

## NURSING CARE STANDARD

### B-00-13-10015– Profiling or Ramping Fluid Removal

#### Hemodialysis: Profiling or Ramping Fluid Removal

**Site Applicability:** SPH In-Centre hemodialysis unit and PHC community dialysis units

**Skill Level: Specialized:**

Nurses (RN or LPN) who have successfully completed Nephrology Nursing Specialty Education and provide care in a Providence Health Care Renal Program Hemodialysis Unit.

**Related Documents and Resources:**

1. [B-00-13-10058](#) – Hemodialysis: Patient Assessment Pre, Intra and Post Dialysis
2. [Appendix A](#) – B Braun Dialog Plus Ultrafiltration Program (Adapted)
3. [Appendix B](#) – Common Types of Profiling used in Fresenius 5008 Machine

**Need to Know:**

1. **Profiling:**

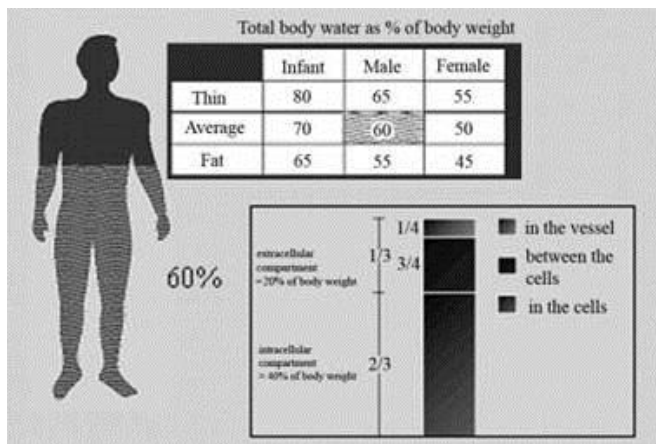
**Dialysate sodium and ultrafiltration profiling** are two methods to reduce symptoms such as hypotension and cramping during hemodialysis. Removing too much fluid in a short period of time usually causes hypotension. Profiling fluid removal works best when accompanied by profiling or ramping the sodium. This profiling enhances the shift of fluid from the intracellular compartment into the vascular system. This keeps the individual hemodynamically stable and decreases the incidence of complications. If ordered, Sodium profiling is set using the conductivity profile that prevents cerebral edema and excessive thirst between dialysis treatments. The most common type of Sodium profiling is linear, where the Sodium level is set to start from the highest level and gradually decreases to the lowest level over the length of the dialysis treatment.

Ultrafiltration rates (UFR) is the rate of fluid removed during the course of hemodialysis treatment. **Rapid and/or high UFR** have been associated with increased of cardiovascular mortality and intradialytic episodes. To improve outcome, it is recommended to use an **UFR between 10 to 13 mL/kg/h**

## NURSING CARE STANDARD

### B-00-13-10015– Profiling or Ramping Fluid Removal

#### Distribution of Body Water:



Adapted from GAMBRO Basics 2. GAMBRO Education 1996

#### A. Fluid profiling can be used if the patient experiences any of the following:

- Hypotension
- Cramping during the treatment
- Nausea, vomiting, abdominal discomfort and dizziness
- Dialysis disequilibrium headache post treatment
- Fluid gains more than 3.0 kg.

#### B. Types of fluid profile:

##### For B-Braun Dialog+ HD Machine (Ultrafiltration Programs)

- Diffusive Profiles – Use for removal of fluid through ultrafiltration and diffusive clearance through dialysate flow through the dialyzer
- Combination Profiles include Sequential (Yellow Segments) that is ultrafiltration without diffusion and Diffusion (Green Segments) is ultrafiltration with diffusion
- Sequential Profiles are ultrafiltration without diffusion

##### For Fresenius 5008 Machine

- Profile 1 (Progressive)
- Profile 2 (Steps)
- Profile 3 (Picket Fence)
- No Profile

2. If the most recent blood test results show a serum sodium more than or equal to 135 and if Sodium profiling is beneficial to the patient, the nurse should obtain an order from MD

## NURSING CARE STANDARD

### B-00-13-10015– Profiling or Ramping Fluid Removal

or NP. The fluid profile along with the selected sodium profile should be written in the care guide form.

