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LETTER

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Response to “Are fluids resuscitation the “Keyser Soze” of acute kidney injury in trauma patients?”

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See related letter by Jamme and Salem, <https://ccforum.biomedcentral.com/articles/10.1186/s13054-019-2333-9>

We appreciate the interest expressed by Dr. Jamme and Ben Hadj Salem in our study recently published in critical care reporting the prevalence and the risk factors of acute kidney injury (AKI) in a multicentre cohort of 3111 trauma patients [1]. The issue they raised was the lack of data on fluid resuscitation, especially regarding the amount of crystalloids and colloids. We share with the authors the view that the choice of fluid is a critical issue to prevent AKI in trauma patients. Indeed, recent studies have called into question the safety of colloids [2] in trauma patients as well as the safety of NaCl 0.9% in ICU patients [3]. Our database provides data on pre-hospital fluid resuscitation for the whole study cohort as well as data on 24-h fluid resuscitation for hemorrhagic shock patients ($n = 355$, 11%).

Nineteen percent of the 3111 study patients received colloids (median volume of 500 mL [IQR 500–750]) while 94% of the 3111 study patients received crystalloids (median volume of 500 mL [IQR 500–1000]) during the prehospital period. When the volume of colloids or crystalloids administered in the prehospital setting was forced into the predictive model of AKI (all stages of RIFLE classification), odd ratios were respectively (per 1000 mL of solution) 1.34 (CI 0.85–2.12, $p = 0.21$) and 1.11 (CI 0.84–1.45, $p = 0.47$). Thus, prehospital fluid resuscitation does not provide additional value to early predict AKI. Longer period of exposure might be worth considering to capture the potential nephrotoxic effect

of fluid on renal function; however, as our main objective was to early predict AKI after trauma, we believe it would make the model less relevant.

Eighty-seven percent of hemorrhagic shock patients received colloids over the first 24 h of care (median volume of 1000 mL [IQR 500–2000]). Though only 9.6% of them received a dose higher than 33 mL/kg, we cannot rule out that colloids caused renal toxicity in our study cohort. In the meantime, patients received a median volume of 3500 mL [IQR 2000–6000] of crystalloids. Our database does not distinguish the various types of crystalloids and provides no data on hyperchloremia to indirectly assess the administered volume of NaCl 0.9%. However, at the time of the study, the three centres were using, though not exclusively, NaCl 0.9% for fluid resuscitation. Given the large amount of administered crystalloids in hemorrhagic shock patients, we cannot exclude that chloride-rich fluids worsened renal aggression.

As shown in Fig. 1, colloid use has declined over the last few years while crystalloids remain the cornerstone for fluid resuscitation in trauma patients. In order to prevent nephrotoxicity related to NaCl 0.9%, isotonic-balanced crystalloids have been proposed for fluid resuscitation, including for patients with traumatic brain injury [4]. However, further studies are necessary to assess if this practice translates to better outcome in trauma patients. We are about to start such a study (NCT03630224).

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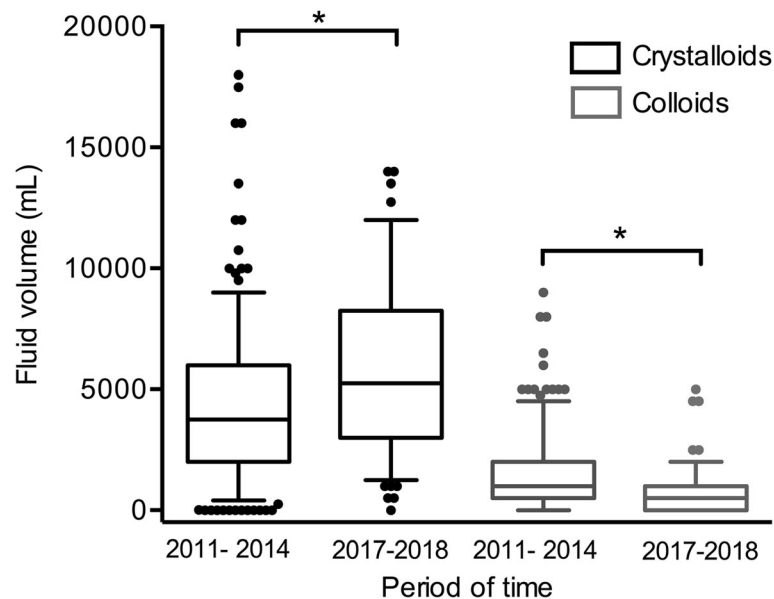


Fig. 1 Amounts of colloids and crystalloids administered during the first 24 h in patients with hemorrhagic shock from the study cohort [1] (2011–2014, $n = 355$) and in 129 patients with hemorrhagic shock managed in the same 3 trauma centres over 14 months in 2017–2018. Hemorrhagic shock is defined by the transfusion of at least 4 units of packed red blood cells within the first 6 h. Boxes are represented as median, interquartile range (upper and lower box limit) and 5–95% percentile. * $p < 0.001$ (Mann-Whitney test)

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Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request

Authors' contributions

AH and JD contributed to the study concept and design. AH, BS, SH, MR and TG contributed to the data acquisition. AH, SH, BS and JD contributed to the data analysis. AH, BS, SH, MR, TG and JD contributed to the data interpretation. AH, BS and JD contributed to the drafting. AH, BS, SH, MR, TG and JD contributed to the critical revision. All authors read and approved the final manuscript.

Ethics approval and consent to participate

The TraumaBase® group obtained approval for this study, including waived informed consent from the Institutional Review Board (Comité pour la

Protection des Personnes, Paris VI-Pitié-Salpêtrière, France). The database was approved by the Advisory Committee for Information Processing in Health Research (Comité Consultatif sur le Traitement de l'Information en matière de Recherche dans le Domaine de la Santé), and the French National Commission on Computing and Liberty (Commission Nationale Informatique et Liberté).

Consent for publication

The manuscript does not contain any individual person's data in any form.

Competing interests

The authors declare that they have no competing interests.

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