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Key Points:

Abstract:

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Nephrologists Rather Than Intensivists Should Manage Kidney Replacement Therapy in the ICU: CON

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[are we in a crisis?]

Who should prescribe and manage acute kidney replacement therapy (KRT), more specifically continuous kidney replacement therapy (CKRT) in critically ill patients in ICU settings? Is this really “black-and-white”? Is this really framed in a suitable and appropriate context? What essentially drives this issue of “who”, nephrologists or intensivists, “should manage kidney replacement therapy” for critically ill patients in the ICU? Does this issue genuinely derive from a foundational core on high-quality care with the patient as a central focus? I remain skeptical and believe questions surrounding this issue deserve frank and transparent dialogue. There would appear to be some record of communicative and collaborative challenges on this issue between these specialities[1, 2].

[what is critical care and who are intensivists?]

Intensive care units (ICU) are highly organized and specialized systems of care (medical, nursing, etc.) capable of providing enhanced, around-the-clock, multi-modal physiologic monitoring and advanced organ support aimed to rapidly rescue and to sustain life for patients at risk of or with acute life-threatening illness[3]. ICUs provide care for the most severely ill patients in the health system, and as such, embody some of the most resource-demanding and stressful settings in acute care hospitals. Intensive care or critical care, as a speciality, remains young relative to established disciplines, such as internal medicine and nephrology[4]. Nonetheless, critical care is now a well-established “all-encompassing” profession, perhaps further recognized and consolidated by its central role in the response to the COVID-19 pandemic, with the
term “*intensivist*” now having been formally adopted into our daily lexicon (https://www.merriam-webster.com/dictionary/intensivist).

Intensivists receive dedicated and comprehensive accredited training focused on severe life-threatening conditions (e.g., shock, sepsis, respiratory failure, liver failure, coma, acute kidney injury [AKI], end-of-life etc. [https://www.royalcollege.ca/rcsite/ibd-search-e?N=10000033+10000034+4294967052&label=Critical%20Care%20Medicine]), on sophisticated and technologically advanced monitoring modalities, and on mechanisms of multi-organ support (including KRT), rather than the single organ approach of many specialties. Intensivists work integrated in a complex, often strained, multi-disciplinary, team-based environment that defines a modern ICU[5].

Therefore, perhaps clinical context, as well as the variations in organization that exist across health systems, are important to consider. For example, intensivists are unlikely to consult respirologists for every patient with “hypoxia” and to manage invasive mechanical ventilation. Likewise, intensivists are not likely to consult cardiologists for every patient with “low-cardiac output syndrome” after surgery and to guide the management of inotropes[6]. So, should intensivists then consult nephrologists for every critically ill patient in the ICU with AKI and to manage KRT, specifically CKRT? Some offer arguments to advocate for such an approach[2, 7], whereas others tend to suggest otherwise[8-10], and still some acknowledge that a more nuanced strategy may be desirable[6, 11].

AKI is exceedingly common in critical illness, occurring in more than half of those admitted to ICU[12], making it more frequent than many other ICU syndromes (e.g., sepsis, acute respiratory distress syndrome [ARDS])[8]. Likewise, a substantial
proportion of ICU patients with severe AKI receive KRT[12]. Such KRT is commenced near universally for AKI occurring in critically ill patients with multiple dysfunctional or failing organs, rather than for isolated AKI per se[13]. So, is it really feasible to ask the nephrology services of most acute care institutions to practically provide timely, around-the-clock, high-quality, expert consultation to manage this patient volume?

This does not preclude a vital role for nephrology collaboration in ICU settings. In my view, the management of KRT in ICU settings should be directed to clinicians who at a minimum have BOTH: 1) a nuanced and integrated understanding of the patient’s burden of critical illness, their trajectory, spectrum of organ support, prognosis, and their overarching philosophy of care (i.e., having a beneficial relationship with the patient and their family), and 2) a deep comprehension of KRT physiology, a nuanced understanding of its prescription and management in critical illness, including an appreciation for when it may be indicated, when it should be avoided, and the potential harm of acute KRT in selected circumstances. Does this then leave us in search of critical care nephrology “unicorns”?

[what is the worst-case scenario?]

The worst-case scenario would be any mix of: 1) sole management of acute KRT in the ICU by nephrology, where selected nephrologists are generally uninterested or inexperienced in critical care or AKI, whose services are too busy and often unavailable, who fail to effectively communicate with the ICU team, or whose institutions have limited nephrology resources (e.g., dialysis nurses) such that the timeliness of ICU care is compromised, and 2) sole management of acute KRT in the ICU by critical care, where selected intensivists have little or limited understanding of the broad principles of KRT,
who fail to recognize the limitations in their knowledge and other blind spots (e.g., AKI not attributed to hypotension or sepsis), who do not effectively communicate with the nephrology service, or whose ICU teams have limited experience with KRT or the organization of a KRT program. While this may seem extreme, I would hazard in many jurisdictions, aspects of both these scenarios manifest not infrequently. Surely there must be some middle ground, whereby again, the patient is the central tenet of care[14].

[what is the role of the nephrology?]

