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MEETING ABSTRACTS

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P001

A machine learning model for predicting 7-day stroke recurrence using imaging markers in transient ischemic attack (TIA) patients

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Critical Care 2025, **29(S1)**:P001

Introduction: Predicting early stroke recurrence after transient ischemic attack (TIA) is crucial in emergency settings, where rapid intervention for high-risk patients is essential. While the ABCD2 score is traditionally used for recurrence risk assessment, adding imaging markers may improve predictive accuracy. This study integrates perfusion, hemorrhage after reperfusion marker (HARM), diffusion-weighted imaging (DWI), and stenosis with the ABCD2 score in a machine learning model to enhance 7-day stroke recurrence predictions.
Methods: Data were collected from TIA patients who presented to the ED between 2010 and 2023. Variables analyzed included the ABCD2 score and imaging markers: perfusion, HARM, DWI, and stenosis. After evaluating the association of these variables with recurrence risk, they were integrated into the final model. A random Forest model was developed, with random oversampling applied to enhance the learning of stroke recurrence in the minority class. Model performance was evaluated using accuracy, precision, recall, and F1-score.
Results: The random Forest model combining imaging markers with the ABCD2 score achieved an accuracy of 80.7%, with a precision of 52.8% and a recall of 81.0%. In contrast, the model using only the ABCD2 score demonstrated a lower accuracy of 64.3%, with comparatively reduced precision and recall for recurrence prediction. The imaging markers were identified as significant contributors to short-term stroke recurrence predictions in ED patients with TIA, enhancing the model's predictive capability.
Conclusions: This study suggests that a machine learning model integrating the ABCD2 score with imaging markers effectively predicts early stroke recurrence in TIA patients. With an 81.0% recall, the model enables rapid identification of high-risk patients, supporting timely intervention and clinical decision-making in emergency settings. This approach may contribute to improved management and preventive strategies for high-risk patients in the ED.

P002

Exploring the link between diastolic blood viscosity and distribution of brain lesion in acute ischemic stroke

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Critical Care 2025, **29(S1)**:P002

Introduction: Blood viscosity (BV) plays a critical role in blood rheology and has been linked to microvascular perfusion, contributing to the development of cerebrovascular diseases. However, its influence on the lateralization of brain lesions has not been fully explored. This study aims to investigate the association between BV, particularly dynamic blood viscosity (DBV), and white matter hyperintensity (WMH) burden, as well as the occurrence and lateralization of brain lesions in patients with acute ischemic stroke (AIS).
Methods: We prospectively enrolled 208 patients with AIS within 7 days of symptom onset. BV was assessed using a scanning capillary tube viscometer, with DBV measured at a shear rate of 5 s^{-1}. Based on DBV values, patients were stratified into three groups according to established reference ranges. WMH volumes were quantified and normalized using automated localization and segmentation software. A multivariable logistic regression analysis was performed to assess the relationship between DBV levels and the lateralization of brain lesions in AIS patients.
Results: Lateralization of brain lesions in AIS patients was significantly associated with atrial fibrillation, elevated fasting glucose, and DBV levels. After adjusting for multiple variables, lower DBV (OR 2.036, 95% CI 1.179–3.515) was independently associated with left hemisphere lesions in AIS patients (Table). Additionally, WMH burden was

significantly correlated with low DBV in left hemisphere brain lesions. DBV demonstrated a superior area under the ROC curve (AUC) in predicting AIS lesion distribution compared to systolic BV.
Conclusions: These findings suggest that DBV may serve as a valuable blood biomarker for predicting the occurrence and lateralization of brain lesions in AIS, as well as the progression of WMH. The measurement of DBV could enhance our understanding of stroke pathophysiology and inform future therapeutic strategies.

Table (abstract P002) Logistic regression analysis for left hemisphere dominant brain lesion

Values	Odds ratio (95% CI)-univariable analysis	Odds ratio (95% CI)-multivariable analysis	*p* value
Atrial fibrillation	0.424 (0.222–0.810)	0.428 (0.219–0.836)	0.013
Fasting blood sugar	0.994 (0.975–0.998)	0.991 (0.985–0.998)	0.008
Diastolic blood viscosity			
Normal	Reference		
Low	1.859 (1.103–3.132)	2.036 (1.179–3.515)	0.011
High	0.997 (0.470–2.111)	1.258 (0.572–2.765)	0.568
Systolic blood pressure	0.998 (0.989–1.007)		0.650
Diastolic blood pressure	0.992 (0.978–1.006)		0.237

P003

Monitoring cerebral autoregulation during endovascular thrombectomy for ischemic stroke

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Critical Care 2025, **29(S1)**:P003

Introduction: Endovascular therapy (EVT) improves outcomes in acute ischemic stroke (AIS) [1]. AIS patients are vulnerable to blood pressure fluctuations due to loss of cerebral autoregulation [2]. However, the ideal blood pressure before and after revascularization is unclear [3]. Our goal was to determine if optimal blood pressure can be derived from monitoring cerebral autoregulation before revascularization during EVT and examine factors influencing optimal blood pressure for preserved autoregulation.
Methods: This prospective study included 30 AIS patients undergoing EVT under general anesthesia. Mean arterial pressure (MAP) and brain oxygenation (via near-infrared spectroscopy; regional oxygen saturation; rSO_2) were continuously monitored. MAP-induced changes in rSO_2 were analyzed. The ICM + software calculated the cerebral oxygenation-derived autoregulatory index (COx), identifying the optimal MAP for each patient (Figure). This MAP was compared to pre-procedural blood pressure and its correlation with hypoperfused brain volume (calculated from CT perfusion scans) was explored.
Results: Data from 26 patients was analyzed and in 22, COx could be calculated despite the short data collection periods (average 15 min). The optimal MAP range was 90–130 mmHg and correlated ($r = 0.68$) with pre-procedural levels. No correlation was found between hypoperfused brain volume and optimal MAP in the 9 patients included in the analysis so far ($r = -0.02$).
Conclusions: Cerebral autoregulation calculations before revascularization in AIS patients seem feasible even with short data collection times. Optimal blood pressure levels correlated with pre-procedural values, highlighting the need for precise blood pressure management during EVT. In a small subset of patients, no relationship was found between hypoperfused brain volume and optimal MAP, but analysis of the full dataset is pending.

References

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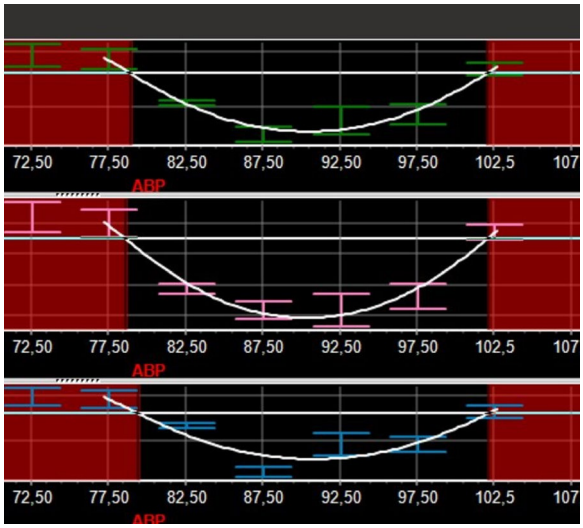

Figure (abstract P003) The parabolic curve of MAP fitted to COx in which the nadir of the curve corresponds to the optimal MAP (based on autoregulatory function) for the individual patient. Top panel (green), collapsed rSO_2 data from both hemispheres. Mid panel (pink) rSO_2 data only from left hemisphere. Bottom panel (blue) rSO_2 data only from right hemisphere

P004

$CD4^+$ $CCR5^+$ T cells increase in the cerebrospinal fluid of patients with aneurysmal subarachnoid hemorrhage

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Critical Care 2025, **29(S1)**:P004

Introduction: Neuroinflammation is involved in brain injury progression after aneurysmal subarachnoid hemorrhage (SAH), but the contribution of adaptative immune response is poorly understood. T lymphocytes $CD4^+$ ($CD4^+$ T cells) display a crucial role in orchestrating the immune response and may have toxic or neuroprotective properties after SAH. CC chemokine receptor type 5 (CCR5) is involved in the recruitment of peripheral $CD4^+$ T cells into the brain and could represent a therapeutic target. The aims of this study were 1) to identify $CD4^+$ T and $CD4^+$ $CCR5^+$ T cells in the cerebrospinal fluid (CSF) and blood of SAH patients 2) to explore the relationship between these cells and the early brain injury severity.
Methods: Adult SAH patients (n = 53) admitted to the intensive care unit were enrolled. CSF and blood samples were obtained from external ventricular drainage within 48 h (T1), at 5 days (T2), and 7–10 days (T3) after SAH. Early brain damage severity was assessed using admission clinical evaluation and CT scan. T cell subpopulations were identified according to surface markers using flow cytometric analysis. Data are presented as median and interquartile range.

Results: The percentage of $CD4^+$T cells at T1 was not different between CSF and blood samples (59% [45–68] vs 57% [40–70]). However, $CD4^+$T cells increased significantly between T1 and T3 only in the CSF (T1: 59% [45–68], T2: 73% [57–79], T3: 71% [61–76], one-way ANOVA $p<0.01$). $CD4^+CCR5^+$T cells were higher in CSF compared to blood (18% [7–25] vs 8% [1–13]) and they increased significantly between T1 and T3 only in the CSF (T1: 18% [7–25], T2: 25% [18–99], T3: 33% [24–79], one-way ANOVA $p<0.01$). The frequencies of these cells were not related to clinical and radiological parameters.
Conclusions: $CD4^+$T and $CD4^+CCR5^+$T cells enrich over time in the CSF after SAH but these changes are not related to early brain injury severity. Further studies will clarify the relationship with the occurrence of delayed cerebral ischemia.

P005

Aquaporin 4 in cerebrospinal fluid of patients with aneurysmal subarachnoid hemorrhage

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Critical Care 2025, **29(S1)**:P005

Introduction: Aneurysmal subarachnoid hemorrhage (SAH) is a critical neurological condition with high mortality and morbidity rate. The pathophysiology of SAH is complex and cerebral edema represents an important mechanism in the early brain injury progression. Aquaporin 4 (AQP4) is a transmembrane water channel and has emerged as potential edema regulator. The aims of this study were 1) to measure AQP4 in the cerebrospinal fluid (CSF) of SAH patients 2) to explore the relationship between CSF AQP4 values and early brain damage severity.
Methods: Adult SAH patients (n = 43) admitted to our neuro-intensive care unit within 24 h from bleeding have been enrolled. CSF samples were obtained from external ventricular drainage (EVD) within 48 h (T1), 5 days (T2), and 7–10 days (T3) after SAH. AQP4 measurement was performed with specific ELISA kits. Early brain damage severity was assessed using clinical (admission GCS) and radiological (modified Fisher Scale and Subarachnoid Hemorrhage Early Brain Edema Score (SEBES) on CT scan) parameters. Data are presented as median and interquartile range.
Results: CSF AQP4 concentrations were measurable in SAH patients and were higher compared to controls. An increase in AQP4 concentrations was observed over time (T1:0.47 [0.30–0.76] ng/mL; T2:0.93 [0.69–1.51] ng/mL; T3: 1.06 [0.71–2.04] ng/mL, one-way ANOVA $p<0.01$). However, AQP4 values were not significantly related to clinical and radiological parameters.
Conclusions: Our data show a pathological and significant increase of AQP4 concentrations after SAH, suggesting a potential role in the pathogenesis of cerebral edema. Further analysis, based on MR imaging, will be performed to clarify the relationship between AQP4 and the early brain injury progression and to explore the relationship with the occurrence of delayed cerebral ischemia.

P006

Validation of in-hospital mortality score in patients with spontaneous subarachnoid hemorrhage

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Critical Care 2025, **29(S1)**:P006

Introduction: Spontaneous subarachnoid hemorrhage (SAH) is a condition associated with high morbidity and mortality rates [1–2]. While different scales have been developed to predict SAH prognosis [3], a new simple In-Hospital Mortality (IHM) score was recently developed to predict death [4]. The aim of our study was to externally validate the IHM score in a cohort of patients admitted for spontaneous SAH and to find a cut-off value to predict unfavourable outcomes.
Methods: This was a monocentric retrospective cohort study conducted at the Hôpital Universitaire de Bruxelles, Brussels (Belgium) including adult (≥ 18 years) patients admitted in the ICU for spontaneous SAH from 2014 to 2023. We excluded patients who remained in the ICU less than 24 h. Demographics, data on clinical presentation, ICU complications and in-hospital mortality were collected.
Results: We enrolled 329 patients, with a mean age of 55 ± 13 years and a higher frequency of females (n = 205; 62.3%). Cerebral vasospasm (n = 140; 42.5%) and intracranial hypertension (ICHT—n = 123; 37.4%) were the most frequent complications. In-hospital mortality occurred in 30.1% of patients. A higher IHM score was significantly correlated to in-hospital death ($p<0.001$). In a multivariate logistic regression analysis, including age, comorbidities, presence of epilepsy, rebleeding, hydrocephalus, the occurrence of delayed cerebral ischemia or ICHT, IHM score was an independent predictor of in-hospital mortality (OR = 1.51; 95% CI 1.29–1.76). The IHM score had an area under the receiver operating characteristics curve of 0.83 (95% CI 0.79–0.88) to predict in-hospital mortality, with the optimal cut-off of ≥ 6 (Figure).
Conclusions: In our cohort, the IHM score significantly predicted in-hospital mortality after SAH, with the optimal cut-off value of ≥ 6.

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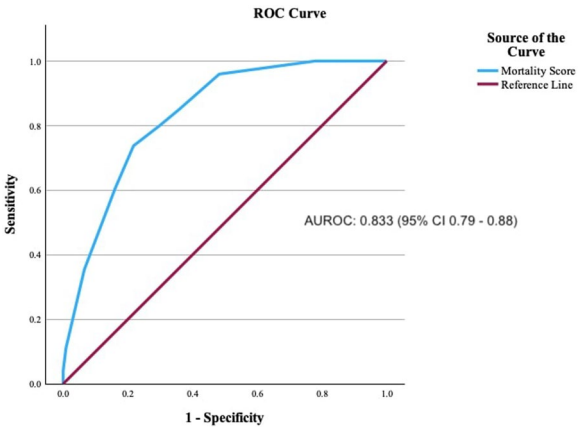

Figure (abstract P006) The area under the receiver operating characteristics curve (AUROC) for the IHM score to predict in-hospital mortality

P007

Effects of intravenous milrinone treatment on vasospasm in aneurysmatic SAH

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Critical Care 2025, **29(S1)**:P007

Introduction: Although the etiology of delayed cerebral injury (DCI) in patients with subarachnoid hemorrhage (SAH) is multifactorial, the only detectable and treatable component currently is vasospasm (VS). Intravenous milrinone could be a therapeutic option for treating VS in SAH. The objectives of this study are:
• Describe patients treated with milrinone
• Analyze whether milrinone reduces DCI incidence
• Compare SAH treated with milrinone + nimodipine vs. nimodipine alone
Methods: Observational, retrospective cohort study. Inclusion criteria: aneurysmatic SAH in a tertiary ICU (2023). Descriptive and bivariate analyses were conducted on quantitative (means/medians) and qualitative (percentages) variables. Normality was tested with the Shapiro–Wilk test.
Results: The study included 73 SAH patients (mean age 56.2 years). 65.8% were women. The majority had Hunt-Hess III/IV (79.5%) and Fisher III/IV (93.1%). Of the 73 patients, 27.4% (20) developed VS, and 28.8% (21) developed DCI. 35% of patients with VS developed DCI compared to 26.4% without VS ($p = 0.4$). Of those with VS, 55% had refractory VS and were treated with intravenous milrinone.When comparing milrinone + nimodipine to nimodipine alone, the mean age and sex distribution showed no significant differences. Hunt-Hess IV: 18.2% vs. 61.3%, and Hunt-Hess III: 45.5% vs. 21%, $p = 0.03$. Fisher IV: 90.9% vs. 79% and Fisher III: 0% vs. 14.5%, $p = 0.1$. DCI: 36.4% vs. 27.4%, $p = 0.5$. Characteristics of HAS in the milrinone group, 81.1% had VS secondary to aneurysms in the anterior territory. VS diagnosis was suspected via TCD in 72.7% of cases, with a mean velocity of 182 cm/sec, which decreased to 112.4 cm/sec post-treatment ($p = 0.00$). Angiography and perfusion confirmed VS in 90.9%. No arteriograms were required after treatment with milrinone (95% CI: 0–2).
Conclusions: 55% of patients with VS were treated with milrinone; no higher incidence of DCI was observed in milrinone-treated patients; milrinone may be useful in reducing vasospasm in SAH.

