



**NEPHROLOGY PROGRAM
DEPARTMENT POLICIES AND PROCEDURES**

**Hemodialysis - Section 11 - Auxiliary Hemodialysis Procedures - Neph 11-08
Hemoperfusion using the Toraymyxin PMX-20R (PMX) Cartridge**

No.: 01380 (TOH Standardized Policy Number)

ISSUED BY:

Hemodialysis Clinical Practice Committee

DATE OF APPROVAL:

N/A

APPROVED BY:

Nephrology Steering Committee

LAST REVIEW/REVISION DATE:

N/A

CATEGORY:

Auxiliary Hemodialysis Procedures

IMPLEMENTATION DATE:

2013/02

POLICY STATEMENT:

- The use of the PMX cartridge is part of a research study to evaluate the use of this cartridge as a treatment method for adults with endotoxemia and septic shock

BACKGROUND STATEMENT:

- The ICU research nurse assigned to this project for each campus (Civic and/or General) will be present for the duration of the treatment in ICU during the trial
- Blood flows during the treatment are low due to the large surface area of the cartridge therefore increasing contact time with the patient's blood
- Fluid (0.9%NaCl and blood) must always flow in the direction of the arrow on the cartridge
- **Do not remove the caps on the PMX cartridge until the procedure step indicates to do so.** The cartridge is **prefilled** with 0.9% NaCl, to ensure no air enters the cartridge the 0.9% NaCl must not be allowed to leak out
- The research nurse is responsible for providing all sponsor provided equipment, orders for treatment parameters and documenting the study information

- If the patient is receiving renal replacement therapy (RRT) for acute renal failure, please note the following scheduling recommendations (to be assessed and ordered by physician):
 - If the patient is on continuous RRT (CRRT), it must be interrupted for the PMX direct hemoperfusion. Do not perform both treatments simultaneously
 - If the patient is on intermittent Hemodialysis, the PMX direct hemoperfusion treatment should **precede** the hemodialysis treatment on that calendar day. The interval between the treatments doesn't matter

Heparin Recommendations:

- The patient's blood should be systemically anticoagulated with heparin, unless there is a contraindication. Dosage should be individualized. A heparin-free hemoperfusion may be medically indicated
- The following are guidelines:
 - Recommended dosing of heparin:
 - Bolus: 3000 units. The bolus includes the 1000 units infused with the heparinized saline prime solution, plus the 2000 units delivered by the heparin syringe pump.
 - Infusion: 20 units/kg per hour (maximum 2000 U/hr)
- The following are reasons to consider an adjusted heparin dosage or eventually if required a heparin-free hemoperfusion:
 - Concurrent systemic anticoagulation with heparin or warfarin
 - Active bleeding
 - Coagulopathy
 - INR ≥ 2.0
 - PTT outside of target range of 50-60 seconds
 - Platelet count $< 100,000$

Equipment/Supplies:

- Toraymyxin PMX-20R cartridge (**sponsor provided**)



- Artis Bloodlines for Hemodialysis
- Extension Set (secondary medication line, 41" w/two male Luer lock adapters) **(sponsor provided)**



- I.V. Catheter Extension Set (8" Male Luer lock adapter) **(sponsor provided)**



- Transducer (sponsor provided)



- Auxiliary pressure meter **(sponsor provided)**



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- 7-1Liter bags 0.9% NaCl
- 1- 500cc bag 0.9% NaCl with 2000 units of heparin added (heparinized saline)
- FX 800 dialyzer
- Acid and Bicarbonate concentrates (See step 2 Hemodialysis setup)
- Non-sterile gloves
- Dialysis on/off tray
- Heparin 1:1000 units
- Hansen by-pass connector (**sponsor provided**)



- 3 -10cc syringes
- 18 gauge blunt needle
- 2 blue clamps
- Yellow plastic garbage bag with biohazard sticker
- Sterile dialyzer caps (**sponsor provided**)

