

读书报告

Critical Care 11-12

罗程

- ❖ **Arterial hyperoxia and mortality in critically ill patients: a systematic review and meta-analysis** Hyperoxia may be associated with increased mortality in patients with stroke, traumatic brain injury and those resuscitated from cardiac arrest. However, these results are limited by the high heterogeneity of the included studies.
- ❖ **High flow nasal cannula oxygen versus non-invasive ventilation in patients with acute hypoxaemic respiratory failure undergoing flexible bronchoscopy - a prospective randomised trial** The application of NIV was superior to HFNC with regard to oxygenation before, during and after bronchoscopy in patients with moderate to severe hypoxaemia. In patients with stable oxygenation under HFNC, subsequent bronchoscopy was well tolerated.
- ❖ **The efficacy and safety of plasma exchange in patients with sepsis and septic shock: a systematic review and meta-analysis** Insufficient evidence exists to recommend plasma exchange as an adjunctive therapy for patients with sepsis or septic shock. Rigorous randomized controlled trials evaluating clinically relevant patient-centered outcomes are required to evaluate the impact of plasma exchange in this condition.

- ❖ **Fibroblast growth factor 23 in acute myocardial infarction complicated by cardiogenic shock: a biomarker substudy of the intra-aortic balloon pump in cardiogenic shock II (IABP-SHOCK II) trial** In CS, high levels of FGF-23 are independently related to a poor clinical outcome. However, this prognostic association appears only to apply in patients with impaired renal function.
- ❖ **The arterial blood pressure associated with terminal cardiovascular collapse in critically ill patients: a retrospective cohort study** The arterial blood pressure associated with terminal cardiovascular collapse in critically ill patients was very low and varied with individual co-morbid conditions (for example congestive heart failure, left main stem stenosis, severe valvular aortic stenosis, acute right heart failure), drug exposition (for example sedatives or opioids) and the type of acute illness (for example sepsis).

- ❖ Evaluation of urinary tissue inhibitor of metalloproteinase-2 in acute kidney injury: a prospective observational study
- ❖ Percutaneous and surgical tracheostomy in critically ill adult patients: a meta-analysis In critically ill adult patients, PT techniques can be performed faster and reduce stoma inflammation and infection but are associated with increased technical difficulties when compared to ST.
- ❖ Comparison of the effects of albumin and crystalloid on mortality in adult patients with severe sepsis and septic shock: a meta-analysis of randomized clinical trials
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- ❖ Effect of a fever control protocol-based strategy on ventilator-associated pneumonia in severely brain-injured patients

- ❖ **Incidence, risk factors and outcomes of new-onset atrial fibrillation in patients with sepsis: a systematic review**
- ❖ **Early high protein intake is associated with low mortality and energy overfeeding with high mortality in non-septic mechanically ventilated critically ill patients**
- ❖ **Hyponatremia influences the outcome of patients with acute-on-chronic liver failure: an analysis of the CANONIC study**
- ❖ **Mechanism of action of tranexamic acid in bleeding trauma patients: an exploratory analysis of data from the CRASH-2 trial**
- ❖ **Serum miR-122 correlates with short-term mortality in sepsis patients**
- ❖ **Association between vitamin D deficiency and mortality in critically ill adult patients: a meta-analysis of cohort studies**

- ❖ **Methylglyoxal 甲基乙二醛 as a new biomarker in patients with septic shock: an observational clinical study**
- ❖ **The combined effects of extracorporeal membrane oxygenation and renal replacement therapy on meropenem pharmacokinetics: a matched cohort study**
- ❖ **Adenosine, lidocaine and Mg²⁺ improves cardiac and pulmonary function, induces reversible hypotension and exerts anti-inflammatory effects in an endotoxemic porcine model**
- ❖ **Assessment of respiratory system compliance with electrical impedance tomography using a positive end-expiratory pressure wave maneuver during pressure support ventilation: a pilot clinical study**
- ❖ **Plasma glutamine concentration after intensive care unit discharge: an observational study**

- ❖ Assessment of brain midline shift using sonography in neurosurgical ICU patients
- ❖ Combination of extracorporeal membrane oxygenation and continuous renal replacement therapy in critically ill patients: a systematic review
- ❖ Pathological changes in a patient with acute respiratory distress syndrome and H7N9 influenza virus infection
- ❖ Current practices and barriers impairing physicians' and nurses' adherence to analgo-sedation recommendations in the intensive care unit – a national survey
- ❖ Decreasing the time to achieve therapeutic vancomycin concentrations in critically ill patients: developing and testing of a dosing nomogram
- ❖ Jugular vein distensibility predicts fluid responsiveness in septic patients
- ❖ The protective effects of a phosphodiesterase 5 inhibitor, sildenafil, on postresuscitation cardiac dysfunction of cardiac arrest: metabolic evidence from microdialysis

