



MANITOBA RENAL PROGRAM

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| SUBJECT <ul style="list-style-type: none"> ▪ Use of Fresenius 5008 Delivery System using 0.9% NaCl to Set up, Initiate, and Terminate Treatment. | SECTION 30.10 Hemodialysis: Equipment Procedures |
| | CODE 30.10.01 |
| AUTHORIZATION <ul style="list-style-type: none"> ▪ Professional Advisory Committee, Manitoba Renal Program ▪ Nursing Practice Council, St. Boniface Hospital | EFFECTIVE DATE Sept 2011 |
| | REVISION DATE November 2012 October 2014 April 2015 March 2017 October 2018 |

PURPOSE:

1. To describe the policies and procedures for using 0.9% NaCl to:
 - a. Prepare the Fresenius 5008 machine
 - b. Initiate hemodialysis treatment
 - c. Terminate hemodialysis treatment
2. To maintain a pathogen free pathway during hemodialysis.

POLICY:

1. Hemodialysis Nurses who have received instruction and who have demonstrated competency to educator or delegate may perform this procedure.
2. Health Sciences Centre, Seven Oaks Hospital, Brandon Regional Health Centre and Local Renal Health Centres Unit Assistants, Nursing Assistants and Health Care Aides who have received instruction from the Renal Educator or delegate and who have demonstrated competency to the Renal Educator or delegate may perform part of this procedure as indicated with symbol Φ .
3. St. Boniface Hospital Health Nursing Assistants who have received instruction from the Renal Educator or delegate and have demonstrated competency may perform part of this procedure as indicated with symbol Δ .
4. The Fresenius 5008 Hemodialysis delivery system (internal pathways and external surfaces) shall undergo cleaning and disinfection as outlined in MRP Procedure 30.10.18 Cleaning and Disinfection of the Fresenius 5008 Hemodialysis System: Internal fluid pathways and External surfaces.
5. An additional 1 litre rinse is required for dialyzers when an assessment determines that patient sensitivity of the dialyzer is an issue.
6. For infection prevention and control purposes, a primed extracorporeal circuit including dialyzer must be discarded once three hours has elapsed if unused after set up.
7. Following a Code Blue or Critical Clinical Incident, the delivery system along with concentrates intact shall be removed from service to be inspected by a Dialysis technologist. To preserve patient information the machine must be left in the same mode as it was when incident occurred (i.e. do not put into a cleaning cycle). Remove the blood lines and inspect for defects, describe (take photo if necessary) and document.

EQUIPMENT:

- Fresenius blood lines
 - AV-Set ONLINE plus BVM 5008R
- Fresenius IV administration set
- Prime/Rinse Bag
- Dialyzer per physician's order
- Acid concentrate and bicarbonate concentrate or bi-bag® as per physician's order
- 2 or 3 – 1 litre 0.9% NaCl. Refer to Policy Statement #5 above
- Heparin Sodium 1000 units/mL
- 1 – 20 mL syringe with needle
- Forceps (prn)
- Total Chlorine strips to test for chemical residue

PROCEDURE:

A. Preparation of the Dialysis Concentrates:

1. ☐ ▲ Ensure the Fresenius 5008 is connected to:
 - treated water
 - drain
 - appropriate electrical source
 2. ☐ ▲ Perform hand hygiene. Turn on the machine by pressing the Power key located on the top left corner of the control panel.
 3. ☐ ▲ Perform the disinfection procedure if needed per facility schedule.
 4. If necessary, check for residual disinfectant according to the manufacturer's instructions for use on the bottle and prompts on the screen. Document on hemodialysis treatment record.
 5. Verify that the machine is in "Standard" mode for adult patients, unless otherwise ordered by physician.
 6. Connect the bicarbonate line to bicarbonate concentrate.
To connect the bibag®:
 - Open the bicarbonate flap. The bicarbonate suction tube (blue) remains in the rinse chamber.
 - Remove seal from the bibag®.
 - Place the bibag® on the ports and press down to connect.
 - Close the bicarbonate flap until it clicks into place.
 7. Verify that the concentrate matches the Medication Administration Record (MAR). Document.
- If the power is interrupted during treatment the 5008 will change over to battery supplied power.
 - ☐ ▲ Ensure the valve to the treated water is open as needed.
 - Refer to MRP Policy 30.10.18 *Cleaning and Disinfection of the Fresenius 5008 Hemodialysis System*
 - If machine is in Pediatric mode, a teddy bear icon will displayed at the top of the screen
 - Pediatric mode may not allow full QB or fluid removal rate.
 - To revert to Adult mode, touch the blue tile on right hand side of screen "HD-PAED"
 - Select HD-PAED off. A prompt will appear to confirm section
 - If the T1 test is initiated prior to bicarbonate bath connection, the T1 test may fail.
 - Check the expiry date on bibag
 - Invert bag to check filter
 - Refer to MRP Policy 30.10.19 *Changing Dialysate Concentrate during Hemodialysis Treatment* if a change in dialysate is required after initiation of HD.