DEFINITION(S): N/A

ALERTS: N/A

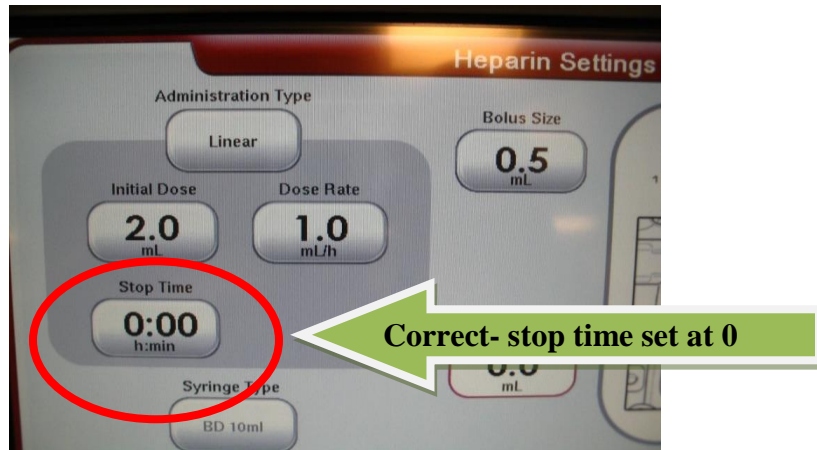
PROCEDURE:

1. Set up dialysis machine in ICU as per [Policy #00756 - Installing Gambro Artis with Portable Reverse Osmosis System outside of Dialysis Unit](#)
2. Prime machine as per [Policy #01160 - Preparing the Gambro Artis machine for double needle Hemodialysis](#)
3. **Prior to initiation of treatment if Hepatitis B status is unknown, draw Hepatitis B screening blood work**
4. Place 4 additional 1 L bags of 0.9% NaCl on the dialysis machine
5. Add 2,000 units of heparin to a 500 mL bag of 0.9% NaCl and place on top of machine. On the *Prescription Screen*, check/adjust the following parameters:
 - Treatment type: HD
 - K 2.0
 - Bicarb 36

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- Treatment time: 2 hrs.
- UF volume: 0.2 L
- Dialysate flow 300mL\min
- Enter heparin prescription according to physician orders: initial bolus, hourly rate and no stop time

6. Go into the heparin settings and program initial dose (Heparin bolus) into initial dose box and program hourly rate in dose rate box and set stop time to zero



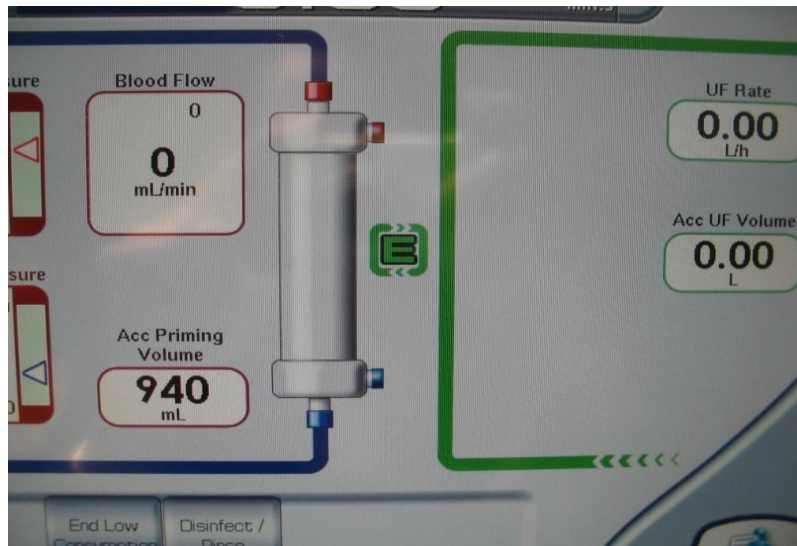
7. Check the PMX cartridge for integrity and sterility

