


CONTINUOUS RENAL REPLACEMENT THERAPIES (CRRT) INITIATION ORDER

AUTHORIZATION IS GRANTED TO DISPENSE AND ADMINISTER AN ALTERNATE DRUG PRODUCT ACCEPTABLE TO THE MEDICAL STAFF'S PHARMACY COMMITTEE UNLESS THE DRUG PRODUCT IS SPECIFICALLY CIRCLED.

- Obtain informed consent
- Consult Pharmacy for medication dosing adjustments while patient on continuous renal replacement therapy (CRRT)
- Weights: Prior to therapy (within 1 hour) Once per shift Once per day Post therapy (within 1 hour)

1. THERAPY TYPE

- Slow Continuous Ultra-Filtration (SCUF) - No solution choice required
- Continuous Venovenous Hemodialysis (CVVHD) - Solution choice required

2. PRE-TREATMENT
A. Pre-Filter Ionized Calcium (PREICA) - STAT

1. Goal greater than 1 mmol/L
2. If less than 1 mmol/L, contact on call nephrologist and consider intravenous Calcium Chloride 1,000 mg prior to initiation

C. Install Citrate ACD- A line pre-pump
D. Install Calcium Chloride post-pump
B. Other Labs:

- Comprehensive Metabolic Profile (STAT)
- Phosphorus (STAT)
- INR (STAT)
- Magnesium (STAT)
- Other _____

E. Ensure Calcium Chloride and Citrate ACD- A infusions are started just prior to starting CRRT machine

If at any time the treatment is interrupted or discontinued immediately stop these infusions

3. INITIATION

A. Treatment Length 12 hours Continuous 24 hours Other specify: _____

B. Dialysate Flow Rate 2 L/hr (standard) 3 L/hr Other specify: _____
consider higher dialysate flow rates in patients with higher BMI

C. Blood Flow Rate 100 mL/min 150 mL/min (consider in liver disease) 200 mL/min
 250 mL/min Other specify: _____

D. Fluid Balance** (circle *Negative* or *Positive*, or *cross-out* both if a neutral/euvolemic 0 mL/hr is desired)

Initial net *Negative/Positive*: _____ mL/hr *Comments*: _____

Target net *Negative/Positive*: _____ mL/hr *Comments*: _____

** Initial net fluid balance ordered by nephrology, subsequent adjustments per primary service

Decrease net fluid loss to 0 mL/hr and contact primary service if mean arterial pressure (MAP) is less than 50 (mmHg) or increasing pressor requirements

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Signature

Date Time

 [] []
PATIENT ID LABEL
[] []

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E. Solution Choices

- Initial solution # _____ for _____ hours, then switch to solution # _____ for remainder of treatment
- Constant solution # _____ * SOLUTIONS 400 AND 401 ARE NOT TO BE ORDERED WITH CITRATE / CALCIUM CHLORIDE ANTI- COAGULATION

RFP 400* (NO CITRATE USE)
RFP 401* (NO CITRATE USE)
RFP 453
RFP 454

INGREDIENT	AMOUNT PER LITER
Sodium	140 mEq
Potassium	2 mEq
Calcium	3 mEq
Magnesium	1 mEq
Chloride	111 mEq
Bicarbonate	35 mEq
Glucose	1 gm

INGREDIENT	AMOUNT PER LITER
Sodium	140 mEq
Potassium	4 mEq
Calcium	3 mEq
Magnesium	1 mEq
Chloride	113 mEq
Bicarbonate	35 mEq
Glucose	1 gm

INGREDIENT	AMOUNT PER LITER
Sodium	130 mEq
Potassium	2 mEq
Calcium	0 mEq
Magnesium	1.5 mEq
Chloride	108.5 mEq
Bicarbonate	25 mEq
Glucose	1 gm

INGREDIENT	AMOUNT PER LITER
Sodium	130 mEq
Potassium	4 mEq
Calcium	0 mEq
Magnesium	1.5 mEq
Chloride	110.5 mEq
Bicarbonate	25 mEq
Glucose	1 gm