KEY POINTS:

KEY POINTS:

PROCEDURE:

8. Verify dialysate number on acid concentrate jug matches dialysate number on dialysate screen.
9. Connect the acid line to the acid concentrate:
 - Open the concentrate flap.
 - Place the red concentrate suction tube into the acid container.
 - Close the concentrate flap until it clicks into place.
10. Put the patient treatment card (if available) in slot located on upper right hand side of treatment screen.
11. Start T1 test” The test can be started by touching “Treatment” or go to **Blood System** screen:
 - The operating mode display (upper left screen) shows the progress of the T1 test.
 - Message: *T1 test completed* is displayed for a moment after successful completion of the T1 test.
 - **Message: Attach Dialyzer Couplings to Dialyzer will appear if T1 test has been successfully completed.**

B. Preparation of the Extracorporeal Blood Circuit

1. Perform hand hygiene.
 - Open 2 x 1 Litre 0.9% NaCl IV bags.
 - Hang first bag
 - Spike and then hang second 1 litre of 0.9% NaCl using Fresenius IV administration set. Ensure “Y” line cap of the saline administration set is firmly in place and that the roller clamp is closed
2. **Φ** Hang prime/rinse bag and clamp blue clamp on prime bag.
3. **Φ** Insert the dialyzer into the holder and attach dialysate port caps.
4. **Φ Arterial blood line.**
 - Follow the diagram (if displayed) on the 5008 blood system screen to correctly insert the arterial lines:
 - Insert the red guide into the blood pump until a signal is heard. The arterial pressure measurement unit will now open automatically.

KEY POINTS:

- Compare parameters with patient’s dialysis prescription. If changes are necessary they can be entered prior to initiation of hemodialysis.
- This step may be performed at any time during the procedure.
- If there are no blood lines inserted, the system automatically moves to the BLOOD SYSTEM screen.
- The T1 test is now running in parallel with the preparation of the hemodialysis system.
- The T1 indicator bar is displayed in the top left corner of the display screen during the T1 test.
- If any portion of the T1 test has failed a message will appear prompting further action.
- **This step can be performed during cleaning cycle or in standby mode).**
- **Use aseptic technique for all bloodline connections and all connections in the area where sterile solutions are to be used.**
- If 2 litre NS rinse is required, 3 litres of 0.9% NaCl will be required.
- Ensure the dialyzer matches the patient’s dialysis prescription.
- An audible ding indicates that the pump segment loaded correctly.
- Refer to MRP Policy 30.10.21 *Manually Opening Arterial Measurement Unit on the Fresenius 5008* if arterial pressure measurement unit does not open.

PROCEDURE:

- Insert the arterial pressure dome into the arterial pressure measurement unit.
- Insert the arterial blood line into the arterial occlusion clamp.
- Insert the Blood Volume Measurement segment into the BVM Measuring head and close the door.
- Insert the arterial blood line into the Blood Temperature Monitoring (BTM) measuring head and close the flap.
- Connect the arterial line patient end to the red port of the prime bag.
- Insert the arterial blood line into the line holder to the upper left of the blood pump.
- Connect the arterial blood line to a bloodline port of the dialyzer.