- Sterility indicator should be dark brown. Whitish-yellow means a compromised cartridge. Do not use the PMX cartridge if the sterility indicator is not dark brown



Do NOT remove the caps from the PMX cartridge until procedure step indicates to do so

8. Verify that the machine is in **BYPASS** (on the home screen, the green dialysate line is not going into the dialyzer)



9. Disconnect dialysate fluid lines from dialyzer, and attach them to the Hansen bypass adapter. Connect the third inlet of the **Hansen bypass connector** to a 1-liter bag of 0.9% NaCl and place it on the concentrate tray at the bottom of the machine



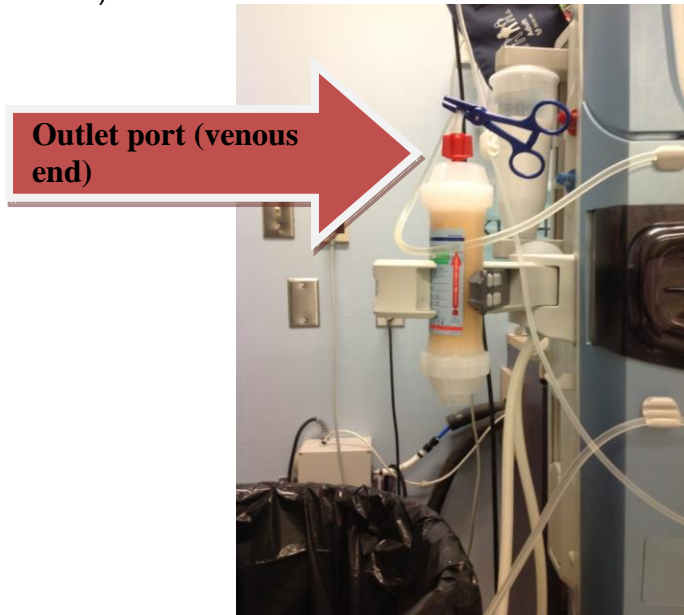
10. Clamp distal ends of the arterial and venous dialyzer bloodlines with blue clamps.
Remove the dialyzer from the holder



11. Place the cartridge on the machine with the arrow pointing up



12. Remove the arterial bloodline from the dialyzer being careful not to contaminate the end of the blood tubing
13. Remove the cap from **outlet** port (venous end) of the PMX cartridge, connect arterial bloodline. **DO NOT ALLOW ANY AIR TO ENTER** (do not allow any 0.9% NaCl to leak out of the cartridge as this will introduce air into the circuit that will be difficult to troubleshoot)



14. Flip the cartridge to so the **arrow is pointing down**. Remove the venous bloodline from the dialyzer, remove **inlet** cap (arterial end) from PMX cartridge and connect the venous bloodline to PMX cartridge. **DO NOT ALLOW ANY AIR TO ENTER SYSTEM**



