CITRATE ANTICOAGULATION QUICK REFERENCE FLOWCHART AND SELECTED TABLES ONLY

ALWAYS REFER TO FULL CRITICAL CARE NHS LOTHIAN PROTOCOL

Step 1 (see page 7)

- **Normalise systemic ionised calcium (Ca) before starting CVVHD**
- **Check Ca on ABG 1 hr before starting and correct as per table 1**
- **Acute liver failure may require different protocol – see page 11**

Step 2 (see page 7)

- **Determine patient's dialysate flow rate use actual body weight**
  - **25ml/kg/hour – see table 2**
  - **35ml/kg/hour in exceptional circumstances – see table 3**

Step 3 (see page 8)

- **Prescribe the dialysate flow rate, blood flow and fluid removal rate and now FILTER TYPE (AV 1000 or EMIC 2) on 24 hour chart**
- **Prescribe the following 'continuous infusions' within Kardex**
  - **Calcium chloride, Sodium citrate and Ci-Ca dialysate K4/K2 bags – page 8 + picture 1 (page 25) for info/dose**

Step 4 (see page 9)

- **Start citrate at 4mmol/L and check post filter ionised calcium at 5 minutes. Adjust as per table 4.**
- **Start calcium chloride at dose recommended in table 1.**
- **Check post filter and systemic ionised calcium every 6 hours unless table 4 and table 5 indicate otherwise**

Step 5 (see page 10)

- **Record information on ICU CVVHD monitoring sheet**
- **Check and record Calcium T : I ratio daily**
- **Be alert to unexplained metabolic acidosis and risk of citrate accumulation – see pages 13-14**
- **Patients at risk are acute liver failure and severe lactic acidosis**

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Table 1 – Starting dose of calcium chloride and If pre-treatment bolus dose required

Systemic ionised Calcium (mmol/L) (Arterial Line)	<1.01	1.01 – 1.11	1.12 – 1.20	1.21 – 1.45	>1.45
Calcium pre-treatment bolus required? (see page 7 for dose)	**Yes**	**Yes**	No	No	No
Starting prescription of calcium chloride (mmol/L of filtrate)	2.2	2.0	1.9	1.5	1.4

Table 2 – CVVHD prescription actual body weight 25ml/kg/hr (see page 7 for 35ml/kg/hr)

Weight	<60kg	60-69kg	70-79kg	80-89kg	>90kg
Dialysate flow rate (ml/hr)	1400	1600	1800	2000	2200
Blood flow rate (ml/min)*	70	80	90	100	110
Fluid removal rate (ml/hr)	CLINICIAN DECISION ON INDIVIDUAL PATIENT BASIS				

*During citrate anti-coagulation the ratio of dialysate flow rate to blood flow rate **should be 20:1, it should not be changed**. Any change in ratio will affect citrate delivery/excretion and affect acid-base balance. In dialysis without citrate i.e with heparin the ratios will change as the blood flow rate will need to be increased to at least 250mls/min to prevent clotting.

Table 4 – Citrate dose adjustment. Set initial citrate dose to **4mmol/L** of blood. **5 minutes** after start of therapy check post filter ionised calcium and adjust as below. **More frequent checks than 6 hourly should not be done.**

Post filter ionised calcium (mmol/L) (venous/blue port)	Change of citrate dose (per litre of blood)	Check post-filter ionised calcium and review citrate dose after
> 0.40	Increase by 0.2 mmol/L and inform medical staff	6 hours
0.35 – 0.40	Increase by 0.1 mmol/L	6 hours
0.25 – 0.34	No change	6 hours
0.20 – 0.24	Decrease by 0.1 mmol/L	6 hours
< 0.20 or ** or ↓↓↓↓**	Decrease by 0.2 mmol/L	6 hours

Table 5 – Calcium dose adjustment. Once treatment started an immediate systemic ionised calcium is not required (unlike post filter calcium above). Check as per table below.

Systemic ionised calcium (mmol/L) (arterial line)	Change of calcium dose (per litre of filtrate)	Check systemic ionised calcium and review dose after
> 1.35	Decrease by 0.4 mmol/L and inform medical staff	6 hours
1.21 – 1.35	Decrease by 0.2 mmol/L	6 hours
1.12 – 1.20	No change	6 hours
1.00 – 1.11	Increase by 0.2 mmol/L	6 hours
< 1.00	Increase by 0.4 mmol/L inform medical staff	**2 hours**