

LETTER

Comparison of RIFLE with and without urine output criteria for acute kidney injury in critically ill patients: a task still not concluded!

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See related research by Wlodzimirow *et al.*, <http://ccforum.com/content/16/5/R200>

In a recent issue of *Critical Care*, we read with interest the article by Wlodzimirow and colleagues [1], who prospectively studied the Risk Injury Failure Loss End-stage renal disease (RIFLE) [2] classification with serum creatinine (SCr) and urine output (UO) (RIFLE_{SCr+UO}) and **without UO criteria** (RIFLE_{SCr}) for acute kidney injury (AKI) in **260 critically ill patients**. RIFLE_{SCr} significantly **underestimated** the presence of AKI on admission and during the first week in the intensive care unit and significantly **delayed** AKI **diagnosis**. Those are important findings that **corroborate** the utility of **simultaneously** using **both criteria** as proposed by the Acute Dialysis Quality Initiative workgroup [2]. The authors also found that RIFLE_{SCr} was associated with **higher mortality** than RIFLE_{SCr+UO}. This observation should be interpreted with extreme caution, as this association has not been tested

by multivariate analysis. Data regarding the impact on mortality of RIFLE defined by SCr **and** UO or by SCr are not conclusive. For example, in a systematic review, the relative risk for death among studies that used **RIFLE_{SCr+UO}** was **lower** than in those using RIFLE_{SCr} [3]. Previously, however, we did not find any difference in terms of mortality for RIFLE_{SCr+UO} (Risk, odds ratio (OR) 2.69; Injury, OR 2.01; Failure, OR 3.59; AKI of any category, 2.78; area under the receiver operator characteristic (AUROC), 0.733) or for RIFLE_{SCr} (Risk, OR 2.63; Injury, OR 2.12; Failure, OR 3.2; AKI of any category, 2.68; AUROC, 0.729) [4]. Therefore, prospective studies with a large number of patients are **still needed** to better determine the impact on mortality of RIFLE defined by SCr+UO criteria or by SCr criteria.

Authors' response

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We agree with Lopes and Jorge that multivariate analysis should be attempted when testing whether RIFLE_{SCr} is associated with higher mortality than RIFLE_{SCr+UO}. Essentially the question is whether the group (hereafter G₁) of patients with AKI based on the RIFLE_{SCr} criteria (regardless of UO) is at higher risk of death than the group (hereafter G₂) classified as having AKI based on the UO criteria only. Additional analysis, not reported in [1], shows that out of admission type, age, gender, weight, Acute Physiology and Chronic Health Evaluation (APACHE) score, Simplified Acute Physiology Score

(SAPS), cardiopulmonary resuscitation, and length of stay, only SAPS was a confounder. Before adjustment for SAPS, patients in G₁ had 1.64 times the odds of dying than those in G₂. After adjustment for SAPS, the OR was reduced to 1.45 ($P = 0.0004$), still confirming our findings, which are in agreement with those of the other study [3].

The seeming contradiction between our findings and those of Lopes and colleagues [4] is easily explained by the significant differences in case mix. In our study, 48.6% of the RIFLE_{SCr+UO} AKI patients were classified as having AKI on the basis of the UO criteria only [1] versus 5.6% in the study by Lopes and colleagues [4]. Differences in case mix may be attributable to the different inclusion criteria, the Modification of Diet in Renal Disease (MDRD)-based estimation of baseline SCr in all patients in the previous study [4], which may overestimate AKI based on SCr [5], and the outcome definition. All of these are important factors to consider when comparing studies.

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Abbreviations

AKI, acute kidney injury; AUROC, area under the receiver operator characteristic; OR, odds ratio; RIFLE, Risk Injury Failure Loss End-stage renal disease; RIFLE_{SCr}, RIFLE criteria based on the serum creatinine criteria only; RIFLE_{SCr+UO}, RIFLE criteria based on serum creatinine and urine output criteria; SAPS, Simplified Acute Physiology Score; SCr, serum creatinine; UO, urine output.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

JAL and SJ drafted the letter, revised it critically for important intellectual content, and gave final approval of the version to be published.

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