15. Remove Both Blue Clamps



16. Flip the cartridge so that the arrow is pointing up and remove blue clamps

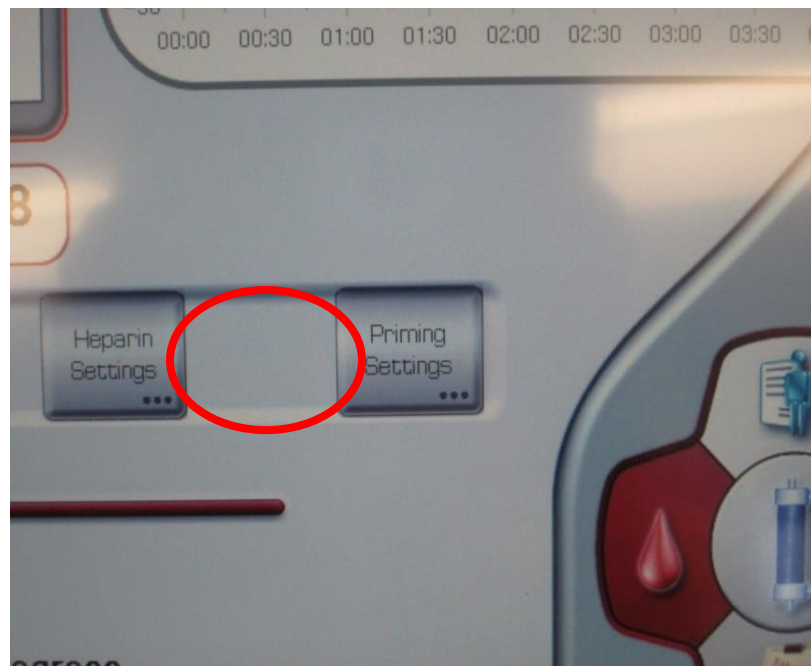
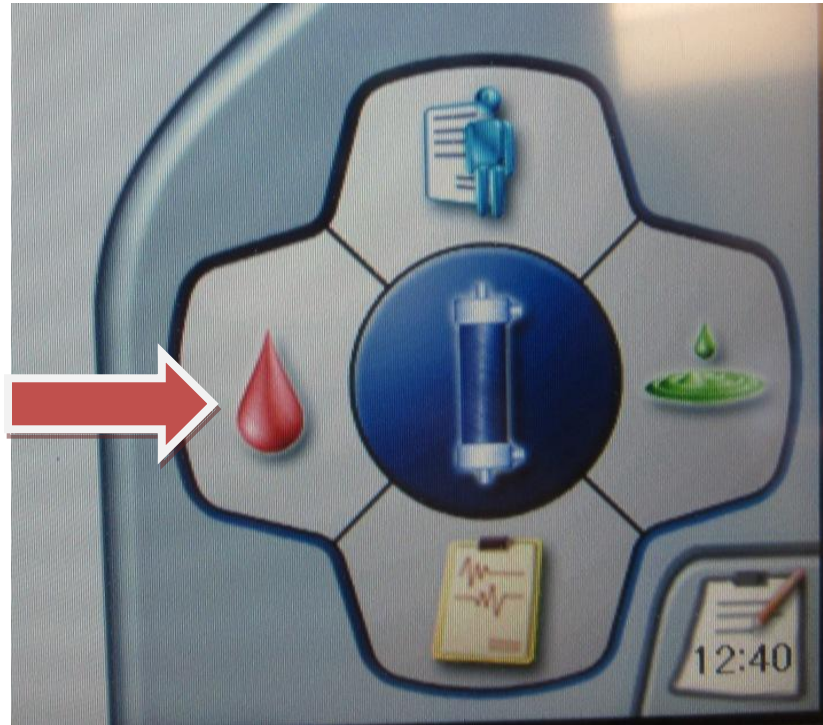


