Prescription and observation record for use during the trial of the Baxter Prismaflex using regional citrate anticoagulation CVVH & CVVHDF on GICU / CTICU

For the purposes of this trial we will be using the establish protocol of Manchester University NHS Foundation Trust. A copy of their guideline is included as Appendix A.

1. Patient eligibility:
   - The decision to use the **Prismaflex** with regional citrate anticoagulation must be made by the Consultant of the week in daylight hours.
   - For the purposes of the trial, contraindications to using citrate are:
     - Sustained / refractory to replacement, systemic hypocalcaemia PRIOR to cRRT initiation - defined as a blood ionised calcium (blood gas) ≤1.00mmol/l (despite attempted IV replacement) AND the presence of any of: long QT, problematic cardiac dysrhythmia; refractory / unstable cardiogenic and/or vasoplegic shock
     - Patients who require systemic anticoagulation for any reason
     - Patients with fulminant liver failure - defined as a recognised liver insult AND a high lactate + low glucose + elevated INR
     - Patients with a metabolic alkalosis (defined as an arterial pH >7.45)
     - Patients with a serum sodium <135 or >145mmol/l (trisodium citrate is the circuit anticoagulant thus a rapid rise in serum sodium AND / OR hypernatraemia can be induced)
   - General contraindications to using the **Prismaflex** in the context of the trial are any Patient who needs emergency / time critical cRRT (defined as life threatening hyperkalaemia / acidosis / fluid overload / other) AND / OR is considered to be physiologically or biochemically unstable (in the opinion of the consultant).

2. Please define the goals of cRRT and amend these at least every 24 hours (or more often - as indicated by the patient's clinical condition / biochemistry)

Date and time	**Goals** (e.g. normalisation of pH within 6-12 hours urea clearance of 12-18mmol/l in 24 hours fluid balance of -1,500mls in 24 hours)	**Print & sign**

3. Treatment escalation / de-escalation strategy - PLEASE DO NOT DEVIATE FROM THE RATES BELOW
   - Start all patients on the 25ml/kg/hr CVVH protocol (Table 1) based upon the patient's IDEAL BODY WEIGHT
   - If normalisation of potassium / pH AND / OR clearance of urea is inadequate INCREASE the settings as per Table 1 to the patient's IDEAL BODY WEIGHT + 10kg.
   - If normalisation of potassium / pH AND / OR clearance of urea is still inadequate, mode switch to 35ml/kg/hr CVVHDF protocol (Table 2) based upon the patient's IDEAL BODY WEIGHT
   - If normalisation of potassium / pH AND / OR clearance of urea is still inadequate, INCREASE the settings as per Table to the patient's IDEAL BODY WEIGHT + 10kg.
   - To de-escalate clearance in excess of targets reverse the above strategy.
   - NOTE: When priming the machine, select CVVHDF and connect a 500ml bag of 0.9% sodium chloride to the DIALYSATE line; this will ensure easy mode switching from CVVH to CVVHDF if this is required. Once the line is flushed, set the DIALYSATE flow rate to 0ml/hour.

Table 1

Standard dose CVVH 25ml/kg/hr

Weight	Blood flow ml/min	Citrate Dose	Citrate flow rate ml/hr (Prismocitrate)	Dialysiate ml/hr (Prismocal B22)	Replacement post filter ml/hr (Prismasol)	Effluent Dose	Actual dose (ml/kg/hr)
50	100	3	1000	0	450	29.2	25
55	100	3	1000	0	600	29.2	25
60	100	3	1000	0	750	29.2	25
65	100	3	1000	0	900	29.2	25
70	120	3	1200	0	850	29.2	25
75	120	3	1200	0	1000	29.2	25
80	120	3	1200	0	1150	29.2	25
85	120	3	1200	0	1300	29.2	25
90	150	3	1500	0	1150	29.2	25
95	150	3	1500	0	1300	29.2	25
100	150	3	1500	0	1400	29.2	25
105	160	3	1600	0	1450	29.2	25
110	160	3	1600	0	1600	29.2	25

