds. Timing is important as an injection that is done too quickly can result in a false high reading and one that is done too slowly can result in a false low.
19. Record the measurement.
20. Stop the blood pump.
21. Clamp the arterial and venous needle/machine lines (4 clamps.)
22. Reverse lines back to normal position, open clamps, and resume dialysis at the prescribed pump speed.
23. Remove and clean sensors.

## Documentation

### Cerner

1. Findings must be documented in the 'Hemodialysis Flow Monitoring' log under the Dialysis Management band in Cerner and into PROMIS.
2. The nephrologist and vascular access team must be notified of any abnormal findings.
3. Due date for next transonic measurement must be placed under Ambulatory Workflow > Team Communication > Situational Awareness & Planning.

### Paper Chart

1. Findings should be documented on the Hemodialysis Flow Monitoring Log and into PROMIS.
2. The nephrologist and vascular access team should be notified of any abnormal findings.
3. Hemodialysis Log – Procedure done.
4. Hemodialysis Care Guide – Date of next measurement due.

## Patient and Family Education

1. Explain procedure to patient and what findings mean.
2. Explain what access flows are and the importance of regular monitoring.
3. Explain any interventions that need to be done (e.g. fistulograms and angioplasties.)

## References

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- British Columbia Renal Agency. (2021) [Vascular Access Guideline](#): Rope Ladder Cannulation of AV Fistulas and Grafts. Accessed at <http://www.bcrenal.ca> March 23, 2021

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Transonic Systems. [Hemodialysis and Vascular Access](http://www.transonic.com) (2021). Accessed at [www.transonic.com](http://www.transonic.com) March 23, 2021. Transonic Systems Inc. 34 Dutch Mill Rd. Ithaca, NY 14580 USA 1-800-353-3569. <http://www.transonic.com>

### Persons/Groups Consulted:

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BCPRA, Provincial Recommendations for Vascular Access

British Columbia Vascular Access Educators Group

PHC Renal Clinical Practice Group

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<b>First Released Date:</b>	April 2017
<b>Posted Date:</b>	22-SEPT-2021
<b>Last Revised:</b>	22-SEPT-2021
<b>Last Reviewed:</b>	
<b>Approved By:</b>	PHC
	Renal Practice Committee Professional Practice Standards Committee
<b>Owners:</b>	PHC
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