Winnipeg Regional Health Authority / Office régional de la santé de Winnipeg
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kidneyhealth.ca manitoba renal program

MANITOBA RENAL PROGRAM

SUBJECT ▪ Bellco (Formula 2000)—Delivery System; Use of	**SECTION** 60.50 Home Hemodialysis
	CODE 60.50.01
AUTHORIZATION ▪ Professional Advisory Committee, Manitoba Renal Program	**EFFECTIVE DATE** November 2009
	REVISION DATE January 2013 September 2015

PURPOSE:

1. To control and monitor the blood flow through the extracorporeal circuit.

2. To control and monitor the dialysate flow through the dialysate flow path.

3. To maintain a pathogen free blood circuit.

POLICY:

1. Registered Nurses (RN)/Licensed Practical Nurses (LPN) as per facility that received instruction and who have demonstrated competency to the Renal Educator, or delegate, may operate the Formula 2000.

2. Home Hemodialysis Nurse Patient Educators, who have previously demonstrated competency with use of the Formula 2000, may instruct patients to perform independent hemodialysis with the Formula 2000.

3. Rinse is performed between every patient use, if different individual.

4. Acid Clean is performed at the end of the treatment day.

5. Heat Disinfect is performed at the end of the treatment day.

6. Chemical Full (Bleach) is performed at least once per week or per Unit guidelines and following a blood leak (Blood Leak Alarm: responding by a nurse in Dialysis).

7. A 2-litre rinse is required for dialyzers when a nursing assessment determines that the biocompatibility of the dialyzer is an issue.

EQUIPMENT:

Ensure all supplies are not expired

- Bellco blood lines
- Dialyzer per physician's order
- Acid concentrate and bicart (or bicarbonate concentrate) per physician's order
- Heparin Sodium 1000USP units/ml
- 2 or 3 –1 liter 0.9% NaCl
- 1 – 20 ml syringe with needle

- Forceps
- Rinseback line (Bellco)
- Vinegar
- Bleach (if scheduled)
- Chemical residue test supplies

PROCEDURE:	**KEY POINTS:**
A. Set up of Formula:	
1. Start the RO (Aquaboss EcoRO Dia 702**)**. Once the 2nd line of the display on the RO reads OPERATION start the Formula.	▪ See procedure 30.30.01 *Use of AQUABOSS EcoRO Dia 70 RO System* or 30.30.02 *Use of Fresenius AquaC UNO H RO system*
2. Verify that the MAIN SWITCH on the back of the Formula to the on position.	▪ Ensure the Formula is connected to an appropriate electrical source and drain. ▪ Main switch is left on to facilitate adequate charge of battery.
3. Press the POWER BUTTON on the front of the monitor to turn on the machine.	▪ The LED lamp will turn from orange to green.
4. The auto diagnostic tests will run for several minutes: ▪ Ensure the Formula reads RUNNING AUTO TEST on the monitor. (2-3 min). ▪ Ensure the Formula reads RINSING/SELF TEST in the upper left status bar once rinsing has started (5 min). ▪ DO NOT CONNECT THE TRANSDUCEUR PROTECTORS OR HEMOX TUBING until after the auto test is complete.	
5. If necessary, check for residual disinfectant according to the manufacturer's instructions for use on the bottle QUALITATIVE PROCEDURE (5 sec stream) and prompts on the screen.	▪ Verify appropriate cleaning cycle was last performed. If bleach cycle performed, chemical residue must be checked. ▪ The fluid from the drain or the outflow dialysate hose may be used to test for chemical residue.
B. Rinsing the dialyzer:	
1. Hang 2 liters of 0.9% NaCl on the IV pole.	
2. Place the dialyzer in the holder and put on the dialysate port caps.	
3. Remove the venous bloodline from the package ensuring all the end caps and connections are tight.(1)	
4. Hang the drain bag on the back hook of the IV pole.	
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5. Peel off/remove the blue tab on the end of the bloodline with the blue cap and connect to the dialyzer.	▪ Aseptic technique is used throughout the procedure and sterility of the bloodflow pathway is strictly maintained.
6. Place the venous tubing in the blue line	