- ❖ Expert consensus and recommendations on safety criteria for active mobilization of mechanically ventilated critically ill adults
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- ❖ The impact of hydroxyethyl starches in cardiac surgery - a meta-analysis
- ❖ Understanding skeletal muscle wasting in critically ill patients
- ❖ Validity of pediatric index of mortality 2 (PIM2) score in pediatric acute liver failure
- ❖ Contrast-enhanced ultrasonography to evaluate changes in renal cortical microcirculation induced by noradrenaline: a pilot study
- ❖ Erratum to: Do heart and respiratory rate variability improve prediction of extubation outcomes in critically ill patients?

- ❖ A practical approach to goal-directed echocardiography in the critical care setting
- ❖ Intravenous immunoglobulin for severe sepsis and septic shock: clinical effectiveness, cost-effectiveness and value of a further randomised controlled trial
- ❖ Accuracy of invasive arterial pressure monitoring in cardiovascular patients: an observational study
- ❖ Decision Support Tool for Differential Diagnosis of Acute Respiratory Distress Syndrome (ARDS) vs Cardiogenic Pulmonary Edema (CPE): a Prospective Validation and Meta-Analysis
- ❖ Determining the mechanisms underlying augmented renal drug clearance in the critically ill: use of exogenous marker compounds
- ❖ Levosimendan attenuates multiple organ injury and improves survival in peritonitis-induced septic shock: studies in a rat model
- ❖ Does pulse pressure variation predict fluid responsiveness in critically ill patients? A systematic review and meta-analysis
- ❖ Sleep continuity: a new metric to quantify disrupted hypnograms in non-sedated intensive care unit patients

- ❖ Sedation assessment in a mobile intensive care unit: a prospective pilot-study on the relation of clinical sedation scales and the bispectral index
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- ❖ Effects of selective β 1-adrenoceptor blockade on cardiovascular and renal function and circulating cytokines in ovine hyperdynamic sepsis
- ❖ Multi-drug resistance, inappropriate initial antibiotic therapy and mortality in Gram-negative severe sepsis and septic shock: a retrospective cohort study
- ❖ Predictive models for kidney disease: improving global outcomes (KDIGO) defined acute kidney injury in UK cardiac surgery
- ❖ Chloride-liberal fluids are associated with acute kidney injury after liver transplantation
- ❖ Differential expression of the nuclear-encoded mitochondrial transcriptome in pediatric septic shock
- ❖ Dynamic gene expressions of peripheral blood mononuclear cells in patients with acute exacerbation of chronic obstructive pulmonary disease: a preliminary study

- ❖ **The clinical utility window for acute kidney injury biomarkers in the critically ill**
- ❖ **Effects of intra-abdominal sepsis on atherosclerosis in mice**
- ❖ **Estimated cerebral oxyhemoglobin as a useful indicator of neuroprotection in patients with post-cardiac arrest syndrome: a prospective, multicenter observational study**
- ❖ **Fluid balance, intradialytic hypotension, and outcomes in critically ill patients undergoing renal replacement therapy: a cohort study**
- ❖ **Physician-related barriers to communication and patient- and family-centred decision-making towards the end of life in intensive care: a systematic review**

Combination of extracorporeal membrane oxygenation and continuous renal replacement therapy in critically ill patients: a systematic review

introduction

Extracorporeal membrane oxygenation (ECMO) is used in critically ill patients presenting acute cardiac and/or pulmonary dysfunctions, who are at high risk of developing acute kidney injury and fluid overload. Continuous renal replacement therapy (CRRT) is commonly used in intensive care units (ICU) to provide renal replacement and fluid management. We conducted a review to assess the feasibility, efficacy and safety of the combination of ECMO and CRRT and to illustrate the indications and methodology of providing renal replacement therapy during the ECMO procedure.

Method

We searched for all published reports of a randomized controlled trial (RCT), quasi-RCT, or other comparative study design, conducted in patients undergoing ECMO plus CRRT. Two reviewers independently selected potential studies and extracted data. We used the modified Jadad scale and the Newcastle-Ottawa for quality assessment of RCTs and non-RCTs, respectively. Statistical analyses were performed using RevMan 5.2.

