

TITLE:**Calcium Chloride Infusion Titration in CRRT Protocol- Adult Critical Care****PURPOSE:**

When sodium citrate is used during Continuous Renal Replacement Therapy (CRRT), a continuous calcium infusion must be utilized concomitantly.
Sodium citrate is used as an anticoagulant during CRRT as to prevent clotting in the extracorporeal circuit. The citrate chelates ionized calcium, an essential cofactor in the clotting cascade, causing the calcium to be unavailable for clot formation.
The citrate/calcium chelate is then dialyzed off and the blood returned to the patient is therefore very low in calcium.

It is the responsibility of the bedside ICU nurse to maintain a serum Ionized Calcium level between 4.5-5.5 mg/dl. This protocol is to ensure safe use of this therapeutic agent as a continuous infusion.

PATIENT POPULATION: **Adult Critical Care****DEFINITIONS:**

CRRT- Continuous Renal Replacement Therapy

PATIENT ASSESSMENT/DOCUMENTATION:

Renal Fellow:

-Initiate order set for CVVHD with *either* Calcium Chloride or Calcium Gluconate Continuous Infusion.

Renal RN:

-Once order is placed, renal RN will build or convert CRRT system to CVVHD with a continuous Calcium Chloride *or* Calcium Gluconate infusion

ICU RN:

-Maintain CRRT system and Calcium infusion per protocol.

TREATMENT/DOCUMENTATION:**Initiation**

- Calcium chloride 10g in 250 mL will be sent from the pharmacy
- Sodium citrate is infused in the arterial side (red port) of the patient catheter
- Calcium is infused in the venous side (post-filter) of the patient catheter
- Initiate calcium chloride infusion at 10 mL/hr

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Titration

Serum ionized calcium	Calcium chloride titration
< 4 mg/dL	Increase by 4 mL/hr
4 - 4.4 mg/dL	Increase by 2 mL/hr
4.5 - 5.5 mg/dL	No change
> 5.5 mg/dL	Decrease by 2 mL/hr

- Recheck ionized calcium 1 hour after each change in infusion rate
- Check ionized calcium every 6 hours if no change in infusion rate
- Page nephrology fellow if calcium infusion is < 8 mL/hr

DISCHARGE/FOLLOW-UP/PATIENT EDUCATION AND HAND-OFF OF CARE:

Patients with this therapy will remain in the Intensive Care Unit. Therefore, only referral to the protocol is required.

OUTCOME MEASURES:

Streamlined practice in all UVa Intensive Care Units of Calcium Chloride and Calcium Gluconate Infusion Titration in CRRT patients.

REFERENCES:

1. Palsson R and Niles JL. Regional citrate anticoagulation in continuous venovenous hemofiltration in critically ill patients with a high risk of bleeding. *Kidney Int.* 1999;55:1991-1997.
2. Tobe SW, Aujila P, Walele AA, et al. A novel regional citrate anticoagulation protocol for CRRT using only commercially available solutions. *J Crit Care.* 2003;19:121-129.
3. Tolwani AJ, Prendergast MB, Speer RR, et al. A practical citrate anticoagulation continuous venovenous hemodiafiltration protocol for metabolic control and high solute clearance. *Clin J Am Soc Nephrol.* 2006;1:79-87.

DISCLAIMER:

Guidelines or protocols are general and cannot take into account all of the circumstances of a particular patient. Judgment regarding the propriety of using an specific procedure or guideline with a particular patient remains with the patient's physician, nurse, or other health care professional, taking into account the individual circumstances presented by the patient.

REVISION HISTORY

Date	Version	Description	Owner(s) Name, Credentials, Title	Committee Approval*	Date of Approval
	1	Calcium Infusion Titration in CRRT	-Amanda Zomp, PharmD, BCPS -Stephene Hertwig	Critical Care Procedure Committee (CCPC)	7/13

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	1	Calcium Infusion Titration in CRRT	-Amanda Zomp, PharmD, BCPS -Stephene Hertwig RN, BSN, CCRN	Clinical Practice Committee (CPC)	8/13
	1	Calcium Infusion Titration in CRRT	-Amanda Zomp, PharmD, BCPS -Stephene Hertwig RN, BSN, CCRN	Pharmacy and Therapeutics Committee (P&T)	9/13
	1	Calcium Infusion Titration in CRRT	-Amanda Zomp, PharmD, BCPS -Stephene Hertwig RN, BSN, CCRN	Patient Care Committee (PCC)	11/13

***Adults-** Patient Care Committee approval is required if the guideline will be used in multiple areas or if the local area does not have a practice committee to approve the guideline. If approval is required through other committees (such as patient safety, infection control, etc), please list those committees and dates of approval as well.

***Pediatrics-** Children's Hospital Clinical Practice approval is required if the guideline will be used in multiple areas or if the local area does not have a practice committee to approve the guideline. If approval is required through other committees (such as patient safety, infection control, etc), please list those committees and dates of approval as well.