Should the criteria for starting acute RRT in ICU vs. outside ICU be different?

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Background

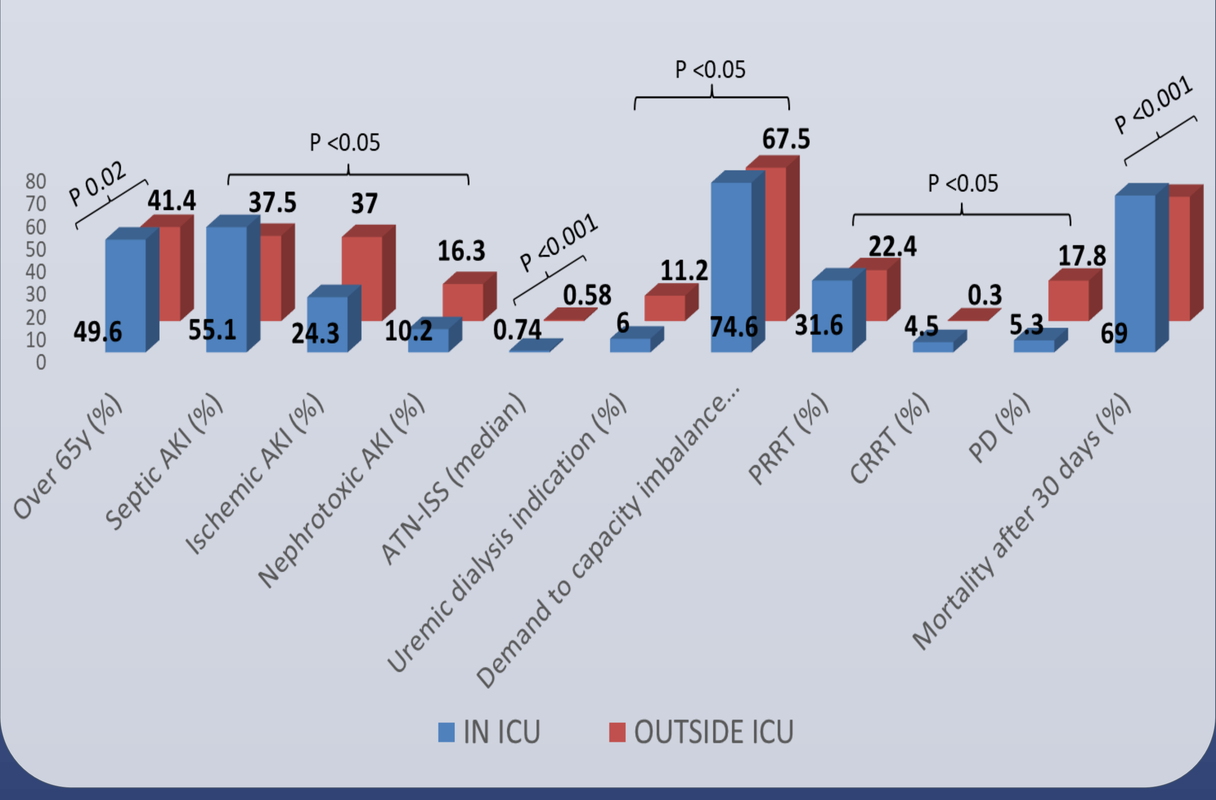
Considering that acute renal replacement therapy (RRT) should be considered when metabolic and fluid demands exceed total kidney capacity and that demand for kidney function is determined by non-renal comorbidities, severity of the acute disease and solute and fluid burden, the criteria for starting RRT in Intensive Care Unit (ICU) vs outside ICU may be different.

