

## Letter

**Acute renal failure in patients with sepsis**José António Lopes<sup>1</sup>, Sofia Jorge<sup>1</sup>, Cristina Resina<sup>1</sup>, Carla Santos<sup>2</sup>, Álvaro Pereira<sup>2</sup>, José Neves<sup>2</sup>, Francisco Antunes<sup>2</sup> and Mateus Martins Prata<sup>1</sup><sup>1</sup>Department of Nephrology and Renal Transplantation, Hospital de Santa Maria, Av. Prof. Egas Moniz, 1649-035, Lisboa, Portugal<sup>2</sup>Department of Infectious Diseases, Hospital de Santa Maria, Av. Prof. Egas Moniz, 1649-035, Lisboa, PortugalCorresponding author: José António Lopes, [jalopes93@hotmail.com](mailto:jalopes93@hotmail.com)

Published: 19 April 2007

This article is online at <http://ccforum.com/content/11/2/411>

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*Critical Care* 2007, **11**:411 (doi:10.1186/cc5735)

The evaluation of acute renal failure (ARF) by the newly developed classification for ARF (RIFLE, standing for 'risk, injury, failure, loss, end-stage kidney disease') [1] in patients with sepsis has not yet been performed. We evaluated, retrospectively, the incidence of ARF and its risk factors, therapy, and outcome among patients with sepsis admitted to the Infectious Diseases Intensive Care Unit of the Hospital de Santa Maria between January 2005 and December 2006. ARF was defined by means of the RIFLE classification [1]. Sepsis was classified in accordance with the American College of Chest Physicians and the Society of Critical Care Medicine consensus [2]. In all, 182 patients (aged  $56.2 \pm 18.56$  years (mean  $\pm$  SD), 120 male, 162 Caucasian)

were analyzed. Baseline characteristics of the patients are summarized in Table 1. Sixty-eight patients (37.4%) had ARF. By multivariate analysis, age more than 60 years (odds ratio (OR) 0.39, 95% confidence interval (CI) 0.17 to 0.87,  $P=0.002$ ), male (OR 5.5, 95% CI 2.2 to 13.5,  $P<0.0001$ ), chronic kidney disease (OR 0.2, 95% CI 0.06 to 0.79,  $P=0.021$ ), Gram-negative-related infection (OR 0.38, 95% CI 0.16 to 0.89,  $P=0.027$ ), and a Simplified Acute Physiology Score, version II (SAPS II)  $>50$  (OR 0.14, 95% CI 0.06 to 0.31,  $P<0.0001$ ) were independently associated with ARF. Thirteen patients (3 with injury and 10 with renal failure) had received renal replacement therapy (12 receiving continuous venovenous hemodiafiltration, and 1 receiving

**Table 1****Baseline characteristics**

Variable	No AKI	Risk	Injury	Failure	<i>P</i>
<i>n</i>	114	11	21	36	
Age (years) <sup>a</sup>	54 $\pm$ 18.2	61.9 $\pm$ 20.9	61.6 $\pm$ 13.4	61.8 $\pm$ 16.3	NS
Sex (male)	65 (57)	10 (91)	18 (85.7)	27 (75)	0.009
Race (Caucasian)	102 (89.5)	10 (91)	20 (95.2)	30 (83.3)	NS
Severe sepsis <sup>b</sup>	77 (67.5)	6 (54.5)	12 (57.1)	13 (36.1)	0.012
Septic shock <sup>b</sup>	25 (21.9)	4 (36.4)	8 (38)	23 (64)	<0.0001
CVD	37 (32.4)	3 (27.3)	10 (47.6)	14 (38.9)	NS
CKD	5 (43.9)	1 (9)	4 (19)	8 (22.2)	0.009
SAPS II $>50$	22 (19.3)	6 (54.5)	7 (33.3)	9 (26.5)	0.06
Mortality	11 (9.6)	3 (27.3)	6 (28.6)	20 (55)	<0.0001

Figures in parentheses are percentages. AKI, acute kidney injury; CKD, chronic kidney disease; CVD, cardiovascular disease, diabetes mellitus and hypertension; NS, not significant; SAPS II, Simplified Acute Physiology Score, version II. The SAPS II was calculated on the basis of the worst variables recorded during the first 24 hours of ICU admission. <sup>a</sup>Means  $\pm$  SD; <sup>b</sup>sepsis was classified in accordance with American College of Chest Physicians and the Society of Critical Care Medicine consensus [2].

ARF = acute renal failure; CI = confidence interval; OR = odds ratio; RIFLE = risk, injury, failure, loss, end-stage kidney disease; SAPS II = Simplified Acute Physiology Score, version II.

intermittent hemodialysis). The mortality rate was 37.4%, and increased from 'normal' to 'failure'. Patients who did not die had renal function recovery. Multivariate analysis including age more than 60 years, gender, SAPS II > 50, comorbidity (namely cardiovascular disease), and ARF showed that SAPS II > 50 (OR 0.12, 95% CI 0.05 to 0.29,  $P < 0.0001$ ) and ARF (OR 0.26, 95% CI 0.11 to 0.63,  $P = 0.003$ ) were independent predictors of mortality.

Thus, ARF as determined by RIFLE is common among patients with sepsis, and increases mortality. Age, gender, chronic kidney disease, Gram-negative-related infection and severity of illness are independently associated with ARF in this setting.

### Authors' contributions

JAL, SJ, CR, and CS made substantial contributions to the conception and design of the study, to the acquisition of data, and to the analysis and interpretation of data. JAL, CR, AP, JN, FA, and MMP were involved in drafting the manuscript and revising it critically for important intellectual content. All authors read and approved the final manuscript.

### Competing interests

The authors declare that they have no competing interests.

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