PROCEDURE:	KEY POINTS:
holder, which is to the left of the transducer ports.	
7. Slide the T line clamp on the venous bloodline close to the bloodline and clamp.	
8. Remove the arterial bloodline from the package ensuring all the end caps and connections are tight.(3)	
9. Place the expansion chamber in the holder at the top left of the Formula: ▪ Clamp the medication line on the top of the expansion chamber.	
10. Insert the clear plastic segment below the expansion chamber into the Hemox ensuring it clicks into place.	▪ As per facility protocol. **DO NOT LOAD THE HEMOX until the after the auto test is complete.**
11. Remove the spike from the arterial tubing and attach the arterial tubing to the drain bag.	
12. Load the Blood Pump: ▪ Open the blood pump door. Insert the RED tagged side of the blood pump segment into the bottom of the blood pump. ▪ Press the up key on the heparin pump control to automatically turn the blood pump to load the tubing, close the blood pump door.	
13. Place the arterial tubing in the red line holder, which is to the left of the transducer ports.	
14. Press the arterial tubing below the blood pump and arterial chamber into the optical blood sensor and tubing guide below the blood pump. Clamp the medication port on the arterial chamber.	
15. Connect the arterial pressure monitor line to the red transducer port above the arterial chamber. Ensure the line remains unclamped.	▪ DO NOT CONNECT THE TRANSDUCEUR PROTECTORS until after the auto test is complete and select priming appears.
16. Connect the venous pressure monitoring line to the blue transducer port above the venous drip chamber. Ensure the line remains unclamped.	
17. Peal off the red cap on the arterial line and connect the bloodline to the arterial end of the dialyzer. When complete, ensure the venous end of the dialyzer is up.	
18. Attach the saline administration set to the 1-liter 0.9% NaCl bag: ▪ Slide the clamp on the arterial T line closer to the bloodline (**clamp** at this time).	

PROCEDURE:	KEY POINTS:
19. Prepare the heparin infusion in a 20 mL syringe.	▪ The formula heparin pump is calibrated for a 20 mL BD syringe. ▪ Preparation of heparin is a 2 nurse check (site specific)
20. Attach the heparin syringe to the heparin line.	
21. Insert the Heparin Syringe in the Heparin pump: ▪ Line up the heparin syringe with the numbers facing outwards. ▪ Hold the flange of the syringe at the level of the clips under the syringe barrel holder. ▪ Adjust the syringe plunger on the heparin pump with the up and down arrow keys beside the heparin pump until the syringe barrel and plunger slide into the mount. ▪ Make sure the flange on the plunger of the syringe is secure in the slit on the plunger holder of the heparin pump. ▪ Make sure the flanges on the barrel are secure in the flange holder. ▪ Tighten the screw on the bottom of the syringe plunger.	
22. Press the up arrow on the heparin pump control until 1 mL of Heparin fills the heparin line.	
C. Preparation of the Dialysate:	▪ Once the Rinse has finished (5min), an audible alarm will sound and the SELECT DIALYSIS button is available.
1. Press RESET to stop the audible alarm.	
2. Press SELECT DIALYSIS.	
3. Ensure the. BIDRY (or Bicarbonate) button is highlighted.	
4. Ensure DOUBLE NEEDLE is highlighted.	
5. Press OK to verify.	▪ Make sure the acid concentrate and the bicarbonate concentrate are as prescribed.
6. A) Connect the Bicarbonate cartridge: ▪ Rotate the locking bracket to release the upper piercing connector. ▪ Disconnect the upper piercing connector from the mobile bypass. ▪ Lift the mobile bypass. ▪ Place the bottom of the cartridge into the lower piercing connector. ▪ Press the upper piercing connector onto the top of the cartridge. ▪ Insert the upper connector into the upper clip support. **OR**	▪ Upper left hand corner status bar will read “BID + STD A Conc” ▪ Remember to remove caps/ends from bicarbonate cartridge.

PROCEDURE:

KEY POINTS:

6. **B) Connect the Bicarbonate concentrate:**
   - Place the bicarbonate concentrate on the left side of the concentrate shelf on the front of the machine.
   - Insert the blue concentrate wand.
   - Attach the blue concentrate line to the concentrate wand.

- Ensure that "bicarbonate" was chosen with "SELECT DIALYSIS"
- The upper left status bar will read "BIC + STD A Conc"

7. Connect the Acid Concentrate:
   - Place the Acid concentrate on the right side of the concentrate shelf.
   - Insert the red concentrate wand.
   - Attach the red concentrate connector to the concentrate wand.