3. The following subgroups of chronic hemodialysis patients should be evaluated carefully for the risk of developing intradialytic hypotension (IDH):
  - Patients with Cardiovascular Disease (CVD):
  - Patients with diabetes
  - Patients with poor nutritional status and hypoalbuminemia
  - Patients with uremic neuropathy or autonomic dysfunction due to other causes
  - Patients with severe anemia
  - Patients requiring high volume ultrafiltration; more than expected weight gain
  - Patients with predialysis SBP of less than 100 mm Hg
  - Patients who are elderly (e.g. 65 years or older)
4. **Intradialytic hypotension (IDH)** is defined as per Kidney Disease Outcomes Quality Initiative (KDOQI) and European Best practice Guideline as a decrease in systolic blood pressure by more than or equal to 20 mm Hg or a decrease in mean arterial pressure (MAP) by 10 mm Hg associated with symptoms that include: abdominal discomfort, yawning; sighing, nausea, vomiting, muscle cramps, restlessness, dizziness or fainting, and anxiety.
5. **Hemoscan or Blood Volume Monitoring (BVM) System or CRIT-Line Monitor** is a quality assurance tool present on some hemodialysis machines that helps to monitor changes in blood volume and hematocrit in relation to assessment of fluid status and ideal dry or goal weight.
6. **Plasma Refilling Zone:** The body starts to compensate fluid removal through physiological reaction. This is characterized by a smooth decrease of the blood volume. This is a favorable period and the aim is to maintain it until the end of the dialysis treatment.
7. **Crash Zone:** When the body is unable to compensate, it reaches a critical level often leading to a hypotensive episode. This varies in every patient from one treatment to another treatment (e.g. patient needs time to move fluid from cells into vascular system, if fluid is removed too quickly then BP may drop suddenly, or they have reached their dry weight and there is no more fluid to be removed)
8. **Rebound Zone:** Patient rebounds when an intervention is done before or after the crash point is reached. (E.g. Patient put into minimum UF or lower UF point is reached in the profile).

## PRACTICE GUIDELINE

### Equipment & Supplies:

On-line Blood Volume Monitoring (BVM) (for use with Fresenius 5008 Machine)

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B-00-13-10015- Page 3 of 11

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Questions, concerns, comments about PHC guidelines can be emailed to: [nursingstds@providencehealth.bc.ca](mailto:nursingstds@providencehealth.bc.ca)

## **NURSING CARE STANDARD**

### **B-00-13-10015– Profiling or Ramping Fluid Removal**

CRIT-LINE HCT-Based Monitor (Hema-Metrics) -for use with B-Braun Dialog Plus machine  
CRTI-LINE Sensor Clip (for B Braun machine)