P008

Experience with IV milrinone to treat cerebral vasospasm in aneurysmal subarachnoid hemorrhage: a monocentric descriptive study

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Critical Care 2025, **29(S1)**:P008

Introduction: Cerebral vasospasm (CV) and delayed cerebral ischemia (DCI) are complications of aneurysmal subarachnoid hemorrhage (aSAH) and are associated with worse functional outcome. Despite scarcity of data, intravenous (IV) milrinone, a phosphodiesterase inhibitor, has been proposed as a treatment option for patients with moderate-to-severe CV [1]. We report our experience with the use of IV milrinone.
Methods: We conducted a retrospective observational study, including patients with aSAH admitted from 1st January to 31st December of 2023. Forty patients were enrolled in this study. We assessed (1) functional disability at-discharge (poor outcome defined as a modified Rankin Scale score higher than 2), incidence of delayed cerebral ischemia (DCI), (2) frequency of complications (hyponatremia, intracranial hypertension (ICH), hydrocephalus and cardiovascular) and (3) length of ICU stay and intrahospital mortality.
Results: IV milrinone was administered to 22 patients (after diagnosis of moderate-to-severe vasospasm on angiography). Dose range was 0.5 to 2.5 mcg/kg/h (median 1.29 mcg/kg/h). Patients had similar smoke use history compared to those without milrinone, but more prevalence of hypertension (63.3 vs 50%). Table summarizes the results. There was no significant difference in functional outcome. Patients on milrinone had a more prolonged ICU stay (18.73 vs 13.17 days), despite no differences in intrahospital mortality. Hyponatremia (33.3 vs 22.7%), hydrocephalus (45.5 vs 38.9%), DCI (31.8 vs 16.6%), ICH (0 vs 13.6%) and cardiovascular complications (0 vs 4.5%) were all more frequent on the milrinone group, but only with significant difference on ICH.
Conclusions: Patients receiving IV milrinone have more frequent complications and a longer length-of-ICU-stay, since these are the ones diagnosed with moderate-to-severe vasospasm. We did not find an increased mortality or morbidity.

Reference

1. Abulhasan YB et al. J Neurosurg. 2020;134:971-982

Table (abstract P008) Prevalence of poor outcome, intra-hospital mortality and complications observed

	No IV milrinone use (n = 18)	IV milrinone (n = 22)	*p* value
Rankin score (> 2)	9 (50%)	10 (45.5%)	0.401
Intra-hospital mortality	2 (11.1%)	2 (9.1%)	0.419
Hyponatremia	6 (33.3%)	5 (22.7%)	0.234
Hydrocephalus	7 (38.9%)	10 (45.5%)	0.343
Delayed cerebral ischemia	3 (16.7%)	7 (31.8%)	0.136
Intracranial hypertension	0 (0%)	3 (13.6%)	0.041
Cardiovascular complications	0 (0%)	1 (4.5%)	0.186

P009

Protective effects of Angong Niuhuang Pill on patients with spontaneous severe intraventricular hemorrhage

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Critical Care 2025, **29(S1)**:P009

Introduction: Spontaneous severe intraventricular hemorrhage (sIVH is an emergent stroke. Angong Niuhuang Pill (ANP) is a promising adjacent for patients with brain injury such as stroke.In this study, the clinical effects of ANP for sIVH patients were analyzed.
Methods: Sixty-eight patients with spontaneous sIVH meeting the enrolment criteria were divided 1:1 into ANP combined with EVD group (ANP-EVD group) and EVD group (control group) according to random number table method, with 34 cases in each group. The intraventricular ICP probe was placed into the anterior ventricular horn of the patient, and the ICP was monitored for 5 days. In the ANP-EVD group, ANP was given an oral dose of 1 pill a day, melted with warm water and lasted for 1 week. Both groups received the same management such as ICU monitoring, prevention and treatment of cerebral vasospasm, controlling of blood pressure, target temperature management and nutritional support. The ICP, ADL\GOS score, the amount of dehydrating agent and complications (such as epilepsy, etc.) were compared and analyzed.
Results: There were statistically significant differences ($p < 0.01$) in the following three time points (at the time of EVD, and 24 and 48 h after EVD). No serious complications occurred in the treatment group. There was no significant difference between the two groups in the ratio of patients with good prognosis ($\times 2 = 1.926$, $p > 0.05$), the retention time of drainage tube ($2 = 0.188$, $p > 0.05$), and the complete clearance time of intraventricular hematoma ($\times 2 = 1.067$, $p > 0.05$). The rate of ICP and pulmonary infection in the treatment group was significantly reduced, and the good prognosis (ADL 1–3 score) at 3 months of treatment was 80%, significantly higher than that of the control group 54%.

Conclusions: ANP combined with EVD can significantly reduce ICP and the incidence of pulmonary infection, improve the 3-month prognosis rate of patients with sIVH. ANP might be safe and effective for spontaneous sIVH without serious complications.

P010

Determinants of prolonged hospital stay in pituitary surgery

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Critical Care 2025, **29(S1)**:P010

Introduction: Hospital stay (HS) in pituitary surgery (PS) has decreased due to less invasive techniques and rapid recovery protocols, although some patients still present prolonged hospital stay (PHS) [1]. We aim to evaluate the perioperative variables associated with PHS in patients undergoing PS.
Methods: Patients undergoing PS between 2022 and 2024 in a University Hospital with Clinical Care Center of Excellence standardized by Joint Commission International (JCI-C3) were included. We conducted a historical cohort type study with an analytical component; PHS was defined as greater than 5 days. Perioperative variables were analyzed in relation to HS using descriptive statistics (frequencies and trend measures) and analytical statistics (Chi-square, Fisher and Kruskal–Wallis) according to their distribution.
Results: We analyzed 75 patients, 65.4% female, mean age 49.4 years (SD: 15.44), ASA III classification was more frequent (77.3%). 30.7% of the tumors were functioning, with hyperprolactinemia (56.5%) being the most frequent hormonal disorder. 13.3% of the population was classified as frail by the MFI5 scale. The most frequent preoperative related disorders were headache 70.7%, visual disturbance 36% and arterial hypertension 22.66%. The median duration of HS was 4 days (RI: 4–6), 21.3% presented PHS. 18.7% presented postoperative complications and these were related to PHE ($p < 0.001$). The most prevalent complication was diabetes insipidus (DI) (50%) which was related to EHP ($p < 0.001$) (Table). No association was found between sociodemographic factors (age, gender, ASA, BMI) or perioperative factors such as anemia, lesion size, bleeding and EHP.
Conclusions: DI is the most prevalent postoperative complication in patients taken to PS and is a determinant of PHS.

Reference

1. Saad M et al. J Clin Med 2022;11:5829

Table (abstract P010) Determinants of prolonged hospital stay in pituitary surgery

	In-hospital stay > 5 days (N = 16) (21.3%)	In-hospital stay < 5 days (N = 59) (78.7%)	*p* value
Postoperative complications			< 0.001
Yes	14 (18.6)	0 (0)	
No	2 (2.7)	59 (78.6)	
Diabetes insipidus			< 0.001
Yes	7 (9.3)	0 (0)	
No	9 (12)	59 (78.6)	

P011

Impact of perioperative factors on clinically relevant intraoperative bleeding in patients undergoing pituitary surgery

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Critical Care 2025, **29(S1)**: P011

Introduction: Clinically relevant intraoperative bleeding (CRIB) in pituitary surgery (PS) is a multifactorial phenomenon. Although surgical factors have been extensively studied, anesthetic and perioperative factors have been less explored [1]. This study aims to evaluate factors related to CRIB in patients undergoing PS.
Methods: A historical cohort with analytical component was performed in patients undergoing PS in a fourth level university hospital in Bogota, Colombia, located at 2600 m above sea level. CRIB was defined as bleeding greater than 500 mL, perioperative factors were analyzed in relation to this outcome. A descriptive analysis of the variables according to their distribution was carried out and parametric and non-parametric tests were applied in the analysis of the hypotheses.
Results: 75 patients were analyzed, of whom 34.6% were men and the majority (74.3%) were younger than 60 years old. 13.3% of the population was classified as frail according to the MFI5 scale (score ≥ 2). In 92% of cases, the surgical approach was transsphenoidal. 48% of patients had some degree of anemia, of which 30% had moderate or severe anemia. The median bleeding rate was 200 mL (RI: 100–400), 18.7% of the patients presented CRIS. A statistically significant association was found between CRIB and preoperative frailty ($p = 0.015$), as well with longer operative time ($p = 0.0035$). No significant differences were found in relation to lesion site ($p = 0.092$) or surgical approach ($p = 0.39$) (Table). The presence of CRIB was not associated with an increase in postoperative complications, such as acute myocardial infarction, renal failure, prolonged ICU stay or mortality.
Conclusions: Preoperative frailty and longer operative times correlate with the presence of CRIB. However, adequate management during surgery did not increase postoperative complications associated with CRIB.

Reference

1. Younus I et al. J Neurosurg 133:702–708, 2020

Table (abstract P012) Relationship between perioperative factors and clinically relevant intraoperative bleeding in patients undergoing pituitary surgery

	Intraoperative bleeding > 500 mL (N = 14) (18.7%)	Intraoperative bleeding < 500 mL (N = 61) (81.3%)	*p* value
Frailty			0.015
Frail	3 (4)	7 (9.3)	
Not Frail	11 (14.6)	54 (72.1)	
Surgical time	6.7 h (SD 2.05)	4.8 h (SD 1.41)	0.0035

P012

Connective tissue disease is associated with the risk of posterior reversible encephalopathy syndrome following lung transplantation

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Critical Care 2025, **29(S1)**: P012

Introduction: Posterior reversible encephalopathy syndrome (PRES) is a rare complication of lung transplantation with poorly understood risk factors and clinical characteristics [1]. This study aimed to examine the occurrence, risk factors, and clinical data of patients who developed PRES following lung transplantation.
Methods: A retrospective analysis was conducted on 147 patients who underwent lung transplantation between February 2013 and December 2023. The patients were diagnosed with PRES based on the clinical symptoms and radiological findings. We compared the baseline characteristics and clinical information, including primary lung diseases and immunosuppressive therapy related to lung transplantation operations, between the PRES and non-PRES groups.
Results: PRES manifested in 7.5% (n = 11) of the patients who underwent lung transplantation, with a median onset of 15 days after operation. Seizures were identified as the predominant clinical manifestation in the group diagnosed with PRES, with 81.8% (n = 9) of patients exhibiting this symptom and 18.2% (n = 2) presenting altered mental status. All patients diagnosed with PRES recovered fully. Patients with PRES were significantly more likely to have connective tissue disease-associated interstitial lung disease (45.5% vs. 18.4%, $p = 0.019$). Nonetheless, no significant variance was observed in the type of immunotherapy, such as the use of calcineurin inhibitors, blood pressure, or acute renal failure subsequent to lung transplantation.
Conclusions: PRES typically manifests shortly after lung transplantation, with seizures being the predominant initial symptom. The presence of preexisting connective tissue disease as the primary lung disease represents a significant risk factor for PRES following lung transplantation.

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P013

Rare case of viral encephalitis

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Critical Care 2025, **29(S1)**:P013

Introduction: Neuroinvasive West Nile virus infection can lead to significant morbidity, especially in the elderly and to high mortality in the presence of comorbidities. Physicians should consider WNV infection in the differential diagnosis in causes of aseptic meningitis and encephalitis.
Methods: We present two cases of neuroinvasive WNV infection in the Clinic of Intensive Therapy at the Military Medical Academy—Sofia. Clinical and epidemiological data, laboratory, microbiological, molecular methods, and imaging techniques were used. Both patients resided in Sofia, Bulgaria, and had not travelled in recent months. The first case: 60-year-old man who presented with mental status changes, fever and progression of existing Parkinson's disease. Antibodies to WNV were present in cerebrospinal fluid (CSF). His condition worsened with the development of sepsis and respiratory failure and he ended up lethally in 7 days. The second case: 72-year-old man who presented with high fever and lower dyspeptic syndrome for one week, mental status changes, with adynamia to inability to walk independently, and head, hand and tongue tremors. CSF analysis showed mild pleocytosis with proteinorachy. Antibodies to WNV were present in serum and there was a positive PCR for WNV in urine. The patient was admitted to ICU due to worsened mental and neurological status, coma and development of acute respiratory failure leading to artificial mechanical ventilation. He ended lethally after 13 days.
Results: Neuroinvasive disease occurs when the virus penetrates the blood–brain barrier and invades certain groups of neurons, particularly in the brainstem, deep nuclei, and anterior horn of the spinal cord. The clinical presentation of neuroinvasive disease varies and includes encephalitis, aseptic meningitis and polio-like syndrome of the spinal cord.
Conclusions: West Nile neuroinvasive disease (WNND) has a severe clinical course, potentially fatal outcome, and frequent neurological sequelae in survivors. The mortality rate among patients with WNND could be up to 17%.
Acknowledgements
Written consent to publish was received from the patients' families.

P014

Severe angiostrongyliasis with neuropsychiatric symptoms in vulnerable adults: early diagnosis via next-generation sequencing and successful treatment

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Critical Care 2025, **29(S1)**:P014

Introduction: Angiostrongylus cantonensis (AC) is a parasite that occasionally infects humans, typically causing eosinophilic meningitis (EM). The purpose of this study is to advance the comprehension of angiostrongyliasis for both the general public and healthcare professionals for the management of severe AC infection.
Methods: Summarizing information on the clinical features (Figure), treatment protocols, and prognosis of two adult patients with severe angiostrongyliasis who were admitted to ICU of the Second HMU.
Results: Both patients initially presented with mental and behavioral disturbances. The first patient (P1), a homeless individual, displayed elevated eosinophil (EOS) counts and classical symptoms of meningitis, such as neck stiffness. Due to the endemic presence of AC on Hainan Island, P1 was promptly diagnosed with eosinophilic meningitis (EM). The diagnosis was confirmed through next-generation sequencing (NGS) of cerebrospinal fluid (CSF), leading to successful treatment and rapid stabilization. The second patient (P2), with a history of schizophrenia, did not initially exhibit elevated EOS levels or classic signs of meningitis, complicating diagnosis. NGS of CSF ultimately confirmed angiostrongyliasis in P2. Both patients received corticosteroids and anthelmintics, resulting in significant health improvements and subsequent discharge. A review of eight additional cases with severe neuropsychiatric presentations highlights that children, particularly those with pica, and vulnerable adult populations, including individuals with mental illness or homelessness, face heightened AC infection risks.
Conclusions: For patients with potential AC exposure and presenting neurological or psychiatric symptoms, altered consciousness, elevated EOS in blood or CSF, or unexplained fever, eosinophilic meningitis should be considered. In cases where diagnosis is uncertain, NGS serves as a valuable tool for early detection and effective treatment of angiostrongyliasis.
Acknowledgement: Written consent to publish was received from the patients' families.