KEY POINTS:

- Soft side in.
- Ensure BTM flap closed.

5. Venous blood line:

- Close the clamps on the two venous medication ports/lines.
- Follow the diagram (if displayed) on the 5008 blood system screen to correctly insert the venous lines:
 - Insert the venous bubble catcher/chamber into the level detector.
 - Insert the venous blood line into the venous monitoring device
 - Insert venous blood line into venous occlusion clamp.
 - Insert the venous blood line into the Blood Temperature Monitor (BTM) measuring head and close the flap.
 - Connect venous line patient end to the blue port of the prime bag.
 - Insert the venous blood line into the line holder above the venous bubble catcher.
 - Attach the venous pressure monitor line to the venous pressure port (transducer).
 - Connect the venous blood line to the other bloodline port of the dialyzer.
- The venous bubble catcher/chamber must directly rest against the locator.
- The venous monitoring device contains optical detector and air bubble detector
- Rinsing the dialyzer venous end up enhances clearance of air from the dialyzer.

PROCEDURE:

- Close the doors.

6. Saline administration line:

- Perform hand hygiene. Attach the IV administration set to the saline "T" line.

7. Preparing the Heparin Syringe:

- The heparin pump can be set up any time during preparation. If blood pump is running ensure that the heparin line is clamped prior to attaching the heparin syringe.
- Perform hand hygiene. Connect heparin syringe to the heparin line.
- Press on the clamping bracket to move the grip handle to its lower position.
- Place the heparin syringe between the barrel holders. The syringe wings must be positioned between the barrel holder & the bracket.
- Press on the clamping brackets to move the grip handle to its starting position. The thumb rest of the syringe plunger now must be positioned between the clamps of the grip handle.
- Open the clamp on the heparin line and close the doors.
- If patient is dialyzed heparin free; ensure that the heparin line is clamped and that the cap is securely tightened.

C. Priming the Blood Circuit:

1. Select **PREPARATION SCREEN**

Message : *Priming / Rinsing – Start*

- Check that the rinse volume has been set at 700 mL
 - Check that the blood flow rate is set at 150 mL/min.
 - Ensure dialyzer is blue end (venous side) up.
2. Open the roller clamp on the 0.9% NaCl line and gravity prime the arterial line.
 3. Clamp the red arterial clamp and unclamp the blue venous clamp on the prime bag.
 4. Touch the **Start** button. **Blood pump I/O** indicator will now be green.

KEY POINTS:

- The pump segment will be automatically inserted and the arterial pressure measurement unit will close.
- Follow facility policy for preparation and administration of heparin
- Ensure overfill is not greater than 1.5 ml of total required treatment dosage.
- The syringe is correctly secured if it is no longer possible to move the thumb rest of the syringe plunger without pressing on the clamping brackets.
- Once doors are closed the machine will automatically prime the heparin line and perform a connection test.
- To prevent formation of microbubbles in the extracorporeal blood circuit during treatment.
- The rinse volume and the blood flow rate are automatically set to the value preselected in the Operator Setup.
- Arterial line primed when fluid in the prime bag and no large air bubbles in the arterial line.
- May take approximately 10 seconds for the blood pump to start.

PROCEDURE:

5. While lines are priming, gently roll the dialyzer to facilitate air removal.
6. The blood pump will stop automatically once 700 mL of 0.9% NaCl infused.
7. Message: Rinse volume reached. – RINSE **Continue** or CIRCULATION **Start**
8. Close the white clamp on the Prime bag.
9. Ensure that the red and blue clamps on the prime bag are open.
10. Touch the Start button to launch Precirculation.
11. Increase the blood pump to 400 mL/min to circulate.