As aforementioned, nephrologists can and should be vital in the care of critically ill patients in ICU settings[11]. Nephrologists can offer added expertise and insights for patients with AKI and diagnostic uncertainty (e.g., renal vasculitis, glomerulonephritis, interstitial nephritis), for management of patients with complex electrolyte derangements (e.g., hyponatremia), for patients who fail to liberate from KRT and need transition to prolonged intermittent KRT, and for patients in need of specific therapeutic interventions (e.g., therapeutic apheresis or plasma exchange). Nephrology can offer a breadth of knowledge and expertise to the management of patients with pre-existing complex chronic kidney disease (CKD) (e.g., glomerulonephritis), end-stage kidney disease (ESKD) receiving maintenance dialysis (e.g., hemodialysis or peritoneal dialysis), and in those who have received kidney transplantation (e.g., immunosuppression).

While nephrology expertise may add insight into the avoidance of perceived unnecessary or futile KRT[11], which intensivists may be more susceptible of providing, this may be limited by nephrologists having only a snapshot of the patients critical illness and overall trajectory. Nephrologists may also have limited knowledge of what
constitutes futility in critical illness, navigating end-of-life care in ICU settings, and a limited or no prior relationship with the patient and their family.

Perhaps most important, nephrologists have a crucial role to ensure continuity during transitions of care from the ICU to the ward, particularly when transferred to non-nephrology services, and ultimately amongst those who transition into the community to survey for the sequelae of CKD and other legacy complications[15]. This should encompass not only those who remain dialysis dependent, but also should consider those patients who had an episode of severe AKI not treated with KRT, or those treated with KRT whose kidney function recovered to liberate while still in ICU.

[what is the common ground?]
The clinical, administrative, and educational “lead” for acute KRT services in ICU settings could be driven primarily by nephrology, in collaboration with ICU[2]. One solution would be for nephrology to allocate dedicated resources and develop a specialized ICU nephrology team, whose exclusive responsibility is the sole provision of 24/7 nephrology and KRT-related services in the ICU. This would enable and ensure continuous communication, care integration, and alignment with the ICU team and the evolving care needs for critically ill patients. This might be feasible in large institutions supported by a high-volume of critically ill patients receiving KRT and to justify the clinical service model, however, such an approach may simply not be feasible in most or smaller institutions.

But is this really a necessity or in fact desired by all stakeholders? What are the organizational and clinical barriers to having the ICU team “lead” the provision of a high-
quality, safe, and lean acute KRT service, specifically CKRT, in collaboration with nephrology, as is currently done in numerous jurisdictions around the world? So much of this circular argument is context-specific and seemingly motivated by concerns beyond the bedside.

The middle ground and the mystical “unicorn” we are searching for to “lead” may simply be the engaged nephrologist or intensivist who has undertaken focused clinical training in both disciplines and remains wholeheartedly committed to the subspecialty of “critical care nephrology” in the ICU, both clinically and academically. While dual training and certification in both disciplines is now relatively common[14], this may not always be practical or welcome.

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Kidney360. Responsibility for the information and views expressed herein lies entirely with the author(s).

Author Contributions: Sean Bagshaw: Writing - original draft.

References


**Table:** Relative comparison of ICU vs. nephrology directed KRT in the ICU[9].

<table>
<thead>
<tr>
<th>KRT attributes</th>
<th>ICU</th>
<th>Nephrology</th>
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<tbody>
<tr>
<td>Program administration</td>
<td>Specific to individual ICU or integrated ICU region; aligned with other ICU-specific programs</td>
<td>Integrated into larger KRT programs that include ward-based or outpatient-based KRT services</td>
</tr>
<tr>
<td>Education</td>
<td>ICU specific, focused primarily on CKRT, can be led by ICU-based clinician educators</td>
<td>Nephrology-based clinician training adapted to ICU setting</td>
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<tr>
<td>Key Performance Indicator and Quality Improvement</td>
<td>Well established legacy of KPI reporting in ICU settings; specific KPI for CKRT less well developed</td>
<td>Adapted from well established KPI reporting in ESKD and chronic KRT programs</td>
</tr>
<tr>
<td>Availability</td>
<td>Immediate, ICU team inserts catheter, skilled ICU nurse primes and operates all aspects of CKRT machine</td>
<td>Potentially delayed, necessitating external consultation +/- nephrology based nursing availability</td>
</tr>
<tr>
<td>Modality</td>
<td>Predominantly CKRT, external consultation for transition from CKRT to intermittent KRT</td>
<td>Any modality, however, potentially limited training/experience with CKRT</td>
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<tr>
<td>Individualized therapy</td>
<td>Protocol-driven, less flexibility</td>
<td>Protocol-driven, expertise to adapt to specific circumstances</td>
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<td><strong>Costs</strong></td>
<td>Higher consumable costs for CKRT, ICU nurse trained to manage CKRT machines; lower human resource costs*</td>
<td>Lower consumable costs with intermittent KRT (if predominant modality, no difference with CKRT), higher human resource costs (i.e., dialysis nurse)</td>
</tr>
<tr>
<td><strong>Care transition and follow-up</strong></td>
<td>Potentially represents missed opportunity, external consultation for care transition</td>
<td>Continuity to facilitate longer follow-up after ICU</td>
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</tbody>
</table>

* Cost efficiency further improved by ICU nurses trained in provision of intermittent KRT.

Abbreviations: KPI = key performance indicator; ICU = intensive care unit CKRT = continuous kidney replacement therapy; KRT = kidney replacement therapy;