Results

We identified 19 studies meeting the eligibility criteria (seven cohort, six case control, one historically controlled trial and five studies of technical aspects). There are three major methods for performing CRRT during ECMO: “independent CRRT access”, “introduction of a hemofiltration filter into the ECMO circuit (in-line hemofilter)” and “introduction of a CRRT device into the ECMO circuit”. We conducted a review with limited data synthesis rather than a formal meta-analysis because there could be greater heterogeneity in a systematic review of non-randomized studies than that of randomized trials. For ECMO survivors receiving CRRT, overall fluid balance was less than that in non-CRRT survivors. There was a higher mortality and a longer ECMO duration when CRRT was added, which may reflect a relatively higher severity of illness in patients who received ECMO plus CRRT.

Conclusion

The combination of ECMO and CRRT in a variety of methods appears to be a safe and effective technique that improves fluid balance and electrolyte disturbances. Prospective studies would be beneficial in determining the potential of this technique to improve the outcome in critically ill patients.

- ❖ **Multi-drug resistance, inappropriate initial antibiotic therapy and mortality in Gram-negative severe sepsis and septic shock: a retrospective cohort study**
- ❖ **Introduction** The impact of *in vitro* resistance on initially appropriate antibiotic therapy (IAAT) remains unclear. We elucidated the relationship between non-IAAT and mortality, and between IAAT and multi-drug resistance (MDR) in sepsis due to Gram-negative bacteremia (GNS).
- ❖ **Methods** We conducted a single-center retrospective cohort study of adult intensive care unit patients with bacteremia and severe sepsis/septic shock caused by a gram-negative (GN) organism. We identified the following MDR pathogens: MDR *P. aeruginosa*, extended spectrum beta-lactamase and carbapenemase-producing organisms. IAAT was defined as exposure within 24 hours of infection onset to antibiotics active against identified pathogens based on *in vitro* susceptibility testing. We derived logistic regression models to examine a) predictors of hospital mortality and b) impact of MDR on non-IAAT. Proportions are presented for categorical variables, and median values with interquartile ranges (IQR) for continuous.
- ❖ **Results** Out of 1,064 patients with GNS, 351 (29.2%) did not survive hospitalization. Non-survivors were older (66.5 (55, 73.5) versus 63 (53, 72) years, $P = 0.036$), sicker (Acute Physiology and Chronic Health Evaluation II (19 (15, 25) versus 16 (12, 19), $P < 0.001$), and more likely to be on pressors (odds ratio (OR) 2.79, 95% confidence interval (CI) 2.12 to 3.68), mechanically ventilated (OR 3.06, 95% CI 2.29 to 4.10) have MDR (10.0% versus 4.0%, $P < 0.001$) and receive non-IAAT (43.4% versus 14.6%, $P < 0.001$). In a logistic regression model, non-IAAT was an independent predictor of hospital mortality (adjusted OR 3.87, 95% CI 2.77 to 5.41). In a separate model, MDR was strongly associated with the receipt of non-IAAT (adjusted OR 13.05, 95% CI 7.00 to 24.31).
- ❖ **Conclusions** MDR, an important determinant of non-IAAT, is associated with a three-fold increase in the risk of hospital mortality. Given the paucity of therapies to cover GN MDRs, prevention and development of new agents are critical.

❖ Does pulse pressure variation predict fluid responsiveness in critically ill patients? A systematic review and meta-analysis

❖ **Introduction**

❖ Fluid resuscitation is crucial in managing hemodynamically unstable patients. The last decade witnessed the use of pulse pressure variation (PPV) to predict fluid responsiveness. However, as far as we know, no systematic review and meta-analysis has been carried out to evaluate the value of PPV in predicting fluid responsiveness specifically upon patients admitted into intensive care units.

❖ **Methods**

❖ We searched MEDLINE and EMBASE and included clinical trials that evaluated the association between PPV and fluid responsiveness after fluid challenge in mechanically ventilated patients in intensive care units. Data were synthesized using an exact binomial rendition of the bivariate mixed-effects regression model modified for synthesis of diagnostic test data.

❖ **Result**

❖ Twenty-two studies with 807 mechanically ventilated patients with tidal volume more than 8 ml/kg and without spontaneous breathing and cardiac arrhythmia were included, and 465 were responders (58%). The pooled sensitivity was 0.88 (95% confidence interval (CI) 0.81 to 0.92) and pooled specificity was 0.89 (95% CI 0.84 to 0.92). A summary receiver operating characteristic curve yielded an area under the curve of 0.94 (95% CI 0.91 to 0.95). A significant threshold effect was identified.