8. **DO NOT PRESS DIALYSATE PREPARATION at this time.**

D. Priming the Dialyzer:

1. The Formula should display PRIMING DN in the top right hand display bar. If it does not then:
   - Press SELECT PRIMIMG on the left side of the monitor screen.
   - Press DOUBLE NEEDLE if not already green.
   - Press OK to verify.

2. Back fill the 0.9% NaCl administration set and arterial bloodline:
   - Open the clamp on the 0.9% NaCl administration set and T line.
   - Fill the patient end of the arterial blood tubing to the drain bag.
   - Clamp Y tubing of drain bag attached to the arterial tubing.

3. Set the blood pump speed to 150 ml/min by turning the blood flow regulator knob to the right.

4. Press the BLOOD PUMP key at the bottom of the monitor to turn on the blood pump.

5. Follow the flow of 0.9% NaCl from the administration set drip chamber to the expansion chamber.

6. Fill the expansion chamber:
   - Remove the arterial expansion chamber from the holder and turn upside down.
   - Allow the chamber to fill 1/3, and then turn right side up and place back into the holder.
   - Ensure the clamp on the medication line on top of the chamber is clamped.

- DO NOT tip expansion a 2nd time as it causes air detector alarms. If expansion chamber is empty attach 20mL sterile syringe and pull fluid into chamber.

7. Fill the venous drip chamber:

PROCEDURE:	KEY POINTS:
▪ When the 0.9% NaCl reaches the venous drip chamber loosen the cap on the medication line on the venous chamber. ▪ Allow the chamber to fill to the fill line. ▪ Retighten the cap. ▪ Clamp the medication line.	▪ This will take 1-2 minutes at blood flow of 150mL/min.
8. Insert the venous line into the air detector below the drip chamber.	▪ The clamp will automatically open once the 0.9% NaCl is at the correct level in the drip chamber.
9. Insert the venous line into the venous line clamp.	▪ **NOTE:** If the line is not placed in the air detector of clamp an alarm will sound at the beginning of dialysis preventing dialysis until these steps are completed.
10. Rotate the dialyzer to aid in air removal. You may also clamp and release the venous bloodline to create pressure surges to aid in air removal.	
11. The blood pump will stop automatically once **800**mLs have primed the dialyzer: ▪ The status bar at the bottom of the screen will turn red and read PUMP OFF. ▪ If you wish to continue priming for air removal press the BLOOD PUMP key to turn on the blood pump. ▪ Once you have finished priming the dialyzer press the BLOOD PUMP off again. ▪ Attach a new 1 L bag of 0.9% NaCl to the administration set as required.	▪ The blood pump will no longer stop automatically until you press it off. ▪ **NOTE**: Delay changing NS bag until level detector test complete, as this test will cause 0.9% NaCl to back up into bag. ▪ Ensure the 0.9% NaCl drip chamber is no more than ½ full. This will allow you to check that the new 0.9% NaCl bag remains full of the fresh 0.9% NaCl and 0.9% NaCl from the dialyzer and lines has not backed up into the bag.
12. Close the clamp on the drain bag.	
13. Open the clamp on the Y of the drain bag attached to the arterial bloodline.	
14. Increase the blood flow to 400 mL/min and press the blood pump on. Make sure the roller clamp on administration set is open.	

E. Testing the level detector:

1. Test the level detector by pressing the arrow down key on the front of the monitor until the level falls below the level detector.	
2. Make sure the Formula performs the following functions: ▪ The alarm lamplights. ▪ The status bar becomes red and reads BLOODLEVEL. ▪ The blood pump stops. ▪ The venous line clamp closes.	
3. Raise the level in the venous drip chamber by pressing the up arrow on the front of the monitor.	

