

# ADVANTAGES OF INTEGRAL MANAGEMENT OF RENAL REPLACEMENT THERAPY IN ACUTE KIDNEY INJURY IN THE INTENSIVE CARE UNITS

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## Background and Aims

Renal replacement therapy (RRT), during the initial hours/days of hospitalization, of Acute Kidney Injury (AKI) patients setting in the Intensive Care Units (ICU) is conditioned by several factors. Adverse haemodynamics favours the use of continuous renal replacement therapies (CRRT). After patients stabilization, any type of RRT, either conventional haemodialysis (HD) or CRRT could be applied. However, the techniques choice depends more on: 1) the facilities available to perform HD in the ICU; 2) the medical culture in each hospital and 3) the relationship between intensivists and nephrologists at each institution. When the care of AKI patients is managed exclusively by intensivists, CRRT is the usual procedure. When Nephrology Department is integrated in the caring team, CRRT and/or HD are used according to patient clinical condition. As the use of these techniques bears a high cost, we have tried to evaluate if the co-operating model performed in our hospital, where intensivists and nephrologists are involved together in the care of the ICU patients having an AKI that needs RRT, was efficient

## Methods

To provide the RRT required for AKI patients admitted to the 6 ICUs (50 beds) of our hospital (700 beds), the Nephrology Department has 3 haemodialysis machines (AKAL-200; Baxter), 4 monitors for CRRT (Prismaflex. Baxter) and 2 portable water-treatment systems. The dose and type of RRT is arranged in collaboration with the intensivists.

HD was usually performed during 4-6 hours, using a dialyser of 1.4 m<sup>2</sup> (Polyflux, Baxter), a blood flow around 350ml/min and 500 ml/min of dialysate flow. Dialysate was buffered with sodium bicarbonate. Haemofilters of 1.5 m<sup>2</sup> (AN69, Baxter) were used for the CRRT. Dialysis and replacement fluids had bicarbonate as buffer. Blood flow ≈ 350ml/min. In both techniques sodium heparin was the anticoagulant of choice. Sodium citrate was not used.

A CRRT session is defined as an started prescribed treatment with the aim of being maintained for at least 24 hours using the adequate monitors and membranes. Even if more than one filter is used, an interruption of the therapy during less than 2 hours, due to blood circuit coagulation, or transfer of the patient for another diagnostic or therapeutic procedure, was considered as a single session.

Conventional HD or extended dialysis are performed by the nurses team of the department of Nephrology. CRRT treatments involve a strong collaboration between the Nephrology and the Intensive Care Units nurses. The nephrology nurses connect and disconnect the patients in each session, and periodically supervise how it is running. The intensive care nurses manage and control at least every hour how the treatment is ongoing and detect possible incidences.

We analysed in our database from 2006 to 2013 the following parameters: number of patients with AKI-needing RRT in the ICUs and the number of HD and CRRT performed in these setting. The CRRT data show the number of filters used, their half-life and the number of hours on CRRT of patients treated during the 8 years of the study (70,461h). According with our standards we estimated in 3 litres per hour the volume of dialysis and/or substitution fluids used in these patients. We do not consider either amortization of the haemodialysis and continuous renal replacement machines (similar prices), amortization of portable water-treatment systems or staff costs. We apply prevailing prices at 31/12/2013.

## Results

- During the 8 analysed years, 2,412 conventional HD sessions and 1,776 CRRT were done among the patients with AKI admitted in the 6 intensive care units of our hospital.
- Costs per session were 40 € for HD and 520 € for CRRT.
- Using the actual model of management of the RRT, our institution spent 96.480,00 € on conventional hemodialysis, and 923.520,00 € on CRRT.
- In other scenario, where conventional HD would not have been undertaken, at least 2,000 additional sessions of CRRT would have been necessities.
- With the previous estimative approach (only 2,000 additional CRRT sessions and only one day of length per session) an increase of the costs by 1.040.000,00 € would have had place. This means that our co-operative Nephrology/ICU approach to the management of AKI in the ICU during these 8 years has represented a saving for our institution of 943.520,00 € or 118.000,00 € per year. (Table)

	Actual or Cooperative (Nephrologists and Intensivists)		Unilateral or Alternative (Only intensivists)	
	HD	CRRT	HD	CRRT
Number of sessions	2,412	1,776	---	3,776
Costs per session (€)	40	520	---	520
Costs (€)	96,480	923,520	---	1,963,520
Global costs (€)	1,020,000		1,963,520	
Additional Costs (€)	0		1,040,000	
Saving (€)	943,520		---	

## CONCLUSIONS

The integrate use of the several techniques of RRT and its cooperative management involving Nephrology and Intensive Care Medicine departments for treating ICU-AKI patients was efficient and allowed a considerable saving.

