

Intensive Renal Replacement Therapy and Mechanical Ventilation Duration



Acute kidney injury (AKI) is a global health issue, accounting for approximately two million deaths per year as well as presenting a heavy economic burden on healthcare systems. Hospital-acquired AKI is associated with increased risk of death and prolonged length of hospital stay.

There are no effective treatments beyond supportive care for patients with AKI from sepsis or hypotension. Severe AKI requires support through intermittent or continuous renal replacement therapy (CRRT). The goal is to replace some life-sustaining functions of the kidney.

Clinical trials to date have shown little benefit from increasing the intensity of renal replacement therapy (RRT) for acute kidney injury. Intensive RRT is associated with an increase in adverse events, including electrolyte abnormalities such as hypophosphataemia and hypokalaemia, inadequate dosing of antibiotics due to enhanced elimination, excessive nutrient losses and lower urine output. Nevertheless, this treatment strategy continues to be used frequently.

In the AKI-Epidemiological Prospective Investigation randomised multicentre trial, the researchers compared the use of less intensive RRT and more intensive RRT in critically ill patients with acute kidney injury to determine if more intensive RRT (haemodialysis or sustained low-efficiency dialysis six times per week or continuous venovenous haemodiafiltration at 35 mL/kg per hour) compared to less intensive RRT (haemodialysis or sustained low-efficiency dialysis three times per week or continuous venovenous haemodiafiltration at 20 mL/kg per hour) leads to longer duration of mechanical ventilation. 1124 patients were included in the study, out of which 907 were supported by mechanical ventilation at study initiation. The majority of the study participants were men (70.4%). The hypothesis of the study was that more intensive RRT would have a more adverse effect, such as a longer duration of mechanical ventilation. The primary outcome of the study was the time to first successful extubation off mechanical ventilation.

Results of the study show that patients who were assigned randomly to more intensive RRT had a lower rate of successful extubation and an average of 2.07 ventilator-free days compared to patients assigned to less intensive RRT who had 3.08 ventilator-free days over a period of 14 days. There was no difference in survival between the two treatment groups. 64.3% of patients in the intensive RRT group were alive compared with 63.9% in the less intensive RRT group. Baseline serum phosphate concentrations were similar in patients on mechanical ventilation in both groups, but by day 14, there was a greater reduction in serum phosphate in the more intensive RRT group compared to the less intensive RRT group. Sixty-one percent of the patients in the more-intensive treatment had at least one hypophosphataemic event compared with 38% in the less-intensive RRT group over the two weeks of the study.

These findings suggest that critically ill mechanically ventilated patients who are assigned to more intensive RRT have a longer duration of mechanical ventilation when compared to patients who are assigned less intensive RRT. More intensive RRT may increase the duration of mechanical ventilation due to iatrogenic complications associated with a higher dose of RRT. It is possible that the nutritional status of critically ill patients with AKI is compromised by the depletion of vital nutrients with increased RRT dose.

Source: [Chest](#)

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