Intensive Care Medicine Experimental (2024) 12:87
https://doi.org/10.1186/s40635-024-00658-z

Intensive Care Medicine Experimental

MEETING ABSTRACTS

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ESICM LIVES 2024

Barcelona, Spain. 5–9 October 2024

Best abstracts

000200

Protective mechanisms of CPAP on lungs and diaphragm in experimental Patient Self-Inflicted Lung Injury

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Intensive Care Medicine Experimental 2024, **12(suppl 1):** 000200

Introduction: Strong respiratory effort is recognized as a potential "second hit" in acute lung injury (ALI), introducing the concept of "patient self-inflicted lung injury" (P-SILI). We have previously reported that continuous positive airway pressure (CPAP) attenuates lung and diaphragm injury in P-SILI model.
Objectives: We aimed to investigate the effects of CPAP on respiratory distress symptoms, regional lung strain, and diaphragmatic contraction kinetics, in a preclinical ALI model.
Methods: Lung injury was induced in Sprague Dawley rats by surfactant depletion (saline lavage), followed by 3 h of unsupported or supported spontaneous breathing (Unassisted- and CPAP-groups). Respiratory distress symptoms, gas exchange, diaphragmatic ultrasound, micro-CT scans, and morphometric analysis of lungs and diaphragms were assessed.
Results: Compared with Unassisted-group, CPAP-group had: (1) Lower respiratory rate, nasal flaring, sternocleidomastoid and abdominal muscles use, minute ventilation (VE) and higher SpO2 at the end of the study (all $p < 0.05$). (2) A trend towards less volumetric strain progression in basal regions of the lungs. (3) A trend towards longer expiratory time and lower diaphragm contraction velocity. (4) Higher morphometric lung aeration ($p < 0.05$). (5) Higher morphometric diaphragm muscle area, and lower interstitial area ($p < 0.05$).
Conclusions: Unassisted spontaneous breathing induced lung and diaphragm structural damage, consistent with P-SILI and load-induced diaphragm injury models. CPAP reduced lung and diaphragmatic injury and improved respiratory distress symptoms and oxygenation. The reduction in respiratory distress symptoms and VE, the decrease in strain progression in juxta-diaphragmatic regions, and better diaphragm contraction kinetics, suggest that CPAP effectively reduced the respiratory drive.

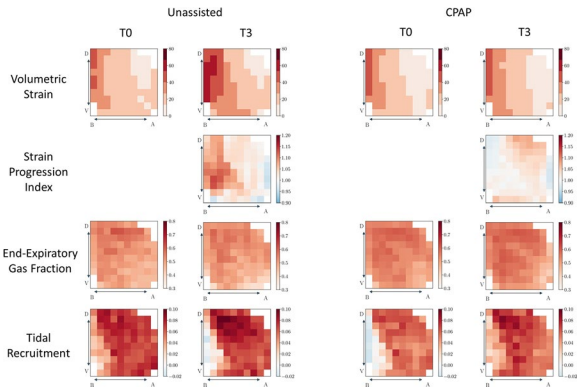

Fig. 1 (abstract 000200) Regions-of-interest (ROI) array heat maps in the apical–basal (A-B) and ventral–dorsal (V-D) directions at the beginning (T0) and the ending (T3) of the study. A) Regional volumetric strain. B) Strain progression index. C) Regional end-expiratory gas fraction. D) Regional tidal recruitment

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3. Fondecyt 1220322
4. FONDEQUIP EQM150010

1. Creating uncertainty-aware multivariate trajectories for irregularly sampled data combining neural networks and statistical models
2. Using graph networks and longitudinal clustering to identify patient clusters while considering heterogeneity of treatment effects.
3. Validating with external datasets and prospective experimental biomarkers for biological validation

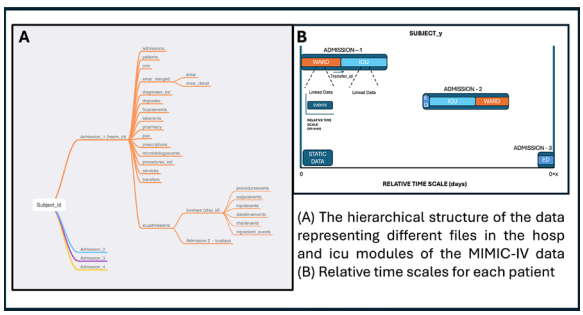

Fig. 1 (abstract 000751) (A) LLM-based pair programming was used to create a separate JSON files for each patient which retained the missingness and data types for each field while arranging the data into a hierarchical structure using common anchor fields. Each end field is a collapsed representation. (B) The bound time space is created for each patient by plotting date and time stamps on a relative time scale. This allows for temporal harmonisation and comparison between different patient trajectories**Reference(s)**

