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EDITORIAL

A nephrologist should be consulted in all cases of acute kidney injury in the ICU: We are not sure

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Introduction

The development of a consensus definition of acute kidney injury (AKI) has revealed the scope of this syndrome, both inside and outside the ICU. It is now increasingly clear that AKI affects more than 50% of ICU patients [1] and that it is associated with poor outcomes both short-term and long-term [2]. Efforts to change that grim prognosis are therefore of utmost importance and should concentrate on every phase of the disease process and involve all caregivers that may contribute to improved outcomes. Opinions on whether or not to consult a nephrologist for every patient with AKI in the ICU may differ [3, 4]. The respective arguments concentrate on the specific role of the intensivist, the different organizational models of the ICU, the scale and diversity of the problem, and the post-discharge "legacy" of AKI [3, 4].

The divergent training and knowledge of intensivists and nephrologists

Intensivists are dedicated to the treatment of patients with severe life-threatening conditions requiring vital organ support and/or invasive monitoring. ICU training programs involve the acquisition of knowledge and skills that are specific to critically ill patients and involve all aspects of the care of the critically ill [5]. Intensivists do not consult cardiologists for every low cardiac output or pulmonologist for every hypoxia. However, the intensivist should have knowledge of renal (patho)physiology and recognize and manage the patient with or at risk of AKI. In "closed" ICUs where intensivists have final responsibility for all aspects of patient care, they often also initiate and manage renal replacement therapy (RRT) [5]. The "closed" organization, however, does not exclude interactions with other specialties for the management of difficult cases. In addition, many ICU teams are composed of physicians with multidisciplinary backgrounds. The many "open" ICUs in the USA are at the other end of the spectrum, with the referring physician maintaining responsibility and organs specialists being involved in the form of daily rounds or on-call consultation. It is evident that AKI is part of nephrology training. However, in daily practice nephrologists spend a great part of their clinical time managing renal problems in systemic diseases (e.g., glomerulonephritis), chronic kidney disease (CKD), chronic dialysis, and kidney transplantation. A member of the ICU team with nephrology training probably represents the ideal "manager" for AKI patients. Training and skills of ICU nurses as well as personal relationships, local politics, and financial issues may also play an important role.

Why every intensivist should be able to manage the early phase of AKI

Several features of AKI in the ICU are incompatible with routine management by consultant nephrologists (Table 1).

1. AKI develops in more than 50% of ICU patients. A nephrology consultation for every episode of AKI would require an enormous expansion of the nephrology community.
2. Severe AKI nowadays mainly occurs in the ICU setting and is part of multiple organ failure. This type of AKI may substantially differ from the AKI in ward

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For contrasting viewpoints, please go to doi:10.1007/s00134-017-4712-5 and doi:10.1007/s00134-017-4790-4.

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Table 1 Role of the nephrologist in the ICU

Improbable in most ICUs	Desirable in most ICUs	Mandatory in all ICUs
Prevention of AKI Initial diagnostic approach to AKI Management of early AKI		Diagnostic approach and treatment of specific causes
Indication for RRT Choice of RRT modality Prescription of fluid management	Provision of intermittent hemodialysis Translation of knowledge from the CKD population	
		Post-discharge nephrological follow-up

patients. Furthermore, diagnostic work-up as taught to nephrology residents may not be applicable to ICU patients. As an example, the accuracy of the classical urinary indices for the differential diagnosis between prerenal and renal causes is disappointing in ICU patients [6].

3. Prevention is the best approach to AKI and requires good basic intensive care including infection prevention, early antibiotics when appropriate, protective mechanical ventilation, minimal sedation, hemodynamic management, etc. In addition, the holistic management of the ICU patient may require prioritizing treatments that may be life-saving but harm the kidney (e.g., administration of aminoglycosides in septic shock with multidrug-resistant organisms, establishing a vital diagnosis with contrast administration, etc.). Intensivists are most experienced in assessing this benefit-to-risk ratio.
4. In the absence of classical indications, the decision to start RRT and the choice of modality are often more dependent on the underlying pathology than on the actual level of kidney function [7]. Once RRT is started, the management of fluid balance is part of the global management of the patient, should constantly be adapted to the actual situation of the patient, and cannot be directed by an external consultant.

What should be the role of the nephrologist in the ICU?

The foregoing argumentation certainly does not exclude an important role for nephrologists in the management of ICU patients with AKI. There are many areas where nephrology input is desirable or even mandatory (Table 1).

1. The diagnostic approach in patients where the etiology of AKI is not directly evident or when routine screening yields results that raise suspicion of a specific renal problem such as glomerulonephritis undoubtedly requires the input of a nephrologist to avoid delaying potentially life- or kidney-saving treatments. Rare and complicated electrolyte disorders may also require nephrology consultation.
2. Transfer of knowledge between the ICU and nephrology, e.g., during daily rounds, will undoubtedly improve the quality of care. For instance, nephrologists may draw attention to the long-term consequences of dialysis catheters in the subclavian vein [8], although ICU studies suggest this vein as the preferential site for catheter placement [9]. Nephrologists may suggest modifications to the intermittent dialysis procedure that promote hemodynamic stability, e.g., blood volume monitoring or sodium profiling [10, 11]. In this way, nephrologists could assist in the development of procedures and protocols for RRT and in quality improvement programs.
3. The most important role for the nephrologist, however, is in the follow-up of AKI patients after ICU and hospital discharge. In many AKI patients, kidney function will not return to baseline and even after complete recovery the risk of progression to CKD is increased [12]. Involving the nephrologist before the patient is discharged to the ward will avoid that many are "lost to follow-up" resulting in an important care gap. This post-ICU nephrological follow-up, especially after severe AKI, should include regular assessment of kidney function and institution of the appropriate therapy to prevent further progression to CKD [13]. Such an approach may improve long-term outcomes [14] but is currently neglected [15].

Conclusion

AKI is a common syndrome in the ICU. Its development/deterioration can be prevented by the interventions of skilled intensivists. The involvement of nephrologists should minimally include the diagnosis of difficult and rare kidney diseases and the long-term follow-up of AKI patients after discharge. Knowledge-sharing and cooperation between intensivists and nephrologists have great potential to further improve the outcome of AKI patients.

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Compliance with ethical standards
This article does not contain any studies with human participants or animals performed by any of the authors.

Conflicts of interest
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