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NEPHROLOGY PROGRAM
DEPARTMENT POLICIES AND PROCEDURES

Hemodialysis - Section 10 - Gambro Artis - Neph 10-07
Hemocontrol with the Gambro Artis
No.: 01159 (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:
Gambro Artis

IMPLEMENTATION DATE:
2013/12

PURPOSE:

- To deliver a hemodialysis treatment with the optimal dialysate sodium concentration to help prevent hypotension
- To deliver a hemodialysis treatment with the optimal Ultrafiltration (UF) rate to achieve a desired fluid balance, while minimizing the risk of intra and post-dialysis hypotension and cramping

BACKGROUND STATEMENTS:

1. During a Hemodialysis session using hemocontrol, fluid removal and sodium levels are continuously adjusted by the Artis machine based on the patient's blood volume (Hemoscan)
2. Patients with a high incidence of hypotension during conventional hemodialysis may benefit from hemocontrol
3. The use of the patient prescription card is recommended to simplify the settings. See section "A" for programming hemocontrol using the prescription card or manual entry
4. The Hemocontrol system must be activated before starting treatment
5. Hemocontrol Standby option:

    - The "stand-by" button pauses the modulation of the "UF rate" and "sodium" parameters performed by Hemocontrol function
    - This option should be selected when administering a bolus of 0.9% NaCl, as the bolus will interfere with the machines ability to accurately read the blood volume

6. Contraindications for Hemocontrol. Hemocontrol should not be used under the following circumstances as this may interfere with the machine's ability to accurately read blood volume (BV):

    - Heparin free treatments requiring 0.9% NaCl infusions or flushes
    - Blood product administration
    - Total parenteral nutrition (TPN)
    - IV infusions on dialysis
    - Interdialytic tPA
    - If goal is less than 1.0 L
    - If hgb is less than 60 or greater than 140
    - Blood flow less than 180

7. For all infusions during run, deactivate Hemocontrol
8. If Hemocontrol is turned off during the treatment:

    - You will get a warning message.
    - The UF rate will be calculated for the remainder of the treatment.
    - Sodium level will be set at the level when the program is turned off.
    - ***Note:*** You should confirm this message, then you MUST go to the prescription page to set the ordered Na level

9. Once deactivated, the hemocontrol system cannot be activated again for the remainder of the treatment

DEFINITION(S): N/A

ALERTS: N/A

PROCEDURE:

The physician will enter the order into NephroCare using the **"frequently prescribed order"** for hemocontrol

Section A: Programming Hemocontrol on the patient card

1. To program the Hemocontrol prescription on the patient card

    - ***Note:*** Refer to Neph 10-08 (#01232) for programming the patient's basic prescription on the card

2. Press the 'Prescription NavPad' to enter the prescription screen
3. Select 'Pt card edit'
4. Press 'Modify card'- Scan the patient prescription card
5. In treatment settings, change the UF Volume (goal) to 1.0 liter
6. Press 'Distribution Vol. Settings'. Press 'Dist Vol Entry' button
7. Select 'Watson' and 'confirm'. Enter the patients height obtained from Nutrition guidelines screen in NephroCare, patient age obtained from the Personal screen in NephroCare, Ideal weight from the R 191 and gender
8. Arrow down to Hemocontrol settings. Select Hemocontrol 'yes' and confirm

9. Enter the treatment parameters for Hemocontrol found in the comment section on the front of the R191. Note the UF volume(goal) has populated into the screen

    - Enter Final BV\UF vol
    - Enter the Equivalent Na
    - Maximum UF Co-efficient
    - Enter Sodium limits(Standard, Large or Narrow)

10. Press 'Save'
11. Place the card in front of the reader. A pop-up screen will appear reading prescription saved on Patient card- press 'confirm'
12. Scan the card to transfer the patient's prescription (including the Hemocontrol function) and verify parameters before pressing confirm

If the patients card is not read by the Artis machine, or the patient card is not available, hemocontrol may be entered manually as follows:

1. Press 'Prescription ' on the NavPad
2. Press 'Distrib Vol Settings' button
3. Under 'Distribution Vol Entry', press the 'no entry' button
4. Select Watson and confirm. Enter the patient height obtained from Nutrition guidelines screen in NephroCare, patient age obtained from the Personal screen in NephroCare, Ideal weight from the R 191 and gender
5. Press 'close'
6. In the main Parameters screen enter all prescription parameters; if the UF Volume is unknown enter 1.0 as a goal.
    - ***Note:*** this must be adjusted to reflect the patients calculated goal before treatment is begun
7. Confirm Treatment time and UF volume
8. Under Activated Functions, press the 'Hemocontrol' button
9. Enter the following:

    - Enter Final BV\UF vol
    - Enter the Equivalent Na
    - Maximum UF Co-efficient
    - Enter Sodium limits(Standard, Large or Narrow)
    - Enter calculated UF volume if known

10. Press 'Hemocontrol' button
11. A pop-up screen will appear stating 'Confirmation required'- verify that the max initial UF does not exceed 2.5 l/hr and the final BV will be indicated
12. Press 'Confirm' to activate
13. Close Hemocontrol screen

    - Once Hemocontrol has been activated, the Home screen now contains the Hemocontrol icon in the top right corner as well as in the hourly UF rate and Acc UF Vol fields. There will also be a large Plasma Refilling Indicator (speedometer) on the left side of the screen

Section B: Initiating Hemocontrol

1. Scan the patient's prescription card on the Artis and verify prescription against R191 to ensure the card is up to date
2. Calculate goal for the treatment and manually enter goal on prescription page, verify that the max initial UF does not exceed 2.5L/hr
3. Assess max initial UF value and ensure that this is appropriate for the patient Begin treatment as per Neph 5-01 (# 00741) or Neph 6-01 (# 00748)
4. 45 minutes after the treatment starts, hemocontrol information will be displayed on the cross graph and the hemocontrol icon on the main screen

Hemocontrol Parameters

- There are 3 forecast values displayed in the hemocontrol screen, Forecast blood volume (BV) and Forecast UF vol, and forecast sodium
  - **Forecast BV**: Defines the forecast value for the Final BV parameter at the end of the treatment
  - **Forecast UF vol**: Defines the forecast value for the UF volume parameter at the end of the treatment
  - **Forecast Sodium**: Estimated sodium value for the end of treatment

Final BV/UF volume

- Is what the machine expects the RBV to drop by for each litre of fluid removed. To calculate this value use the spreadsheet in the appendix

Maximum UF Co-efficient

- The hourly UF rate multiplied by the Max UF co-efficient calculates the maximum initial UF. The maximum initial UF is the beginning UF rate and decreases throughout the treatment

Section C: Hemocontrol settings Sub screen (click on Hemocontrol function key, the sub screen will be available)

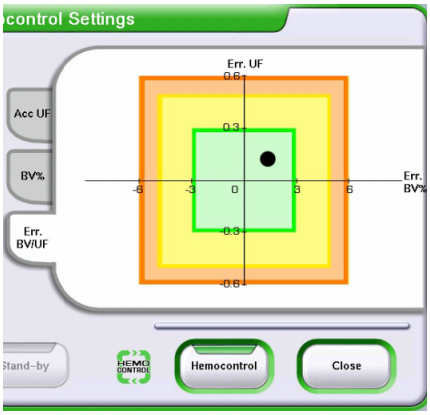
Acc. UF graph

- The blue lines show the allowed bands for the accumulated UF volume. The limits are set at +\- 0.3L from the optimal UF trajectory (shape of curve)
- The red line shows the current accumulated UF volume

Blood volume Graph

- The blue lines show the allowed bands for the current BV%. The limits are set at +\- 0.3L from the optimal BV trajectory (shape of curve)
- The red line shows the current BV (%)

Section D: Interpretation of the cross graph



- ***Note:*** It takes up to 30 minutes to see the full effect after adjustment of a hemocontrol parameter. Once one adjustment has been made wait 30 min before making another change, it needs time to take effect