KEY POINTS:

- Tapping or hitting the dialyzer against a surface is not recommended as this can cause damage to the dialyzer membrane.
- If more volume required to deaerate the lines/dialyzer, select Continue. Blood pump will **not** automatically stop.
- If 2 litre rinse is required, prime with 2nd litre of 0.9% NaCl
- Blood pump I/O indicator will now be green

D. Priming the Dialysate Side:

1. Ensure the T1 test is done and documented.
2. Rotate dialyzer arterial end up to facilitate filling.
3. Open the Shunt/Interlock door. Disconnect the dialysate hoses from the machine and attach to the dialyzer.
 - Inflow (blue) dialysate hose attaches to the venous end of the dialyzer.
 - Outflow (red) dialysate hose attaches to the arterial end of the dialyzer.
 - This will ensure counter-current blood/dialysate flow.
4. Close the shunt/interlock door.
5. Allow at least 2 minutes for the dialysate to prime the dialyzer.
 - Air in the dialyzer may cause a blood leak alarm when HD is initiated.
6. Rotate dialyzer venous end up to facilitate removal of air from extracorporeal circuit.
7. Circulate the blood side at a blood pump rate of 400 mL/min. Dialysate flow will be at ECOflow (100 mL/min).

E. External Tests:

1. Check for a normal dialysate flow by observing moving bar across dialysate icon.
 - Located on the left side top of the screen.
2. Open the Shunt/Interlock door and verify that the dialysate flow is stopped.
 - The moving bar across dialysate icon should stop.
3. Reset the venous chamber/bubble catcher limit:
 - Select *BLOOD SYSTEM SCREEN*
 - Select *LEVEL SET* (will take approximately 30 sec.)
 - Level of the drip tube in the chamber/bubble catcher should be 0.5-1.0cm below the fluid level.

PROCEDURE:

4. Verify venous line in clamp.
5. Document the above four checks on the treatment record.

F. Setting Treatment Parameters:

1. Press the *PREPARATION* button.
2. Confirm and set dialyzer and UF time.
3. Press *Dialysate Menu*. Confirm and set the following values:
 - Concentrate dialysate number
 - Prescribed Na⁺
 - Prescribed Bicarbonate
 - Dialysate Flow will read 100ml/min. Once dialysis is initiated, confirm and set flow to patient specific value.
 - Dialysate Temperature
 - Press OK.
4. Confirm and Set the Na⁺ Profile:
 - Select Na⁺ profile screen.
 - Select the appropriate profile.
 - Set the Na⁺ start value using the rocker switch.
 - Press OK
5. Set Online Clearance Monitor (OCM) parameters:
 - Touch Options button; then the OCM button.
 - Confirm/Set the following parameters:
 - Goal Kt/V
 - V (urea) (patient volume)
 - Ensure OCM button lit
 - Press OK
6. Set Heparin Parameters:
 - Touch the Heparin button
 - Confirm/Set the following Parameters:
 - Syringe type
 - Heparin rate (ml/hr); touch OK
 - Stop time in minutes; touch OK
 - Heparin Bolus amount (mL)
7. Set Blood Pressure Monitor (BPM) parameters:
 - Touch the BPM button
 - Confirm/Set the following values:
 - Alarm limits
 - Interval (minutes apart)
 - Press OK

KEY POINTS:

- Other than dialysate bath selection, parameters may be set at any time during preparation.
- Na⁺ profile can only be selected once UF time is entered.
- Maximum starting Na⁺ is shown by default and must be adjusted to reflect the appropriate start Na⁺.
- The OCM measurement starts approximately 10 to 15 minutes after the start of the treatment (optical detector senses blood).
- The following dialysis parameters are checked for stability before the OCM measurement is started.
 - Stable conductivity
 - No change of the blood flow by more than 10 ml/min.
 - Blood flow > 80 mL/min.
 - Dialysate flow > 270 mL/min.
- The heparin rate cannot be set at less than 0.5 mL/hr. If the patient does not require heparin, do not attach a syringe to the line. Leave the heparin line clamped. Once dialysis is initiated a prompt to stop heparin will appear.
- Follow facility policy for administration and preparation of heparin
- Refer to MRP Policy 30.10.20 *Administering a Heparin Bolus during Hemodialysis treatment using the Fresenius 5008 Heparin pump* if a heparin bolus required after initiation of hemodialysis.

