

CONTINUOUS RENAL REPLACEMENT THERAPY (CRRT) - ICU

- PURPOSE:** To outline the management of patients receiving CRRT.
- SUPPORTIVE DATA:** CRRT is used for fluid and metabolic management in the critically ill patient with acute or chronic renal failure, problems with electrolytes and acid-base balance, or fluid overload. For all types of CRRT, blood is pumped through a highly permeable filter and re-infused to the patient. Plasma water is removed by ultrafiltration. Additional information on the types of CRRT follows:
- Slow Continuous Ultrafiltration (SCUF):**
Primarily used to manage fluid overload. Neither replacement fluid nor dialysate is used.
- Continuous Venovenous Hemofiltration (CVVH):**
The principle of clearance is convection. Replacement solution is infused to maintain intravascular volume and increase convection. CVVH is less efficient in removing small molecular weight solutes such as urea. Dialysate is not used.
- Continuous Venovenous Hemodialysis (CVVHD):**
The principle of clearance is diffusion. A dialysate solution is pumped countercurrent through a hemofilter to help remove large and small molecular weight solutes by diffusion. Replacement fluid is not used.
- Continuous Venovenous Hemodiafiltration (CVVHDF):**
Combines CVVH and CVVHD therapy. CVVHDF is a more efficient method of removing large and small molecular weight solutes. **This is the most common type used.**
- Premixed dialysate is used as replacement fluid. A citrate lock is used to maintain patency between dialysis treatments. Do not use arteriovenous fistula (AVF)/arteriovenous graft (AVG) with CRRT.
- ASSESSMENT:**
1. Assess the following prior to initiating CRRT, then every 15 minutes until stable, then every hour:
 - Change in level of consciousness (LOC)
 - Vital signs (VS)/hemodynamic parameters
 - Signs/symptoms of:
 - Hypovolemia
 - Hypervolemia
 - Bleeding
 - Respiratory distress
 2. Assess the following a minimum of every 1 hour:
 - Intake and output
 - Hemodialysis catheter site and dressing
 - CRRT equipment and circuit patency including the following:
 - Tubing – free of kinks, leaks, air
 - Connections secure
 - Hemofilter free of clots, blood separation or darkening, air bubbles, leaks
 - System pressure
 - Transmembrane
 - Arterial and venous
 - Ultrafiltrate

- Volume
 - Color
 - Clarity
3. Upon receipt of the patientnote: date and time of last filter change
 4. Weigh daily
 5. Assess the following laboratory values as ordered:
 - Basic Metabolic Panel [particularly Blood Urea Nitrogen (BUN), creatinine and electrolytes]
 - Phosphorus level
 - Magnesium level
 - Ionized Calcium level
 - Complete Blood Count (CBC)
 - Blood gas
 - Partial thromboplastin time (aPTT) (if heparin is used)
- PHYSICIAN ORDER:
6. Verify physician’s order set is complete, including electrolyte replacement (All CRRT orders must be written by Renal Fellows).
 7. Ensure settings/fluid match physician’s order at the beginning of each shift and with each change in physician’s order.
- CITRATE LOCK:
8. Remove citrate by aspirating and discarding 3-5 mL of blood from each dialysis catheter lumen prior to each CRRT session. DO NOT FLUSH.
 9. Prepare each dialysis catheter lumen at completion of each CRRT session as follows:
 - Flush with 10 mL normal saline then
 - Slowly instill the pre-filled syringe of citrate (instill citrate in the amount of volume that is indicated on each catheter lumen)
- SAFETY:
10. Ensure alarm parameters are individualized for patient’s status.
 11. Protect from accidental catheter removal and tubing disconnection:
 - Ensure luer lock connections are tight
 - Limit patient movement
 - Patient may be carefully turned from side to side or proned
 12. Perform the following if a blood leak occurs:
 - Minimal blood leak – return all blood in circuit
 - Gross blood leak – discontinue therapy and replace circuit
 13. Return blood manually with crank in case of emergency (e.g. equipment failure).
- DISCONNECTION:
14. Perform the following if accidental disconnection occurs:
 - Reconnect immediately using sterile technique. If unable to reconnect immediately, clamp and flush both arterial and venous ports of access catheter with normal saline (NS). Maintain patency with appropriate flush system.
 - Re-infuse blood immediately if no air/clots are present in the system
- MAINTENANCE:
15. Perform the following:
 - Circuit change every 72 hours and prn
 - Central venous catheter care per standard
 - Set up CRRT circuit for recirculation after returning blood, if patient is disconnected.
(Circuit may not be reused if disconnection is greater than 2 hours.)

REPORTABLE
CONDITIONS:

16. Notify the provider immediately for:
 - Accidental catheter removal or tubing disconnection
 - Unplanned discontinuation of therapy
 - Difficulty with blood flow from access catheter
 - Persistent hypotension
 - Repeated clotting of circuit
 - Bleeding
 - Significant change in:
 - VS
 - LOC
 - Hemodynamic parameters
 - Respiratory status
 - Ultrafiltrate amount/character/color
 - Lab values (e.g. ABG/VBG or electrolyte results which may necessitate a change in CRRT prescription)

PATIENT/FAMILY
TEACHING:

17. Instruct on the following:
 - Purpose of CRRT
 - To notify RN of
 - Pain/discomfort
 - Signs/ symptoms of hypotension
 - Anaphylactic reaction
 - Importance of limiting patient movement
 - To never connect or reconnect tubings

ADDITIONAL
STANDARDS:

18. Implement the following as indicated:
 - Anticoagulant Therapy
 - Blood and Blood Products
 - Central Venous Catheter
 - Electrolyte Replacement: Intravenous
 - Intravenous Therapy
 - Restraints: Non-violent, Non-self-destructive
 - Sedation and Analgesia (Intravenous) – ICU

DOCUMENTATION:

19. Document in accordance with “documentation standards”.
20. Document per CRRT section of Dialysis Management Navigator Band.
21. Document net balance on the intake and output section in iView and I&O every hour.

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