

## LETTER TO THE EDITOR

## Renal long-term outcome of critically ill COVID-19 patients with acute kidney failure and continuous renal replacement therapy

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A year and a half after the onset of the coronavirus disease 2019 (COVID-19) pandemic, there are few published data about the long-term renal prognosis of infected critical patients admitted to intensive care units (ICUs) who develop acute kidney injury (AKI) requiring continuous renal replacement therapies (CRRTs) [1, 2]. We performed a retrospective observational study in which we analysed the renal long-term clinical course and outcomes of 53 critical patients infected with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) who developed acute respiratory failure and AKI requiring CRRT.

Baseline characteristics are shown in Table 1. Regarding long-term renal function, the surviving patients did not receive any additional dialysis; however, at discharge, the decrease in

estimated glomerular filtration rate (eGFR) was  $31.7 \pm 21.8$  and  $29.8 \pm 18.4$  mL/min/1.73 m<sup>2</sup> at 6 months and 1 year, respectively ( $P < 0.001$ ) (Figure 1). At admission, 22 patients had albuminuria and 29 had microhaematuria. After 6 months, only 2 patients of 14 survivors maintained these alterations.

Ng et al. [3] recently published the outcomes among patients hospitalized with COVID-19 and AKI. Among those with AKI Stage 3 who survived, 30.6% remained on dialysis at discharge, and pre-hospitalization chronic kidney disease (CKD) was the only independent risk factor associated with needing dialysis at discharge. It is unclear how many of these patients may subsequently experience recovery of kidney function, although it should be noted that more than half of them had pre-existing

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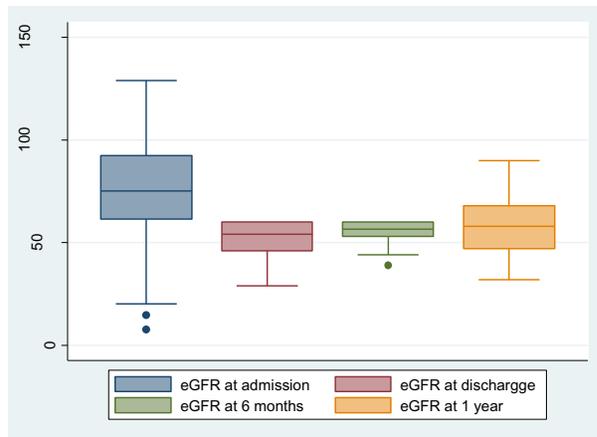
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**Table 1. Clinical and demographic characteristics of 53 critically ill COVID-19 patients who developed AKI requiring CRRT**

Clinical and demographic characteristics	Values
Sex (male/female), n/n	42/11
Age (years), median (IQR)	63 (31–78)
Baseline serum creatinine (mg/dL), mean $\pm$ SD	1.23 $\pm$ 0.93
Baseline eGFR (mL/min/1.73 m <sup>2</sup> ), mean $\pm$ SD	73.1 $\pm$ 26.7
Diabetes, n (%)	12 (23)
Hypertension, n (%)	40 (75)
Obesity, n (%)	20 (38)
CRRT prescription, %	CVVHD: 85 CVVH: 15
Time on CRRT (days), median (IQR)	18 (1–176)
Mortality, n (%)	39 (73.5)

CVVHD, continuous venovenous haemodialysis; CVVH, continuous veno-venous haemofiltration; IQR, interquartile range; SD, standard deviation.

**FIGURE 1:** eGFR (mL/min/1.73 m<sup>2</sup>) 6 months and 1 year after SARS-CoV-2 infection (n = 14 survivors)

advanced CKD. In contrast, in our data series, only patients with previous normal baseline kidney function were included in the analysis. A meta-analysis [4] showed a high prevalence of abnormal urinalysis and kidney dysfunction in COVID-19 patients (3.7%). Fifty-seven percent of patients during hospitalization present proteinuria, but no data about long-term renal outcomes have been described in these patients. The long-term health consequences of patients with COVID-19 who have been discharged from hospital have been recently published in a Chinese cohort [5]. Thirteen percent of the patients without AKI and with normal eGFR at the acute phase had decreased eGFR at the 6-month follow-up. Therefore the decrease of kidney function is important after COVID-19 infection even in patients who do not develop AKI.

Our results offer important messages: survivor patients who develop AKI requiring CRRT in the ICU do not require long-term dialysis if they have normal baseline renal function; 1 year after discharge, no patients have recovered their renal function and have lost half of kidney function after SARS-CoV-2 infection; by 1 year, most of the urinary sediment alterations have disappeared and, lastly, these results support that these patients require post-discharge nephrology care.

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## AUTHORS' CONTRIBUTIONS

R.M., A.M. and M.G. conceived and designed the study, had full access to data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. R.M. and M.G. acquired, analysed or interpreted the data. All of the authors revised and drafted the manuscript.

## CONFLICT OF INTEREST STATEMENT

P.R.B. has received fees for conference from Baxter. The other authors declare no conflicts of interest.

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