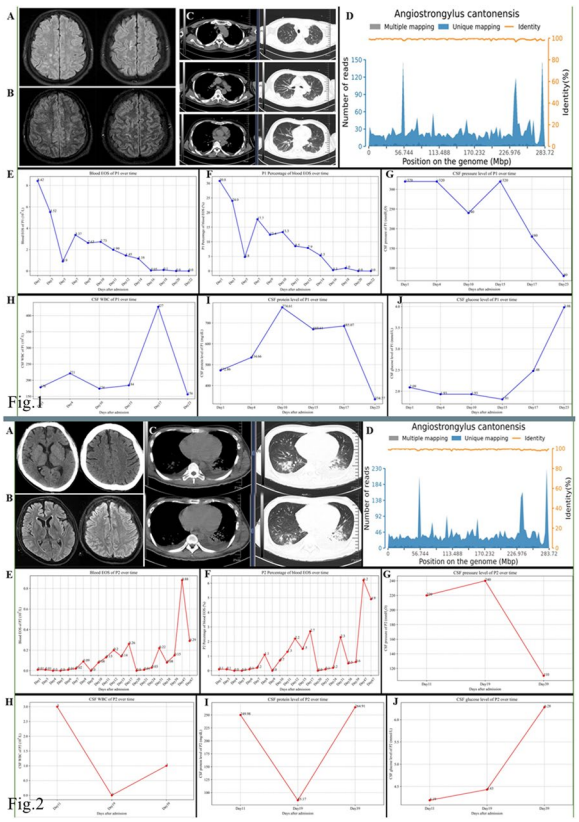

Figure (abstract P014) Imaging, blood and cerebrospinal fluid analysis data of P1 and P2

P015

Impact of antiplatelet therapies on the early hemorrhagic progression of traumatic cerebral contusions

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Critical Care 2025, **29(S1)**:P015

Introduction: Traumatic brain injury (TBI) is a leading cause of morbidity and mortality, with cerebral contusions being one of the most common and clinically significant. The aging population has increased TBI incidence among older adults, many on long-term antiplatelet therapy (APT). However, the impact of these medications on contusion occurrence and progression is unclear. This study aims to investigate the effect of APT on early hemorrhagic progression of cerebral contusions after TBI.
Methods: Data were extracted from a prospective database of adult TBI patients admitted to a Trauma Center ICU between 2014 and 2017. The database includes patient demographics, injury mechanisms, pre-injury medications, and clinical findings. Cerebral contusions were identified, and their hemorrhagic volumes were quantified on CT scan at hospital arrival and on the next scan within 24 h using the Philips Intellispace Portal. Data are presented as median and interquartile range. Two-way ANOVA with multiple comparisons was used to analyze brain contusion progression.
Results: One hundred fifty consecutive patients were included. Thirty patients (20%) were on pre-injury APT, and 66 (44%) presented cerebral contusions. In total, 136 cerebral contusions were detected, of which 38 (28%) were in patients with APT. The hemorrhagic volume of contusions at arrival was not significantly larger in the APT group compared to the non-APT group. A significant increase in contusion volume on the second CT was detected in both groups. However, this increase was significantly greater in the antiplatelet therapy group (Figure).
Conclusions: Pre-injury use of antiplatelet therapy is associated with a greater early hemorrhagic progression of cerebral contusions after TBI.

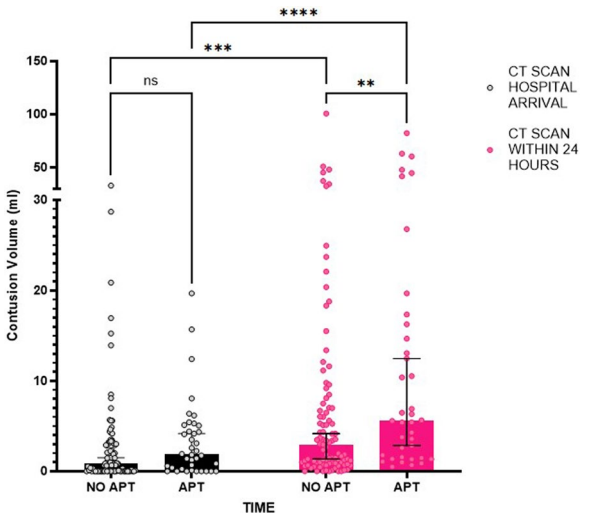

Figure (abstract P015) Two way anova with multiple comparison using Uncorrected Fisher's LSD. Ns 0.79 ** 0.004 *** 0.001 **** < 0.0001; APT antiplatelet therapies.

P016

Incidence of ventilator-acquired pneumonia after one-time dose of ceftriaxone in patients with traumatic brain injury

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Critical Care 2025, **29(S1)**:P016

Introduction: Ventilator-acquired pneumonia (VAP) in severe traumatic brain injury (TBI) patients is associated with worse long-term neurologic outcomes. The TBI population is at increased risk of VAP compared to other critically ill populations due to brain injury-induced immune dysregulation. These patients may remain intubated for longer periods of time and have increased risk of aspiration [1]. Previous studies have shown a reduction in early VAP following a single dose of a broad-spectrum antibiotic within 12 h of intubation [2].
Methods: This single-center retrospective study between 1/1/2021 and 31/8/2024 examined the incidence of VAP in mechanically ventilated patients with severe TBI who received a one-time dose of ceftriaxone in the first 24 h of admission. The control group was defined as patients who did not receive a broad-spectrum antibiotic within 24 h of admission. The primary objective was the incidence of VAP within 7 days of intubation (early VAP). Secondary objectives included the ICU and hospital length of stay, ICU mortality, duration of mechanical ventilation, antibiotic-free days, and incidence of VAP occurring > 7 days after intubation.

Results: Fifty-three patients were included in the ceftriaxone group and 113 patients in the control group. The median GCS score on admission was 3 in the ceftriaxone group and 5 in the control group. The rate of early VAP was 18.9% vs. 47.8% ($p < 0.001$) for the ceftriaxone vs. control group, respectively. The average duration of mechanical ventilation, antibiotic-free days, hospital and ICU length of stay, and incidence of late VAP were similar between groups.
Conclusions: The administration of ceftriaxone within the first 24 h of intubation demonstrated a decreased incidence of early VAP.

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P017

MONTE: intracranial pressure analysis software to assist traumatic brain injury management. A prospective multicenter pilot study

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Critical Care 2025, **29(S1)**:P017

Introduction: Elevated intracranial pressure (ICP) is an important therapeutic target in patients with severe traumatic brain injury (sTBI). While current sTBI guidelines recommend to treat ICP above 22 mmHg, more recent concepts for personalized ICP management have yet to be implemented. To address this challenge, the MONTE (MOnitor for iNTracranial hypErtension) software provides real-time analysis of the ICP and mean arterial blood pressure signal to display in real-time: 1) the time-intensity burden of ICP (ICP dose) [1]; 2) the low-frequency autoregulation index (LAx) [2]; and 3) a prediction of potentially harmful ICP elevations in the next 30 min, based on advanced artificial intelligence [3]. This prospective multi-center randomized pilot study aims to evaluate the feasibility, potential clinical benefits, and safety of implementing the MONTE software at the bedside of sTBI patients.
Methods: Adult sTBI patients with continuous invasive intraparenchymal ICP monitoring and need for sedation are eligible for inclusion. Patients are randomized into two groups: the control group provided with standard monitoring information, or the intervention group provided with both MONTE software-generated and standard monitoring information. Every 4 h, clinicians answer questions to evaluate their clinical decision making. The Figure provides an overview of the protocol. As this is a pilot study, a formal sample size calculation is not required.
Results: Patient recruitment started January 2024.
Conclusions: This is a pre-market, investigator-driven, academic, and first-in-human investigation of the MONTE monitor. If feasibility is demonstrated, the methodology used in this pilot study will be applied to design a future larger scale, adequately powered clinical investigation.

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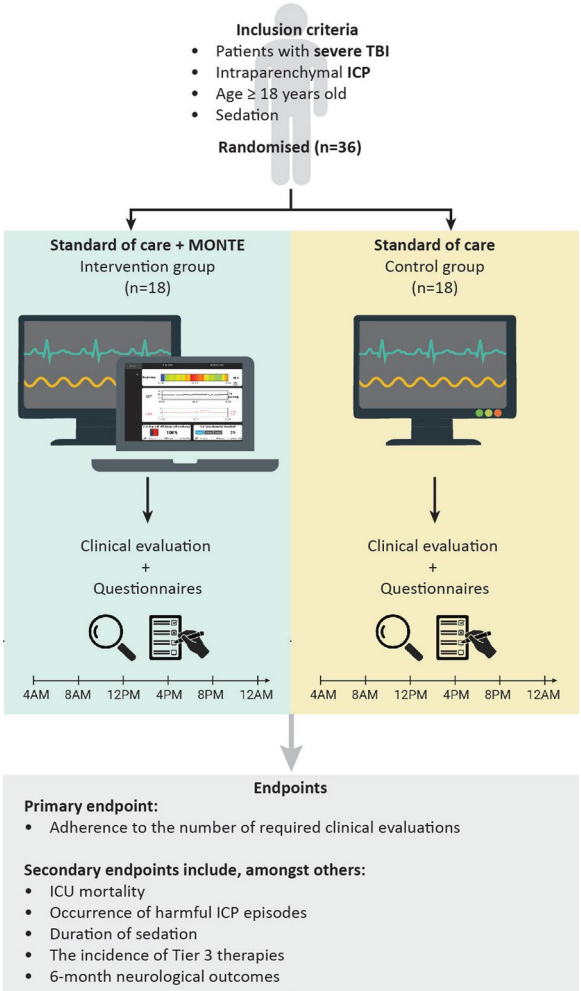

Figure (abstract P017) 1 Schematic representation of the study protocol depicting enrolment of adult patients with severe traumatic brain injury (TBI) that require invasive intraparenchymal intracranial pressure (ICP) monitoring and sedation, randomization into control (standard of care) and intervention (standard of care and MONTE software) groups, and clinical evaluation and completion of the questionnaire by the clinician every 4 h

P018

Secondary insults monitoring for prevention of organ dysfunction in catastrophic brain injury at risk to evolve to brain death. Pilot study

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Critical Care 2025, **29(S1)**:P018

Introduction: The present research aims to study the effects of early application of intensive care treatment endpoints and the occurrence of secondary insults in patients with catastrophic brain injury potentially evolving to brain death.

Methods: Minute by minute physiological data was recruited from patients admitted to ICU with GCS < 5, as part of an ethically approved study. To date, 14 patients have been recruited prospectively from the University Hospital Messina, Italy. Patient monitoring data captured ranged between 3216 min (0.5 days) to 72,554 min (50 days). Twelve patients survived at least three days post-ICU admission and their secondary insults calculated. Hypotension was defined as 5 sequential minutes of data below a mean arterial pressure (mmHg) of 70 (Grade 1), 60 (Grade 2) or 50 (Grade 3) severities. Hypoxemia was defined as SpO_2 below 94% (EUSIG classification [1]). Short acting (< 5 min) insults were discarded as potentially artefactual with an algorithm used to estimate the percentage of 'Valid Monitoring Time'(VMT) so that proportion of time spent at insult level of VMT could be calculated.
Results: Seven patients were admitted with cerebral hemorrhage, 2 TBI, 3 SAH and 2 ischemic stroke. Mean age was 66 years (±3.2 SE) and mode GCS was 4 (mean: 4.5). Five patients were alive at discharge. The duration in minutes of hypotension during the first 3 days was 519 (±97)(Grade1), 69 (±21)(Grade 2) and 7 (±4)(Grade 3) which represents 13 (±2)%, 2 (±0.6) and 0.1 (±0.1)% of VMT respectively (Figure). Hypoxemia occurred with a duration of 145 (±66) minutes, 4 (±2)% of VMT. Generally, insult burden was higher on day 1, compared to days 2 and 3.
Conclusions: In patients with catastrophic brain injury the incidence of hypotension remains significant. Ongoing analysis will aim to identify correlation between secondary insults and organ dysfunction.
Funding: PRIN_20223TWA55_001.

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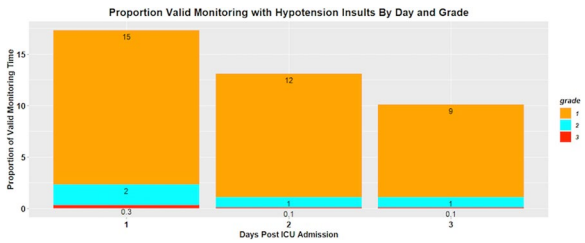

Figure (abstract P018) Illustrate occurrence of hypotension insults in the studied patients during first 3 days of ICU admission

P019

A clinical audit of diabetic ketoacidosis admitted to the emergency department

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Critical Care 2025, **29(S1)**:P019

Introduction: In 2024 a new expert consensus emerged on managing hyperglycemic crises in adults. Recently, there has been an alarming rise in hospitalizations for diabetic ketoacidosis (DKA) [1]. This study aims to describe the clinical characteristics of patients with DKA admitted to emergency department (ED) and readmissions at 90 days.
Methods: Retrospective cohort study conducted between January 2022 and December 2023, including all adult patients admitted with DKA into the ED of a tertiary care hospital. Continuous variables are described as mean ± standard deviation or median with interquartile range according to the data distribution.
Results: During the study period, 68 patients were included in the study with a mean age of 47.5 ± 19 years, 54.4% were male, 50% had type 1 diabetes, with an average diagnosis age of 21 ± 19.5 years; while 47.1% had type 2 diabetes, diagnosed at 45 ± 18 years; 50 (74%) were already followed by endocrinology. The median HbA1c value was 11.2% (9.3–12.9), with a peak recorded value of 18.5%. There were 89 episodes of DKA; the primary precipitating factor was therapeutic non-compliance in 64%, followed by respiratory infections (11.2%) and new diagnose of diabetes (7.9%); 87.7% were moderate to severe and 67.4% of the patients required ICU admission (level II), with a median ICU stay of 1(0–2) day and hospital stay of 4(2–8) days. Ten patients had 21 readmissions over the study period; readmission rate at 28 days was 7.8% and at 90 days 15.8%. All patients readmitted were actively followed in the endocrinology outpatient clinic. Only one death was recorded in the study period, unrelated to the DKA episode.
Conclusions: Given the high incidence of therapeutic non-compliance and substantial readmission rates, in a group of patients already followed by endocrinology, this study appeals to the need of new strategies to improve patient education and treatment compliance, to improve individual prognosis and optimize healthcare delivered.

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P020

Machine learning models for early prediction of hypoglycemia and hyperglycemia in critically ill patients

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Critical Care 2025, **29(S1)**:P020

Introduction: Dysglycemia, including both hyperglycemia and hypoglycemia, is a common complication in ICU patients. Maintaining blood glucose levels in proper range is crucial but challenging due to the many factors influencing blood glucose levels. This study aims to develop a model that predicts hypoglycemia or hyperglycemia six hours in advance.
Methods: We developed and compared machine learning models using XGBoost, neural network, random forest, and logistic regression. This study utilized electronic health record data from 8,853 ICU patients (1,350,097 records) at Chiba University Hospital between November 2010 and October 2022.
Results: The XGBoost model achieved highest performance, with an AUC of 0.940 for hypoglycemia (blood glucose levels ≤ 80 mg/dL or 4.4 mmol/L) prediction, and an AUC of 0.918 for hyperglycemia (blood glucose levels ≥ 180 mg/dL or 10 mmol/L) prediction (Figure). XGBoost also demonstrated the highest performance in the F1 score, PR-AUC, calibration plot and decision curve analysis.
Conclusions: Our results highlight the potential of machine learning in the early detection of dysglycemia in ICU patients.

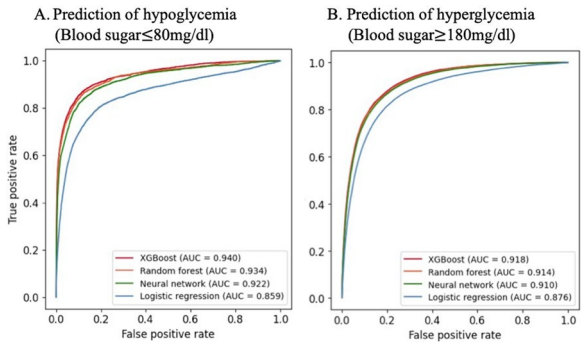

Figure (abstract P020) ROC curves of prediction models for hyperglycemia and hypoglycemia, predicting occurrences 6 h in advance in ICU patients.