PROCEDURE:	KEY POINTS:
4. Press the RESET key to reset the air detector.	
F. Setting the treatment parameters:	
1. Complete pre-hemodialysis nursing assessment.	
2. If not at the Main Menu then press RETURN.	▪ If the screen does not return to the Main Menu, press RETURN until at the Main Menu.
3. If using a **user profile** for sodium and/or fluid profiling then activate the profile: ▪ Press SEE/MOD PARAMETERS ▪ Press PROFILES ▪ Press USER PROFILES ▪ Press USER PROFILES again ▪ Press PROFILE NAME ▪ Select the profile by using the up and down arrows to find your profile in the green box. ▪ Press TOT CONDUCTIVITY; ensure the key turns blue. ▪ Press UF PROFILE; make sure the key turns blue. ▪ Press OK to verify.	▪ Profiling is used for conventional treatments only as required and prescribed. If profiling has been selected, the total conductivity box and the ultrafiltration rate box on the main screen will both remain green.
4. Set remaining treatment parameters: ▪ Press SEE/MOD PARAMETERS ▪ Press DIALYSATE ▪ Press TREATMENT TIME and use the up and down arrows to set your dialysis time prescribed. ▪ Press WEIGHT LOSS and use the up and down arrows to set desired goal. ▪ Press BICARBONATE CONDUCTIVITY and use the side arrow keys to set the bicarbonate conductivity. ▪ If not previously set with a prescribed profile, press TOTAL CONDUCTIVITY and use the side arrow keys to set the total conductivity prescribed. ▪ Press OTHER PARAMETERS: o Press TEMPERATURE and use the up and down arrow keys to set the prescribed dialysate temperature. o Press FLOW and use the side arrow keys to set the flow rate as prescribed ▪ Press OK to verify the treatment parameters.	▪ The setting for standard Bicarbonate conductivity (35 mmol/L) is 3.1 ▪ OK must be pressed for settings to take effect.
5. Set the Heparin parameters: ▪ If not at the Heparin screen press RETURN to go back to Main Menu. ▪ Press SEE/MOD PARAMETERS. ▪ Press HEPARIN.	

PROCEDURE:	KEY POINTS:
▪ Press HEPARIN PRESTOP. Use the side arrow keys to set the time that the heparin is prescribed to stop before the end of dialysis.	
▪ Press HEPARIN INFUSION then use the side arrow keys to set the rate per hour.	▪ The heparin infusion rate is prescribed by the physician.
▪ Press SYRINGE CAPACITY then use the side arrow keys to set the syringe to 20 mL.	
▪ Press OK ▪ Press HEPARIN ON so the heparin will start automatically when the machine enters the dialysis mode. It will be grayed out and read HEPARIN SET.	▪ There will be an alarm at the start of dialysis if this step is forgotten.
6. Set the UF so the UF program will start automatically when the machine enters dialysis mode: ▪ Press UF ON. ▪ The button will be grayed out and will then read UF SET.	
7. Set the Kt/V parameters • Select SENSORS; then press APPLICATIONS; then press Kt/V • Press SEE/MOD PARAMETERS • Press DISTRIBUTION VOLUME X 2 • Use the ← or → arrow keys to set the urea volume of distribution value • Press OK to confirm • Press MEASUREMENT INTERVAL and set the time for 30 minutes • Press OK to confirm	▪ Ensure the urea volume of distribution value is current. ▪ The status bar at the bottom of the screen will read “Kt/V” during measurements.
G. Preparing the dialysate side of the dialyzer:	
1. Press DIALYSATE PREPERATION**.**	▪ “Connection Patient” button will appear on the main screen. Do NOT press.
2. If using bicarbonate cartridge, ensure BIDRY FILL-UP ON appears while the cartridge is filling.	▪ The status bar on the upper left corner of the monitor will read BID & STD A CONC PREP if using bicarbonate cartridge. or will read BIC & STD A PREP if using liquid bicarbonate concentrate. Note the “BID message stands for use of the bicarbonate cartridge and “BIC” stands for use of bicarbonate liquid.
3. Turn the dialyzer arterial end up.	▪ The Total Conductivity will reflect the starting sodium (eg. 14.O for sodium 140) and the status bar will read “BYPASS”. The status bar on the upper left corner of the monitor will read BID/BIC+STD A CONC-FILTER. ▪ The Formula will be in bypass mode. The yellow LED light beside the bypass button at the bottom of the monitor will light.