Methods

We performed a retrospective observational study that evaluated AKI KDIGO 3 adults patients underwent RRT in ICU and outside ICU from 2012 to 2018 in a teaching Brazilian Hospital. Protocol of the study was approved by the local ethics committee. All the AKI KDIGO 3 patients who were hospitalized, treated by dialysis and consultated by nephrology team in the teaching hospital from Botucatu School of Medicine during the studied years were evaluated via consecutive sampling. Patients who had CKD stages 3 to 5 based on CKD-EPI, kidney transplants or were under treatment with one of the renal replacement therapy (RRT) methods including hemodialysis or peritoneal dialysis and lower than 18 years old were excluded from the study. The choice of dialysis method was based on indication for dialysis, hemodynamic stability and catabolism of patients. It could be intermittent HD (IHD), prolonged intermittent RRT (PIRRT), continuous RRT(CRRT) and peritoneal dialysis (PD). All the AKI KDIGO 3 dialyzed patients were divided into two groups: In ICU and Outside ICU. The main goal was to evaluate and compare indication for acute dialysis. Clinical and laboratory characteristics, in-hospital mortality and recovery of kidney function at discharge hospital were also recorded.

Results

We enrolled 7,976 AKI patients during the study period (7 years), and 913 AKI patients were included (16.8%), of which 284 were treated by dialysis in ICU, and 629 were treated outside ICU. The mean age was 61.45 ±16.75 years, 569 (62.3%) patients were male, 698 (76.4%) of patients were Caucasian. The mean ATN-index specific score (ISS) was 0.71 ±0.28, and 31.1% of all patients were in ICU. Infections were the main cause of hospitalization (34.4%). Septic and Ischemic AKI were the main etiology of AKI (50.8% and 32.9%, respectively), metabolic and fluid demand to capacity imbalance was the main indication for dialysis (69.7%) and intermittent hemodialysis (IHD) was the method more used (59.2%). The general mortality rate after 30 days was 59%.



The two groups (IN vs. OUTSIDE ICU) were different in ATN-ISS, AKI etiology, elderly population, indications for dialysis, dialysis methods, and mortality rate. In-ICU, patients higher 65 years old and septic AKI were more frequent (49.1 vs. 41.4% and 55.1 vs. 37.5%, respectively), while ischemic and nephrotoxic AKI were less frequent (24.3 vs. 37 and 10.2 vs. 16.3%, respectively), ATN-ISS was higher (0.74±0.31 vs. 0.58 vs. ±0.16). Metabolic and fluid demand to capacity imbalance, prolonged hemodialysis, and continuous renal replacement therapy were more frequent in IN-ICU patients, while PD was less frequent (74.6 vs. 69.7%, 31.6 vs. 22.4%, and 5.3 vs. 17.8%) and mortality was higher (69 vs. 54.7%, respectively).

Table 3. Subdistribuition Hazard Ratio of Covariates for mortality.

Variables	HR (CI 95%)	p value
Age > 65 years old	1. 08 (1.02 –1.75)	0.04
In ICU	2.12 (1.73- 3.66)	0.003
Septic AKI	1.18 (1.04- 1.97)	0.04
uremia	0.97 (0.91-2.76)	0.31
CRRT	1.54 (0.97-2.67)	0.34

AKI: acute kidney injury, CRRT: continuous renal replacement therapy

In this study, criteria for starting acute RRT were different between IN and OUTSIDE ICU patients. The demand capacity imbalance was more frequent in ICU patients; while uremia was less frequent; however they were not associated with death at logistic regression. There was difference in dialysis method between patients in and outside ICU. PD was more indicated OUTSIDE ICU, while PIRRT and CRRT were more frequent in ICU patients. However, at logistic regression, the dialysis methods were not associated with death. At logistic regression, age, septic AKI, and being in ICU were factors associated with death.

This study has several strengths, most notably its large sample size and 7-yr duration. The major limitations are the absence of detailed laboratory and clinical data and it was performed in a single center.

Conclusion

The criteria for starting acute RRT and dialysis methods are different between AKI patients IN and OUTSIDE ICU, but they did not affect short patients' survival. Admission at ICU, age and septic AKI are the risk factors associated with death. Acute RRT should be initiated emergently in and outside ICU when life-threatening changes in fluid, electrolytes, and acid-base balance are unresponsive to medical therapy and it should be also considered when metabolic and fluid demands exceed total kidney capacity. Factors such as quality of life, comorbid conditions, severity of acute illness, expected prognosis, logistics, and social and cultural issues should be considered when deciding whether to start RRT in and outside ICU.