17. Go to home screen and if machine is in low consumption end low consumption

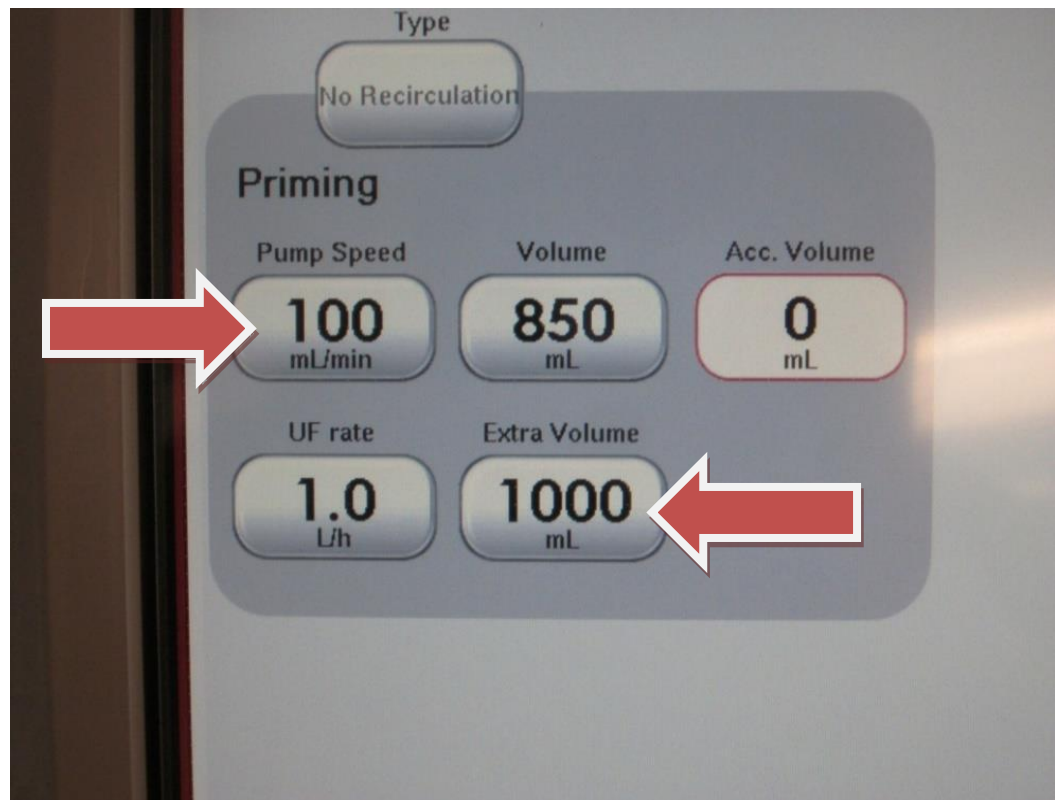
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18. Flush cartridge with 4 L of 0.9% NaCl by:

- Go to priming setting by pressing the blood drop on the nav pad



- Change pump speed to 100 ml/min
- Change extra volume to 1000 ml



- Attach a new bag of 0.9% NaCl to the saline infusion line
- Go to the home screen and press extra prime
- Repeat until a total of 4 L of 0.9% NaCl has been infused

19. Flush cartridge with heparinized 0.9% NaCl by:

- Attach 500ml 0.9% NaCl bag with 2000 units of heparin to saline infusion line
- **Go to priming setting by pressing the blood drop on the nav pad**
- **Change extra volume to 500 ml**
- Go to home screen and press extra prime

If the patient is heparin free you still need to flush the system with heparinized saline but then will need to flush this through with another liter of saline

20. Once heparinized 0.9% NaCl is finished priming clamp distal ends of blood lines



21. Remove arterial blood line and attach a sterile dialyzer cap (**sponsor provided**) to the outlet (venous end) of the PMX cartridge, keeping arterial end of bloodline sterile



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- 22.** Flip the PMX cartridge so the **arrow is pointing down**, remove venous bloodline. Have research nurse hold venous blood line to ensure end of blood line is kept sterile. Attach arterial blood line to the inlet (arterial end) of the PMX cartridge