PROCEDURE:	KEY POINTS:
4. Attach the dialysate lines to the dialyzer: ▪ Attach the RED line to the arterial end of the dialyzer. ▪ Attach the BLUE line to the venous end of the dialyzer.	
5. Press the BYPASS key to take the Formula out of bypass mode.	
6. Change the 0.9% NaCl bag if required.	
7. Facilitate de-aeration of the dialysate compartment by slightly turning the dialyzer so that the arterial dialysate port is up.	
8. Once the air is removed on the dialysate side. (about 30 seconds) turn the dialyzer VENOUS END UP.	
H. Recirculation of the Dialyzer with 0.9% NaCl and Dialysate:	
1. Ensure the blood pump is on at 400 mL/min.	▪ The Formula will automatically set the UF (ultra-filtration rate) to 0.2 mL/hr. ▪ The DIALYZER RINSE OFF key will turn blue. If this key is turned off, the UF rate will decrease to 0.1 mL/hr. ▪ When the total priming volume has decreased to 0.4 liters from 25 liters, the blood pump will stop automatically after every 150 mLs pumped.
2. If the blood pump shuts off, then restart by pressing the blood pump key.	▪ Continue to recirculate the dialyzer until the dialysate compartment and the blood compartment are completely de-aerated.
3. Complete the safety check list.	
I. Initiating Hemodialysis:	
1. Ensure the UF SET button has appeared. If the UF ON button is evident, press the button so the UF SET appears.	
2. Press the blood pump button to stop the blood pump.	
3. If 0.9% NaCl bag has not been changed, hang a new bag at this point.	▪ If the bag was previously changed and the 0.9% NaCl drip chamber is full, the 0.9% NaCl from the dialyzer may have backed up into the 0.9% NaCl bag. Therefore this bag will need to be changed as well.
4. Clamp the Y line attached to the venous (blue) bloodline on the drain bag.	

PROCEDURE:	KEY POINTS:
5. Open the clamp on the drain bag.	
6. Ensure the 0.9% NaCl is replaced from the T line to the drain bag.	
7. Clamp the Y line attached to the arterial bloodline on the drain bag.	
8. Clamp the arterial bloodline.	
9. Open the clamp on the Y line attached to the venous bloodline on the drain bag.	
10. Ensure the clamp on the venous bloodline is open.	▪ Make sure the 0.9% NaCl is running in the administration set drip chamber. If air enters the 0.9% NaCl administration set from bubbles in the drip chamber, decrease the blood pump speed.
11. Set the blood pump to 300 mL/min and then press the blood pump button on, allowing 300-500 mLs of 0.9% NaCl to enter the dialyzer.	
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12. Press the blood pump off.	
13. Make sure the following clamps are closed: ▪ Drain bag. ▪ Y line attached to the venous (blue) bloodline on the drain bag. ▪ Y line attached to the arterial (red) bloodline on the drain bag. ▪ Venous bloodline. ▪ Arterial bloodline. ▪ 0.9% NaCl 'T' line. ▪ Administration set.	▪ There should be 7 clamps closed**.**
14. Turn the Dialyzer arterial end up.	
15. Connect the bloodlines to patient access as per unit protocol and unclamp the venous bloodline and vascular access.	
16. Set the blood pump to 100-120 mL/min.	▪ When blood is detected at the arterial sensor below the arterial chamber, the blood pump will stop, an alarm will sound and the alarm bar will read BLOOD PUMP STOPPED. The top right status bar will read CONNECT DN. This is when heparin prime is given (if programmed).
17. Unclamp the arterial bloodline and access.	
18. Press the blood pump on.	▪ Once blood is detected in the venous chamber, the right top bar will read DIALYSIS DN (double needle). ▪ If blood is not detected 60-90 sec after it is detected in the arterial line a BLOOD LEVEL alarm will sound. ▪ Correct the problem then Press the RESET key to

PROCEDURE:	KEY POINTS:
	restart the blood pump.
19. Make sure the needles (Or dialysis catheter) are taped securely.	
20. Increase Blood pump to dialyzing speed.	▪ When DIALYSIS DN appears in the right top corner of the monitor the following will automatically occur: o The treatment Clock will begin counting down. o BIC/BID+STD CONC.-PROG (or PROF) will appear in the top left corner of the monitor. o The alarm limits will automatically set around the Venous and Arterial pressure. o The Heparin key will be blue and will read HEPARIN OFF (this means that the key will turn the heparin off). o The UF key will be blue and will read MIN UF (this key will turn the UF off). o The RINSEBACK button appears and the status bar at the bottom of the screen will read PRESS RINSEBACK TO COMPLETE DIALYSIS. ▪ If the UF ON key was not activated, there will be an alarm. UF NOT ACTIVATED press UF ON.
21. Complete Post checklist.	
22. Take a blood pressure reading.	
J. Setting the automatic Blood Pressure Monitor:	
1. If not at the Main Menu press RETURN.	
2. Press SENSORS.	
3. Press SPHYGMO.	
4. Press AUTO BP ON, the button should turn blue.	
5. Press SEE/MOD PARAMETERS.	
6. Press MAX SYST THRESHOLD and set the limit.	
7. Press MIN SYST THRESHOLD and set the limit.	
8. Press MAX DIA THRESHOLD and set the limit.	
9. Press MIN SYST THRESHOLD and set the limit.	