P021

Diabetic ketoacidosis in intensive care patients prescribed SGLT2 inhibitors

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Critical Care 2025, **29(S1)**: P021

Introduction: Diabetic ketoacidosis (DKA) is a known complication of sodium-glucose co-transporter-2 inhibitor (SGLT2i) therapy. While some studies deem it reasonable to hold SGLT2i during critical illness, others could not discern SGLT2i-related harm in the acutely ill [1,2]. Local anecdotal evidence highlighted occurrence of DKA in intensive care patients taking SGLT2i, which prompted this audit.
Methods: All patients on regular SGLT2i admitted to Royal Cornwall Hospital Trust's ICU between 11/2021 and 03/ 2024 were included in this retrospective study. Electronic patient records were used for data collection. Based on literature and local guidelines, we defined DKA as pH < 7.3 and serum ketones > 3 mmol/L, where blood glucose levels determined euglycemia (< 15 mmol/L) and hyperglycemia (> 15 mmol/L) [3].
Results: The cohort consisted of 53 patients (35 males, 18 females). The median age was 65. Their median ICU length of stay was three days and average APACHE score was 19.5. As seen in the Table, 18.9% developed DKA. Four patients had EDKA as their primary reason for ICU admission, and three more developed EKDA whilst on ICU. Three of the four developed EDKA shortly after having SGLT2i on the ward. One patient was admitted in HDKA after continuing SGLT2i therapy at home despite acute illness, and two more developed HDKA whilst on ICU. The mortality rate in this cohort was 22.6%, though all ten DKA patients survived the ICU admission.
Conclusions: Nearly one in five of this cohort developed DKA during their ICU admission. We aim to create a local standard operating procedure for SGLT2i therapy in ICU patients, including ketone monitoring on admission, discharge, and on resumption of the SGLT2i. Improved ward and patient education on holding SGLT2i during acute illness, and a notification when prescribing SGLT2i on ICU admission software, could decrease DKA incidence further.

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Table (abstract P021) Results

	Total patients (N = 53)	Total DKA (N = 10)	Total EDKA (N = 7)	Total HDKA (N = 3)
Prevalence		10/53 (18.9%)	7/53 (13.2%)	3/53 (5.7%)
Male	35/53 (67%)	6/10 (60%)	5/7 (71%)	1/3 (33%)
Female	18/53 (33%)	4/10 (40%)	2/7 (29%)	2/3 (67%)
Age in years (median)	31–84 (65)	54–82 (62)	56–82 (63)	54–76 (61)
APACHE score (average)	9–44 (19.5)	10–28 (18.2)	12–28 (19.4)	10–21 (15.3)
Length of stay in days (median)	0–17 (3)	1–11 (3.5)	1–11 (6)	3–4 (3)
ICU mortality	12/53 (22.6%)	0/10	0/7	0/3

P022

Comparison of indirect calorimetry with the Fick method for estimating caloric expenditure in critically ill patients

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Critical Care 2025, **29(S1)**:P022

Introduction: Determining caloric expenditure in critically ill patients is essential to provide adequate nutritional support [1,2]. The gold standard method for measuring resting energy expenditure (REE) is indirect calorimetry (IC) [2]. Fick method (REE = CO X Hb (SaO2—SvO2) × 95.18) was calculated with Swan Ganz catheters, but it is not used any more.
Methods: Prospective observational study, single center. Critically ill patients on mechanical ventilation who required IC during hospitalization and hemodynamic monitoring at the same time were included. IC was performed with Ultima CCM equipment according to ICALIC group [1]. Simultaneously, arterial and venous blood was drawn, and cardiac output was measured with transthoracic ultrasound or with a minimally invasive cardiac output monitoring method (EV1000 clinical platform, Edwards Lifescience, Irvine, Ca. USA) with which caloric expenditure was calculated with the Fick method.
Results: There was no correlation between IC and the FICK method with minimally invasive hemodynamic monitoring (rho = 0.11, $p = 0.7$), nor between IC and the FICK method with cardiac output measured by echocardiography (rho = − 0.2, $p = 0.46$). The study by Bland and Altman was carried out and the results are expressed in the Figure.
Conclusions: There is no adequate agreement between IC of measuring caloric expenditure and its calculation using the Fick method with measurement of cardiac output with noninvasive or minimally invasive devices.

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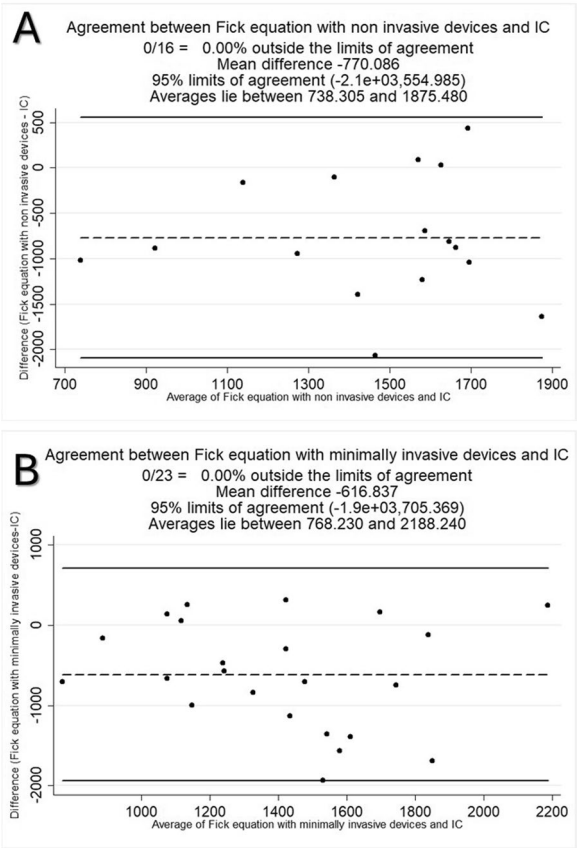

Figure (abstract P022) A: Bland Altman plot (BAP) of agreement between Fick equation with echocardiography and indirect calorimetry (IC). B: BAP of agreement between Fick equation with minimally invasive monitoring (EV1000) and IC.

P023

Resting energy expenditure in chronic critically ill patients

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Critical Care 2025, **29(S1)**: P023

Introduction: Indirect calorimetry is the gold standard for determining resting energy expenditure (REE) in critically ill patients [1]. There are several definitions of a chronically ill critically ill patient, one of them being that the patient remains in the ICU for more than 14 days on mechanical ventilation (MV) [2–4]. There is no data on resting caloric expenditure in these patients, nor a comparison with patients in the EBB and FLOW stages.
Methods: Retrospective observational study, carried out in 2 centers in Buenos Aires, Argentina. Indirect calorimetry data were collected from patients in intensive care under MV. Indirect calorimetry was performed using the ICALIC group standards [5]. Anthropometric variables were measured, and ideal weight was calculated using the Miller formula. REE, CO_2 production (VCO_2), and oxygen consumption (VO_2) were measured; these variables were adjusted to weight and ideal weight. Respiratory quotient (RQ) was also measured. Groups according to the day that IC was performed: 0–3 days, 4–14 days, more than 14 days.
Results: REE was observed to increase at different stages, being higher in patients with more than 14 days in ICU ($p=0.018$) (Table). Changes were also observed in weight-adjusted REE ($p=0.017$) and ideal weight-adjusted REE ($p=0.022$). There were no changes in VO_2, weight-adjusted VO_2, and ideal weight. However, VCO_2 increased at different stages ($p<0.001$), as well as weight-adjusted VCO_2 ($p<0.001$) and ideal weight-adjusted VCO_2 ($p<0.001$).
Conclusions: REE and VCO_2 was increased in patients with more than 14 days of hospitalization.

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4. Hollander JM et al. Nutr Clin Pract 2006;21:587–604
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Table (abstract P023) Results

Period	0–3 days (n = 69)	4–14 days (n = 50)	More than 14 days (n = 28)	*p*
VCO_2 (median (IQ-25–75%))	204 (175–243)	244 (206–300)	297 (213–336)	< 0.001
VCO_2/weight (median (IQ-25–75%))	2.32 (1.9–2.68)	3.11 (2.5–3.82)	2.89 (2.22–3.85)	< 0.001
VCO_2/IBW (median (IQ-25–75%))	3.27 (2.85–3.82)	4.08 (3.5–4.81)	4.4 (3.16–5.18)	< 0.001
REE (median (IQ-25–75%))	1665 (1505–1958)	1839 (1562–2208)	2140 (1606–2414)	0.018
REE/weight (median (IQ-25–75%))	19.4 (16.6–23)	21.9 (18.8–27.9)	21.3 (17.6–28.3)	0.017
REE/IBW (median (IQ-25–75%))	27.4 (24.5–31.3)	31 (25.2–38.5)	32.7 (25.2–38.5)	0.022
RQ (median (IQ-25–75%))	0.8 (0.76–0.91)	0.97 (0.85–1.02)	0.99 (0.86–1.08)	< 0.001

IQ: interquartile interval. IBW: ideal body weight. COPD: chronic obstructive pulmonary disease. BMI: body mass index.

P024

Resting energy expenditure in obese patients

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Critical Care 2025, **29(S1)**:P024

Introduction: Indirect calorimetry (IC) is the gold standard for determining resting energy expenditure (REE) [1]. This method has been

compared with different predictive equations in critically ill patients, and no equation has been found that has good correlation, and low bias when compared with IC. These equations have generally been compared with the general population and not specifically with the obese patient population.
Methods: Retrospective observational study, carried out in 2 centers in Buenos Aires, Argentina. Indirect calorimetry data were collected from patients in intensive care under MV. Indirect calorimetry was performed using the ICALIC group standards [1]. Anthropometric variables were measured, and ideal weight was calculated using the Miller formula. REE, CO_2 production (VCO_2), and oxygen consumption (VO_2) were measured; these variables were adjusted to weight and ideal weight (IBW). IBW was calculated with Miller formula. Respiratory quotient (RQ) was also measured. Groups were divided according to World Health Organization (WHO) definition of obesity.
Results: There were no differences in REE ($p=0.927$), VO_2 ($p=0.414$) and VCO_2 ($p=0.232$) between groups (Table). Also, there were no differences in REE/IBW ($p=0.233$), VO_2/IBW ($p=0.058$) or VCO_2/IBW ($p=0.598$): There were differences between groups in REE/Weight ($p<0.001$), VO_2/weight ($p<0.001$) and VCO_2/weight ($p<0.001$). The Bland–Altman plot was used to evaluate the agreement between IC and the 20 kcal/kg equation for calculating REE. The mean bias was −91.8 kcal, with limits of agreement ranging from −1032.7 to 849.1 kcal. It was also evaluated IC and the 28 kcal/kg IBW equation, the mean bias was 180.9 kcal, with limits of agreement ranging from −707.9 to 1069.7 kcal.
Conclusions: There are no differences in REE in the 3 populations studied, but there are differences when REE is adjusted to weight.

Reference

1. Oshima T et al. Clin Nutr 2017;36:651–662.

Table (abstract P024) Results

Period	Normal weight (n = 28)	Overweight (n = 35)	Obese (n = 85)	*p*
REE (median (IQ-25–75%))	1918 (1502–2235)	1833 (1432–2172)	1777 (1565–2148)	0.927
REE/weight (median (IQ-25–75%))	27.6 (22.6–33.3)	22.2 (19.1–28.9)	18.7 (16.5–21.3)	< 0.001
REE/IBW (median (IQ-25–75%))	27.6 (24–33.2)	28 (23.2–34.5)	29.6 (26–34.5)	0.233
VO_2 (median (IQ-25–75%))	267 (204–301)	248 (196–301)	251 (196–301)	0.414
VO_2/weight (median (IQ-25–75%))	3.77 (3.13–4.64)	3.03 (2.61–4)	2.66 (2.34–3.01)	< 0.001
VCO_2 (median (IQ-25–75%))	235 (191–306)	241 (197–310)	214 (187–262)	0.232
VCO_2/weight (median (IQ-25–75%))	3.88 (3.24–4.58)	3.08 (2.57–3.79)	2.23 (1.83–2.64)	< 0.001

IQ: interquartile interval. IBW: ideal body weight. COPD: chronic obstructive pulmonary disease. BMI: body mass index.

P025

Correlation between nutritional scores and survival prognosis in elderly ICU patients with severe pneumonia

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Critical Care 2025, **29(S1)**:P025

Introduction: This study investigates the link between nutritional scores and survival in elderly ICU patients with severe pneumonia. We retrospectively analyzed data from 344 patients at Zhejiang Hospital (2019–2023), all over 65 and meeting severe pneumonia criteria. The goal is to identify nutritional markers that correlate with survival, aiding treatment strategies for this vulnerable group.
Methods: We analyzed data using R software. Categorical variables were compared with Fisher's exact test, and continuous data were tested for normality. T-tests were used for normally distributed data, and Mann–Whitney U tests for non-normal data. Significant variables from univariate analysis were further examined with multivariate logistic regression to identify independent risk factors, with model optimization through stepwise or LASSO regression. Model accuracy was evaluated using AUC, and optimal cutoffs were determined by the Youden index.
Results: Significant variables identified through univariate analysis included C-reactive protein (CRP), globulin, cholesterol (CHO), and low-density lipoprotein (LDL). Multivariate logistic regression and stepwise regression models highlighted CRP and globulin as significant prognostic factors, while LASSO regression singled out CRP. The stepwise regression model demonstrated superior fit with an AUC of 0.626. Further ROC curve analysis for CRP, globulin, and total protein allowed us to calculate each variable's AUC, optimal cutoff, sensitivity, and specificity for survival prediction. Among these variables, globulin showed the most substantial contribution to outcome classification, with an optimal cutoff of 28.335.
Conclusions: The significance of CRP and globulin highlights the impact of inflammation and protein status on patient prognosis. These insights can help clinicians enhance prognostic assessments and tailor treatment strategies. Further research is needed to validate these findings and explore interventions targeting these biomarkers.

P026

Effect of micronutrient supplementation on clinical outcomes: assessing compliance and feasibility in a cohort study

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Critical Care 2025, **29(S1)**:P026

Introduction: Micronutrient (MN) supplementation has a positive impact on clinical outcomes. However, the evidence for the impact of MN supplementation remains controversial. Therefore, our study aims to assess the impact on nutritional outcomes according to exploring the implementation of MN support with multidisciplinary collaboration.
Methods: All 255 patients referred to a nutrition support team (NST) between July and November 2022 were included. The NST reviews the MN protocol, which includes multivitamins and trace elements, based on international nutrient guidelines. All patients who were on nothing per oral and did not meet ≥ 70% of their nutritional requirements within 1 week were recommended MN supplements. Compliance with the MN protocol was evaluated, alterations in nutritional status based on the Nutrition Risk Screening 2002 (NRS 2002) scoring system and clinical outcomes were assessed after 7 day and at discharge. Multiple

logistic regression analysis was used to identify factors associated with high nutritional risk in discharged patients. In addition, a sub-analysis was performed on changes in the nutritional of patients on the ward and in the ICU.
Results: The rate of implementation of MN supplementation was 50.2%. The findings indicated a significant decrease in the NRS 2002 score in the good-compliance group with MN supplementation. No significant differences in protocol compliance were observed in terms of mortality (Figure), hospital stay, or length of stay in the intensive care unit. However, bad compliance with MN supplementation was correlated with risk factors for malnutrition at discharge. In subgroup analysis, nutritional status in the ICU and wards improved, with a significant difference between the two groups.
Conclusions: MN supplementation via the protocol is helpful for inpatients' nutritional status. Therefore, bad compliance with MN supplementation has been identified as a risk factor for malnutrition at discharge, which requires active intervention by the NST.

