



PROVINCIAL STANDARDS & GUIDELINES

UREA TESTING PRE & POST HEMODIALYSIS

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Approved by the BCPRA Hemodialysis Committee

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Urea Testing Pre & Post Hemodialysis

2.0 Scope

This guideline applies to adults and children receiving hemodialysis (HD) and hemodiafiltration (HDF) in:

- In-centre HD units.
- Community dialysis units (CDUs).

The information is consistent with the instructions provided to home HD (HHD) patients in the *HHD Patient Workbook* found on the BC Renal Agency website.

The purpose of the guideline is to identify a standardized procedure for pre and post-urea blood sampling.

The PRU (Percent Reduction of Urea), also referred to as the URR (Urea Reduction Ratio), is a test that is used to measure dialysis adequacy. The results of the test determine if the amount of dialysis received by the patient is achieving an adequate amount of solute clearance. The pre-dialysis / post-dialysis urea level ratio is the amount of plasma cleared of urea during dialysis and is obtained by drawing blood using a systematic process.

The mathematical formula used to calculate the PRU is:

Pre Urea minus Post Urea divided by Pre Urea multiplied by 100

KDOQI (2006) and BCPRA key indicators (2015) recommend a PRU value of 65% as a measure of achievement of the minimally adequate dose of HD. KDOQI recommends a PRU of 70% as a measure of the target dose.

PRU is utilized in BC as a standard measure of

dialysis adequacy. While it is not as precise as some measures, it is easily calculated. Additional or different measures may be considered in the future with advances in HD machines and/or technology.

Standardizing the pre and post-urea collection procedure provincially will help to ensure PRU data is applicable across BC's HD units.

3.0 Recommendations

Recommendation #1: Pre and post urea blood testing is done a minimum of every 6 weeks (every 4 weeks for children¹) for patients on hemodialysis and hemodiafiltration.

Frequency of measurement:

KDOQI Clinical Practice Guideline for HD Adequacy (draft 2015 & 2006 versions) recommend monthly sampling. CSN guidelines (2006) recommend sampling every 8 weeks.

Recommendation #2: Draw the pre and post dialysis samples during the same treatment session.

If the dialysis run is not typical for the patient (e.g., too many alarms that cause multiple pump interruptions, run duration is shorter than usual), do not draw the post-urea blood sample. Repeat the pre- and post-urea at the patient's next dialysis treatment.

¹Most children dialyze 4 times per week and the clearance (Kt/V) is calculated using a standard vs split pool Kt/V.

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Recommendation #3: Draw pre-dialysis blood sample prior to connection of the blood lines (arterial tubing) to the vascular access and after removal of the saline and/or anti-clotting agent.

The presence of saline and/or anti-clotting agent may distort the urea level results.

Recommendation #4: Draw post-dialysis blood sample 15 - 20 seconds after dialysis is completed utilizing the slow-flow method (refer to section 3.0 for details).

KDOQI Clinical Practice Guideline for HD Adequacy (draft 2015 & 2006 versions) recommends the use of either the slow-flow method (100 mL for 15 seconds) or the stop-dialysate-flow method (for 3 minutes). To facilitate longitudinal comparisons, it is important that the sampling technique be consistent from treatment to treatment and between patients.

For provincial consistency, the slow-flow method is recommended for BC HD units.

4.0 Procedure

4.1 Equipment/materials

- Non-sterile gloves
- Alcohol swab
- Vacutainer with a needle or luer-lock adapter
- Blood specimen tube & label
- Gown
- Goggles and mask or a face shield

4.2 Assessment & Interventions

Both samples (pre and post-HD) are drawn during the same treatment session.

4.2.1 Pre-dialysis

1. Prepare equipment/supplies.
2. Ensure the timing is correct for the blood draw. The pre-dialysis blood draw occurs prior to connection of the blood lines (arterial tubing) to the vascular access and after removal of the saline and/or anti-clotting agent.
3. Collect the blood sample.
 - a. If using a fistula or graft, obtain the sample from the arterial needle. Be sure that no saline or anti-clotting agent is in the needle or tubing prior to the draw.
 - b. If using CVC:
 - i. Use a 10 mL syringe and withdraw any saline and/or anti-clotting agent from the arterial port of the catheter, along with blood, to a total volume of 10 mL. Discard the contents of the syringe.
 - ii. Connect a new syringe or collection device and draw the sample.
4. Apply the label following site-specific laboratory guidelines. If other specimens are to be collected concurrently, ensure the specimens are collected in the correct order.
5. Continue with connection procedures and commence the patient's dialysis treatment.