PROCEDURE:	KEY POINTS:
10. Press MEASURE INTERVAL and set the time between BP readings.	
11. Press WARNING ON (this should change to read warning off).	
12. Press OK to verify.	▪ The SPHYGMO MEASURE button on the main screen will be GREEN if the automatic BP monitor is set.
K. Setting Hemox alarm limits:	
1. Press SENSORS.	▪ Use of the Hemox is optional.
2. Press SEE/MOD PARAMETERS.	
3. Press MAX VL THRESHOLD.	
4. Set the desired VL maximum by using the side arrow keys.	▪ The maximum VL will be different for individual patients. The value is determined by monitoring patient trends and identifying the value where patient's tolerance to fluid removal would be questionable, requiring the operator's close attention.
5. Press WARNING ON.	▪ The key will turn blue and read WARNING OFF.
6. SO2 and Hct thresholds may be set in the same manner at the operator's discretion.	
L. Discontinuing Hemodialysis with a fistula:	▪ Site specific policy may use procedure outlined in section M to discontinue treatment with a fistula (i.e. closed system return)
1. Ensure there is at least 500 mL of 0.9% NaCl attached to the arterial T line.	▪ When Dialysis time is complete, an alarm will sound and END UF will appear in the status box.
2. Press RINSEBACK and then press YES.	▪ A message box on the screen will say DO YOU WANT TO START RINSEBACK. Press YES. (Once rinse back has been verified, hemodialysis cannot be resumed).
3. The blood pump will automatically STOP and the blood flow rate will be decreased. Set pump speed at 150-200 mL/min.	
4. Clamp the arterial bloodline and arterial needle.	
5. Ensure the 0.9% NaCl administration set and T line are clamped.	
6. Attach the 0.9% NaCl administration set to one of the ends of the rinseback connector.	

PROCEDURE:	KEY POINTS:
7. Disconnect the arterial bloodline from the arterial needle and connect the arterial bloodline to the other end of the rinseback connector.	
8. Use the cap from the rinseback connector to cover the open port of the T line.	
9. Attach a syringe containing 0.9% NaCl to the arterial needle and flush the needle. Re-clamp the arterial needle extension.	
10. Unclamp the arterial bloodline and start the blood pump at 150-200 mL/min.	▪ When there is 0.9% NaCl at the venous drip chamber the blood pump automatically stops and the rate is decreased by 1/3.
11. Clamp and release the bloodlines to help remove the blood stuck to the sides of the tubing.	
12. Ensure the patient is stable prior to disconnecting from the vascular access.	
13. Attach the venous bloodline to the venous drip chamber medication line to ensure a closed system for disposal.	
14. Press the? (Help) key at the top right corner of the monitor until the PARAMETERS DIALYSIS button appears at the top right of the main screen.	
15. Press PARAMETERS DIALYSIS button and dialysis information will be displayed.	
16. Document the amount of TOTAL WIEGHT LOSS, and BLOOD PROCESSED, TOTALIZED HEPARIN (add heparin prime to this value) on the hemodialysis flowsheet.	
M. Discontinuing Hemodialysis with a CVC:	▪ Closed system blood return described for a CVC may be used for a fistula if a site specific policy.
1. Ensure you have at least 500 mL of 0.9% NaCl attached to the arterial T line.	▪ When Dialysis time is complete, an alarm will sound and END UF will appear in the status box.
2. Press RINSEBACK.	▪ A message box on the screen will say DO YOU WANT TO START RINSEBACK. Press YES. (Once rinse back has been verified, hemodialysis cannot be resumed).
3. The blood pump will automatically STOP and the blood flow rate will be decreased. Set pump speed at 150 mL/min.	
4. Clamp the arterial bloodline.	
5. Open the clamps on the arterial T line and on the 0.9% NaCl administration line.	▪ Ensure that no air is allowed to run into the arterial access.