- 23.** Flip the PMX cartridge so the **arrow is pointing up**

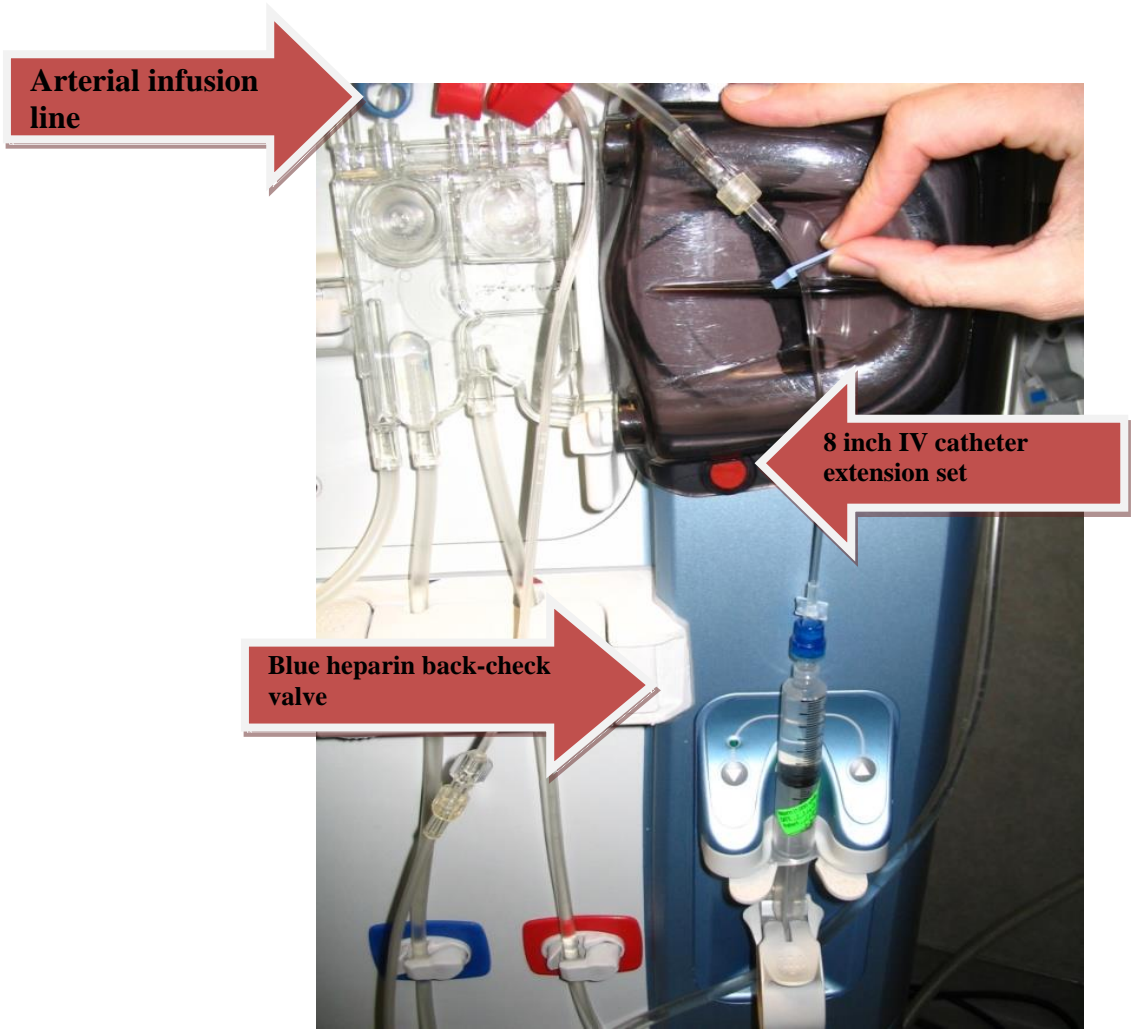


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24. Attach venous blood line to the outlet (venous end) of the PMX cartridge and remove blue clamps



25. Draw up the required amount of heparin for your treatment. Amount of heparin required in 10cc syringe is the 1.2 for heparin line prime, hourly dose x 2 and the bolus
- **Inlet filter pressure must be monitored during the treatment to assess for clotting. This is accomplished by attaching an external monitor to the heparin infusion line as this will allow for monitoring of the inlet pressure to the cartridge. The arterial infusion lines cannot be used for this measurement as these lines are attached to the arterial chamber of the cartridge. Measuring pressure from one of these lines would represent the patient's access pressure rather than the inlet pressure of the filter**
26. Place blue clamp on the heparin infusion line and remove the blue back-check valve and attach to heparin syringe
27. Attach 8 inch IV catheter extension set to an arterial infusion line on the cassette and attach the other end to the blue back check valve on the heparin syringe
28. Manually prime the line with 1.2 ml of heparin and load on to heparin pump. See following page for picture of correct set up