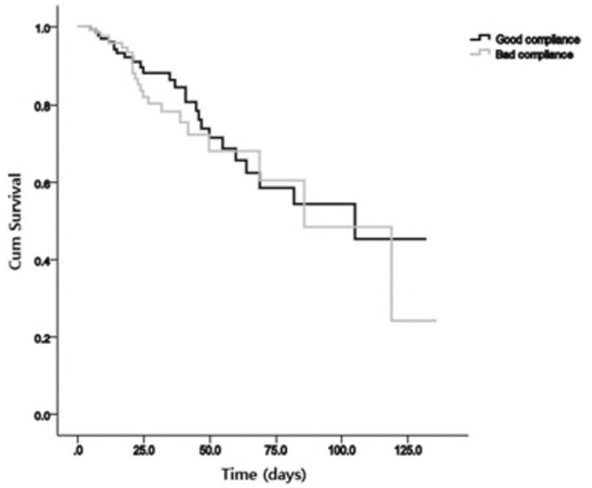

Figure (abstract P026) Kaplan–Meier survival between good compliance and bad compliance group

P027

Prevalence of lipid-soluble vitamin deficiencies in critically ill ICU patients: a cross-sectional analysis

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Critical Care 2025, **29(S1)**:P027

Introduction: Critically ill patients are treated in Intensive Care Units (ICUs), and may have fat-soluble vitamin deficiencies that are prevalent and potentially linked to adverse outcomes. These vitamins are essential for cellular integrity, immune function, and metabolism. In ICU settings, deficiencies may arise from patient´s metabolic disturbances or nutritional routines, boosting the critical condition of the patients. This study explores the prevalence of fat-soluble vitamin deficiencies in ICU patients.
Methods: A cross-sectional observational study was conducted in a tertiary teaching hospital ICU in the Netherlands. Patient data were collected within 24 h after admission. Plasma samples were analyzed for fat-soluble vitamin levels according to ESPEN guidelines [1]. Descriptive statistics and bootstrapping were used for confidence intervals.
Results: A total of 79 ICU patients (median age 69 years [95% CI, 67.0–72.0]; 25.3% women) were involved. Mechanical ventilation (83.5%) and sepsis (19%) were common. Imbalances were observed; with deficiencies most prevalent for vitamin D (78.5%) and A (35.4%), followed by vitamin E (alpha-tocopherol, 17.7%) (Figure). Additionally, high levels of alpha-tocopherol (27.8%) were observed. These findings underscore the variability of vitamin status in critical illness in ICU patients.
Conclusions: Imbalances in fat-soluble vitamins, including vitamin D, A and E deficiencies, and high alpha-tocopherol levels, were identified. The results highlight the need to monitor and address vitamin status in critically ill patients, with potential implications for clinical outcomes.

Reference

1. Berger MM et al. Clin Nutr 2022;41:1-5

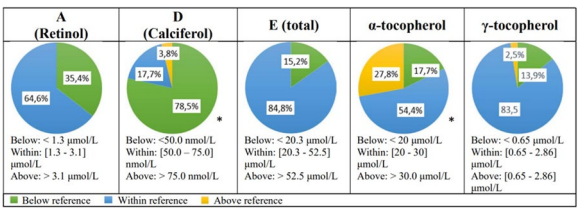

Figure (abstract P027) Prevalence of lipid-soluble vitamin levels among ICU patients, categorized as below, within, or above the reference ranges. Reference values are based on ESPEN guidelines (*), or UMCG standards (when not specified)

P028

Impact of withholding early parenteral nutrition in patients deemed at high nutritional risk

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Critical Care 2025, **29(S1)**:P028

Introduction: In the EPaNIC-RCT, withholding parenteral nutrition until one week after ICU admission (Late-PN) enhanced recovery as compared with early supplementation of insufficient enteral nutrition by parenteral nutrition (Early-PN) [1]. Although subgroup analyses could not identify a subgroup that benefited from Early-PN, true nutritional risk may have been missed. After completion of the EPaNIC-RCT, the modified Nutrition Risk in Critically Ill (mNUTRIC) score has been designed to specifically capture nutritional risk of ICU patients [2].
Methods: In this secondary analysis of the EPaNIC-RCT (N = 4640; NCT00512122), we investigated the impact of the randomized intervention in patients with the highest nutritional risk according to the mNUTRIC-score (score 5–9), which was calculated based on age, Acute Physiology and Chronic Health Evaluation -II score, Sequential Organ Failure Assessment score, number of comorbidities, and days from hospital to ICU admission [3]. Outcomes of interest included the duration of ICU dependency (primary outcome), 90-day mortality (safety outcome), duration of mechanical ventilation (MV) and renal replacement therapy (RRT), and incidence of new infections. Variables were summarized by frequencies (percentages) or median [interquartile range], and analyzed by Median-test or Chi-square test, as appropriate.

The study protocol and consent forms were approved by the ethics committee (ML4190).
Results: 1427 (61.3%) of Late-PN patients and 1402 (60.6%) of Early-PN patients had a mNUTRIC-score of 5 or more, with comparable demographics in both arms. As compared with Early-PN, Late-PN shortened ICU-dependency and duration of MV and RRT and lowered the incidence of new infections in ICU (Table). 90-day mortality was unaffected.
Conclusions: Withholding early PN shortened ICU dependency in patients deemed at the highest nutritional risk.

References

1. Casaer MP et al. N Engl J Med. 2011;365:506–517.
2. Heyland DK et al. Crit Care. 2011;15:R268.
3. Casaer MP et al. Intensive Care Med. 2024;50:1593–1602.

Table (abstract P028) Results

	Early-PN (N = 1402)	Late-PN (N = 1427)	*p* value
Duration of ICU-dependency (days)	6 [3–13]	5 [2–11]	0.0009
90-day mortality	230 (16.64%)	237 (16.75%)	0.96
Duration of mechanical ventilation (days)	3 [2–8]	2 [2–8]	0.0002
Duration of renal replacement therapy (days)	10 [5–23]	7 [3–16]	0.08
Incidence of new infections in ICU	500 (35.66%)	435 (30.48%)	0.003

Data represent numbers (%) and median [interquartile range].

P029

Preoperative carbohydrate loading reduces length of hospital stay compared to fasting in patients undergoing major elective, non-cardiac surgery: a systematic review and meta-analysis

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Critical Care 2025, **29(S1)**:P029

Introduction: Although preoperative fasting is routinely scheduled before elective non-cardiac surgeries with the goal of preventing anesthesia-related complications, Enhanced Recovery After Surgery (ERAS) Guidelines recommend preoperative carbohydrate loading to facilitate early recovery and readiness to discharge, albeit with low level of evidence. We investigated whether preoperative fasting reduces the length of hospital stay.
Methods: We conducted a systematic search on the 15th of October, 2021, in five databases (PubMed via Medline, Embase, Cochrane Central, Web of Science, Scopus). We included only randomized controlled trials (RCT) that compared preoperative carbohydrate loading (CHO) to either fasting or placebo in elective non-cardiac surgeries. The main outcome was the length of hospital stay. Risk of bias and level of evidence certainty were assessed using RoB2 and GRADE assessment respectively. A random-effects model was used in meta-analysis, and results were visualized in forest plots along with 95% confidence intervals.
Results: Systematic search and selection identified 55 RCTs. Preoperative carbohydrate loading was significantly effective in reducing the length of hospital stay when compared to preoperative fasting (mean difference: − 1.71 days [95% CI: − 3.04, − 0.38]) (Figure). However, meta-analysis of RCTs comparing CHO to any kind of placebo did not show this effect (mean difference: − 0.01 days [95% CI: − 0.16, 0.16]). The main outcome had a low risk of bias, and moderate level of certainty.
Conclusions: This study shows that preoperative carbohydrate loading significantly reduces length of hospital stay for patients undergoing elective non-cardiac surgeries. CHO may have wide implications, especially in cases where early achievement of recovery and readiness to discharge are critical for improved hospital resource management.

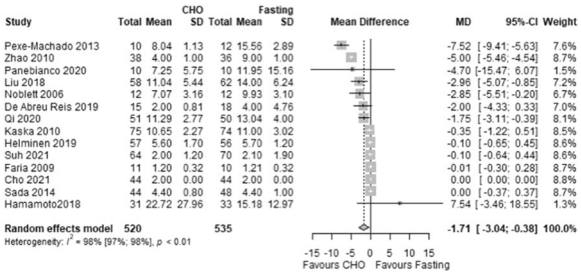

Figure (abstract P029) Forest plot depicting the pooled analysis of length of stay in the CHO and fasting groups

P030

Prevalence of water-soluble vitamin deficiencies in plasma in critically ill ICU patients: a cross-sectional analysis

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Critical Care 2025, **29(S1)**:P030

Introduction: Critically ill patients are treated in intensive care units (ICUs), whose water-soluble vitamin deficiencies may be prevalent and linked to adverse outcomes. These vitamins support oxidative stress management, immune function, and metabolism. Deficiencies may stem from patient´s metabolic conditions or nutritional routines, potentially worsening ICU complications. This study examines the prevalence of these deficiencies.
Methods: This cross-sectional study was conducted in a tertiary teaching hospital ICU in the Netherlands. Patient records were collected within 24 h after admission. According to ESPEN guidelines [1], plasma samples were analyzed for water-soluble vitamin levels. Descriptive statistics and bootstrapping were used for confidence intervals.
Results: A total of 79 ICU patients (median age 69 years [95% CI, 67.0–72.0]; 74.7% men) were included. Cardiovascular diseases (72.2%) and sepsis (19.0%) were common. Vitamin C deficiency was identified in 40.5% of patients, followed by vitamin B9 (21.6%) (Figure). High levels of vitamin B1 (54.4%) and B12 (21.5%) stand out. Only 6.3% of patients showed no vitamin deficiency. These findings highlight the variability of vitamin status in critical illness in ICU patients.
Conclusions: Water-soluble vitamin imbalances were identified, with deficiencies in vitamin C and B9 and elevated levels of B1 and B12. Although most patients had levels into references, these results expose the importance of monitoring and managing vitamin status in critically ill patients to potentially alleviate adverse outcomes.

Reference
1. Berger MM et al. Clin Nutr. 2022;41:1-5

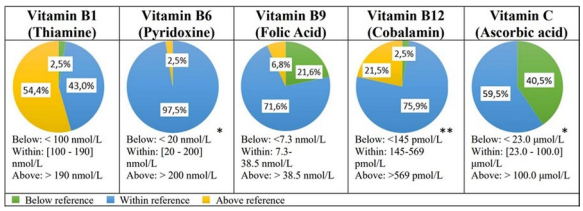

Figure (abstract P030) Prevalence of water-soluble vitamin levels in plasma among ICU patients, categorized as below, within, or above the reference ranges. Reference values are based on ESPEN guidelines (*), CERTE (**), or UMCG standards (when not specified)

P031

Total minimally invasive VS open Ivor-Lewis esophagectomy: comparison of postoperative ICU care

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Critical Care 2025, **29(S1)**:P031

Introduction: The development of less invasive surgical procedures of esophageal cancer has been associated with better outcomes and reduced incidence of complications. The aim of this study is to compare the postoperative ICU stay of patients with esophageal cancer treated either with total minimally invasive (TMIE) or open Ivor-Lewis esophagectomy (OE).
Methods: This is a single-center, retrospective, observational study, including patients that underwent either TMIE or OE and were admitted in the ICU of a tertiary Greek hospital for postoperative care between January 2023 and November 2024. Basic demographic, clinical and radiographic characteristics, along with duration of ICU stay and postoperative complications, were compared between the two groups.
Results: A total of 42 patients were included (38/4—male/female), 19 underwent TMIE and 23 OE. Patients in the minimally invasive group were older (median age 69 vs 58). On ICU admission, the mean APACHE II score was slightly higher in the TMIE group (8.8 vs 7.4) while the PO2/FiO2 ratio was similar between the two groups (243.4 in the TMIE vs 237.2 in the OE group). Pathological postoperative chest radiograph findings incidence (subcutaneous emphysema, lung infiltrates or both) was comparable in both groups, 63.2% in the TMIE vs 65.2% in the OE group. We did not detect any significant difference in the mean ICU hospitalization duration (3.5 vs 3 days in the TMIE and OE group respectively). Four patients in the TMIE group (21%) developed complications (1 atelectasis and 3 atrial fibrillation). In the OE group 3 patients (13%) were diagnosed with pneumonia.
Conclusions: ICU hospitalization length and complication rate were comparable in both groups, despite the fact that the patients in the minimally invasive group were older and had higher APACHE scores. Pneumonia was more frequent in the OE and atrial fibrillation in the TMIE group.

P032

Intestinal fatty acid binding protein and lipopolysaccharide-binding protein in surgical patients with multiple organ dysfunction syndrome

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Critical Care 2025, **29(S1)**:P032

Introduction: The aim of this study was to evaluate the potential biomarkers of bacterial translocation (lipopolysaccharide-binding protein, LBP) and intestinal wall damage (intestinal fatty acid binding protein, I-FABP) in surgical patients with multiple organ dysfunction syndrome (MODS).
Methods: The study involved 165 surgical patients divided into 2 groups: Group 1 – 118 patients with MODS (main group), Group 2–47 patients without MODS (control group). MODS was graded according to the SOFA scale, and mortality was assessed according to the APACHE II. To determine biomarkers, venous blood was taken in the control group on the day of admission, and in patients with MODS when detecting signs of MODS, on the 3rd and on the 7th day of its development. Markers were determined by the ELISA method according to the manufacturer's instructions.
Results: The control and main groups did not differ in age, sex, main pathology and comorbidities ($p=0.108$, $p=0.826$ and $p=0.318$, respectively). In the control group, the levels of LBP and I-FABP were significantly lower ($p<0.05$). In the main group mortality was 31.4% (n = 37). Deceased patients had significantly higher I-FABP levels on day 1 ($p=0.035$), the LBP level on day 7 was lower than in survived patients ($p=0.016$, Figure). The threshold values of markers at which the risk of death in surgical patients with MODS increases were determined: for LBP on day 7 of MODS development—≤ 2727.55 ng/mL, for I-FABP on day 1 of MODS development—> 120.7 pg/mL.
Conclusions: In surgical patients with MODS, increased I-FABP and decreased LBP in serum may indicate increased intestinal wall permeability and bacterial translocation, which may worsen multiple organ dysfunction and increase the risk of mortality. The potential markers of intestinal wall damage and bacterial translocation under study may be used to identify surgical patients with MODS with higher risk of adverse outcome, with the aim of reducing ICU stay and mortality.
Funding: This research is funded by the Science Committee of the Ministry of Science and Higher Education of the Republic of Kazakhstan [Grant No. AP19677271].

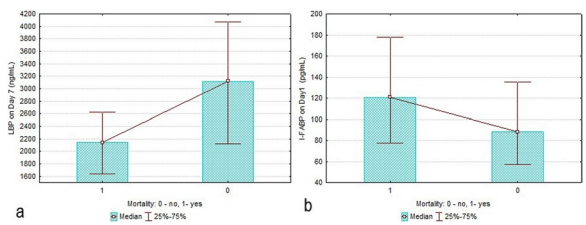

Figure (abstract P032) The lipopolysaccharide-binding protein (LBP, a) and intestinal fatty acid binding protein (I-FABP, b) levels in deceased and surviving surgical patients with MODS

P033

Complete blood count-derived parameters reveal distinct inflammatory status between patients with acute or acute-on-chronic liver failure

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Critical Care 2025, **29(S1)**:P033

Introduction: Acute liver failure (ALF) and acute-on-chronic liver failure (ACLF) are two life-threatening conditions characterized by severe hepatic dysfunction. Systemic inflammation is a hallmark in both conditions. Our objective was to compare the inflammatory status of

patients with ALF and ACLF admitted to the intensive care unit (ICU) using complete blood count (CBC) parameters.
Methods: A retrospective study was conducted at the Hospital Central de las Fuerzas Armadas in Uruguay, including patients (> 16 years old) admitted to the ICU with ALF or ACLF between January 2012 and January 2024. Demographic, clinical and laboratory data were collected. Various inflammatory indexes were calculated from CBC data (at ICU admission and 48 h post-admission), including the neutrophil-to-lymphocyte ratio (NLR), monocyte-to-lymphocyte ratio (MLR), mean platelet volume (MPV)-to-lymphocyte ratio (MPVLR), red cell distribution width (RDW)-to-lymphocyte ratio (RLR), RDW-to-platelet ratio (RPR), MPV-to-platelet ratio (MPVPR) and hemoglobin-to-RDW ratio (HRR).
Results: The study included 37 patients with ALF (39 ± 16 y, MELD 32 ± 9) and 32 with ACLF (52 ± 16 y, MELD 31 ± 8). Mortality was higher in patients with ACLF (81% vs. 43%, $p = 0.001$). Absolute white blood cell and neutrophil counts were similar in both groups, while lymphocytes and platelets were significantly lower in ACLF patients. Compared to ALF patients, those with ACLF had significantly higher NLR, MLR, MPVLR and RLR on admission and at 48 h. Furthermore, although RPR, MPVPR, and HRR were similar between ALF and ACLF patients at admission, significant differences emerged after 48 h. Results are shown in the Figure.
Conclusions: Systemic inflammation is a key feature in liver failure. Among ICU patients, those with ACLF have a significantly higher pro-inflammatory status compared to those with ALF. Basic CBC-derived parameters are accessible tools for evaluating the inflammatory profile in these patients.