PROCEDURE:	KEY POINTS:
6. Start the pump for 10 seconds to allow any air bubbles or clots to run AWAY from the patient, holding the dialyzer side of the blood line up.	
7. Stop the blood pump.	
8. Open the clamp on the arterial bloodline and allow the 0.9% NaCl to flush back blood in the arterial bloodline until it is clear.	▪ This is accomplished by gravity.
9. Clamp the arterial bloodline clamp and the arterial lumen of the catheter.	
10. Make sure the blood pump is set to 150-200 mL/min and start the blood pump.	
11. Clamp and release the bloodlines to help remove the blood adhering to the sides of the tubing.	▪ When there is 0.9% NaCl at the venous drip chamber the blood pump automatically stops and the rate is decreased by 1/3.
12. When the blood pump stops as the venous drip chamber clears, press the blood pump on again. The bottom status bar will read BLOOD LINES EMPTYING. Return as much 0.9% NaCl as required to clear the bloodlines, and then press the blood pump off.	
13. Clamp venous blood line and the venous lumen of the catheter.	
14. Ensure patient is stable prior to disconnecting form the vascular access.	
15. Attach the venous bloodline to the venous drip chamber medication line to maintain a closed system for disposal.	
16. Press the? (Help) key at the top right corner of the monitor until the PARAMETERS DIALYSIS button appears at the top right of the main screen.	
17. Press PARAMETERS DIALYSIS button and the dialysis information will be displayed.	
18. Document the amount of TOTAL WEIGHT LOSS, and BLOOD PROCESSED, TOTALIZED HEPARIN (add heparin prime to this value) on the haemodialysis flowsheet.	
N. Clearing of Lines	▪ **Site specific procedure (SOGH).**
1. Close clamp at red (0.9% NaCl) port ▪ Close roller clamp on saline line ▪ Disconnect 0.9% line from blood lines	▪ Do not remove dialysate hoses from dialyzer.
2. Open the three white clamps on the waste bag	
3. Open two large white clamps on the blood lines.	
4. Move waste bag to the lowest hook or place on the floor.	

PROCEDURE:	KEY POINTS:
5. Start blood pump.	
6. Open clamp at red port.	▪ Wait 3 seconds then proceed to 6.
7. Press BIDRY DRAIN on ▪ Remove titanium cap.	
8. Lines and dialyzer will drain into waste bag until venous chamber is empty.	▪ Air Detector Alarm will be displayed in red at the bottom of the screen.
9. Open Blood Pump door: ▪ Remove tubing from blood pump by pressing the up arrow at the Heparin Pump.	
10. Open Medication Port above Venous Chamber: ▪ Remove blood line from venous clamp ▪ Allow venous lines to empty into waste bag by gravity.	
11. Clamp the 3 waste bag clamps: ▪ Close two large clamps on blood lines ▪ Close the clamp at the Red Port	
12. Remove Blood Lines from waste bag ▪ Attach to venous and arterial transducer lines.	
13. Drain waste bag into toilet	
O. Removing Bloodlines/dismantling equipment:	
1. Empty the dialyzer: ▪ Turn the dialyzer BLUE END UP. ▪ Remove the BLUE dialysate line from the dialyzer. ▪ Connect the BLUE dialysate line to the connector on the Formula. ▪ The dialyzer will automatically drain. ▪ EMPTYING will appear at the top of the screen. ▪ When the dialyzer is empty -BLUE CON appears again. ▪ Remove the RED dialysate line from the dialyzer. ▪ Connect the RED dialysate line to the connector on the Formula. ▪ Recap dialyzer.	▪ Ensure BICARB-BLUE CON appears at the top of the screen.
2. Remove the blood tubing and dialyzer from the Formula from left to right and throw away. ▪ When removing the blood pump segment, open the blood pump door remove the red segment end from the blood pump and use the arrow keys beside the heparin pump to make the blood pump unload the tubing.	

PROCEDURE:

KEY POINTS:

3. **A) For Bicarbonate cartridge removal:**
   - Press BIDRY DRAIN ON.
   - Pull the top of the cartridge outward and remove the top cap.
   - Leave the bottom of the cartridge in place.
   - Set the cartridge upright again.
   - The message on the top left of the screen reads -EMPTYING.
   - When the cartridge is empty the screen reads -BLUE CON
   - Remove the cartridge and discard.
   - Replace the upper connector to close the cartridge holder.

OR

B) For Liquid Bicarbonate:

   - Attach the BLUE concentrate line to the BLUE connection on the front of the machine.

4. Attach the RED concentrate line to the RED connection on the front of the machine.

P. Disinfection of the Formula:

PRESS EARLY DISINFECT.