Substitution for RFP 400:

~~PrismaSol® BGK 2/3.5*~~
(NO CITRATE USE)

Substitution for RFP 401:

~~PrismaSol® BGK 4/2.5*~~
(NO CITRATE USE)

* SOLUTIONS PrismaSol® - BGK 2/3.5 AND PrismaSol® - BGK 4/2.5 ARE NOT TO BE ORDERED WITH CITRATE / CALCIUM CHLORIDE ANTI- COAGULATION

INGREDIENT	AMOUNT PER LITER
Sodium	140 mEq
Potassium	4 mEq
Calcium	2.5 mEq
Magnesium	1 mEq
Chloride	111.5 mEq
Bicarbonate	32 mEq
Lactate	3 mEq
Dextrose	100 mg/dL

INGREDIENT	AMOUNT PER LITER
Sodium	140 mEq
Potassium	4 mEq
Calcium	2.5 mEq
Magnesium	1.5 mEq
Chloride	113 mEq
Bicarbonate	32 mEq
Lactate	3 mEq
Dextrose	100 mg/dL

4. ANTI-COAGULATION AND REPLACEMENT CALCIUM CHLORIDE ORDERS
A. No Anti-coagulation

1. Flush with 100 mL 0.9% Sodium Chloride every hour

B. Regional Citrate ACD-A Anti-coagulation

1. 1,000 mL Citrate ACD-A via pre-blood pump (PBP) to be set at _____ mL/hr (STAT)
(1.5 x the blood flow mL/min rounded to the nearest 10) *Vesicant infuse by central line only*
2. 5,000 mg Calcium Chloride in 250 mL 0.9% Sodium Chloride (20 mg/mL Calcium Chloride) (STAT)
(10% of Citrate ACD-A infusion rate) *Vesicant infuse by central line only*

Initial Flow Rate Recommendations

Blood Flow Rate (mL/min)	Citrate ACD- A Rate (PBP) (mL/hr)	Calcium Chloride Rate (mL/hr)
100	150	15
150	230	23
200	300	30
250	380	38

C. Do not start Calcium Chloride infusion more than 5 minutes before treatment starts

D. Stop Calcium Chloride infusion immediately any time treatment is stopped or discontinued

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(CONTINUED) Anti-coagulation and Replacement Calcium Chloride Orders

E. Titration Guidelines:

1. **PRE- FILTER IONIZED CALCIUM (PREICA) and POST- FILTER IONIZED CALCIUM (PSTICA) ARE DRAWN:**
 - a. **Every 2 hours x 2; every 4 hours x 2; then every 8 hours** if no rate adjustments
 - b. **2 hours** after interruption; recirculation, road trip, restarts
 - c. **2 hours** after any Calcium Chloride or Citrate ACD-A rate change
2. **(PREICA) PRE- FILTER IONIZED CALCIUM**, measures "patient" or "systemic" calcium levels
 - a. *(Preferred method)* Levels should be drawn via **ARTERIAL (artline) or PERIPHERAL LINE DRAW**
 - i. **Do NOT stop citrate or calcium infusions**
 - b. For **PREICA** draws off **CENTRAL LINE** which terminates in the right Atrium, SVC or a dialysis catheter
 - i. **STOP the citrate and calcium infusions for 30 seconds before drawing**
3. **(PSTICA) POST- FILTER IONIZED CALCIUM**, represents "circuit" calcium levels
 - a. Draw levels from the **POST- FILTER PORT**
 - i. **Do NOT stop citrate or calcium infusions**
4. For therapy interruption (diagnostic testing, tests, surgery, system clotting and replacement) restart Citrate ACD-A and Calcium Chloride infusions at the previous rate before therapy interruption
5. Changes in blood flow rates must be accompanied by proportional adjustments to the Citrate ACD-A and Calcium Chloride infusion rates
6. Adjust Citrate ACD-A and Calcium Chloride infusion rates according to table below
(If both values are outside target range adjust only the Calcium Chloride infusion and repeat PREICA and PSTICA in 2 hours)

