Commentary

Long-term outcome after intensive care: can we protect the kidney?

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Abstract

Long-term outcome – mortality, morbidity and quality of life – is finally receiving attention in the field of intensive care research. A number of recent studies have focused on patient survival and kidney survival after acute renal failure. The present review focuses on the third publication from the Beginning and Ending Supportive Therapy for the Kidney Investigators Writing Committee. Their study took place in 54 intensive care units in 23 countries. The main findings of the Beginning and Ending Supportive Therapy study was that the choice of continuous renal replacement therapy as the initial therapy is not a predictor of hospital survival or of dialysis-free hospital survival, but that it is an independent predictor of renal recovery among survivors. In conclusion, the critical care research community needs to focus on long-term outcome. A number of recent studies of acute renal failure have done just that.

The issues of long-term outcome – mortality, morbidity and quality of life – are finally receiving attention in the field of intensive care research. This attention is paramount for the critical care community. We need to look above and beyond simple intensive care unit mortality. We owe it to our patients and to their relatives to learn as much as we can about what we as clinicians can do to improve long-term outcome.

A recent study focused on an initial technique of renal replacement therapy and its effect on patient survival and kidney survival in critically ill patients with acute kidney injury [1]. The study is the third publication from the Beginning and Ending Supportive Therapy for the Kidney Investigators Writing Committee. Enrolling 1,218 patients treated with continuous renal replacement therapy (CRRT) or with intermittent renal replacement therapy (IRRT) for acute renal failure in 54 intensive care units in 23 countries, the investigators followed the patients to death or to hospital discharge. Their findings were interesting; patients treated with CRRT ($n = 1{,}006$, 82.6%) had higher illness severity scores and required vasopressor drugs and mechanical ventilation more frequently compared with those receiving IRRT ($n = 212$, 17.4%). The reasons for initiating renal replacement therapy also differed; for instance, sepsis was more common in the CRRT group. Considering the different patient categories, the authors unsurprisingly found that unadjusted hospital survival was lower in the CRRT group. Multivariable logistic regression, however, showed that the choice of renal replacement therapy was not an independent predictor of hospital survival or of dialysis-free hospital survival. Most importantly, the study showed that the choice of CRRT was a predictor of dialysis independence at hospital discharge among survivors (odds ratio = 3.3, 95% confidence interval = 1.8–6.0, $P < 0.0001$). The authors conclude that, worldwide, the choice of CRRT as the initial therapy is not a predictor of hospital survival or of dialysis-free hospital survival, but that it is an independent predictor of renal recovery among survivors. The authors speculate on the reasons for this, and on whether hypotension plays a part. The numbers of reported hypotensive episodes were indeed significantly higher in the IRRT group than in the CRRT group (27.9% and 18.8%, respectively).

Perhaps it is the poor outcome [2] – measured as mortality – of critically ill patients with acute renal failure that has prevented the research community from evaluating the determinants of long-term morbidity. The vast differences between countries and regions concerning the choice of the initial technique of renal replacement therapy could also have hampered this field of research [3-5]. Surgery and internal medicine are disciplines with several hundred years of history – is this an explanation for the fact that long-term outcome is an integrated and natural part of clinical studies in those fields?

The adolescent specialty of intensive care medicine, born in 1952 after the polio epidemic in Copenhagen [6], has been satisfied with less; namely, with the reporting of short-term mortality.

CRRT = continuous renal replacement therapy; IRRT = intermittent renal replacement therapy.

Renal recovery is an important measure of outcome for many reasons. First, chronic dialysis therapy is associated with significant impairment of health-related quality of life [7-9]. Dialysis therapy is also costly, with annual costs in the range of $51,252–69,517 [10,11]. One study showed that the estimated cost per quality-adjusted life-year saved by initiating dialysis was $128,200 [12]. Finally, the overall mortality of patients with renal failure requiring dialysis exceeds that of the general population. Recent Swedish data from the Swedish Register of Active Uremia report a 28.1% yearly mortality ratio for patients on chronic hemodialysis [13].

In collaboration with the Swedish Intensive Care Nephrology Group, we performed a study of 2,202 patients with acute renal failure [14]. These patients were treated with either CRRT or IRRT in 32 Swedish intensive care units. The duration of follow-up ranged from 3 months to 10 years.

We addressed the same issue as the Beginning and Ending Supportive Therapy investigators [1]; namely whether treatment modality used during intensive care affects renal recovery. A total of 1,100 patients died within 90 days of initial dialysis. No association was found between dialysis modality and 90-day mortality. Among the 90-day survivors, 944 had received CRRT and 158 had received IRRT. The risk of end-stage renal disease requiring hemodialysis was considerably higher in 90-day survivors treated with IRRT than in those treated with CRRT (adjusted odds ratio = 2.60, 95% confidence interval = 1.5–4.3). The trend towards a higher risk of end-stage renal disease with IRRT, however, decreased with increasing duration of follow-up. Among the 90-day survivors who did develop end-stage renal disease, the risk of death was markedly higher in patients treated with IRRT than in those treated with CRRT (hazard ratio = 2.3, 95% confidence interval = 1.3–4.1).

In conclusion, the Beginning and Ending Supportive Therapy study shows that CRRT and IRRT are used for quite different patient categories, where sicker and more hemodynamically unstable patients more often than not are treated with CRRT. Furthermore, both that study and the national study by the Swedish Intensive Care Nephrology Group investigators point to the fact that CRRT is associated with a bigger chance of renal recovery.

The findings of these two large studies (1,218 and 2,202 patients, respectively) are in keeping with previous clinical evidence. In a randomized controlled trial by Mehta and colleagues, benefits for CRRT regarding renal recovery were seen [15]. Chronic renal insufficiency at death or at hospital discharge was diagnosed in 17% of patients with initial therapy of IRRT versus only 4% of patients whose initial therapy was CRRT ($P = 0.01$). For patients receiving an adequate trial of monotherapy, the recovery of renal function was 92% for CRRT versus 59% for IRRT ($P < 0.01$). Finally, a higher percentage of subjects crossing over from IRRT to CRRT recovered their renal function compared with the patients crossing over in the opposite direction (45% versus 7%, respectively; $P < 0.01$) [15]. As higher costs associated with CRRT have been used in the debate regarding the choice of modality, the downstream costs of end-stage renal disease requiring chronic hemodialysis may have to be considered in future discussions. Naturally, we do look forward to long-term studies of renal outcome on patients treated with sustained low efficiency (daily) dialysis.

As members of the intensive care research community, we need to strive towards gathering more data concerning long-term outcome. The studies mentioned above are welcome additions to critical care epidemiology in general, and to the field of acute kidney injury in particular.

Competing interests

The authors declare that they have no competing interests.

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