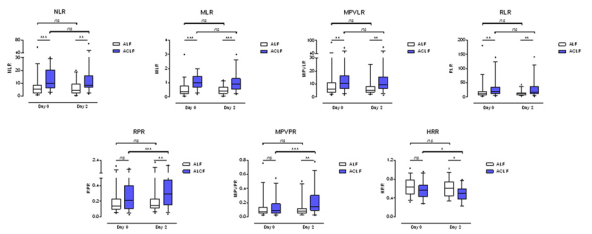

Figure (abstract P033) CBC-derived parameters in patients with ALF and ACLF on admission to the ICU (Day 0) and after 48 h (Day 2). Comparisons of parameters between Day 0 and Day 2 were performed using the Wilcoxon signed-rank test, while the Mann–Whitney test was used to compare parameters between ALF and ACLF patients at each time point. *$p < 0.05$; **$p < 0.01$; *$p < 0.001$

P034

Inhibition of the lysophatidylcholine-autotaxin-lysophosphatidic acid axis rescues pro-inflammatory cytokine production in monocytes in patients with acute-on-chronic liver failure

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Introduction: Acute-on-chronic liver failure (ACLF) is a life threatening syndrome with high mortality rates. It is characterized by monocytic immunoparesis, leading to systemic bacterial infection and high rates of sepsis [1]. Autotaxin (ATX) hydrolyses lysophosphatidylcholine (LPC) to lysophosphatidic acid (LPA) and is upregulated in liver failure. This is correlated with increased mortality and LPA modulates monocyte dysfunction [2,3]. We hypothesize that ATX inhibition rescues monocyte cytokine production capabilities.
Methods: Six patients with ACLF and thirteen healthy controls (HC) were prospectively recruited. Whole blood was cultured with LPA or the ATX inhibitor HA130 at 100 nM. Monocyte-specific cell surface immunophenotyping (CD163, HLA-DR, MerTK, PD-L1), and intracellular cytokine staining (IFNγ, IL-1β, IL-6, TNFα, IL-10) following stimulation with lipopolysaccharide (LPS), was assessed by flow cytometry gating for CD14+ monocytes.
Results: Incubation with LPA downregulated monocytic MerTK and PD-L1 expression in ACLF ($p = 0.0057$; $p = 0.0312$ respectively) and impaired intracellular expression of pro-inflammatory cytokines IFNγ and IL-1β in ACLF ($p = 0.0312$; $p = 0.0625$) and HC ($p = 0.02$; $p = 0.005$). In HC, LPA also suppressed IL-6 production ($p = 0.02$). LPA-induced IFNγ suppression was restored with ATX inhibition in both HC and ACLF ($p = 0.005$; $p = 0.0938$). ATX inhibition also restored IL-6 expression in HC ($p = 0.03$). Interestingly LPA and ATX inhibitor treatment yielded no differences in TNFα and IL-10 production in either cohort.
Conclusions: ATX inhibition restores LPA-induced suppression of monocyte-derived pro-inflammatory cytokines in both ACLF and HC. LPA downregulates pro-inflammatory cell surface proteins in ACLF. The LPC-ATX-LPA axis is a promising immunomodulatory target warranting further investigation in liver failure syndromes.

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P035

Perioperative factors impacting in-hospital stay of patients undergoing hepatectomy

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Introduction: Hepatectomy (HEP) is a challenging procedure that requires comprehensive management to obtain better postoperative outcomes and improve on outcomes that worsen prognosis. It has been shown that prolonged postoperative stays are associated with worse outcomes [1], therefore decreasing in-hospital duration has a direct proportional impact on postoperative costs and complications. The aim of our study was to analyze factors that may prolong patient stay.
Methods: A historical cohort study between 2021 and 2023 was conducted. Patients younger than 18 years of age were excluded. We analyzed perioperative variables such as vasopressor use (VP), dexmedetomidine (DM) use, blood transfusion (BT), and early diet initiation (ED) (< 12 h) in relation to general ward (GW) stay or intensive care unit (ICU) stay. We used descriptive statistics, such as frequency and central tendency measures, according to variable type. Analytical statistics with parametric and non-parametric measures, such as Chi2, Fisher's test, and Mann–Whitney test, according to the distribution of the variables. A value of $p < 0.005$ was considered statistically significant.
Results: 62 patients were analyzed, 35.48% required admission to the ICU and 64.5% were admitted to the GW. We found that patients who received an ED (41%) had a shorter ICU length of stay (M:22 h (IQR 1–27) vs M:46 h (IQR 29–72); $p = 0.0024$), while those who received BT (31.8%) or management with DM (17.7%) had longer ICU stays (M:50 h (IQR 29–216) vs M:27 h (IQR 14–38); $p = 0.012$);(M:22 (IQR 0–27) vs M: 46(IQR 29–72); $p = 0.0024$). The use of VP did not impact ICU length of stay ($p = 0.61$). When analyzing the variables described in relation to stay in the GW, no significant associations were found.
Conclusions: ED decreased the length of ICU stay of patients undergoing HEP. In contrast, the use of DM and BT increased the length of stay in the ICU. None of the factors analyzed had an impact on the length of stay in the GW.

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P036

The impact of donor age on liver transplantation

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Introduction: The shortage of available donor organs is a major limiting factor in liver transplantation, leading to an increase in donor age over the past several years. Our goal was to evaluate the impact of deceased donor age on liver transplantation outcomes at our institution, focusing on the relationship between donor age and recipient survival, while considering other factors that may influence outcomes.
Methods: We conducted a retrospective study using a prospectively collected database of liver transplants performed between 2019 and 2023. Donors were divided into three age groups: young (≤45 years), old (46–70 years), and very old (≥70 years). Factors such as donor and recipient age, sex, and clinical status were evaluated. The primary endpoints were graft survival and recipient survival.
Results: A total of 215 liver transplants were analyzed. Statistically significant differences in graft survival were observed among the groups ($p=0.0001$), with the young donor group (x̄ = 1578.2 days) showing higher survival compared to the very old donor group (x̄ = 1124.5 days). Donor age was a significant predictor of graft survival after adjusting for other variables ($p=0.000$). Elective transplantation was associated with improved graft survival. Regarding recipient survival, significant differences were observed, with the young donor group having 317 additional days of survival compared to the very old group ($p=0.0244$). Age remained a significant predictor of recipient survival after adjusting for other variables ($p=0.043$). Female sex and elective transplants were associated with better outcomes.
Conclusions: Older donor age was associated with decreased graft and recipient survival, with a more detrimental impact on graft survival. A combination of other donor and recipient factors, including recipient sex and clinical status, may influence outcomes. These findings can help guide clinicians in making informed decisions on marginal donor allocation and recipient selection to optimize transplant outcomes.

P037

Acute liver failure and liver transplant: an observational study

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Introduction: Acute liver failure (ALF) is rare and with significant geographical variation in epidemiology. Previous data showed a mortality of 44% and a 56% need for liver transplant (LT) in our country, with DILI and unknown cause being the most common etiologies [1]. We performed a retrospective analysis to characterize the current epidemiology of ALF in Portugal.
Methods: We included adult patients with ALF (encephalopathy, INR≥1.5 [2]), admitted to the ICU of a hepatic transplant center, between 2016 and 2024.
Results: We included 48 patients with a median age of 38 (26.8–47) years. 77% were transferred from other hospitals, after a median 4 (1–6) days. 38 (79%) patients had hyperacute ALF. Etiology was unknown in 35.4% of patients, 14.5% had acute viral hepatitis, 12.5% had DILI, 10.4% had autoimmune hepatitis and 10.4% had paracetamol intoxication. Unknown etiology was associated with higher all-cause mortality (HR 2.37, 95% CI [1.02–5.49]). 18 patients (37.5%) received a biopsy, and in 50% the result pointed to a specific etiology. 25 (52%) patients received a LT (Figure), and recipients had lower all-cause mortality (HR 0.32, 95% CI [0.13–0.79]). Transplant free survival (TFS) was 17%, ICU mortality was 44% and hospital mortality was 46%. The main causes of death were shock (6%, 43% due to infection) and cerebral edema (27%). In a multivariate analysis adjusting for confounding factors, performing LT (OR 0.05, 95% CI [0.001–0.65]) and using N-acetylcysteine (NAC) protocol (OR 0.04, 95% CI [0.001–0.58]) were associated with lower ICU mortality. SAPS, APACHE-II and MELD-Na and KKC were not significantly associated with mortality or need for transplant.
Conclusions: We found an increase in unknown etiology and viral hepatitis. Mortality remains high and similar to previous data. LT and NAC were associated with lower mortality. TFS was low and scores were not independently associated with LT.

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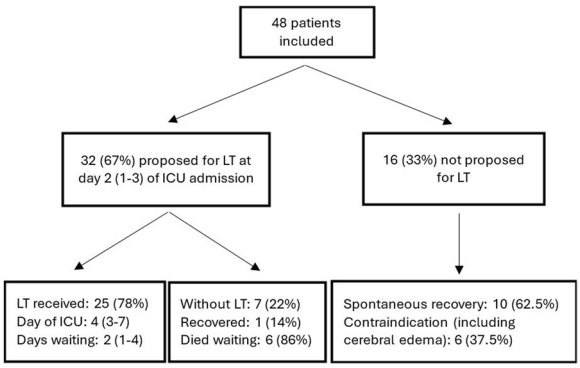

Figure (abstract P037) Liver transplant in ALF patients admitted to our ICU

P038

Model of end stage liver disease (MELD) score and impact on mortality and length of stay in intensive care unit post liver transplant

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Introduction: The impact of Model for End Stage Liver Disease (MELD) score on postoperative morbidity and mortality remains a subject of debate, particularly in patients with high MELD score. While some studies suggest that higher MELD scores are associated with poorer outcomes in liver transplant recipients, others report no significant influence on survival. We conducted a retrospective analysis of 107 consecutive liver transplant recipient over 12 month period focusing on the relationship between MELD score and length of stay in ICU [1].
Methods: We conducted a retrospective review of all consecutive liver transplant recipients at our hospital between January 2023 and December 2023. We followed these patients and divided them based on their MELD score to mild, moderate, severe, and significant. The primary end point was to investigate the one year mortality and length of ICU stay.
Results: A convenience sample of 107 patients met the inclusion criteria. There was no crude mortality occurred during the study period.

The length of ICU stay was significantly different between the groups using Kruskal–Wallis test (Table). The post-hoc analysis indicated that those with severe MELD score had significantly longer hospital length of stay when compared to mild MELD ($p = 0.033$) and moderate MELD ($p = 0.015$).
Conclusions: Higher MELD scores are associated with longer ICU stays after liver transplantation due to increased preoperative severity of the illness and complications like acute kidney injury. Patients with MELD scores above 35 are prone to prolonged ICU stays. This emphasizes the need for tailored postoperative care for patients with elevated MELD scores [2].

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Table (abstract P038) Effect of MELD score severity on LOS in ICU

	Mild MELD	Moderate MELD	Significant MELD	Severe MELD	*p* value
Length of ICU stay	4 (3–5)	4 (3–6)	5 (3–8)	7 (5–7)	0.031

P039

One-year review of liver transplant outcomes in a major tertiary center in the Middle East

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Introduction: Liver transplantation is a critical treatment for end-stage liver disease and acute liver failure but comes with significant postoperative risks. Early complications include primary graft dysfunction, acute rejection, and infections due to immunosuppression, while long-term issues may involve chronic rejection, metabolic disorders, and recurrence of the underlying liver disease. These challenges necessitate close monitoring and comprehensive postoperative care to improve patient outcomes [1].
Methods: We conducted a retrospective review of 107 consecutive patients who underwent liver transplantation within a one-year period. Our primary end point was to investigate the ICU length of hospital stay, and the incidence of postoperative complications, including return to theatre within 30 days post transplant and the post operative incidence of acute kidney injury (AKI) and those required renal replacement (RRT) therapies.
Results: A convenience sample of 107 patients met the inclusion criteria. The post liver transplant ICU length of stay was a median of 4 (3–6) days. Eleven patients returned to theater for various reasons during their ICU stay. Twenty-one patients developed AKI in the postoperative period with 10 (9.3%) required RRT (Table).
Conclusions: Postoperative complications following liver transplantation are common and can significantly affect patient outcomes and contribute to high morbidity and mortality, especially within the first-year post-transplant [2]. Early detection and management of these issues are crucial for improving survival rates and reducing the need for re-transplantation.

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Table (abstract P039) Postoperative complications post-liver transplant surgery

	Mild MELD (%)	Moderate MELD (%)	Significant MELD (%)	Severe MELD (%)	*p* value
Developed AKI	3 (23.1)	9 (16.7)	5 (15.2)	4 (57.1)	0.07
Required CRRT	1 (7.7)	4 (7.4)	1 (3)	4 (57.1)	< 0.001
Returned to theater	1 (7.7)	6 (11.3)	3 (9.1)	1 (14.3)	0.96

P040

Beyond the first liver: the outcomes of liver retransplantation

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Introduction: This study explores the outcomes of liver retransplantation (rLT) and risk factors for mortality in these patients. Liver retransplantation is the therapeutic option for irreversible graft failure. The risk factors include recipient, donor, and prior transplant factors. Given that organs are a finite resource, optimizing patient outcomes is crucial.
Methods: We conducted a retrospective analysis of rLT patients admitted between January 1, 2022, and December 31, 2023. Data were extracted from hospital records, and statistical analysis was performed using SPSS v27 with a significance level of 0.05.
Results: Out of the 155 patients admitted after liver transplantation, we included the 36 cases of rLT. The time since primary liver transplant (pLT) ranged from 1 day to 30 years (mean 5.87 years ± 8.331), with 50% occurring within the first year and 33% within the first 3 months. The leading indications for pLT were viral (25.0%) and alcoholic (19.4%) cirrhosis, with 83.3% being elective. The most common indication for rLT was ischemic cholangiopathy (25.0%), thrombotic complications (19.4%), and chronic rejection (19.4%). Donor age was higher than average in cases of primary non-function (mean 72.3; median 69.0) and ischemic cholangiopathy (mean 70.4; median 73.5). Unlike pLT, rLTs were mostly urgent, with higher MELD-Na scores, higher prevalence of ALF/ACLF, and active infection. Eight patients required subsequent rLT. ICU mortality was 13.9%, while hospital mortality reached 25.0%. ALF/ACLF at pLT, urgent pLT, and transfusion of > 30 fresh frozen plasma units during rLT significantly correlated with ICU and hospital mortality. Higher MELD-Na and longer ICU stays at rLT also impacted hospital mortality.
Conclusions: These findings highlight the impact of the recipient's clinical status and the complexity of scenarios encountered in rLT. A deeper understanding of these factors is key for improving outcomes, underscoring the need for further research.

P041

The national burden of cirrhosis in ICU of China in 2023: a cross-sectional study

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Introduction: We analyzed the current condition of liver cirrhosis, which ranks as the 11th leading cause of death and accounts for about 4% of all deaths globally, in ICU of China in 2023.
Methods: Data of all patients with liver cirrhosis admitted to ICUs in mainland China in 2023 was collected from Hospital Quality Monitoring System (HQMS). The study included patients' demographic characteristic, medical record and prognosis information. The clinical characteristics of these patients and risk factors of cirrhosis were analyzed by comparing prognoses across variables such as gender, age and regional difference.
Results: This study encompassed a total of 4,418,408 ICU patients with liver cirrhosis in mainland China in 2023, including 90,817 patients with cirrhosis and 4,327,519 patients without cirrhosis. Of the 90,817 cirrhosis patients, 38,934 were diagnosed with decompensated cirrhosis. The proportion of male patients in the cirrhosis group was higher at 71.34% ($p < 0.001$). The primary cause of liver disease was viral cirrhosis in China. Compared to non-cirrhosis patients, cirrhosis patients had a significantly higher incidence of shock (27.59% vs 10.63%, $p < 0.001$), especially hypovolemic shock and had a worse prognosis. The proportion of cirrhosis patients was greater in the southern region, while the in-hospital mortality rate among cirrhosis patients was higher in the northern region. Factors such as advanced age, elevated Charlson Comorbidity Index (CCI), using of invasive mechanical ventilation (IMV), as well as the presence of sepsis and shock were significantly associated with an increased risk of mortality.
Conclusions: This study has the largest sample size to date and is the first epidemiological study to investigate the national burden of liver cirrhosis in ICU of China. Future interventions aim at reducing cirrhosis hospital-mortality should focus on male patients, advanced age, the prevention of viral hepatitis and individuals with higher CCI.

