The authors reply:

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We would like to sincerely thank Honore et al (1) for their interest in our recent article (2) published in Critical Care Medicine. The authors argue about our choice regarding the definition of acute kidney injury (AKI), where only serum creatinine (SCr) was used to evaluate the frequency of AKI (2). They have raised a very crucial and important point that had been already extensively discussed in our team during the data analysis. We agree with the authors that adding hourly urine output (UO) would have strengthened our results and modified the results regarding the frequency of AKI in our cohort (Table 1). A drop in UO is a more sensitive early criterion for AKI but less specific, whereas SCr criterion is a more specific but late marker for AKI. However, as it often happens when dealing with big databases and performing secondary analysis, we face the risk of not dealing with precise data that can lead to wrong conclusions. The primary aim of the Collaborative European NeuroTrauma Effectiveness Research in Traumatic Brain Injury study (3) was to assess the epidemiology and clinical practice in the management of traumatic brain-injured patients. The patients and data collected are immense. Unfortunately, granular data not focused on intracranial problems, such as hourly UO, were not available. The UO was evaluated daily, along with the fluid balance. AKI 1 is defined as oliguria over 6–12 hours and AKI 2–3 is oliguria or anuria over 12 hours. As we only had 24 hours UO available, we believe that using any AKI staging based on UO would be an adaptation of the criteria and would have been imprecise. Many other retrospective studies on AKI in different settings suffer from this limitation (4). Although we agree with Honore et al (1) that using only SCr may have led to an underdetection of the problem, we decided to stick to a more rigorous and realistic definition according to the quality of the data that were available for this analysis, and for transparency, we clearly stated this in the methods and limitations section. To make our definition even stronger and to make more precise the definition of baseline SCr values before the trauma, we also performed a sensitivity analysis by back calculating for each patient a preinjury SCr value, obtained with the modification of a previously validated formula (2). We, therefore, believe that we often find ourselves in front of the difficult choice between the precision of the data, at the expenses of under/overestimation of definitions, and the approximation of the data, which might lead to misunderstandings for the readers. We chose to use the definition of AKI according to the available data, avoiding extrapolating definitions that might lead to nonprecise and wrong conclusions, by clearly explaining the rationale for this choice in our article, and realizing that we probably underestimate the true AKI frequency in this population. We highlighted this limitation, and probably the true frequency is between the two boundaries. The frequency of stages AKI 2–3 is between 3% and 6% of the traumatic brain injury population making this problem present but marginal in this severe clinical condition.

REFERENCES

1. Honore PM, Redant S, Kaefer, et al: Acute Kidney Injury Definition in Traumatic Brain Injury Patients Only Based on Serum Creatinine Criteria and Not Together With Urine Output Criteria: Are We Missing Some Acute Kidney Injury Patients? Crit Care Med 2021; 49:e553–e554

2. Robba C, Banzato E, Rebora P, et al; Collaborative European NeuroTrauma Effectiveness Research in Traumatic Brain Injury (CENTER-TBI) ICU Participants and Investigators: Acute kidney injury in traumatic brain injury patients: Results from the Collaborative European Neurotrauma Effectiveness Research in Traumatic Brain Injury Study. Crit Care Med 2021; 49:112–126

3. Maas AI, Menon DK, Steyerberg EW, et al; CENTER-TBI Participants and Investigators: Collaborative European Neurotrauma Effectiveness Research in Traumatic Brain Injury (CENTER-TBI): A prospective longitudinal observational study. Neurosurgery 2015; 76:67–80

4. Koeze J, Keus F, Dieperink W, et al: Incidence, timing and outcome of AKI in critically ill patients varies with the definition used and the addition of urine output criteria. BMC Nephrol 2017; 18:70