PROCEDURE:

- connectors/connections are tight.
 - Touch the I/O button to stop the blood pump.
 - Set the blood pump speed to 100 mL/min
 - Ensure 7 clamps are closed.
 - White clamp prime bag
 - Red and blue clamps on prime bag
 - Arterial and venous blood line clamps
 - Saline administration roller clamp
 - T-line clamp
3. Connecting the patient:
- Connect the bloodlines to patient access as per policy.
 - Unclamp arterial and venous access lines and blood lines.
 - Touch the I/O button to start the blood pump at 100 mL/min working up to 200 mL/min while monitoring Arterial and Venous pressures and for needle infiltration.
 - Once the optical detector senses blood the message reads “Blood detected – Treatment Start”
 - Touch the **START** button
 - **TREATMENT** screen will be displayed
- Turn dialyzer arterial (red) end up.
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- Increase blood flow to dialyzing rate, while monitoring for Arterial/Venous pressures
 - Monitor for signs and symptoms of needle infiltration.
 - Obtain vital signs and initial parameters.
 - Document on treatment record
 - Verify and document on treatment record:
 - UF Goal set
 - UF profile set
 - UF timer on
 - Dialysate flow on and at prescribed rate
 - Heparin line open and heparin running (if heparin ordered)

H. Discontinuing Dialysis:

1. Document data from the Fresenius 5008 on to the Hemodialysis Flow sheet (form #W-00417) as per MRP Documentation Standard 60.20.02 *Hemodialysis Flow Sheet Standard (for Fresenius 5008)*.

KEY POINTS:

▪ **Before connecting the patient to the 5008 ensure:**

- All connections and lines are secure and tightened.
- Absence of air in the blood lines and the correct position of all fluid levels.
- Verify all documentation related to preparing the 5008 is complete.

There will be automatic start of:

- Heparin infusion as programmed
- Alarm limits
- BVM

- To reduce the risk of air advancing into the venous tubing
-
- Arterial Pressure should not exceed -250 mmHg; Venous Pressure should not exceed +250 mmHg
 - For measuring AVG dynamic venous pressure, see Procedure 30.20.06 *AVF /AVG Vascular Access Assessment*.
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- Confirm the dialysate flow has increased to dialyzing speed, the flow light is lit, and the dialysate flow display waves are moving.

- Refer to MRP Policy 30.10.22 *Emergency Reinfusion Procedure using the Fresenius 5008* if the patient requires immediate discontinuation of dialysis treatment.
- Refer to MRP Policy 30.10.23 *Manual Reinfusion Procedure in the Event of Power Failure and Empty Battery* in the event of loss of power
- This data is saved on the machine and patient card and may be documented after the patient is disconnected from the machine.

PROCEDURE:

KEY POINTS:

2. Ensure there is enough 0.9% NaCl for reinfusion:
 - **If the patient has completed dialysis time 5008 will display:**
 - Treatment goal achieved,
 - Treatment **Continue** or **Reinfusion Start**
 - Touch **Reinfusion Start**.
 - Blood pump stops
 - OR**
 - **If patient need to discontinue hemodialysis prior to treatment goal/time achieved:**
 - Press **Reinfusion button**, then **I/O**
 - Blood Pump stops
 3. 5008 will display **Connect 0.9% NaCl Solution-start reinfusion. To reinfuse:**
 - Ensure 0.9% NaCl administration set and T line are clamped.
 - Clamp and disconnect the Arterial blood line from the access.
 - Attach the 0.9% NaCl syringe to the “arterial” access and flush.
 - Connect the Arterial blood line to the “Y” port on the 0.9% NaCl administration set.
 - Open clamps on administration set and Arterial blood line.
 4. **Touch the OK button:**
 - Blood pump will start at 200 mL/min.
 - Blood pump will stop when blood is no longer sensed.
 - Message reads: “Blood reinfused”*
 - Select **reinfuse continue** to infuse more saline if necessary to clear blood from lines or if patient requires additional fluid volume
 - if no further saline infusion required, go to step 5.
 - Once 300 mL saline infused blood pump will stop.
 - *Message reads: Reinfusion volume achieved.* If no further saline required go to step 5.
 - Select **reinfuse continue** to infuse more saline **PRN**. Once required saline is infused stop blood pump using the **I/O** button on the reinfusion screen.
 5. Disconnect patient:
 - Clamp venous access and blood line.
 - Disconnect venous blood line from access.
 - Attach 0.9%NaCl syringe to the
- Refer to following MRP procedures for vascular accesses: 30.20.01 *Venipuncture of Arteriovenous Fistula/Graft* and 30.20.02 *Accessing and Locking Dialysis Central Venous Catheter* or 30.20.04 *Use of Closed Needleless Access Device with Hemodialysis Central Venous Catheters (CVC)*.
 - Keep clamp in T-line closed.
 - Do not leave the bedside. Monitor patient, and assess patient’s need for extra volume.
 - Refer to following MRP procedures for vascular accesses: 30.20.01 *Venipuncture of Arteriovenous Fistula/Graft* and 30.20.02 *Accessing and Locking Dialysis Central Venous Catheter* or 30.20.04 *Use of Closed Needleless Access Device with*

