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Sustained low efficiency dialysis as standard renal replacement therapy in an interdisciplinary intensive care unit – A five year cost-benefit analysis[☆]

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ABSTRACT

Background: Sustained low efficiency dialysis (SLED) as primary renal replacement therapy (RRT) in acute kidney injury (AKI) is not widely used, despite substantial economical advantages. We evaluated costs and outcome in a 5 year retrospective study on our ICU.

Methods: From 2006 to 2010 we selected all patients with the ICD-10 codes N17 and N18 who were treated with SLED on our ICU. Patients with a stay <2 days, an extra-renal indication for dialysis or chronic dialysis were excluded. Variables: number of SLEDs, duration of ICU and hospital stay, ICU and hospital mortality, SAPS II, TISS 28, blood urea and creatinine, C-reactive protein, mechanical ventilation, diagnoses. Long-term outcome was evaluated by sending all discharged patients a questionnaire.

Results: Between 2006 and 2010, 3247 SLED-treatments in 421 patients (mean SAPS II: 41 points without GCS) were performed. ICU and hospital mortality in the patients treated only with SLED (n=392) was 34% and 45%, respectively. 71% of all surviving patients had good quality of life and 12% of all discharged patients still needed dialysis. Total costs for SLED were 526.819€ and total proceeds were 734.996€. Assuming also 3247 “CVVHDF-days” for cost comparisons we calculated costs of 722.750€ with proceeds of 690.864€ for CVVHDF. **Conclusions:** In critically ill patients with AKI SLED is an effective RRT, with short- and long-term outcome being comparable to outcome data with CVVHDF. Based on our cost-proceeds analysis SLED seems to be the preferable renal replacement therapy.

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Diálisis sostenida de baja eficiencia en una unidad de cuidados intensivos interdisciplinarios: un análisis costo-beneficio a 5 años

R E S U M E N

Palabras Clave:

Lesión renal aguda
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Conocimientos: La diálisis sostenida de baja eficiencia (*sustained low efficiency dialysis [SLED]*) como terapia primaria de reemplazo renal en la lesión renal aguda no está muy extendida, a pesar de sustanciales ventajas económicas. Nosotros evaluamos los costos y los resultados en un estudio retrospectivo de 5 años en nuestra unidad de cuidados intensivos (UCI).

Métodos: Desde 2006 hasta 2010 seleccionamos todos los pacientes con los códigos ICD-10 N17 y N18 que fueron tratados con SLED en nuestra UCI. Fueron excluidos los pacientes con una estancia de menos de 2 días, una indicación extrarrenal para diálisis o la diálisis crónica. Las variables fueron: el número de SLED, la duración en la UCI y la estancia hospitalaria, la mortalidad hospitalaria y en la UCI, SAPS II, TISS 28, la urea y la creatinina séricas, la proteína C reactiva, la ventilación mecánica y los diagnósticos. El resultado a largo plazo se evaluó mediante el envío de un cuestionario a todos los pacientes dados de alta.

Resultados: Entre 2006 y 2010 se llevaron a cabo 3.247 tratamientos de SLED en 421 pacientes (media de SAPS II: 41 puntos sin GCS). La mortalidad en la UCI y el hospital de los pacientes tratados solo con SLED (n = 392) fue del 34 y del 45%, respectivamente. El 71% de todos los pacientes que sobrevivieron tenían buena calidad de vida y el 12% de todos los pacientes dados de alta aún necesitaban diálisis. Los costos totales de SLED fueron de 526.819 D, y el producto total, de 734.996 D. Si se considera 3.247 «días de hemodiafiltración venovenosa continua [HDFVVC]» para las comparaciones de costos, se calcularon los costos en 722.750 D con el producto de 690.864 D para HDFVVC.

Conclusiones: En los pacientes críticamente enfermos con lesión renal aguda la SLED es una eficaz terapia de reemplazo renal con resultados a corto y largo plazo que son comparables a los datos de los resultados de HDFVVC. En base a nuestro análisis de costo-beneficios, SLED parece ser la terapia preferible de reemplazo renal.

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Introduction

With an incidence of more than 35% in the critical ill patient AKI is the most frequent organ complication of a basic illness.^{1,2} AKI is an independent risk factor for mortality within the hospital^{3,4} and may be a precursor of the multiple organ system failure MODS.⁵

Around 5–6% of all patients with an AKI in the ICU need a renal replacement therapy.^{6,7} Continuous renal replacement therapy (continuous veno-venous hemofiltration or hemodiafiltration CVVH(DF)) is still believed to provide better hemodynamic stability in case of a MODS and more physiological serum levels for urea, creatinine and potassium over the time. On the other hand intermittent renal replacement therapies (hemodialysis HD, sustained low efficiency dialysis SLED) need less intense anticoagulation and provide more opportunities for the patient's mobilization and other interventions.

Evidence-based guidelines concerning timing, modality and termination of renal replacement therapy are currently not available. Two randomized controlled studies

comparing continuous (CVVHDF) with discontinuous (SLED, hemodialysis) techniques did not find any advantage or disadvantage of either technique even in septic ICU patients.^{8,9} In addition more intense treatment modalities did not translate in better patient outcome regardless whether a discontinuous (3 times vs. 6 times per week⁹) or a continuous (25 ml/kg bw vs. 40 ml/kg bw effluent¹⁰ and 20 ml/kg bw vs. 35 ml/kg bw effluent⁹) replacement therapy was used.

However, one striking advantage of all intermittent therapies is the fact that the costs per treatment are substantially lower compared to continuous therapies.^{11–13} We provide SLED as standard renal replacement therapy in our unit since fourth quarter of 2006. After 5 years of using SLED the present study evaluates three main questions:

- (1) Are the outcomes (ICU and hospital mortality) of our patients treated with SLED comparable to the published data?
- (2) How are the long-term survival, quality of life and adherence to dialysis?
- (3) How is the cost-proceeds ratio over the past 5 years?

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