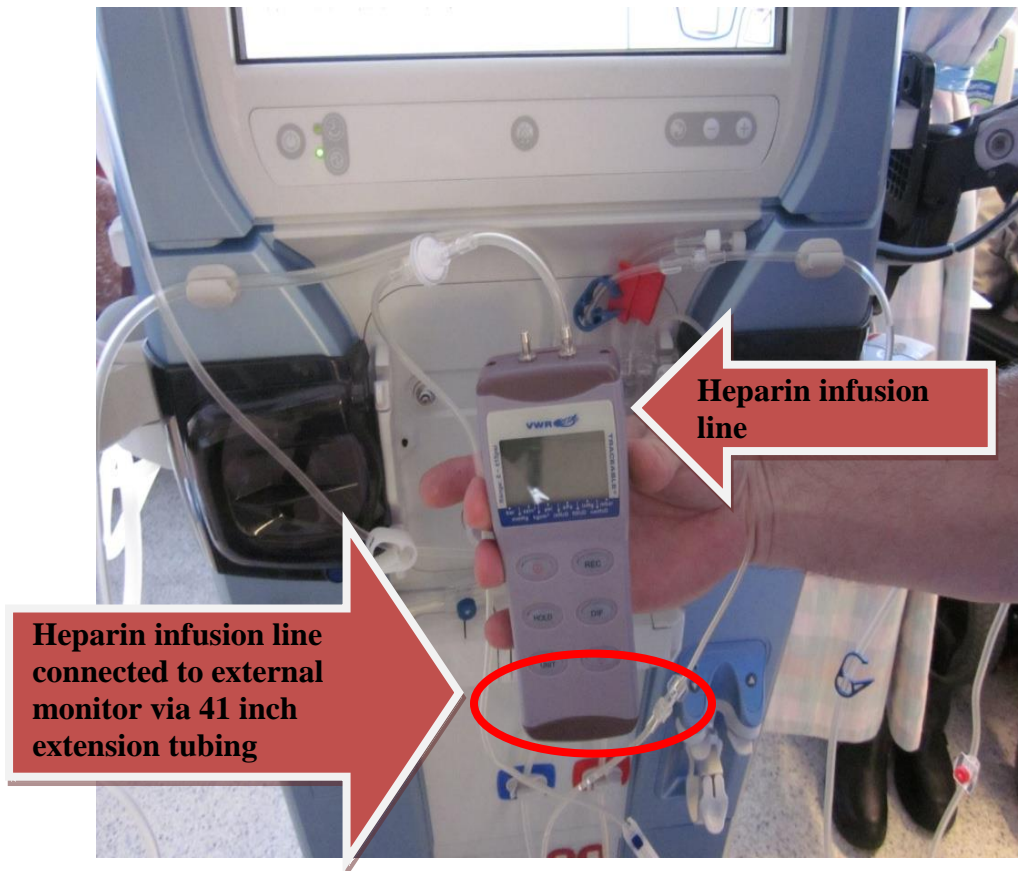


29. Attach the transducer to the external monitor



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30. Attach the 41 inch extension set, with roller clamp OPEN, to the transducer on the external monitor and attach the other end of the extension set to the heparin infusion line



31. Turn on the meter and ensure display is reading mm Hg. The meter can be placed on the bedside table for the duration of the treatment for optimal readings