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Topic: Information systems and Data Science

000752

Exploring combined physical and nutritional rehabilitation across the critical illness continuum: a systematic review and narrative synthesis

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Intensive Care Medicine Experimental 2024, **12(suppl 1):**000752

Introduction: Each day spent in the ICU contributes to decreased physical function and reduced quality of life. This is secondary to the physical, psychological, and cognitive impairments that survivors face following an extended stay in the ICU. In other diverse populations, nutritional and physical interventions are combined to promote muscle gain and improve physical function. However, this concept has only been explored in the context of critical illness in the last 10 years. Thus, a systematic review was performed to explore this concept and provide recommendations for future research and practice.
Objectives: This review aims to explore the effect of combined physical and nutritional interventions, on physical function and health-related quality of life, across the critical illness continuum. A narrative synthesis of the eligible studies will provide the basis for future recommendations.
Methods: A systematic review was conducted across 5 databases. Inclusion criteria were RCTs published between 2000 and 2023, with participants aged ≥ 18 years, with an ICU stay ≥ 4 days. Interventions included any combination of physical and nutritional rehabilitation. In addition, only studies with outcomes that encompassed physical function or health-related quality of life were included. The Risk of Bias 2 (ROB2) tool was implemented to determine the risk of bias in each eligible study. Due to the wide heterogeneity in included studies, a 4-stage narrative synthesis process was conducted to formulate the recommendations from this review.
Results: A total of 9153 articles were screened although only 6 studies met the inclusion criteria. The included studies spanned the critical illness continuum, from ICU through to the community setting.
A theoretical model was developed in the initial stage of the narrative synthesis, outlining the hypothesised pathways in which a combination of physical therapy and nutrition may impact physical function and health-related quality of life. This was developed using only the included studies and informed the reasoning behind combined interventions in the context of critical illness.
The relationships within and between each study were examined using a variety of narrative techniques to form 5 recommendations for clinical practice and future trials. Specifically, the use of Electrical Muscle Stimulation in acute critical illness, the need to define 'high protein' in the context of critical illness, nutritional supplementation further along the recovery continuum, the importance of qualified healthcare professionals in the delivery of specialised interventions to complex populations, and finally considerations for a core outcome set for future research in this area.
Conclusions: There may be some physical benefits to combining physical and nutritional interventions in survivors of critical illness. However, further research is needed to identify which combinations may be the most beneficial at each stage in the continuum. Recommendations from this study aim to inform this process.

Topic: Nursing care and physiotherapy

000753

Association between serum acylcarnitine profile after ICU discharge and mid-term muscle outcomes: an observational study

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Intensive Care Medicine Experimental 2024, **12(suppl 1):**000753

Introduction: In our previous studies, we observed an altered serum acylcarnitine (AC) profile in survivors of an intensive care unit (ICU) during the 3 months after discharge. This profile was associated with markers of protein catabolism.
Objectives: The aim of this observational study was to investigate the association between serum AC profile measured at ICU discharge and muscle outcomes assessed 3 months later in survivors of a prolonged ICU stay.

Methods: Adults enrolled in our post-ICU follow-up program and who attended the consultation 3 months (M3) after discharge were included. Serum AC concentrations were assessed using liquid chromatography with tandem mass spectrometry within 7 days following ICU discharge (T0). Exclusion criteria were known primary carnitine deficiency and ongoing treatment with zidovudine, valproate, cyclosporine or cisplatin at T0. Muscle outcomes included urea/creatinine ratio, sarcopenia index, quadriceps, and handgrip strengths measured using dynamometry and frailty (i.e.: difference in Clinical Frailty Score (CFS) between M3 and the pre-ICU status).
Results: A total of 127 patients (86 men (67,7%), 63(55–70) years, SAPS II 36 (26–56)) who survived an ICU stay of 13 (8–33) days were analyzed. Free carnitine (C0) concentration was 44.4 (33–52.2) µmol/L. C0 deficiency was observed in 2/127 (1.6%). The total AC/C0 ratio (normal ≤ 0.4) was 0.37 (0.28–0.47) at T0. An AC/C0 ratio > 0.4 was observed in 55/127 (43.3%). The short-chain and long-chain ACs reached respectively 1.2 (0.9–1.7) µmol/L and 0.9 (0.6–1.2) µmol/L. At M3, the urea/creatinine ratio and the sarcopenia index were respectively 38.3 (28.3–50.3) and 0.7 (0.6–0.9). Quadriceps strength was 2.9 (2.1–3.7) N/kg and the handgrip strength was 25 (19–34) kg. CFS increased by 1 (0–1) point at M3 compared to pre-ICU level. In univariate analysis, none of the AC profile markers were associated with any of the muscle outcomes. Multivariate analyses are ongoing.
Conclusions: In patients surviving a prolonged ICU stay, there was no association between serum AC profile markers at ICU discharge and muscle outcomes at M3. The interest of AC profile as a predictive marker of post-ICU muscle outcomes, as assessed in daily practice and considered individually, is questionable. Further analysis should investigate if the AC profile could predict a composite muscle outcome, reflecting the interconnection between muscle mass, strength, and function.