PROCEDURE:

venous access and flush (for CVC and for AVF/G prn.)

- Disconnect the venous pressure monitor line from transducer and attach venous blood line to venous pressure monitor line

I. **Discarding the Extracorporeal Circuit:**

1. Remove the venous pressure monitor line from the port if not done prior.
2. **Touch the Remove bloodlines button** (if not on screen press **Blood System**):
 - *Message reads “leave outer doors closed whilst waiting”.*
 - Close doors and wait. Blood lines will automatically be disengaged from clamps and pump mechanisms.
3. There will be several tabs opening on the screen, with only one tab visible at a time. You may scroll between tabs as needed:
 - **TAB: Message reads “Remove blood lines completely”**
 - Open outer doors.
 - Remove and discard all lines. Close outer doors.
 - **TAB: Message reads: Replace the concentrate wand(s) into holder:**
 - Remove wands from containers and place into appropriate holder.
 - If using Bibag: **TAB: Message reads: “Bibag® empty can now be removed”**
 - Remove Bibag®, discard, close door **OR**
 - The Bibag® should **drain** automatically. If it does not:
 - Select the Dialysate button
 - Select **empty Bibag®**. (on the top of the screen)
 - Press **OK**
 - Discard once empty and close the door.
 - **TAB: Save Patient Information to Patient card (prn):**
 - *Message reads “Saving data to card. Leave card inserted”*
 - *Message reads “Save modified treatment parameters onto the card?”*
 - *Message reads “Saving data to card Leave card inserted”.*

KEY POINTS:

Hemodialysis Central Venous Catheters (CVC).

- To ensure closed system for discard.
- It is Important to disconnect venous pressure monitor line from transducer prior to pressing *Remove bloodlines* as pressure increase during removal of bloodlines may force fluid (blood) back into transducer.
- Ensure patient’s venous access is disconnected from the bloodline.
- Accepting yes will save any modifications to the stored treatment parameters.

PROCEDURE:

- Remove card when message disappears and place in patient chart.

- **TAB: Insert inlet dialyzer coupling into the shunt interlock door to empty:**
 - Turn Dialyzer blue end up, and place blue dialysate hose on the shunt and close door.
 - *Message reads: “The dialyzer is being emptied”*
 - *Message reads: “ Dialyzer is now empty”*
 - Once the dialyzer is drained, place the red dialysate hose on the shunt and close door.

- 4. **Perform appropriate cleaning procedure:**
 - Select **Cleaning** on the main screen
 - Choose appropriate cleaning cycle:
 - Rinse
 - Heat disinfect
 - Cold Disinfect/Degreasing

- 5. Wipe the exterior of the 5008 with approved disinfectant.

KEY POINTS:

- Refer to MRP Policy 30.10.18 *Cleaning and Disinfection of the Fresenius 5008 Hemodialysis System* to determine appropriate cleaning cycle

- Refer to MRP Policy 30.10.18 *Cleaning and Disinfection of the Fresenius 5008 Hemodialysis System* to determine appropriate cleaning cycle

DOCUMENTATION:

- Hemodialysis Treatment Record
- Hemodialysis Flow Sheet
- Patient Health Record prn
- Medication Administration record (MAR)

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