SUBJECT: CRRT Policy and Procedure	
DEPARTMENT: Intensive Care Services	**Page:** 1
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1.0 POLICY

1.1 The use of the CRRTsystem is indicated for continuous patient solute and/or fluid removal.

1.2 INDICATIONS FOR CRRT

1.2.1 Non-obstructive oliguria – urine output of less than 200 mls in 12 hours or anuria.
1.2.2 Severe academia with metabolic acidosis (PH <7.1)
1.2.3 Azotemia (urea >30mmol/L)
1.2.4 Hyperkalemia (>6.5mmol/L)
1.2.5 Progressive severe dysnatremia (Na <115mmol/L or >180mmol/L)
1.2.6 Coagulopathy requiring large amount of blood products.
1.2.7 Suspected uremic organ involvement eg. pericarditis
1.2.8 Drug overdose for dialyzable toxins
1.2.9 Hyperthermia with core temperature of >39.5
1.2.10 Congestive heart failure
1.2.11 Crush injuries eg. rhabdomyolysis
1.2.12 Post cardio-pulmonary bypass
1.2.13 Sepsis
1.2.14 ARDS
1.2.15 Severe burns
1.2.16 Cerebral oedema
1.2.17 Volume overload secondary to CHF

1.3 GOALS OF FLUID MANAGEMENT

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1.3.1 Normovolemia
1.3.2 Remove fluid to create a space for fluid therapy (24 hours a day, 7 days a week).
1.3.3 Optimize hemodynamic parameters

NOTE: Avoid hypotension – drop down of systemic BP will cause marked fall in renal blood flow and will lead to further damage, insult or injury to the kidneys.

1.4 **MODES OF CRRT**

1.4.1 **SCUF** – SLOW CONTINUOUS ULTRAFILTRATION

1.4.1.1 Principle Used:

1.4.1.1.1 ULTRAFILTRATION – movement of fluid from an area of higher concentration to an area of lower concentration through a semipermeable membrane. The pressure gradient may be generated by the hydrostatic force of the blood flow and the pull of the effluent pump.

1.4.1.2 FLUID USE: No dialysate or effluent fluid

1.4.1.3 INDICATION: Fluid removal by ultrafiltration eg; fluid overload, pulmonary edema.

1.4.2 CVVH – CONTINUOUS VENO-VENOUS HEMOFILTRATION

1.4.2.1 Principle Used

1.4.2.1.1 CONVECTION – the movement of large amount of fluid causing a solvent drag. Small solutes including urea and potassium may be cleared. However, convection moves medium-sized molecules best such as cytokines. The high volume ultrafiltration is achieved by introducing replacement fluid.

1.4.2.2 FLUID USED: Replacement fluid only.

1.4.2.3 INDICATION: Solute removal by convection. Fluid may also be removed by ultrafiltration eg. Sepsis

1.4.2.4. CVVHD – CONTINUOUS VENO-VENOUS HEMODIALYSIS

1.4.2.4 Principle Used:

1.4.2.4.1 DIFFUSION – movement of solutes through a semipermeable membrane from an area of higher concentration to an area of lower concentration. Diffusion is best for clearing small solutes such as urea and creatinine. A diffusion gradient is made possible through the addition of dialysate fluid running counter-current through the fluid compartment of the filter.

1.4.2.5 FLUID USED: Dialysate fluid only.

1.4.2.6 INDICATION: Solute removal by diffusion eg. Hyperkalemia

1.4.3 CVVHDF – CONTINUOUS VENO-VENOUS

HEMODIAFILTRATION

1.4.3.1 Principle Used: Combination of all the above principles.

1.4.3.2 FLUID USED: Dialysate and Replacement fluid

1.4.3.3 INDICATION: Solute removal via diffusion and convection. Fluid removal via ultrafiltration eg. Multi-organ failure

1.5 FLOW RATES

BLOOD FLOW RATE	minimum – 120 mls
	maximum – 180 mls
	optimal – 150 mls
DIALYSATE FLOW RATE	minimum – 0 to 500 mls
	maximum – 8000 mls
	optimal – 1000 mls
REPLACEMENT FLOW RATE	minimum – 0 to 100 mls
	maximum – 8000 mls
	optimal – 1000 mls

*For the SCUF – Fluid removal depends on the patient's hemodynamic stability.

1.5.1 **NOTE:**

1.5.1.1 Always use the same fluid for Dialysate and Replacement solution.

1.5.1.2 Lactate-based Solution – should be avoided in liver failure and lactic acidosis patients. It is used for patients with high potassium or not requiring potassium supplementation or patients whose PH has returned to normal or become alkalotic in response to HF12 or Hemosol solution.

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1.6 **TYPES OF PRESSURES TO BE MONITORED**

PRESSURE	POSITIVE/NEGATIVE	ALARM RANGE	TYPICAL RANGE
1.ACCESS	NEGATIVE	-250 to +50mmhg	-50 to -150mmhg
2.FILTER	POSITIVE	-50 to +500mmhg	+100 to +250mmhg
3.RETURN	POSITIVE	-300 to +50mmhg	+50 to +150mmhg
4.EFFLUENT	POSITIVE/NEGATIVE	-50 to +350mmhg	>50 to -150mmhg

1.6.1 TMP (TRANSMEMBRANE PRESSURE) – reflects the pressure difference between the fluid and blood compartments of the filter. During the treatment, the permeability of the membrane will decrease due to protein coating on the blood side of the membrane. This will cause the TMP to increase.

1.6.2 FPD (FILTER PRESSURE DROP) – reflects the degree of clotting in the hollow tubes. Overtime, micro clotting can occur in the hollow fibers. This increases resistance as blood flows through the fibers and causes the pressure drop across the filter to increase.

2.0 PROCEDURE

1.7 PRIOR TO PROCEDURE:

1.7.1 Ensure that the patient has normal coagulation profile result.

1.7.2 Obtain chest x-ray if access is on the jugular or subclavian site and ensure it is viewed by the doctor for correct placement and it must be documented in the doctors order form before initiation of the CRRT.

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1.7.3 Obtain baseline vital signs.

1.7.4 Observe for complications and notify the physician on call.

1.7.5 Take routine blood sample as a baseline.

3.0 OTHER GUIDELINES

1.8 All treatments administered by the CRRT must be prescribed by the physician on the CRRT order form given by Gambro Company prior to commencing the treatment. The form must be updated with any changes made by the treatment.

1.9 The primary nurse is responsible for initiating, maintaining and disconnecting the treatment. Ensure that patient has the vascular access before starting the treatment.

4.0 PRIMING TECHNIQUES:

1.10 It is a one-person procedure.
1.11 Priming is an aseptic technique and all connections must be kept sterile.
1.12 Use heparinized saline to prime the filter set unless contraindicated.
1.13 Always perform two primes.
1.14 If the patient is hemodynamically unstable, use Colloids for the second prime instead of Normal Saline.
1.15 The use of anticoagulant (heparin) is needed unless contraindicated or use plain Normal Saline and label it accordingly.
1.16 Once priming is completed, check that Self-test has passed the initialization.

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5.0 TROUBLE SHOOTING: Please refer to the unit CRRT Protocol.

6.0 For any query refer to the ICU CRRT protocol, and CN.

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