

Considerations for Implementing a CRRT Program in the ICU: An Expert Nursing Perspective

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Introduction

Continuous Renal Replacement Therapy (CRRT) is increasingly being adopted within ICUs for the management of acute kidney injury (AKI) associated with acute and chronic medical conditions.¹ Growing evidence demonstrates that CRRT, which gradually removes excess fluids, uremic toxins and electrolytes 24 hours a day, reduces morbidity and may increase survival in AKI patients compared to intermittent hemodialysis (IHD), the previous standard of care.²⁻⁵

Bringing CRRT into the ICU setting is no small undertaking. It necessitates a rigorous process that includes both a thorough needs assessment by the right team of individuals within the medical center, and thoughtful decision-making about the program requirements, in particular the nursing staff. The addition of CRRT to the ICU, already a highly technical environment, creates the need for a new area of clinical competence for the critical care nurse.⁶ As a result, providing critical care nursing staff essential training, hands-on experience and ongoing support requires a strong commitment from clinical and administrative leadership.

The Assessment Process: Who Should Be Involved?

From my perspective, critical care clinical nurse specialists (CNSs) are ideally suited to lead the CRRT program assessment process. They possess the intimate knowledge of the hospital systems and of patient care needs within the critical care environment essential to guiding the assessment and decision-making process. A CNS in nephrology, although rarely found on the staff of medical centers, is also qualified to assume leadership of the process.

Key members of the assessment team should also include nephrologists, who have the expertise to evaluate the patient population that may benefit from CRRT; critical care physicians; and the nursing administration, which manages the nursing resources. If available, a nurse educator should also be part of the assessment team. Because of its role in formulating and supplying renal replacement solutions, pharmacy plays a particularly important position in the process. Engineering must also be represented in the process to evaluate the fit of new technology within the existing infrastructure.

Finally, the medical center or hospital administration must certainly be involved in the CRRT budgetary discussions in the assessment process. Determining the feasibility of a CRRT program includes consideration of the budgetary requirements, not only in starting a program, but also in maintaining it.

The Starting Point: Determining Patient Needs

CRRT needs assessment starts with determining whether or not the current patient population justifies a dedicated program. This requires, first, knowing how many total patients a year are receiving intermittent hemodialysis, peritoneal dialysis, or other procedures under the guise of renal replacement therapy. While intermittent hemodialysis has been the main form of renal replacement therapy in many hospitals, the documented benefits of CRRT are suitable for a wider range of patients than in years past.

Next, it is important to find out where AKI patients reside within the medical center. Because of its association with critical illness and multi-

organ dysfunction, AKI is often seen and managed in the intensive care unit. In medical centers with multiple ICUs, AKI patients may be more prevalent in some units than others. For example, at UCSF Medical Center we have four adult ICUs, but only provide the therapy in two of them due to differing patient populations.

Lastly, in addition to AKI, assessment of need should include consideration of other indications for CRRT that are increasingly being utilized throughout the world. An example of this is acute liver failure. Medical centers with liver transplant programs tend to be the high users of CRRT therapy.

A Key Decision: Choosing the Right Program Model

There are two basic and different models for staffing and managing a CRRT program in the ICU. One option, and the model that I work with, is critical care nurse-managed. In this model, critical care nurses have complete hands-on responsibility for all aspects of CRRT initiation, monitoring and management. This includes setting up the circuit, monitoring and managing the circuit, trouble-shooting technical vascular access and circuit problems that arise and evaluating the patient's response to the therapy along with full patient care responsibilities.

The other option is a combined acute hemodialysis/critical care nurse model. In most centers taking this approach, acute dialysis nurses come to the ICU to set up the circuit, initiate therapy, and make certain the system is operating properly. Once this is complete, the critical care nurse then assumes responsibility for system monitoring and management along with full patient care. Acute dialysis nurses remain available on-call for trouble-shooting problems. While the critical care nurses are trained to manage the system, their depth of training and scope of management is often limited.

The pros and cons of who should provide continuous replacement therapies continue to be debated.⁷ Where assessment of patient needs reveals a low volume and frequency of CRRT candidates (e.g. one patient a month or one every two months), having dialysis nurses come to the ICU and handle most aspects of system setup and operation is the best option. Dialysis nurses have expertise in extracorporeal blood circuits and extensive experience in the management of dialysis systems. Attempting to train nurses to handle CRRT in low frequency, low volume situations both dilutes resources and nursing competency. This poses safety risks for the patient receiving this high risk therapy.

If, on the other hand, there is sufficient frequency and volume of ICU patients requiring CRRT (e.g. a minimum of 12 patients every year with a 5-7 day duration of therapy), I believe critical care nurses should have complete responsibility for CRRT. While there is no hard evidence on this point, my twenty years of observation indicate that, when there is shared responsibility for clinical care, whether it is for mechanical ventilatory therapy or CRRT, critical care nurses do not fully understand the therapy or technology to the level necessary for optimal care. Therefore, with an appropriate volume of CRRT patients, optimal care, in my opinion, is an individual who is managing the patient in the ICU knowing everything about the therapy, how to monitor and manage the therapy and the expected patient responses and complications of the therapy.

