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 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 gluconate 24g in 500 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 gluconate infusion at 25 mL/hr
## Titration

<table>
<thead>
<tr>
<th>Serum ionized calcium</th>
<th>Calcium gluconate titration</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 4 mg/dL</td>
<td>Increase by 10 mL/hr</td>
</tr>
<tr>
<td>4 - 4.4 mg/dL</td>
<td>Increase by 5 mL/hr</td>
</tr>
<tr>
<td>4.5 - 5.5 mg/dL</td>
<td>No change</td>
</tr>
<tr>
<td>&gt; 5.5 mg/dL</td>
<td>Decrease by 5 mL/hr</td>
</tr>
</tbody>
</table>

- 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 < 20 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:


## 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

<table>
<thead>
<tr>
<th>Date</th>
<th>Version</th>
<th>Description</th>
<th>Owner(s) Name, Credentials, Title</th>
<th>Committee Approval*</th>
<th>Date of Approval</th>
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</thead>
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<tr>
<td></td>
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<td>Calcium</td>
<td>Amanda Zomp, Critical Care</td>
<td></td>
<td>7/13</td>
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Template version 2012-01

**Calcium Gluconate Infusion Titration in CRRT Protocol- Adult Critical Care**

**Version 1**
<table>
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<tr>
<th>Infusion Titration in CRRT</th>
<th>Pharmacy and Therapeutics Committee (P&amp;T)</th>
<th>Procedure Committee (CCPC)</th>
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*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.