

Continuous Renal Replacement Therapy in a Neurocritical Care Unit

Michael Armahizer PharmD¹, Sathish Sanna MD², Taghi Ryder RN¹, Rebecca Horrell NP¹, Jennifer Miller MD¹,
Bridig Blaber RN MSN¹, Mary Ann Bautisa RN MSN¹, Neeraj Badjatia MD¹, Paul McCarthy MD¹



¹Neurocritical Care
²Critical Care Medicine & Nephrology
University of Maryland Medical Center
Baltimore, MD, USA

Introduction

Continuous renal replacement therapies (CRRT) are preferred to intermittent therapies in patients with hemodynamic instability or acute neurologic injury. Intermittent hemodialysis can cause cerebral edema and increases in intracranial pressure (ICP) by rapid changes in osmotic gradients (reverse urea affect) and rapid arterial pH changes. Intermittent hemodialysis also can cause hypotension. Both processes can affect cerebral perfusion pressure (CPP) and neurologic outcomes.

Although neurologic injury and acute kidney injury requiring renal replacement are not common, the combination is not unheard of. The acuity of illness in our unit continues to rise and the need for renal replacement has increased. Since February 2013 the Neurocritical Care Unit has had a CRRT program managed by our neurocritical team.

Since the inception of our program we have maintained a registry for the purposes of quality improvement and to help identify potential areas for future study.

Methods

We have reviewed our registry and report the findings. We have also informally surveyed staff to identify any areas of concern or suggestions to improve practice.

Results

From February 2013 through December 2014 thirty-six patients have undergone CRRT. Admission diagnoses have included subarachnoid hemorrhage, cerebral vascular accident, intracerebral hemorrhage, status epilepticus, subdural hematoma, Guillain-Barre Syndrome, traumatic brain injury and anoxic injury. Indications for CRRT have included acute kidney injury, end-stage renal disease, CHF/volume overload, hyperkalemia, and acidosis.

The majority of patients have been managed with CVVH with seventy percent replacement pre-filter. SCUF has been used on a few occasions for volume management. The vast majority of patients have been managed without anticoagulation, however, heparin and citrate have been used in selected cases. A significant number of patients on CRRT in our unit are receiving antibiotics and/or antiepileptic drugs.

Early in our program we experienced an excessive amount of early filter clotting. This problem has improved by giving more replacement pre-filter, using appropriate length catheters, coordinating filter changes with trips to neuro-imaging when possible and using anti-coagulation in selected cases. Increased nursing experience has also helped prevent early clotting and alarms.

Results

Our neurointensivists are satisfied with the CRRT program. Nursing, pharmacy and advanced level practitioners have been satisfied with the CRRT program and feel it as contributed to the quality of care in our unit. Trends show an increase in the acuity of our patient population and an increased need for CRRT.

Conclusions

Our neurocritical care team has successfully managed CRRT on a variety of patients with neurologic diagnosis. A significant number of patients on CRRT are receiving antibiotics and/or antiepileptic drugs and we plan to do pharmacokinetics studies with these drug classes. Our filter clotting problems have improved due to several practice improvements. We also try to arrange therapy down time for imaging and other tests in conjunction with scheduled filter changes. Although we usually use no anticoagulation, we have put in place heparin and citrate protocols and our nurses have gained experience and are more comfortable with the therapy. We plan to implement filter-based plasma exchange in 2015 and will continue to our registry.

References

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