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Training for Competence: Keep It Small and Focused

Safe and effective delivery of CRRT in the ICU demands that every shift, 24/7, has qualified, competent nurses to provide the therapy. In my experience, this goal can best be achieved by training nurses in small groups; providing them both theory-based training and intensive hands-on experience essential for gaining competency.

I learned this lesson the hard way about fifteen years ago, when I made the decision to train everybody who wanted to be trained. A large number of nurses went through a cursory class and the result was patients started getting into trouble. I quickly realized that too many of these nurses were performing CRRT too infrequently to become competent. Subsequently, I changed the scale and focus of training to a small group of 15 to 20 nurses, enough to staff the unit, 24/7, for potential CRRT patients. These were unit leaders who worked full-time, were engaged in the unit culture, and were also charge nurses. After gaining their commitment, we provided them with intense training and gave them assignments where they routinely delivered CRRT and gained experiential knowledge and competency.

I currently conduct training three times a year with small groups of 10 to 12 nurses who are assured of assignments where they get hands-on experience with CRRT that is essential for competency. The small group of nurses that was initially trained are now experts at CRRT and serve as a valuable resource to other nurses in the management of patients receiving CRRT.

Evaluating Training Success

Our approach to training has been highly successful; success meaning that the majority of the nurses going through training end up being able to safely care for patients receiving CRRT. To help evaluate training success and competency, we conduct a formal review of CRRT proficiency annually, which includes a knowledge assessment document. It incorporates understanding the therapy to understanding policy and procedures in an emergency. That document is one piece, and I believe it's only a very small piece.

The second, and more important piece, is my seeing first-hand on an ongoing basis how nurses are doing in practice by routinely rounding on patients receiving CRRT and reviewing the CRRT care with the ICU nurse. This provides an opportunity to evaluate, intervene, and reinforce education in real-time. While I don't use a formal paper checklist, I look at the patients, the patients' labs, their volume status, and their clinical condition related to the therapy, and I ask the nurse about recent or current issues, and then provide feedback to the nurse. I also look at the clinical documentation, not just to see if everyone's dotting their I's and crossing their T's, but to see; are they understanding the prescribed therapy and/or related calculations? Do they understand how the therapy is impacting the patient as evidenced by the monitoring and interventions they have applied?

Technology Evaluation: Choosing the Right System

Device capabilities, flexibility, ease of use and safety are all important considerations in selecting a CRRT device. Since CRRT is not a single treatment but a spectrum of modalities, including continuous hemofiltration (CVVH), continuous hemodialysis (CVVHD), and continuous hemodiafiltration (CVVHDF), it is important to select a device with the therapeutic modes matched to clinician preferences. Not all currently available CRRT systems have the capabilities for every mode.

Flexibility of the system is particularly important. Clinicians should be able to tailor the therapy delivered (volume, frequency and duration) to the

patients' needs. Some systems don't accommodate flexibility to use a different hemo filter or to use the circuit for additional IV infusion access. This lack of flexibility is poorly matched to the needs of a complex critically ill patient. Newer systems provide the flexibility of access to the system and extracorporeal circuitry.

From a nursing perspective, device simplicity and safety are of utmost importance in selecting a CRRT device. Simplicity of device set up, operation and maintenance minimizes the time required of busy ICU nurses in interacting with the system, allowing more time for patient care. Patient safety features of CRRT devices should include safety mechanisms built into the extracorporeal blood circuit, an air detection system, and adequate safety alarms.

When evaluating device safety, the safety of the nurse who interfaces with the device should also be considered. Devices which require nurses to lift and empty effluent waste bags, while both tedious and time-consuming, also expose them to risk of blood and body fluids. The ergonomic impact of managing the system is an important consideration to protect the nurses from work-related injuries.

Summary

With CRRT devices, as with any other automated technology used in the critical care setting, we must continually be reminded that technology is not a substitute for expert nursing skill and judgment. Although we may sometimes be lulled into a false sense of security by advanced technology automation, we can't presume that a device will let us know any time what we need to do. For example, the CRRT device and its alarms can be working as intended, but if we're not watching how the patient is responding to the therapy, we can alter their electrolyte or acid-base status to the point of causing a fatality.

Renal replacement therapy is not about the machine and the circuit, but about knowing, at all times, the status of the patient, the functioning of the device and how the two are interacting. CRRT is an effective, yet at the same time, high risk therapy. It requires the consistent and knowledgeable management, 24/7, of highly qualified, well-trained and fully committed nursing professionals. When patient volume and frequency are appropriate, no one is better suited for the challenges of CRRT than critical care nurses.

References

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