Table 2

High dose CVVHDF 35ml/kg/hr

Weight	Blood flow ml/min	Citrate Dose	Citrate flow rate ml/hr (Prismocitrate)	Dialysiate ml/hr (Prismocal B22)	Replacement post filter ml/hr (Prismasol)	Effluent Dose	Actual dose (ml/kg/hr)
50	80	3	800	800	450	40.8	35
55	80	3	800	800	650	40.8	35
60	100	3	1000	1000	450	40.8	35
65	100	3	1000	1000	650	40.8	35
70	120	3	1200	1200	450	40.8	35
75	120	3	1200	1200	650	40.8	35
80	120	3	1200	1200	850	40.8	35
85	120	3	1200	1200	1050	40.8	35
90	150	3	1500	1500	650	40.8	35
95	150	3	1500	1500	900	40.8	35
100	150	3	1500	1500	1100	40.8	35
105	160	3	1600	1600	1100	40.8	35
110	160	3	1600	1600	1300	40.8	35

4. PRESCRIPTION

DATE	TIME	Patient's Name			
Height		Date of birth		Gender (circle)	M / F
IDEAL BODY WEIGHT		St George's Hospital No.			
GOALS SET IN 2.	**(tick)**	NHS number			
PLEASE complete this form for **EVERY** cRRT **CIRCUIT** used. Keep completed forms with the ICU charts for the audit team.			PLEASE affix a patient's sticker if available		

Fluid	Route	Rate	Print & sign
PRISMOCITRATE	Pre-dilution	As per protocol (table 1 or 2)	
PRISMASOL 4	Post-replacement	As per protocol (table 1 or 2)	
PRISM0CAL B22	Dialysate	As per protocol (table 1 or 2)	
10% CALCIUM GLUCONATE (neat)	Calcium line	As per protocol (table 1 or 2)	

Please ensure the following are prescribed in Cerner

- "10mmol of Ca^{2+}" (either 50mls of 10% calcium gluconate = 11.25mmol Ca^{2+} OR 10mls of calcium chloride = 10mmol Ca^{2+} - given as per our IV prep guide). Rate of administration may need to be increased to treat citrate induced hypocalcaemia - see below
- Unfractionated heparin 5,000units 12 hourly as thromboprophylaxis (unless contra-indicated)
- Antibiotic doses are as for NORMAL RENAL FUNCTION (eGFR>60ml/min)
- Magnesium, potassium and phosphate replacement as per standard protocols.

5. Monitoring ionised calcium in the circuit AND the patient (in place of APTT for heparin)

- Circuit anticoagulation if achieved by a combination of low blood pump speed with high volume predilution AND citrate in the pre-dilution fluid to bind ionised calcium.
- Approximately 50% of the citrate-calcium complexes are filtered off; the remained are reversed by continuous infusion of neat 10% calcium gluconate into a Y-piece attached at the end of the return (venous) circuit line - just prior to attachment to the dialysis catheter (VasCath). Use the syring pump integrated into the filter to deliver the calcium gluconate.
- Prior to starting cRRT, check an arterial or venous blood gas to ensure iCa^{2+} is between 1.0 and 1.3mmol/l. If outside this range seek consultant advice.
- Following commencement, check both the circuit (post filter) AND patient's iCa^{2+} every hour until stable for 2 hours (defined as, both values in target range (Table 3) AND no prescription changes - other than rate of fluid removal). Once stable, monitor every 6 hours.

Table 3

	Filter ionised Ca^{2+} >0.5 mmol/L	**Filter ionised Ca^{2+} 0.25 - 0.5 mmol/L**	**Filter ionised Ca^{2+} <0.25 mmol/L**
Patient ionised Ca^{2+} <1.0 mmol/L	Increase citrate dose by 0.5mmols/L blood **AND** Increase calcium compensation by 10%	Increase calcium compensation by 10%	Decrease citrate dose by 0.5mmol/L blood
Patient ionised Ca^{2+} 1.0-1.3 mmol/L	Increase citrate dose by 0.5mmols/L blood	Normal Ideal Values	Decrease citrate dose by 0.5mmol/L blood
Patient ionised Ca^{2+} >1.3 mmol/L	Decrease calcium compensation by 10%	Decrease calcium compensation by 10%	Decrease calcium compensation by 10% **AND** Decrease citrate dose by 0.5mmol/L blood
Recheck hourly after any change until stable			

Patient name and MRN

Observation chart - Day of therapy ONE	DAILY: ratio of total (unadjusted) serum Ca to ionised Ca^{2+} [target <2.5]

Hour	Blood flow rate ml/min	Primocitrate Predilution		Citrate dose mmol/l	Citrate load mmol/l	Filter iCa^{2+} mmol/l	Patient iCa^{2+} mmol/l	Calcium Comp. %	Calcium Infusion ml/hr	Prism0cal B22 Dialysate		Prismasol 4 Post-replacement		TMP	Chamber check	Access pressure	Return pressure	Fluid removal ml/hr	Effluent ml/kg/hr
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