Topic: Health Services Research and Outcome

000754

Association between VTE and 28-day mortality in patients of critical care medicine: secondary data mining from the large-scale clinical database MIMIC-IV

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Intensive Care Medicine Experimental 2024, **12(suppl 1):**000754

Introduction: Venous thromboembolism (VTE) is a common complication in intensive care unit (ICU) patients and can lead to poor prognosis in critically ill patients. However, the factors affecting the prognosis of ICU patients with combined VTE remain unclear, and there is a lack of models to predict prognosis based on risk factor combinations.
Objectives: This study aimed to screen for independent risk factors for 28-day mortality in critically ill VTE patients and to develop a predictive model for clinical assessment of survival.
Methods: We identified patients with VTE using the MIMIC-IV database, data were split into two groups based on death or survival within 28 days. Variables were selected for display and comparison between groups based on the significance and availability of stepwise analysis. Multivariate Cox proportional regression model predictions were constructed by R software. The performances of the models was tested and compared by AUCs of the receiver operating characteristic curves and decision curve analysis. A nomogram model was used to assess the survival prognosis of critically ill VTE patients.
Results: We included a total of 1162 critically ill VTE patients, including 1002 in the 28-day survival group and 160 in the 28-day death group. In multivariate Cox regression analysis, age (OR: 1.03, 95% CI 1.02–1.05, $P < 0.001$), partial thromboplastin time(PTT)_max (OR: 1.01, 95% CI 1.00–1.01, $P < 0.001$), sepsis (OR: 2.15, 95% CI: 1.22–3.80, $P = 0.008$), malignancy (OR: 2.10, 95% CI 1.48–2.98, $P < 0.001$), severe liver disease (OR: 2.19, 95% CI 1.26–3.81, $P = 0.005$), and respiratory failure (OR: 1.48, 95% CI 1.02–2.15, $P = 0.039$) were independent risk factors for 28-day death in critically ill VTE patients. The area under the curve (AUC) was 0.76, which was used to build the nomogram model with a C-index of 0.795, indicating that the nomogram had good differentiation. Furthermore, Decision Curve Analysis (DCA) showed that the nomogram was clinically useful and had better discriminative ability to identify critically ill VTE patients at high risk.
Conclusions: Age, sepsis, malignancy, severe liver disease, and respiratory failure were independent risk factors for 28-day death in patients with critical VTE. Among them, severe liver disease, sepsis, and malignancy ranked in the top three, respectively. We developed and validated a prognostic nomogram model to assist clinicians in assessing the survival prognosis of critically ill VTE patients.

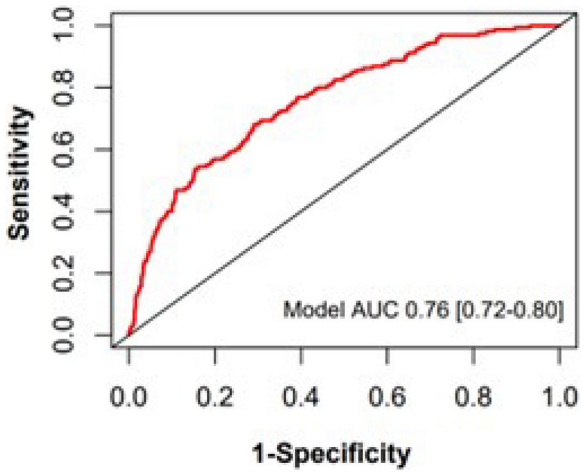

Fig. 2 (abstract 000754) ROC curve analysis of combined age, GCS, temperature, spo2, ptt, urine, sepsis, malignant cancer, severe liver disease and respiratory failure in critical VTE patients

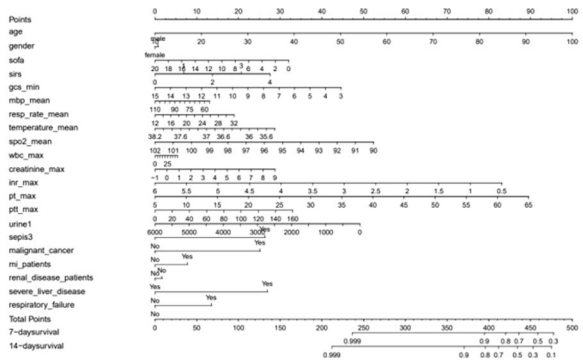

Fig. 3 (abstract 000754) Prediction model nomogram

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