#### **Procedures**

1. Perform initial assessment of patient's fluid status, goal weight and target loss for the dialysis treatment.
2. Assess patient history on previous treatments (e.g. History of cramping, hypertension, etc.)
3. Assess that sodium ramping together with fluid profiling helps in the ultrafiltration during dialysis treatment; a sodium profiling order should be obtained from MD/NP if needed.
4. Choose an appropriate fluid removal profile based on the patient assessment, treatment history and their body's reaction to fluid removal (as seen in the Hemoscan or BVM graph or crit line monitor). Discuss with rounding nephrology team
5. Monitor patient hourly or more frequently as required, including vital signs.
6. Routine measures for the treatment of IDH include:
  - use of Trendelenburg position
  - minimum ultrafiltration (UFR)
  - use of dialysis solution temperature of 35.5°C with upward or downward adjustment if needed
  - normal saline (0.9%) boluses to cause the vascular system to refill and increase the systolic blood pressure to 100–110 mm Hg.
7. Additional Factors Relating to IDH Treatment:
  - **Patient related Factors:**
    - Assess and maintain dry weight as close to the target as possible
    - Counsel and educate patients to reduce interdialytic fluid and dietary sodium intake
    - Assess any antihypertensive medications and discuss with the rounding nephrology team
    - Avoid eating just before or during the dialysis treatment
  - **Dialysis related Factors:**
    - Avoid aggressive ultrafiltration to achieve dry weight
8. Assess for signs of orthostatic hypotension before the patient is discharged from the dialysis unit.
9. Assess the patient's response to the profile during the treatment (e.g. any hypotension, cramping etc.) and when these responses occurred during the treatment.
10. Use the Hemoscan or BVM graph if present, to verify the body's response to the profiling.

## NURSING CARE STANDARD

### B-00-13-10015– Profiling or Ramping Fluid Removal

11. Assess the patient's response to the profiling post dialysis (e.g. achievement of goal weight, BP stable post, evidence of cramping or headache, etc.).
12. Contact nephrologist or nurse practitioner (NP) if an order for sodium ramping is required.
13. Continue ongoing assessment of the use of profiling.

#### Patient/Resident Education:

1. Include dietary consults regarding fluid control, diabetic teaching if appropriate, thirst, sodium restriction and the long range effects of high fluid weight gains in relation to other systems (e.g. cardiac status, respiratory, etc.)
2. Nitro patches should be removed prior to the start of dialysis as this medication can reduce blood pressure and interfere with required fluid removal

#### Documentation:

1. The type or profile number chosen should be specified on the hemodialysis care guide and run sheet, for both sodium and fluid removal.
2. The outcome should be written in the nurses notes on the same sheet under post dialysis assessment or in the interdisciplinary progress notes. The outcome and plan for the use of profiling should be included on the hemodialysis care guide.

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## NURSING CARE STANDARD

### B-00-13-10015– Profiling or Ramping Fluid Removal

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#### Persons/Groups Consulted:

Clinical Practice Group, Renal Program

#### Developed By:

Nurse Educator PHC Renal Program

#### Date of Creation/Review/Revision:

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## NURSING CARE STANDARD

### B-00-13-10015– Profiling or Ramping Fluid Removal

#### Appendix A: B Braun Dialog Plus Ultrafiltration Program (Adapted)

##### 1. Diffusive Profiles:

<b>Profile 0 (Default)</b>	Used for low or high weight gainers when the minimum or maximum UF alarm limit would be exceeded during a high or low segment of other programs. Offers a constant steady pull of fluid throughout the therapy
<b>Profile 1</b>	Used when gradual increase in UF rate is required at the beginning of therapy (e.g. patient drops BP, becomes nauseated/vomits) or when hypotensive toward end of therapy. Also helps if the patient tends to cramp toward the end of therapy
<b>Profile 2</b>	Used more in the acute setting when the patient is unstable and is to receive osmotic e.g. blood or albumin at the onset of therapy. UF is delayed until the patient receives the osmotic. NOT recommended for chronic patient who is likely to cut his therapy short.
<b>Profile 3</b>	Used for the patient, who is volume-overloaded with shortness of breath at the onset of therapy; or, for patients who have tendency to drop their blood pressure toward the end of therapy.

2. Most patients prefer the following profiles below because they feel more energetic at the end of therapy. Majority of fluid (40%) is taken off when the patient has the most to give; and the body adjusts to lower fluid volume when diffusion and less ultrafiltration take place.