Upper Right Quadrant (UR)- Refilling better than expected

- Refilling rate better than expected; opportunity to remove more fluid
- Reassess UF goal e.g. was fluid removal conservative or does the patient have residual renal function and we don't want to dry him/her out
- **Action:**
  - Assess patient for symptoms (cramping, etc) and blood pressure
  - Stable BP: If more fluid can/needs to be removed, increase the UF goal
  - for example from 4.0 to 4.2
  - If BP unstable: In the case of minor symptoms, increase final BV
  - for example -12.0 to -10.0
  - If 0.9% NaCl boluses must be delivered select "**standby"** option for Hemocontrol, this will pause hemocontrol

Upper Left Quadrant (UL)-Inconsistent temporary status

- Unusual status;
- **Action:**
  - If this status persists for more than 15 minutes deactivate hemocontrol

Lower Left Quadrant (LL)-Refilling rate lower than expected

- BV has decreased more than expected; dry weight might not be achieved. The machine has responded by decreasing the UFR and increasing the sodium and as a result the accumulated UF is lower than expected

- **Action:**
  - Assess pt for symptoms (cramping, etc) and blood pressure.
    - Stable BP: Consider decreasing the final BV, for example from -12.0 to -14.0
    - Unstable BP: Decrease UF goal and/or manage symptoms as appropriate

Lower Right Quadrant (LR) - UF Volume may not be reached

- Refilling better than expected, however, the accumulated UF is lower than expected because it is restricted by the max initial UF
- **Action:**
  - Assess patient for symptoms (cramping, etc) and blood pressure
- Stable BP:
  - increase Max initial UF if possible, for example from 1.5 to 1.8
  - If unable to increase max initial UF because it is already at the maximum level (Max UF Coefficient = 2.0), increase the Final BV, for example -10.0 to -8.0
- Unstable BP: manage symptoms as appropriate

Troubleshooting

Maximun Na+ Conc Alarm

- **This alarm occurs**: Patients who are not refilling well, will receive higher dialysate sodium when the BV drops, resulting in forecast Na which is greater than the equivalent Na by more than 3 mmol/L
- **Remedy:**
  - Decrease the Equivalent Na by 2 mmol/L, this forces the delivered end Na to be lower
  - Consider consulting MD to order large Na band (vs. Standard) to allow the Na to drop lower at the end of treatment. ***Note:*** this does not work with an equivalent Na of 136 or lower

Changing the goal

- The machine will not let you decrease the goal as you are limited by the Maximum Initial UF
- **Remedy**
  - Need to decrease the Max initial UF first by 0.3-0.5, then the goal buttons will be reactivated and you can decrease the goal. You may need alternate between decreasing the max initial UF and goal to get to the desired goal

Forgot to enter the correct goal before starting treatment

- **Remedy**
  - Need to increase the Max initial UF first by 0.3-0.5, then the goal buttons will be reactivated and you can increase the goal. You may need alternate between increasing the max initial UF and goal to get to the desired goal

Frequent adjustments over the last 3 treatments:

- If frequent adjustments have been made over the last 3 treatments, then the prescription should be reassessed with the MD

DOCUMENTATION:

- Document HemoControl on/ HemoControl off in incidents screen
- MD to use FPO for HemoControl when ordering
- Nurses will document the outcomes of HemoControl in a Progress Note using the prescripted phrase for HemoControl

RELATED POLICIES / LEGISLATION:

1. Nephrology Policies and Procedures - Hemodialysis - Section 05 - A-V Fistula/Graft - Neph 5-01(# 00741) - Initiation of Hemodialysis Using an Established Arterio-Venous Fistula/Graft Using the Gambro Artis Hemodialysis Machine
2. 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
3. Nephrology Policies and Procedures - Hemodialysis - Section 10 - Gambro Artis – Neph 10-08 (#01232) Use of the Prescription Care with the Gambro Artis Hemodialysis Machine

REFERENCES:

1. Gambro Artis User Manual, 2012 version 8.09
2. Gambro Artis Hemocontrol: Physiological water removal for improved cardiovascular stability. Tips and Hints. 2011/03

COMMENTS / SIGNIFICANT REVISIONS: N/A