P042

Multidrug-resistant organisms in acute-on-chronic liver failure: risks and mortality

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Introduction: Acute-on-chronic liver failure (ACLF) is marked by acute decompensation, systemic inflammation, and organ failure, with high short-term mortality [1,2]. MDROs often trigger or complicate ACLF, worsening outcomes through systemic inflammation and immune dysfunction. This study assessed the impact of MDRO colonization and infection on mortality and explored associated risk factors [1,2].
Methods: A retrospective cohort study on ACLF patients admitted to a tertiary ICU in Zagreb, Croatia evaluated MDRO colonization, and documented MDRO infections. Clinical, demographic, and laboratory data were collected, along with severity (MELD) and organ failure scores (SOFA, CLIF-ACLF).
Results: The cohort included 80 patients (median age 60.4 years, 71.3% male) with alcohol-associated liver disease (83.8%) as the leading etiology. MDRO colonization and infections were observed in 26 patients (32.5%), with infections more common in those colonized at ICU admission ($p < 0.001$). Multivariate logistic regression identified diabetes (OR = 10.52, $p = 0.005$) and hospital admission within three months (OR = 8.04, $p = 0.006$) as risk factors for colonization, while chronic viral hepatitis was protective (OR = 0.085, $p = 0.043$). MDRO colonization at ICU admission (OR = 42.21, $p < 0.001$), lactulose use (OR = 4.46, $p = 0.044$), and younger age (OR = 0.93, $p = 0.039$) were risk factors for MDRO infection. Neither MDRO colonization nor infection was linked to 28-day mortality in ACLF patients, whereas higher ACLF grades predicted worse survival ($p = 0.007$).
Conclusions: These findings support the prognostic importance of ACLF grade over MDRO colonization or infection in predicting mortality, suggesting that once severe organ dyfuncton develops, the impact on MDROs on survival diminishes. This emphasizes the critical need for early prevention and treatment of infections to avoid their role in triggering or exacerbating organ dysfunction in ACLF patients.

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P043

Infections in acute-on-chronic liver failure: a critical challenge in ICU care

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Introduction: Acute-on-chronic liver failure (ACLF) is characterized by systemic inflammation, and immune dysfunction, increasing the risk for severe infections. Multidrug-resistant (MDR) organisms are becoming more frequent and have exacerbated treatment failure and hospital mortality rates [1].
Methods: Retrospective cohort of 59 cirrhotic patients admitted to ICU over 48 months. Baseline characteristics, acute outcomes, infections at admission or during ICU stay and microbiology data were analyzed.
Results: Median age was 56 years. Alcoholic cirrhosis accounted for 49% of the etiologies, followed by coexisting hepatitis C and alcoholic liver disease (15.3%) and non-alcoholic fatty liver disease (8.5%). Infection was the leading cause of decompensation (39%), followed by gastrointestinal bleeding (16.9%). Median SAPSII, SOFA, and MELD scores were 49, 13, and 29, respectively, with 81% classified as ACLF grade 2 or 3. Median ICU and hospital length of stay were 9 and 32 days. We recorded 74 infections, 58% nosocomial. Lower respiratory tract infections (33%) and spontaneous bacterial peritonitis (23%) predominated. Among the 62 pathogens isolated, 85% were bacterial, 68% being Gram-negative. MDR bacteria caused 20% of infections, with 33% of E. coli producing ESBL, 33% of *Klebsiella pneumoniae* producing ESBL and 42% carbapenemases. 62% of empirical antibiotics were adequate, with piperacillin/tazobactam being the most common (59%). ICU and hospital mortality rates were 49% and 69%. Higher MELD score independently predicted ICU mortality (RR 1.1; 95% CI 1.0–1.2, $p < 0.05$), while MDR isolates and infection sites did not.
Conclusions: Infections remain a challenge despite advances in critical care. The severity of liver failure may prevail over infection control in terms of patient outcomes even with proper antibiotherapy.

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P044

Validation of the Augmented Renal Clearance in Trauma Intensive Care (ARCTIC) scoring system for screening augmented renal clearance among adult critically ill trauma patients in Thailand: preliminary results analysis

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Critical Care 2025, **29(S1)**:P044

Introduction: Augmented renal clearance (ARC) is a condition of enhanced renal clearance. This makes conventional dosing regimens for renally eliminated medications challenging, potentially leading to therapeutic failures. The ARCTIC score, developed to identify trauma patients at high risk of ARC (ARCTIC score ≥ 6), addresses the underestimation of eGFR equations. This study aims to validate the ARCTIC score in the Thai trauma intensive care unit (TICU) setting.
Methods: We conducted a prospective observational study of patients aged ≥ 18 years admitted to a TICU in Chiang Mai, Thailand. The primary objective was validation of the ARCTIC score as compared to measured creatinine clearance (mCrCl). A 24-h urine collection was performed for mCrCl. Patients were defined as having ARC if mCrCl ≥ 130 mL/min/1.73 m^2. The secondary objective was determining the optimal cut-off point for CrCl and GFR calculations. Calculations for CrCl by Cockcroft-Gault (CrCl-CG) and eGFR by both CKD-EPI 2009 and 2021 were done for each patient. The reliability of the ARCTIC score and calculated eGFR and CrCl equations to identify high-risk patients were assessed with the Receiver Operating Characteristic (ROC) analysis.
Results: The preliminary analysis included 43 TICU patients. Most were male (90.7%) with a median age of 39 years (IQR 25–48). A total of 30 (70%) patients were confirmed to have ARC, with a mean mCrCl of 167 ± 31 mL/min/1.73 m^2. For the primary outcome, the area under the ROC curve for the ARCTIC score was 0.829, with a sensitivity of 93% and specificity of 31%. For the secondary outcome, the optimal cut-off points for CrCl-CG, CKD-EPI 2009 and 2021 were 118, 108 and 112 with a sensitivity of 77%, 90%, 87%, and specificity of 85%, 69%, 69% respectively.
Conclusions: The preliminary results showed that the ARCTIC score performed well in discriminating ARC patients in Thai TICU and optimal cut-off values for CrCl-CG, CKD-EPI 2009 and CKD-EPI 2021 were able to be determined.

P045

Defying the odds: management of complement mediated thrombotic microangiopathy complicated with multiorgan failure in the ICU—a case series

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Introduction: Complement-mediated thrombotic microangiopathy (CM-TMA) is a rare, life-threatening disorder, characterized by endothelial injury and microvascular thromboses, triggered by complement dysregulation [1]. Clinical presentation typically includes hemolytic anemia, thrombocytopenia and kidney failure, but it can progress into multiorgan failure and death. Heterogenous presentation and lack of specific markers can delay the diagnosis and treatment. Complement inhibitors, such as eculizumab improve survival even in most severe cases and can lead to complete recovery [2]. This study aims to present a series of patients with acute organ failure due to CM-TMA, treated in the medical ICU.
Methods: We analyzed the demographics, initial presentation, diagnostic procedure, treatment, outcome, and complications of patients admitted to the ICU with acute organ dysfunction and suspected CM-TMA over a 2-year period (2022–2024). All patients gave informed consent.
Results: Seven patients (2 M, 5 F), median age 25 years (IQR 10), were admitted to the ICU with hemolytic anemia, thrombocytopenia and acute renal failure. ADAMTS13 was mildly decreased, Shiga toxin *E. coli* was negative, sepsis was ruled out. CM-TMA was suspected based on clinical presentation and supported by complement analysis. Pregnancy was trigger in 3/7, COVID-19 in 1/7, infection in 3/7 patients. 4/7 patients required hemodialysis, 2/7 prolonged mechanical ventilation. 5/7 patients were treated with eculizumab. Two patients with complement MCP mutation of CD 46, recovered with plasma exchange and symptomatic therapy. All survived improved kidney function.
Conclusions: CM-TMA is a life-threatening disorder that can lead to multiorgan failure. Rapid recognition and timely initiation of complement inhibitors can limit organ damage, allow survival and organ function recovery. The recovery can be long, and the duration of complement inhibitor treatment remains to be defined.

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P046

Combination of urinary biomarkers can predict cardiac surgery-associated acute kidney injury: a systematic review and meta-analysis

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Critical Care 2025, **29(S1)**:P046

Introduction: Acute kidney injury (AKI) develops in 20–50% of patients undergoing cardiac surgery (CS). We aimed to assess the predictive value of urinary biomarkers (UBs) for predicting CS-associated AKI.
Methods: All clinical studies reporting on the diagnostic accuracy of individual or combined UBs were eligible for inclusion. We searched three databases (MEDLINE, EMBASE, and CENTRAL) without any filters or restrictions on the 11th of November, 2022. Random and mixed effects models were used for meta-analysis. The main effect measure was the area under the Receiver Operating Characteristics curve (AUC) with 95% confidence intervals. Our primary outcome was thepredictive values of each individual UB at different time point measurements to identify patients developing acute kidney injury (KDIGO). As a secondary outcome, we calculated the performance of combinations of UBs.
Results: We screened 10,763 records and included 89 articles (both randomized and non-randomized studies) in the analysis. The predictive value of UBs measured in the intraoperative and early postoperative period was at maximum acceptable, with the highest AUCs of 0.74 [0.68, 0.81], 0.73 [0.65, 0.82] and 0.74 [0.72, 0.77] for predicting severe CS-associated AKI, respectively. To predict all stages of CS-associated AKI, UBs measured in the intraoperative and early postoperative period yielded AUCs of 0.75 [0.67, 0.82] and 0.73 [0.54, 0.92]. To identify all cases and severe cases of acute kidney injury, combinations of any two UB measurements outperformed any single measurement with AUCs of 0.82 [0.75, 0.88] and 0.85 [0.79, 0.91] for all cases and severe cases, respectively. Combining three or more biomarkers, however, did not improve the predictive value.
Conclusions: The combination of any two urinary biomarker measurements leads to the highest accuracy for predicting cardiac

surgery-associated acute kidney injury. Prompt and accurate evaluation of CS-associated AKI might lead to better patient outcomes.

P047

Cost-effectiveness of perioperative amino acid therapy as renal protection

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Critical Care 2025, **29(S1)**:P047

Introduction: Acute kidney injury (AKI) frequently occurs after cardiac surgery, and is independently linked to increased morbidity and mortality [1,2]. A recent meta-analysis found that intravenous amino acids (AA) likely reduces the incidence of AKI in surgical patients [3], but their cost-effectiveness remains unknown. We conducted an economic evaluation to evaluate the cost-effectiveness of AA therapy versus placebo (as a proxy for standard of care) among adult patients undergoing surgery.
Methods: We conducted a cost-effectiveness analysis using a decision analytical model to simulate and compare outcomes from a healthcare payer perspective using an in-hospital time horizon. We used costs and outcomes from the published literature to calculate the cost per case of AKI avoided. The patient trajectory included intensive care unit (ICU) stay (including renal replacement therapy), hospital ward stay, and discharge or death. Costs did not include the surgical procedure cost. In addition to length of stay, resource use included units of blood transfused. Model parameters were extracted from the literature, and unit costs were identified for Australia, China, Italy, United Kingdom, and the United States (US). Costs were inflated using a GDP index and converted to US Dollars 2022 using OECD power purchasing parity values [4]. Bootstrapping with repeated random sampling was used to establish the expected total costs and 95% confidence intervals.
Results: The use of amino acids resulted in lower costs and fewer cases of AKI, resulting in a dominant incremental cost-effectiveness ratio (Table) in all countries compared to placebo. Length of ICU and ward stay and units of FFP and RBCs had the greatest impact on the probability of cost-effectiveness.
Conclusions: Amino acids are cost-saving and cost-effective regarding the avoidance of AKI cases among adult perioperative patients.

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Table (abstract P047) Modelled cost-effectiveness of perioperative amino acids versus placebo for the treatment of surgical patients, by country (costs are reported in United States Dollars 2022).

Country	Cost of treatment with Amino Acids, mean (95% CI)	Cost of treatment with Placebo, mean (95% CI)	Incremental effect	Incremental cost-effectiveness ratio
Australia	$20,421 ($19,805, $21,061)	$22,223 ($21,475, $23,014)		
China	$1,886 ($1,790, $1,982)	$2,075 ($11,955, $2,201)		
Italy	$14,515 ($14,031, $15,013)	$15,766 ($15,202, $16,386)	5.4% cases of acute kidney injury avoided	Dominant (lower cost, higher benefit)
United Kingdom	$10,690 ($10,182, $11,241)	$11,727 ($11,134, $12,335)		
United States	$38,334 ($37,470, $39,162)	$41,131 ($40,155, $42,017)		

P048

The association between cardiac surgery-associated acute kidney injury and elevated liver function tests in the ICU. A retrospective single center cohort study

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Critical Care 2025, **29(S1)**:P048

Introduction: Cardiac surgery associated-acute kidney injury (CSA-AKI) occurs in up to 30% of patients [1]. Various pathophysiologic pathways are responsible for AKI and elevated transaminases [2,3]. The purpose of this study was to evaluate the association between elevated liver function tests and CSA-AKI in the ICU.
Methods: In this retrospective, single center, cohort study in a tertiary care hospital (Ghent University Hospital, Belgium) adult patients were included who were admitted to the ICU after cardiac surgery from 2012 until 2017. Data about kidney function and aspartate aminotransferase (AST) and alanine aminotransferase (ALT) were collected. AKI was defined by the KDIGO definition. The primary endpoint was the association of transaminases 12 h (h) (+4 h) and the CSA-AKI occurrence within 72 h, both after ICU admission. The secondary endpoint was the association between the transaminases and the severity of AKI (AKI stage $\geq$2 and renal replacement therapy (RRT)). We calculated the area under the receiver operating characteristic curve (AUROC) with 95% confidence interval (CI). The odds ratio was calculated for AKI based on the cut off value of transaminases by the Youden index and adjusted for age, gender, CKD, hypertension (HT), peripheral vascular disease (PVD) and diabetes (DM).
Results: A total of 3415 patients were included. Compared to non-AKI patients, AKI patients were significant older (65 y; 69 y (SD 11.4)), had more CKD (14.1%; 24.9%), DM (18.4%; 24.8%), HT (39,6%; 48.2%) and PVD (8.5%; 13%). The AUROC, cut off value and adjusted OR for the different AKI endpoints are reported in the Table.
Conclusions: AST12, but not ALT12, was poorly associated with AKI, and there was a fair association with RRT. When AST12 was above 69 U/L, the risk for RRT was almost 6 times higher.

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Table (abstract P048) Results

		AKI 95% CI; *p*-value	AKI ≥ 2 95% CI; *p*-value	RRT 95% CI; *p*-value
AST12	AUROC	0.568 (0.548–0.588); $p<0.001$	0.567 (0.546–0.587); $p<0.001$	0.751 (0.733–0.768); $p<0.001$
	Cut off (U/L)*	>47	>40	>69
	Adj. OR**	1.68 (1.36–2.07); $p<0.001$	1.58 (1.32–1.90); $p<0.001$	5.87 (3.75–9.18); $p<0.001$
ALT12	AUROC	0.504 (0.483–0.524); $p=0.765$	0.501 (0.480–0.521) $p=0.964$	0.591 (0.571–0.611); $p=0.009$
	Cut off (U/L)*	>42	>9	>45
	Adj. OR**	1.49 (1.19–1.86); $p<0.001$	0.70 (0.52–0.94); $p=0.016$	5.37 (3.23–8.92); $p<0.001$

AKI: acute kidney injury defined by serum creatinine and urine output criteria of KDIGO; AKI > 2: acute kidney injury stage 2 or higher; RRT: renal replacement therapy; CI: confidence interval; AST12/ALT12: aspartate aminotransferase/alanine aminotransferase at 12 h after ICU admission; AUROC: area under the receiver operating characteristic curve. *Cut off is the associated criterion by the Youden index of the AUROC analysis. ** Adjusted odds ratio for CKD, HT, age, gender, PVD and DM.

