THE UNIVERSITY OF MISSISSIPPI MEDICAL CENTER

Standard Guidelines & Nursing for Continuous Renal Replacement Therapy

Addendum to all Adult CRRT Ordersets

1. The starting rate for ACD-A citrate is ~1.5 times the blood flow rate but **per hour**. That is, if the blood flow rate is at the standard rate of 150 ml/min, the ACD-A rate should be 230 ml/hour.
    a. This rate may be adjusted up (usually in ~10% increments) if the circuit is clotting and the post-filter calcium is >0.3 mmol/liter
    b. The rate may be adjusted down if citrate retention (refractory decrease in ionized calcium with increased total calcium).
    c. Total calcium and post-filter ionized calcium levels are only measured when clinically indicated.
2. The IV calcium drip is infused into a Y-connector to the venous return of the dialysis catheter or via a separate central line.
3. Discontinue all CRRT related infusions anytime the CRRT circuit stops (especially calcium).
4. The filter sets should be replaced when clotted/clogged, or when 72 hours or 780 liters of blood have been processed (whichever comes first), but can be continued for up to 8 hours while waiting for dialysis to change the set. Communicate directly with inpatient dialysis about sets needing routine replacement. Filters may be exchanged up to 6 hours before the end of the filter life**.**
5. Hemosafe clamps should secure all connections at all times and checked every shift.
6. The heater line should be placed on the venous return line (PrismaFlex) and kept on at all times during treatment unless a separate order is written by the nephrology team. Titrate temperature to maintain patient temperature.
7. Recirculate for up to 2 hours (saline recirculation) as needed or <60 minutes briefly as needed using blood recirculation.

Heparin Flush Protocol for Priming of the Extracorporeal Circuit

Heparin (10,000 units) will be added to 1L of normal saline and the circuit will be the primed with this fluid. Once the first prime is complete, the entire circuit is primed again using standard CRRT solutions (without heparin) thus flushing the excess heparin away.

Contraindications to heparin prime/flush:

a) Suspected or diagnosed Heparin-Induced Thrombocytopenia.
b) Heparin allergy.

Daily-Required Nursing Interventions

1. Patient is to be weighed at start of CRRT treatment and daily thereafter (weights are to be entered into the CRRT machine).
2. Enter the AM hematocrit level daily into the CRRT machine.
3. Inpatient Dialysis will monitor CRRT circuits daily and review/verify CRRT prescriptions and condition including but not limited to updated weights, use of protocol, patient safety, and other identified quality indicators

Catheter Care:

1. Dialysis Catheter are to be maintained following UMC dialysis policy #XXX.
2. Catheters may only be used for CRRT without express written consent from Nephrology.
3. Dressing should be changed per Dialysis catheter specific policies.
4. Catheter locks will consist of standard 5% Heparin (5000 IU/mL) based unless heparin is contraindicated. Use of non-heaprin-based locks requires a separate order by the nephrology team.

Removing Fluid – Balancing Intake and Output

1. Goal = match Intake with output by the end of shift.
2. You do not have to match exactly every hour – Plan ahead.
3. Communicate with Nephrology and Primary team to avoid confusion caused by Epic.
4. If “Match Intake and Output” is ordered - see list below.
5. If a patient receives a bolus of fluid for hypotension, or hypovolemia:
    - Minimize or stop removing fluid
    - Call Nephrology fellow for new orders about fluid removal.

Include Completely	
Intake	**Output**
All IV Fluids whether bolus or continuous	Urine
All oral Liquids	Ultrafiltration from CRRT, Hemodialysis, or Peritoneal Dialysis
PEG/NG water flushes	Any Drains/tubes with liquid or Serous drainage
TPN	NG or other GI system drainage
Tube Feeding	Any Liquid bowel movements that are quantified

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Electrolyte Replacements:

- Calcium infusion: UMMC standardized CRRT infusion –see concentrations below
  ***Always Infuse Calcium Chloride via Central Line (do not use a peripheral IV)**
- Mg^{++} Sulfate: UMMC standardized CRRT infusion bags are 4 grams in 100 mL NS (total volume = 108 mL) dosed as 4gm infused over 6 hours PRN once if magnesium level < 2.0.
- K^{+}Phosphate (or Na^{+}): UMMC standardized CRRT infusion bags are 30 mmol in 250 mL NS (total volume = 260 mL) dosed in mmol/24 hours.
  - K Phos Neutral has155-852-130 mg per tablet. 2 or more tablets can be given PO every 8 hours with or without IV phosphorous replacement in the event of shortages

Calcium Chloride ALTERNATE		**Calcium Chloride**		**Equivalent Doses**	**Calcium Gluconate**		**Calcium Gluconate ALTERNATE**	
25gm/750ml		**10gm/500ml**			**20gm/500ml**		**30gm/500ml**	
33.33 mg/ml	ml/hour	20mg/ml	ml/hour		40 mg/ml	ml/hour	60 mg/ml	ml/hour
Grams/Day		**Grams/Day**			**Grams/Day** **= 3X CaCl dose**		**Grams/Day**	
26	32.5	**26**	54.2	→	**78**	81.3	**78**	54.2
24	30.0	**24**	50	→	**72**	75	**72**	50.0
22	27.5	**22**	45.8	→	**66**	68.8	**66**	45.8
20	25.0	**20**	41.7	→	**60**	62.5	**60**	41.7
18	22.5	**18**	37.5	→	**54**	56.3	**54**	37.5
16	20.0	**16**	33.3	→	**48**	50	**48**	33.3
14	17.5	**14**	29.2	→	**42**	43.8	**42**	29.2
12	15.0	**12**	25	→	**36**	37.5	**36**	25.0
10	12.5	**10**	20.8	→	**30**	31.3	**30**	20.8
8	10.0	**8**	16.7	→	**24**	25	**24**	16.7
6	7.5	**6**	12.5	→	**18**	18.8	**18**	12.5
4	5.0	**4**	8.3	→	**12**	12.5	**12**	8.3

K^{+} Phosphate Estimated HOURLY Potassium delivery mEq/Hour	**K^{+} Phosphate** ***Preferred Phos Replacement*** Phosphorus: 93mg (3mM)/mL Potassium: 170mg (4.4 mEq)/mL **Dosed in MMOL per 24 hours**	**Infusion Rate** ***Mixed 30 mmol/260ml Ml/hour***	**Na^{+}Phosphate** ***Alternate Phos Replacement*** Phosphorus: 93mg (3mM)/mL **Dosed in MMOL per 24 hours**
23.76	**15**	**5.4**	**15**
47.52	**30**	**10.8**	**30**
71.5	**45**	**16.25**	**45**
95.48	**60**	**21.7**	**60**
143	**90**	**32.5**	**90**
166.76	**105**	**37.9**	**105**
190.52	**120**	**43.3**	**120**
214.28	**135**	**48.7**	**135**
238.48	**150**	**54.2**	**150**
262.24	**165**	**59.6**	**165**
286	**180**	**65**	**180**
309.76	**195**	**70.4**	**195**