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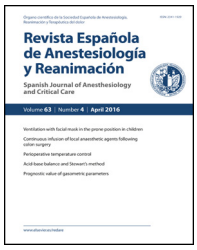

ORIGINAL ARTICLE

Fluid balance and chloride load in the first 24 h of ICU admission and its relation with renal replacement therapies through a multicentre, retrospective, case–control study paired by APACHE-II☆

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KEYWORDS
Resuscitation;
Fluids;
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Fluid balance;
Acute kidney failure;
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Abstract
Objective: To analyse the association between water balance during the first 24 h of admission to ICU and the variables related to chloride levels (chloride loading, type of fluid administered, hyperchloraemia), with the development of acute kidney injury renal replacement therapy (AKI-RRT) during patients' admission to ICU.
Patients and methods: Multicentre case–control study. Hospital-based, national, carried out in 6 ICUs. Cases were patients older than 18 years who developed an AKI-RRT. Controls were patients older than 18 years admitted to the same institutions during the study period, who did not develop AKI-RRT during ICU admission. Pairing was done by APACHE-II. An analysis of unconditional logistic regression adjusted for age, sex, APACHE-II and water balance (in evaluating the type of fluid).

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Results: We analysed the variables of 430 patients: 215 cases and 215 controls. An increase of 10% of the possibility of developing AKI-RRT per 500 mL of positive water balance was evident (OR: 1.09 [95% CI: 1.05–1.14]; $p < 0.001$). The study of mean values of chloride load administered did not show differences between the group of cases and controls (299.35 ± 254.91 vs. 301.67 ± 234.63; $p = 0.92$).
Conclusions: The water balance in the first 24 h of ICU admission relates to the development of IRA-TRR, regardless of chloraemia.
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PALABRAS CLAVE
Reanimación;
Fluidos;
Cloremia;
Balance hídrico;
Insuficiencia renal;
Técnicas de reemplazo renal

Balance hídrico y carga de cloro en las primeras 24 h de ingreso en UCI y su relación con las terapias de reemplazo renal mediante un estudio multicéntrico, retrospectivo, de casos y controles emparejados por APACHE-II

Resumen
Objetivo: Analizar la asociación entre el balance hídrico durante las primeras 24 h de ingreso en UCI y las variables relacionadas con los valores de cloro (carga de cloro, tipo de fluido administrado, hipercloremia), con el empleo de técnicas de reemplazo renal secundarias a insuficiencia renal aguda (IRA-TRR) durante el posterior ingreso en UCI de los enfermos.
Pacientes y métodos: Estudio multicéntrico de casos y controles, de base hospitalaria y ámbito nacional, llevado a cabo en 6 UCI. Los casos fueron pacientes mayores de 18 años que desarrollaron una IRA-TRR. Los controles fueron pacientes mayores de 18 años, ingresados en el mismo periodo y centro que los casos, que no desarrollaron IRA-TRR durante su ingreso en UCI. Se realizó emparejamiento por APACHE-II. Se llevó a cabo un análisis de regresión logística no condicional ajustada por edad, sexo, APACHE-II. Las variables de interés principales fueron: balance hídrico, carga de cloro administrada, e IRA-TRR.
Resultados: Se han analizado las variables de 310 enfermos. Se evidenció un aumento del 10% en la posibilidad de desarrollar IRA-TRR por cada 500 mL de balance hídrico positivo (OR: 1,09 [IC 95%:1,05–1,14]; p < 0,001). El estudio de los valores medios de carga administrada no evidenció diferencias entre el grupo de casos y de controles ($299{,}35 \pm 254{,}91$ frente a $301{,}67 \pm 234{,}63$; p = 0,92).
Conclusiones: El balance hídrico en las primeras 24 h de ingreso en UCI se relaciona con el desarrollo de IRA-TRR, independientemente de la cloremia.
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Introduction

Two hypotheses linking fluid resuscitation of critically ill patients with the subsequent development of acute kidney injury and the need for renal replacement therapies (AKI-RRT) have been put forward in medical literature[1–4]: on the one hand, hyperchloraemia triggered by the use of fluids with a high chlorine content, and on the other, over-administration of fluids (positive fluid balance or fluid overload). However, a possible connection between these variables cannot be ruled out, and either one could act as a confounder in the studies published to date.[5]

The aim of this study is to analyse the association between fluid balance in the first 24 h following admission and the development of AKI-RRT in patients subsequently transferred to the ICU. As a secondary objective, we studied the relationship between chlorine load in the same period and subsequent AKI-RRT.

Patients and methods

Study design and population

This was a multicentre case–control hospital-based study carried out in 6 ICUs in Spain.

Cases were patients aged over 18 years at the time of diagnosis, admitted to participating hospitals between 1 January 2013 and 31 December 2015, who developed AKI for which they were treated with RRT (haemodialysis and continuous venovenous haemodiafiltration) during their stay in the ICU. Patients were chosen on the basis of the parameters used in the Randomised Evaluation of Normal vs Augmented Level Replacement Therapy (RENAL) study, and met 1 of the following physiological criteria for ADI: diuresis <100 mL/6 h; serum potassium >6.5 mmol/L; pH < 7.2; serum urea >70 mg/dL; serum creatinine >3.4 mg/dL; and clinically significant organ oedema in the setting of AKI.[6]

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