

Sabrina Congedi^{a*}, Ginevra Randona, Francesca Medici^a, Claudio Bonanno^a, Leda Cattarin^b, Federico Nalesso^b, Paolo Navalesi^a, Ivo Tiberio^a, Ilaria Godi^a

^aDepartment of Anesthesia and Intensive Care, Azienda Ospedaliera Università di Padova

^bDepartment of Medicine-DIMED, Nephrology, Dialysis and Transplant Unit, Università degli Studi di Padova, Padova, Italy.

Background Recent and emerging data suggest that patients with coronavirus disease 2019 (COVID-19) disease can experience as common sequela an acute kidney injury (AKI), suggesting a stronger relationship among COVID-19 and kidney damage organ. Until to 20,6% of critically ill adults with COVID-19 admitted to intensive care units (ICU) develop AKI treated with renal replacement therapy (AKI-RRT), with higher risk to die and a significantly economic burden of illness. The newer topic of COVID-19 disease and AKI-RRT has gained interest over the last months, and to date, the information is limited to single-center experiences with homogeneous population and focused on mortality rate. Indeed, data on long-term outcomes among critically ill patients with AKI-RRT associated to COVID-19 are scarce: survival long-term rate and dialysis dependence in this defined population are still unknown. Therefore, nowadays the clinician has no key evidence regarding long-term outcomes of COVID-19 patients with AKI-RRT.

Methods This single-center, retrospective, follow-up study was conducted on the ICU of the University Padua Hospital in the Northeast of Italy. From March 2020 to January 2022, patients hospitalized in the ICU, aged ≥ 18 years, and treated with RRT due to COVID-19-associated AKI were included. Data for the declared outcomes were collected at almost 3-month from RRT initiation. Exclusion criteria were age < 18 years and end-stage renal disease requiring dialysis. Statistical analysis was performed using the software “Statistical Package for the Social Sciences” (SPSS, version 28 for macOS, IBM, Corp, New York, USA). Epidemiological and clinical characteristics were summarized by standard descriptive statistics. Continuous variables were expressed as mean and standard deviation, and categorical ones as percentage distribution of variables was assumed. To evaluate the probability of KRT independence from start to follow-up we used R studio with the package “survival”. We perform the analysis accounting for death as competing risk.

Objective Among critically ill patients with AKI-RRT-associated COVID-19, we aimed to describe outcomes of death and RRT-dependence at almost 3-month follow-up from RRT initiation. We also aimed to estimate the probability of this subgroup to be alive and dialysis-free at 6 months.

Results We identified a cohort of fifty-five patients with COVID-19 disease developed AKI-RRT, of whom nine were excluded. In total 46 patients were considered eligible. 81% were male, with a mean age of $68,04 \pm 9,5$ years at time of inclusion and a mean weight of $90,02 \pm 16,86$ Kg; 12 patients (26%) had a history of chronic-kidney-disease (stage 1 8,33%, stage 2 8,33%, stage 3 50%, stage 4 16,6%, stage 5 16,66%) and mean creatinine value was $1,32 \pm 1,04$ mg/dl. Comorbidity reported in clinical medical history was also investigated (hypertension 67,4%, diabetes mellitus 23,9%, peripheral vascular disease 10,9%, steroid therapy 4,3%, BPCO 2,2%). At the ICU admission most (91,7%) had respiratory symptoms with a mean Horowitz index of $138,44 \pm 76,7$; signs of renal impairment were present in 18,8% of cases. All of them were mechanically ventilated, for 39 patients (81,3%) vasoactive drugs were prescribed and in 3 cases ECMO support was needed. The median time to RRT initiation was 8 days (interquartile range 2-12). On April 30, 2022, 31 (67,4%) patients had died of whom 25 died during ICU stay (at a median time of 29 days, interquartile range 15,5-92 days); 18 participants (39,1%) had been discharged from ICU with a median length of stay of 34 days (interquartile range 28,2-65 days). In ICU survivors,

the median overall duration of RRT was 386 days (interquartile range 160-672 days). After a median follow-up time of 489 days (interquartile range 261-534) since RRT initiation, 3 patients (16,6%) were RRT-dependent and 4 (22,2%) had died, while the remaining 11 (61,1%) were alive and RRT-free.

Kaplan-Meier curve for probability of RRT-independence is shown in Figure 1. We calculated a probability of RRT-independence of 23% (CI 13-39%) at 6 months since RRT initiation.

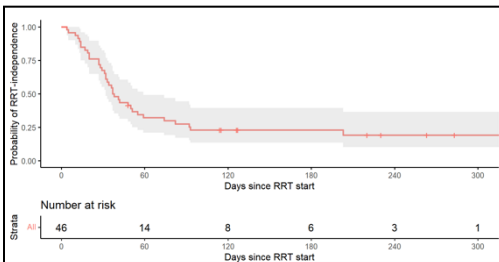


Figure 1. Kaplan-Meier curve for probability of RRT-independence at 6 months since the start.

Conclusion With the limitation of the small sample and the retrospective nature of the study, these findings indicate that despite the high mortality rate in ICU of the subgroup of COVID-19 and AKI-RRT patients, there is up to 23% chance of renal recovery at 6 months.