❖ **Conclusions**

❖ PPV predicts fluid responsiveness accurately in mechanically ventilated patients with relative large tidal volume and without spontaneous breathing and cardiac arrhythmia.

- ❖ Fluid balance, intradialytic hypotension, and outcomes in critically ill patients undergoing renal replacement therapy: a cohort study
- ❖ **Introduction**
- ❖ In this cohort study, we explored the relationship between fluid balance, intradialytic hypotension and outcomes in critically ill patients with acute kidney injury (AKI) who received renal replacement therapy (RRT).
- ❖ **Methods**
- ❖ We analysed prospectively collected registry data on patients older than 16 years who received RRT for at least two days in an intensive care unit at two university-affiliated hospitals. We used multivariable logistic regression to determine the relationship between mean daily fluid balance and intradialytic hypotension, both over seven days following RRT initiation, and the outcomes of hospital mortality and RRT dependence in survivors.
- ❖ **Results**
- ❖ In total, 492 patients were included (299 male (60.8%), mean (standard deviation (SD)) age 62.9 (16.3) years); 251 (51.0%) died in hospital. Independent risk factors for mortality were mean daily fluid balance (odds ratio (OR) 1.36 per 1000 mL positive (95% confidence interval (CI) 1.18 to 1.57), intradialytic hypotension (OR 1.14 per 10% increase in days with intradialytic hypotension (95% CI 1.06 to 1.23)), age (OR 1.15 per five-year increase (95% CI 1.07 to 1.25)), maximum sequential organ failure assessment score on days 1 to 7 (OR 1.21 (95% CI 1.13 to 1.29)), and Charlson comorbidity index (OR 1.28 (95% CI 1.14 to 1.44)); higher baseline creatinine (OR 0.98 per 10 μ mol/L (95% CI 0.97 to 0.996)) was associated with lower risk of death. Of 241 hospital survivors, 61 (25.3%) were RRT dependent at discharge. The only independent risk factor for RRT dependence was pre-existing heart failure (OR 3.13 (95% CI 1.46 to 6.74)). Neither mean daily fluid balance nor intradialytic hypotension was associated with RRT dependence in survivors. Associations between these exposures and mortality were similar in sensitivity analyses accounting for immortal time bias and dichotomising mean daily fluid balance as positive or negative. In the subgroup of patients with data on pre-RRT fluid balance, fluid overload at RRT initiation did not modify the association of mean daily fluid balance with mortality.
- ❖ **Conclusions**
- ❖ In this cohort of patients with AKI requiring RRT, a more positive mean daily fluid balance and intradialytic hypotension were associated with hospital mortality but not with RRT dependence at hospital discharge in survivors.

Assessment of brain midline shift using sonography in neurosurgical ICU patients

Introduction

Brain midline shift (MLS) is a life-threatening condition that requires urgent diagnosis and treatment. We aimed to validate bedside assessment of MLS with Transcranial Sonography (TCS) in neurosurgical ICU patients by comparing it to CT.

Methods

In this prospective single centre study, patients who underwent a head CT were included and a concomitant TCS performed. TCS MLS was determined by measuring the difference between the distance from skull to the third ventricle on both sides, using a 2 to 4 MHz probe through the temporal window. CT MLS was measured as the difference between the ideal midline and the septum pellucidum. A significant MLS was defined on head CT as >0.5 cm.

Results

A total of 52 neurosurgical ICU patients were included. The MLS (mean \pm SD) was 0.32 ± 0.36 cm using TCS and 0.47 ± 0.67 cm using CT. The Pearson's correlation coefficient (r^2) between TCS and CT scan was 0.65 ($P < 0.001$). The bias was 0.09 cm and the limits of agreements were 1.10 and -0.92 cm. The area under the ROC curve for detecting a significant MLS with TCS was 0.86 (95% CI = 0.74 to 0.94), and, using 0.35 cm as a cut-off, the sensitivity was 84.2%, the specificity 84.8% and the positive likelihood ratio = 5.56.

Conclusions

This study suggests that TCS could detect MLS with reasonable accuracy in neurosurgical ICU patients and that it could serve as a bedside tool to facilitate early diagnosis and treatment for patients with a significant intracranial mass effect.

Thank you for your attention

— Luo Cheng