CITRATE ACD- A INFUSION TITRATION	
Post Filter/Circuit I Ca++ (PSTICA) (mmol/L)	Citrate ACD - A Adjustment
Less than 0.25	Decrease by 10 mL/hr
0.25 - 0.5 (Target Range)	No Change
0.51 - 0.6	Increase by 10 mL/hr
Greater than 0.6	Increase by 10 mL/hr and page nephrologist

CALCIUM CHLORIDE INFUSION TITRATION	
Pre - Filter/Patient I Ca++ (PREICA) (mmol/L)	Calcium Chloride Adjustment
Less than 0.9	1,000 mg Calcium Chloride IVPB, increase by 10 mL/hr and page nephrologist
0.9 - 0.99	Increase by 5 mL/hr
1 - 1.3 (Target Range)	No Change
1.31 - 1.4	Decrease by 5 mL/hr
Greater than 1.4	Decrease by 10 mL/hr

7. Notify Nephrologist for:
 - a. Increase in patient's bicarbonate by more than 10 mEq/L
 - b. Increase in patient's sodium by 10 mEq/L or is greater than 155 mEq/L
 - c. If Citrate or Calcium titration requires adjustment for 6 consecutive Ionized Calcium draws

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5. ELECTROLYTE REPLACEMENT

CHECK BLOOD SERUM PHOSPHORUS, MAGNESIUM AND BASIC METABOLIC PROFILE EVERY 12 HOURS

**Call Nephrologist if potassium level results are less than or equal to 3 or greater than or equal to 5.5*

A. PHOSPHORUS REPLACEMENT

ASYMPTOMATIC PATIENTS TAKING ORAL MEDICATIONS

Serum Phosphorus Level (mg/dL)	Oral Replacement Dose (KPhos Tabs)
Greater than or equal to 3	No Replacement Necessary
Greater than or equal to 2.3 and less than 3	2 Kphos Tablets orally x 1 dose
Greater than or equal to 1.5 and less than 2.3	2 Kphos Tablets orally x 2 doses 2 hours apart
Less than 1.5	2 Kphos Tablets orally x 3 doses 2 hours apart

A single Kphos Tablet contains: 8 mmol Phosphorus, 1 mEq Potassium and 13 mEq Sodium

SYMPTOMATIC PATIENTS OR PATIENTS THAT CANNOT TAKE ORAL MEDICATIONS

Serum Phosphorus Level (mg/dL)	IV Replacement Dose (Sodium Phosphate IVPB)
Greater than or equal to 3	No Replacement Necessary
Greater than or equal to 2.3 and less than 3	Sodium Phosphate 15 mmol IVPB x 1 dose
Greater than or equal to 1.5 and less than 2.3	Sodium Phosphate 15 mmol IVPB x 2 doses
Less than 1.5	Sodium Phosphate 15 mmol IVPB x 3 doses

B. MAGNESIUM REPLACEMENT

Serum Magnesium (meq/L)	IV Replacement Dose
Less than or equal to 1.7	Magnesium Sulfate 2 gm IVPB over 2 hours x 1 dose

C. Replace per following algorithm

ADDITIONAL ORDER(S):

- Notify Pharmacy when therapy is terminated or on hold

Calcium Chloride 1,000 mg IVPB in 50 mL of 0.9% Sodium Chloride over 30 minutes x 1 dose via central line

DWELL DIALYSIS CATHETER PER PROTOCOL WITH:

Instilled as a dwell in both lumens of the hemodialysis catheter after the CRRT treatment

Heparin 1000 unit/mL. Dwell volume = ____ mL. RN to instill exact volume PLUS an additional 0.2mL to each lumen of the catheter. Total volume (dwell volume + 0.2mL) = ____ mL. (Pharmacy – add total volume to dose field).

Sodium Citrate 4%. Dwell volume = ____ mL. RN to instill exact volume PLUS an additional 0.2mL to each lumen of the catheter. Total volume (dwell volume + 0.2mL) = ____ mL. (Pharmacy – add total volume to dose field).

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