Storage of CRRT Blood with Pediatric Patients on ECMO During Transports to Reduce Blood Exposure

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Disclosures

- None

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Goals

- Show the need for a system to save blood on ECMO for pediatric and neonate patients

- Review simple math steps to repurpose a standard CPD bag

- Other uses of this technique in ECMO

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Background

- Using CRRT in pediatric and neonate patients while on ECMO is becoming more published

- CRRT circuit can contain a large percentage of total patient blood

- Transports do happen with these patients and causes an issue of what to do with the CRRT circuit

- Excessive or unneeded transfusions are not helpful in pediatric and neonate patients

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Adapting the autologous blood storage bag

- CPD bag has enough citrate to anticoagulant 450 mL of whole blood
- Pediatric CRRT circuit holds a residual volume of 165 mL
- CPD bag has 63 mL of CPD so the amount in the bag must be reduced precisely

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Benefits of CPD as anticoagulant

- Reversible with just Ca administration
- Will not cause a long term increase patient coagulation values
- Can safely anticoagulant blood for long periods of time
- Used in many areas of the hospital including autologous blood removal during cardiac surgery

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Methods (Shortened)

- All of the CPD is removed from the bag and then only the calculated amount is added back in
- Clip off long end of tubing that holds CPD
- Need to correctly measure blood entering bag via counter on CRRT machine or syringes if needed

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Solving for the amount of CPG needed

No Citrate Infusing into CRRT circuit example:

$$\frac{63mL}{450mL} \cdot x \cdot \frac{x\,mL}{165mL} = 23mL\ CPD\ returned\ to\ bag$$

Solve for x using a ratio

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What if using citrate in CRRT circuit

Citrate Infusing into CRRT circuit example:

$$\frac{2.0 mg/dL\ *}{5.0 mg/dL\ **} \times 23mL = 9.2mL\ CPD\ returned\ to\ bag$$

*CRRT Post-Filter Calcium Level
**Assumed Normal Calcium Level

Other Thoughts to Consider

- Patient may need small bolus amounts of CaCl when CRRT is restarted
- This will treat the hypocalcemia caused by the CRRT circuit volume
- Make sure to label this bagged product within established guidelines

Results and Conclusions

- At our center, storage of CRRT circuit blood with CPD has successfully and safely prolonged the time that the patient can be off CRRT
- No adverse events have been reported at our facility on the use of CPD in this method
- Also saves the platelets and plasma in the CRRT circuit blood

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Results and Conclusions

- This procedure did greatly reduce the need to use donor blood to prime CRRT circuits on the patients away from the ICU for less than 8 hours.
- Also been used to save the ECMO circuit blood for reinfusion of pediatric and neonate patients following a successful ECMO wean
- Also this technique was used to save a CRRT circuits blood on a non ECMO pediatric patient

References and Literature

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Questions

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