32. The PMX cartridge must have the **arrow pointing up** prior to connecting the patient. It should remain this way throughout the treatment to ensure the correct direction of flow through the cartridge
33. Clamp 0.9% NaCl infusion line and move to arterial infusion line on the cassette
34. Clamp venous and arterial bloodlines and press connect patient on the home screen but do not confirm
35. Access CVC and connect patient as per [Policy #00748 - Initiating Hemodialysis with a Hemodialysis Catheter](#)
36. **Decrease pump speed to 50ml/min and start blood pump.**
37. The initial dose of heparin will be administered as programmed in the heparin settings
38. When blood is detected at the venous drip chamber the machine will stop, verify both patient lines are connected and press the on/off key to start the blood pump
39. Press Start Treatment
40. Increase pump speed to 100 ml/min. Acceptable range for blood flow is 80-120 ml/min based on access pressures

Monitoring Inline Pressures:

Note: Please note that due to a power saving feature the monitor will turn itself off and will need to be turned on again prior to each reading

1. Record cartridge **inlet** pressure from external monitor. Do not exceed 250 mm Hg
2. Record venous pressure from home screen on Gambro hemodialysis machine
3. Calculate your TMP or Delta pressure by:
 - Inlet pressure –venous pressure= TMP
4. Document the above equation in the comments section of the off unit record. Document the TMP (result of equation) in the TPM column of the off unit flowsheet. Do not document the TMP value from the hemodialysis machine, this value is not accurate
5. If either pressure limit is exceeded, the cartridge is likely to be clotting.

If clotting is suspected, return patient's blood, DO NOT GIVE 0.9% NaCl flushes to visualize circuit. If over 90 minutes of treatment time has elapsed discontinue treatment. If less than 90 minutes of treatment time has elapsed, prime new circuit

6. Rinseback and disconnect patient as per program standard, [Policy #00749 - Discontinuing Dialysis with a Hemodialysis Catheter](#), using a **QB of 50ml/min** for the rinseback on the machine

Discontinuation of Treatment:

1. Rinseback and disconnect patient as per program standard, [Policy #00749 - Discontinuing Dialysis with a Hemodialysis Catheter](#), using a QB of 50ml/min for the rinseback on the machine, flip the PMX cartridge so that the **arrow is pointing down**, this will assist in clearing the cartridge of blood
2. Strip as disinfect machine as per program standard, [Policy #00755 - Stripping and Disinfection of the Gambro Artis](#)
3. If possible reapply the caps on the cartridge to prevent leakage and discard cartridge in a yellow garbage bag and apply biohazard sticker to the outside of the bag



DOCUMENTATION

1. Document on off unit record
2. Do not enter treatment details in NephroCare for non-renal failure patients

RELATED POLICIES / LEGISLATION:

1. [Nephrology Policies and Procedures - Hemodialysis - Section 06 - Hemodialysis Catheters - Neph 6-01 \(#00748\) Initiating Hemodialysis with a Hemodialysis Catheter and the Gambro Artis Hemodialysis Machine](#)
2. [Nephrology Policies and Procedures - Hemodialysis - Section 06 - Hemodialysis Catheters - Neph 6-02 \(#00749\) Discontinuing Dialysis with a Hemodialysis Catheter and the Gambro Artis Hemodialysis Machine](#)
3. [Nephrology Policies and Procedures - Hemodialysis - Section 10 - Gambro Artis - Neph 10-01 \(#01160\) Preparing the Gambro Artis Machine for Double Needle Hemodialysis](#)

4. [Nephrology Policies and Procedures - Hemodialysis - Section 10 - Gambro Artis - Neph 10-03 \(#00755\) Stripping and Disinfection of the Gambro Artis Hemodialysis Machine](#)
5. [Hemodialysis - Section 10 - Gambro Artis - Neph 10-04 \(#00756\) Installing Gambro Artis with Portable Reverse Osmosis System outside of Dialysis Unit](#)
6. [Nephrology Policies and Procedures - Hemodialysis - Section 10 - Gambro Artis - Neph 10-05 \(#00757\) Shutdown of Gambro Artis Hemodialysis Machine with Gambro Portable Reverse Osmosis Unit outside the Dialysis Unit](#)

REFERENCES:

1. PMX Package insert

COMMENTS / SIGNIFICANT REVISIONS: N/A