4.2.2 Post-dialysis

1. Prepare equipment/supplies.
2. Ensure the timing is correct for the blood draw. The post-dialysis blood draw occurs *after* completion of the HD treatment and prior to commencing the rinse-back procedure.

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3. Prepare to draw the sample.
 - a. If patient is on HDF, take machine out of HDF mode. Wait at least 2 minutes.
 - b. Put machine in bypass. This stops the flow of dialysate, minimizes the ultra filtration rate and opens the arterial and venous pressure limits.
 - c. Reduce blood pump speed to 100 mL/min. Blood must be drawn at least 15 seconds and no more than 2 minutes after the pump speed has been reduced. This is to minimize the effects of access recirculation and urea rebound.
 4. Draw the blood sample.
 - a. If drawing the sample from the blood line sampling port (uses needle):
 - i. After the 15 second slow-flow period, stop the blood pump or keep it running at 100 mL/min when drawing the sample.
 - ii. Swab the arterial injection port (red) on the arterial bloodline with alcohol.
 - iii. Insert the needle (of the vacutainer) at a 90 degree angle into the port.
 - iv. Attach the specimen tube to the vacutainer.
 - v. Withdraw enough blood to fill specimen tube.
 - vi. Remove the blood tube and gently rock tube back and forth, 2-3 times.
 - vii. Apply label following site-specific laboratory guidelines.
 - viii. Stop the blood pump (if not already stopped).
 - b. If drawing the sample from the arterial needle tubing (avoids use of needle):
 - i. After the 15 second slow-flow period, stop the blood pump.
 - ii. Clamp the arterial and venous blood lines.
 - iii. Clamp the arterial needle tubing.
 - iv. Disconnect the blood line tubing from the inlet bloodline.
 - v. Attach either a syringe or a vacutainer with a luer-lok type connection to the arterial needle tubing (or arterial port of the CVC).
 - vi. Release the clamp on the arterial needle tubing and obtain the blood sample.
 - vii. Withdrawal enough blood to fill specimen tube.
 - viii. Remove the blood tube and gently rock tube back and forth, 2-3 times.
 - ix. Apply label following site-specific laboratory guidelines.
 5. After sample is obtained, follow unit-specific rinse-back and disconnect procedure.
- For children**, draw a second post-urea blood sample (repeat step 4) 15 minutes after drawing the first sample.

4.3 Patient education & resources

Key teaching points:

1. Pre and post-dialysis blood work is one of the tools used to determine dialysis adequacy. Blood work is usually drawn every 6 weeks (every 4 weeks in children). The results help your nephrology team make sure your dialysis prescription is the best one for you.
2. The amount of blood drawn is minimal.

4.4 Documentation

Document that pre and post-urea blood samples were drawn on the HD log.

Blood sample results automatically load into PROMIS. The PRU is automatically calculated.

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5.0 References

Caring for Australians with Renal Impairment (CARI) Blood Urea Sampling Methods. (2005). http://www.cari.org.au/Dialysis/dialysis%20adequacy/blood_urea_sampling_jul_2005.pdf. Accessed Feb 22, 2015.

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UK Renal Association, Hemodialysis Guidelines 5.8 - Hemodialysis post-dialysis blood sampling, pages 29 - 31. <http://www.renal.org/guidelines/modules/haemodialysis#s5>. Accessed Feb 22, 2015.

BC Health Authority guidelines used in the development of this guideline:

- Interior Health, Percent Reduction Urea (Nov 2014)
- Providence Health Care, Urea Post Dialysis, NCS5451 (Sept 2012)

6.0 Sponsors

This provincial guideline was developed to support improvements in the quality of hemodialysis care delivered to patients with chronic kidney disease in BC. Based on the best information available at the time it was published, the guideline relies on evidence and avoids opinion-based statements where possible. When used in conjunction with pertinent clinical data, it is a tool health authorities and health professionals can use to develop local guidelines.

Developed by a working group of renal educators from across BC, the guideline was approved by the BCPRA Hemodialysis Committee and the BCPRA Medical Advisory Committee. It has been adopted by BCPRA as a provincial guideline.

This guideline is based on scientific evidence available at the time of the effective date; refer to www.bcrenalagency.ca for most recent version.