<b>Profile 5</b>	Used for patients, who benefit from a gentle increase in UF or for patients who have a tendency to drop their blood pressure at the start of dialysis
<b>Profile 7</b>	Used for patients with difficulty shifting fluids freely from the tissues into the vascular space (diabetics, cardiovascular compromised and elderly patients). Some patients have difficulty at the beginning of therapy and usually drop blood pressure randomly throughout the treatment. Segments on the machine can be altered toward end of treatment to establish pattern that increases and decreases the UF pull during the entire therapy. This is ideal for diabetic patient.
<b>Profile 8</b>	Used for patients with tendency to drop blood pressure during the last 40% of treatment. Also helpful for patients, who complain of mild cramps in their fingers and toes at end of therapy.
<b>Profile 9</b>	Used for patient with tendency to cramp or drop blood pressure toward end of therapy (last 60%). They do not have as much fluid on board so that shift of fluid is not rapid. The increased UF is followed by a decrease in pull of fluid that allows shifting of fluid from the tissues to the vascular space.



## NURSING CARE STANDARD

### B-00-13-10015– Profiling or Ramping Fluid Removal

<b>Profile 10</b>	Identical to Profile 0
<b>Profile 11</b>	Linear profile with more UF at the beginning. This is used for patients, who can tolerate more fluid removal at the start of therapy with a gradual decrease to a lower amount at the end. Ideal for patients who drop their blood pressure at the end or who tend to cramp at the end of therapy.
<b>Profile 12</b>	Used for patients who have difficulty shifting fluid freely from the tissues into the vascular space (e.g. diabetics, cardiovascular compromised and elderly patients). This starts off by taking a small amount of fluid off to be gentle at the beginning then it alternates (every 10% of the therapy) between high UF to low UF.
<b>Profile 13</b>	Exponential UF profile. This starts off by taking a large amount of UF during the first 10% of therapy then rapidly drops down to lower UF. Ideal for patients who can tolerate a large fluid removal at the beginning. Good for patients who tend to drop their pressure in the middle and at the end of therapy
<b>Profile 14</b>	Used for patients who have difficulty shifting fluid freely from the tissues into the vascular space (e.g. diabetics, cardiovascular compromised and elderly patients). This starts off by taking a large amount of UF then alternates every 10% of therapy between low UF and high UF. This is tolerated very well by patients who cramp and drop their blood pressure randomly throughout the treatment. Patients often comment that they feel much better after this UF profile.
<b>Profile 15</b>	Used for patients who have difficulty shifting fluid freely from the tissues into the vascular space (e.g. diabetics, cardiovascular compromised and elderly patients). This can be used for the more unstable patient. This profile has a high UF at the first 10% of treatment then low UF for the next 20% of treatment. This is alternated throughout the therapy.

### 3. Combination Profiles:

- Sequential (Yellow Segments): Ultrafiltration **without** diffusion
- Diffusion (Green Segments): Ultrafiltration **with** diffusion

<b>Profile 4</b>	This allows sequential dialysis (ultrafiltration without diffusion) for the first 12% of therapy followed by regular dialysis ( <b>ultrafiltration with diffusive clearance</b> ). Used for patients who present shortness of breath at the onset of dialysis; or, for fluid overloaded patients that need a higher UF at the beginning of therapy. The treatment time is usually increased to accommodate for the decreased time of diffusion.
<b>Profile 6</b>	Used for patients who require additional fluid removed, but who cannot



## NURSING CARE STANDARD

### B-00-13-10015– Profiling or Ramping Fluid Removal

	withstand a large volume at the onset of therapy; or, who have a high potassium level and do not need to dry patient out too quickly, which could increase the potassium level in the blood. Sequential dialysis ( <b>ultrafiltration without diffusion</b> ) is performed the last 12% of the therapy.
<b>Profile 17</b>	Linear UF profile with the first 30% in sequential mode ( <b>ultrafiltration without diffusion</b> ). Used for a patient who is fluid overloaded and needs to pull a majority of their fluid at the beginning in the sequential mode.