1. Press YES when the formula asks operator to confirm early disinfect.
2. Press DISINFECT on the right side of the monitor.
3. Press MANUAL DISINFECT.
4. Press CHEMICAL STD (vinegar) **or** CHEMICAL FULL (bleach).
5. Press AGENT.
   - Use the up and down arrow keys to select ACETIC A. (Vinegar) **or** USER (bleach).
6. Press OK to verify**.**
7. Place the yellow disinfecting wand in the Acetic acid (vinegar) **or** Bleach.
8. Attach the yellow disinfecting connector on the front of the Formula to the yellow disinfecting wand.

- Bleach must be discarded if opened longer than 6 months.
- The Formula will rinse for a few minutes and will read WITHIN FEW MINUTES THE MACHINE WILL START THE DISINFECTION PROGRAMED.
- Once the rinse has completed and the disinfection mode has started the disinfection screen will appear. The left side of the monitor will read:
  - DISIN.-CHEMICAL STD (or FULL) in the status bar at the top.

PROCEDURE:	**KEY POINTS:**
	○ ACETIC ACID (or USER) will appear in the chemical agent box. ○ The 2nd disinfection box will read (not set). ○ The 3rd box will display the water temperature. ○ The 4th box will display the disinfection time. ○ The status bar at the bottom of the screen will display WAIT FOR DISINFECTION END.
	▪ If a DISINFECTION warning occurs, failure of the disinfection programmed is likely and the disinfection must be repeated. ▪ Ensure vinegar/bleach are not empty, replace if required and repeat disinfection cycle.
9. Set 2nd HEAT disinfection and automatic off: (35 min) once the acetic acid rinse has started. Press SECOND DISINFECTION at the top of the disinfection screen. ▪ Press HEAT. ▪ Press AUTOMATIC OFF at the bottom right of the disinfect screen. ▪ Press the up and down arrow key once so ENABLE is seen in the box. ▪ Press OK to verify.	▪ If using bleach do not set second disinfection or automatic off until bleach is completed and residual test is negative (step 12).
10. Once the disinfection mode changes to the second segment (blue) of the chemical procedure you may move the disinfect connector to the port on the front of the Formula.	
11. A test for residual chlorine must be performed when bleach used in the User disinfect cycle: ▪ Use a 10 mL syringe to withdraw a 10 ml sample of fluid from the port on the drain line of the Formula and discard. Take a second sample. ▪ Remove one test strip from the chlorotest bottle and replace the cap. ▪ Check for residual disinfectant according to manufacturer's instructions on the bottle, use <u>QUALITATIVE PROCEDURE</u> (5 sec stream) ▪ Remove test strip from sample and compare to color chart on the bottle.	▪ Any change in color of the chlorotest test strip indicates that bleach is still present in the delivery system. Recheck in 5 minutes. If still positive, you may try to use a new bottle of chlorotest; if still positive, turn the Formula off at the back of the machine and then turn the Formula on to force a re-rinse of the delivery system. Once the rinse is complete, re-check chlorotest. If still positive, <u>DO NOT USE THE FORMULA</u>, NOTIFY DIALYSIS TECHNOLOGIST.
12. Once the Heat disinfection is complete the Formula will turn itself off.	
13. Turn off the Water.	▪ See procedure 30.30.01 *Use of AQUABOSS EcoRO Dia 70 RO System* or 30.30.02 *Use of Fresenius AquaC UNO H RO system*
14. Rinse the disinfect wand under running water and replace in the holder on the side of the Formula.	

PROCEDURE: **KEY POINTS:**

Q. Cleaning the exterior of the Formula 2000:

1. Wipe the machine with the approved cleaning solution and a soft cloth. Take handling precautions as indicated on the label:
   - Make sure the cloth is not so wet that it drips over or into the machine.
   - Once the machine is dry it is ready for the next dialysis.

2. Clean the concentrate wands once a week by:
   - Soaking in a 1:100 bleach solution for 20 min.
   - Rinse under running water for 5 min.
   - Ensure the water has run through the inside of the wands.

DOCUMENTATION:
- Hemodialysis Treatment Worksheet
- Hemodialysis Flowsheet
- IPN to patient record as required

REFERENCES:
Formula ™ 2000 PLUS Information Binder, BHC Medical, 2855 Argentina Road, Unit 2, Mississauga, ON L5N 8G2; www.bhcmedical.ca.