#### 4. Sequential Profiles: Ultrafiltration without diffusion

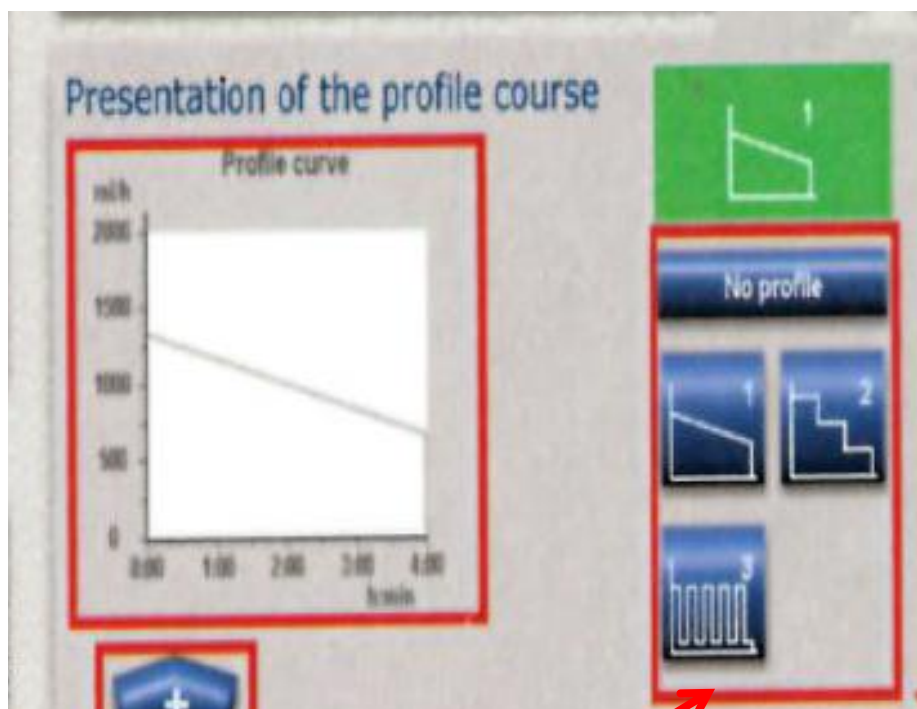
<b>Profile 16</b>	All sequential straight across. This is used for patient who tends to have a stable blood pressure throughout entire treatment; for low or high weight gainers when the minimum UFR would be exceeded during one of high or low segments of other programs. Offers a constant steady pull of fluid throughout the therapy
<b>Profile 18</b>	All in sequential mode. This starts with large amount of UF then alternates every 10% of therapy between low UF and high UF. Patients tend to tolerate this profile very well. Used for patients who are in fluid overload and have difficulty shifting fluid freely from the tissues into the vascular space (e.g. diabetics, cardiovascular compromised and elderly patients); and especially for those who cramp and drop their BP randomly throughout the treatment. Patients often comment that they feel much better after
<b>Profile 19</b>	The mode is all in sequential. This is a linear profile with more UF at the beginning. Used for patients who can tolerate more fluid removal at the beginning and is tapered down to a less amount at the end of treatment. Ideal for patients who drop their blood pressure at the end or who tend to cramp at the end of therapy
<b>Profile 20</b>	This is all in sequential mode. Exponential UF profile. This starts off by taking a large amount off during the first 10% of therapy then rapidly drops down to a lower UF. Ideal for patients who can tolerate a large fluid removal at the beginning. Good for patients who tend to drop their pressure in the middle and at the end of therapy

For more details and images refer to the BBraun Dialog+ HD machine

**NURSING CARE STANDARD**

**B-00-13-10015– Profiling or Ramping Fluid Removal**

**Appendix B: Types of Profiling and Blood Volume Monitoring Graph in Fresenius 5008 Machine**



**Selection of the desired profile**

**NURSING CARE STANDARD**

**B-00-13-10015– Profiling or Ramping Fluid Removal**