P049

Renal resistive index and lung ultrasound for early AKI prediction in mechanically ventilated patients

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Critical Care 2025, **29(S1)**: P049

Introduction: The interplay between lung and kidney is well-recognized in the critically ill, with mechanical ventilation (MV) inducing hemodynamic changes that can impair renal function [1]. However, the early prediction of AKI (acute kidney injury) remains challenging. This study aimed to assess the utility of a combined Lung Ultrasound Score (LUS), Doppler-derived Renal Resistive Index (RRI) and Venous Excess Ultrasound Score (VExUS) evaluation in predicting AKI, in mechanically ventilated patients.
Methods: This prospective cohort study included adult patients on MV within the first 24 h of ICU admission. We excluded postoperative status, advanced chronic kidney failure and AKI at admission. LUS, RRI, and VExUS were measured at enrollment. Patients were compared regarding their progression to AKI and mortality.
Results: In total, 144 patients were enrolled, of whom 66 (45.8%) developed AKI. LUS and RRI were significantly higher in patients who developed AKI (7.27 ± 5.02 vs 4.78 ± 4.81, $p=0.002$ and 0.669 ± 0.107 vs 0.625 ± 0.08, $p=0.008$ respectively), but VExUS was not ($p=0.6495$). LUS and RRI were also higher in patients who died, compared to survivors (7.02 ± 4.92 vs 5.30 ± 5.04, $p=0.024$ and 0.668 ± 0.1 vs 0.632 ± 0.091, $p=0.04$ respectively). The area under the ROC curve (AUROC) for LUS in predicting AKI was 0.6517. For RRI, the AUROC was 0.6366, with a cutoff value of 0.642 achieving a sensitivity of 62.5% and a specificity of 63%. Binary logistic regression combining RRI and LUS showed an AUROC of 0.683 for predicting AKI (Figure). Spearman's correlation coefficient between LUS and RRI was 0.21 ($p=0.017$).
Conclusions: Early assessment combining LUS and RRI may help to predict AKI in mechanically ventilated patients. The lack of association between VExUS and AKI suggests that simultaneous renal and pulmonary inflammatory activity, rather than venous congestion, could explain our findings. Larger studies are needed to validate these results.

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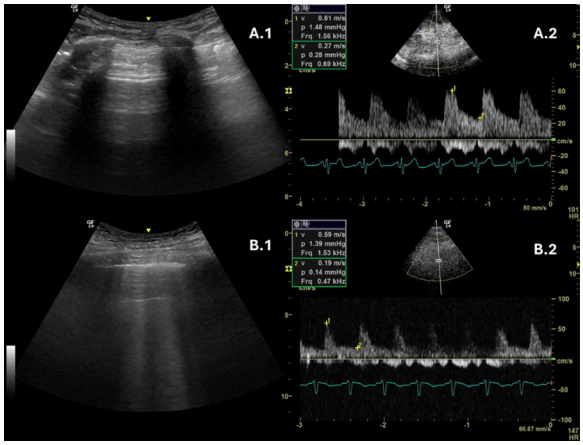

Figure (abstract P049) 1: Examples of LUS and RRI measurements are shown for a patient who did not develop AKI (A) and a patient who did (B). In A.1, the LUS score is 0 (final score of 0 for patient A). In B.1, the LUS score is 3, contributing to a final score of 14 for patient B. For RRI measurements, patient A had a value of 0.563 in A.2, while patient B had a value of 0.6846 in B.2

P050

Influence of creatinine clearance on linezolid target attainment in critically ill patients

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Critical Care 2025, **29(S1)**:P050.

Introduction: Linezolid (LNZ) is an antibiotic used to treat infections caused by methicillin-resistant Staphylococcus aureus (MRSA) and Enterococcus. The effect of renal function on linezolid clearance is still a matter of controversy with some studies showing no relationship [1] and others the contrary [2]. This study aims to evaluate the influence of the creatinine clearance (CrCL) on critically ill patients who received treatment with LNZ.
Methods: Retrospective and observational study at a tertiary hospital, between 11/2022 and 08/2024. Critically ill patients who received a therapeutic dose of LNZ (600 mg q12h) were included and therapeutic drug monitoring (TDM) was performed. To determine LZD exposure, minimum (Cmin) and maximum concentrations (Cmax) were measured after a minimum of 3 treatment administrations. Normal therapeutic range of linezolid was considered between 24 h-AUC levels of 200–400 mg*h/L. An analysis of CrCL influence was performed, by comparing 3 groups, (A) CrCL < 60 mL/min, (B) CrCL ≥ 60 < 130 mL/min, and (C) CrCL ≥ 130 mL/min.
Results: A total of 96 patients were included, 50% were surgical patients. Median SOFA Score was 11.0 [9.0–13.0], mean APACHE II was 26.8 ± 7. The median CrCL was 50.6 [29.7–82.8] mL/min, with 60%, 30% and 9% of the patients having CrCL < 60 mg/dL, 60–130 and > 130 mg/dL, respectively. The median linezolid 24 h-AUC was 154.0 [97.0–260.0] (Table). All groups based on renal function showed significant differences on age and body mass index, nearly half had AUC in the desired range. Group C, corresponding to augment renal clearance (ARC) had a higher proportion of underdose AUC. There were no cases of overdosed linezolid levels, but without statistical significance.
Conclusions: Patients with ARC have a tendency for decreased linezolid levels, compared to patients with normal or decreased renal

function, and TDM should be considered to minimize the risk of therapeutic failure.

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Table (abstract P050) Results

	Total N = 96	Group A N = 58	Group B N = 29	Group C N = 9
Age (years); [IQR]	67.5 [56.0–76.8]	69.5 [56.0–77.3]	70.0 [59.0–77.5]	55.0 [52.0–57.0]
Body mass index (kg/m^2); [IQR]	29.5 [27.2–33.4]	28.8 [27.0–31]	30.5 [27.6–33.7]	34.0 [30.0–42.5]
APACHE II; Mean ± SD	26.8 ± 7.6	27.2 ± 6.5	27.1 ± 8.0	22.6 ± 11.7
SOFA Admission; median [IQR]	11.0 [9.0–13.0]	11.0 [9.0–13.2]	10.0 [9.0–11.0]	9.0 [7.5–12.0]
CrCL median [IQR]	50.6 [29.7–82.8]	37.6 [20.5–46.0]	83.6 [72.1–101.9]	158.2.0 [147.2–185.7]
AUC; median [IQR]	154.0 [97.0–260.0]	145.0 [92.5–274.5]	206.0 [110.5–291.0]	105.0 [78.0–199.0]
AUC range; N (%)				
Normal dose	49 (51.0%)	29 (50.0%)	15 (51.7%)	5.0 (55.6%)
Underdose	23 (24.0%)	14 (24.1%)	5 (17.2%)	4.0 (44.4%)
Overdose	24 (25.0%)	15 (25.9%)	9 (31.0%)	0.0 (0.0%)

IQR—Interquartile range.

P051

Cystatin C derived measures of renal function as risk factors for mortality and renal replacement therapy in the critically ill—an analysis of the SWECRIT cohort

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Critical Care 2025, **29(S1)**:P051

Introduction: The main objectives of this study were to validate our previous finding that cystatin C derived measures of kidney function are associated with mortality in septic intensive care unit (ICU) patients, and assess if a similar association can be detected in non-sepsis patients.
Methods: Retrospective study of the SWECRIT cohort which collected ICU admission blood samples in adult patients in southern Sweden, 2015–2018. Patients staying > 24 h were included. Outcomes were mortality (90-day, 1-year). Blood samples were analyzed for cystatin C (cysC) and creatinine (crea). Associations were assessed with Cox regression and adjusted according to a prepublished analysis plan for age, sex, SAPS-3, mechanical ventilation, CKD, septic shock and estimated glomerular filtration rate (eGFR) based on crea. A reduced ratio of eGFRcysC/eGFRcrea < 0.6 defined shrunken pore syndrome (SPS).
Results: We included 4455 patients, of which 32% had sepsis. SPS was present in 7.4%. Mortality at 90 days and 1 year was 31% and 38% respectively. In sepsis- and non-sepsis patients, eGFRcysC and SPS were associated with 90-day and 1-year mortality in unadjusted analyses. In sepsis, SPS was associated with 1-year mortality in the adjusted analysis (hazard ratio 1.4, 95% confidence interval 1.1–1.9, $p = 0.021$, Figure).
Conclusions: SPS was more robustly associated with mortality in sepsis, suggesting that the impact of SPS on mortality could depend on underlying pathophysiology.

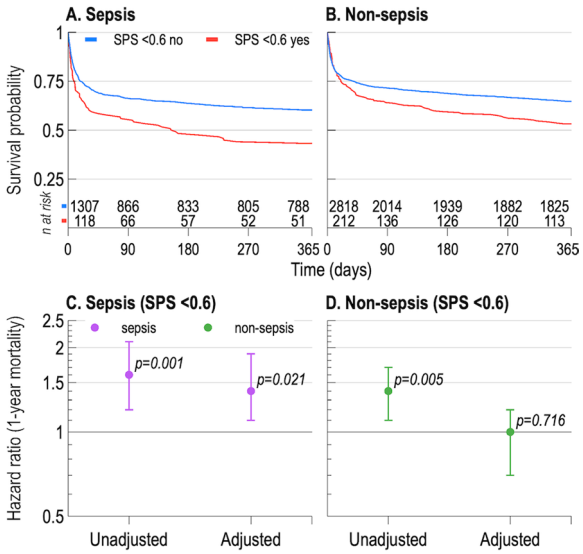

Figure (abstract P051) Panels A, B: Kaplan Meier survival curves, septic and non-septic patients. Panels C, D: Hazard ratios from Cox regression, outcome 1-year mortality, point estimates with 95% confidence intervals, septic and non-septic patients with shrunken pore syndrome (SPS, cut off 0.60), logarithmic y axis with reference 1.0 (no SPS). Analyses adjusted for age, sex, SAPS-3 score, invasive ventilation, septic shock at admission, chronic kidney disease, eGFRcrea, SPS-models also adjusted for eGFRcysC

P052

Does the time between acute kidney injury and continuous renal replacement therapy initiation impact outcomes in critically ill children?

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Critical Care 2025, **29(S1)**:P052

Introduction: Early dialysis initiation in critically ill adults with acute kidney injury (AKI) is associated with adverse events without improved outcomes. While observational evidence in children indicated that starting continuous renal replacement therapy (CRRT) more than 48 h after ICU admission is associated with worse outcomes, using ICU admission as time zero to instead of AKI diagnosis does not capture the true duration of renal dysfunction. We aimed to examine how the time between AKI onset and CRRT initiation impacted outcomes in critically ill children.
Methods: Observational study of critically ill children receiving CRRT from 2/2014 to 2/2020 at Texas Children's Hospital, excluding those with chronic kidney disease or ingestions. AKI was diagnosed using KDIGO criteria for urine output (< 0.5 mL/kg/hr for > 12 h (AKI-UOP)), serum creatinine (> 2 × increase from baseline (AKI-Cr)), and fluid overload (FO) > 15% as per PODIUM guidelines. AKI duration was the sum

of the days with AKI-Cr, AKI-UOP, and FO before CRRT initiation. The primary outcome was dialysis-free days censored 30 days post-CRRT initiation.
Results: 231 patients with a median age of 55.7 months (11.5–155), a median FO at CRRT start of 9.4% (1.2–26.2) and a median of 17 dialysis-free days (3–25) were included. In adjusted analysis patients who received extracorporeal membranous oxygenation [β 4.58 (0.70–8.45)] and those with higher vasoactive inotropic scores [β 0.13 (0.05–0.21)] had more dialysis-free days, whereas those with a longer AKI duration [β −0.69 (−1.17 to −0.22)] and more organ dysfunction had fewer CRRT-free days (Table).
Conclusions: In critically ill children receiving CRRT, a longer time between AKI diagnosis and CRRT initiation is associated with fewer dialysis-free days. Our findings suggest that adult literature on the timing of dialysis might not apply to critically ill children. Further research is needed to validate these findings and determine the optimal timing for dialysis initiation in this population.

Table (abstract P052) Adjusted analyses for CRRT-free days

Variables	β-Coefficient	Confidence intervals
ECMO (Yes)	4.58	0.70–8.45
PMODS (Yes)	0.42	−2.52–3.36
Transplant (Yes)	−2.90	−6.20–0.41
AKI duration	−0.69	−1.17 to −0.22
VIS	0.13	0.05–0.21
Total organ dysfunctions at CRRT start	−3.29	−5.73 to −0.85
Age at ICU admission	−0.02	−0.06–0.02

P053

Hypomagnesemia in patients undergoing CRRT with regional citrate anticoagulation—a retrospective review ' the case for magnesium' in patients undergoing CRRT with regional citrate anticoagulation

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Critical Care 2025, **29(S1)**:P053

Introduction: Regional citrate anticoagulation (RCA) in CRRT works by chelation of calcium which is a prerequisite for the generation of thrombin, thereby effectively preventing the formation of clots within the CRRT circuit. However, the citrate complex does not discriminate against other bi-valent cations and could chelate magnesium. This has the potential for profound hypomagnesemia and associated adverse events in critically ill patients, leading to higher morbidity and mortality [1,2]. This study aims to appraise the pattern of hypomagnesemia and electrolyte replacement in patients undergoing CRRT.
Methods: This was a retrospective analysis of the incidence, magnitude, contributory and confounding factors and adverse effects of hypomagnesemia in patients undergoing CRRT with RCA in the period from July to December 2023. The frequency and pattern of magnesium replacement was also studied.
Results: In the 50 patients analyzed, there was a significant drop in magnesium levels with mean reduction of 0.26 mmol which corresponded to a drop of 22% on the percentage scale. The mean pre-filter Mg levels was found to be 1.12 (SD ± 0.26) and post filter Mg levels of 0.86 (SD ± 0.19). This was statistically significant with a *p*-value of < 0.001 (Table). The average magnesium replacement was 44 mmol (52 ± 31). Adverse events such as arrhythmia was noted in 12 patients (24%).
Conclusions: Hypomagnesemia has a significant correlation with CRRT using RCA and has potential for complications in our critically ill patients particularly the precipitation of cardiac arrhythmias. Judicious magnesium monitoring and replacement must be undertaken in critically ill patients undergoing CRRT with RCA to prevent adverse effects particularly in cardiac patients.

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Table (abstract P053) Pre and post filter magnesium

Reduction scale	Pre filter Mg Mean ± SD	Post filter Mg Mean ± SD	Reduction Mean (95% CI)	*p*-value
Original scale	1.12 ± 0.26	0.86 ± 0.19	0.26 (0.20, 0.32)	< 0.001

P054

Gibbs-Donnan effect across CRRT filters using Stewart's approach

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Critical Care 2025, **29(S1)**:P054

Introduction: The aim of the present in-vitro and in-vivo studies is to describe, using the physical–chemical approach, the acid–base impact of the Gibbs-Donnan effect across the filter during Continuous veno-venous hemofiltration (CVVH). Indeed, the presence of ionic-charged non-permeable molecules, such as albumin, within the filter generates an uneven distribution of ions across a semipermeable barrier, altering electrolytes' sieving coefficient (SC).
Methods: A PrismaMax machine with an AN69ST150 filter (Baxter) was used for both experiments. An in-vitro experiment was conducted using a 1-L reservoir filled with a mixture of 0.9% NaCl, 5% glucose, and 20% albumin. Albumin concentration was progressively raised through Slow Continuous Ultrafiltration with a weight loss of 500 mL/h. Fluid samples were simultaneously collected every 30 min from the sampling ports settled pre-filter, post-filter, and along the ultrafiltrate lines using a blood gas machine (Siemens Rapidpoint e500). A single-center, prospective, observational study was conducted on ICU patients requiring CVVH. Electrolyte variations across the filter were measured 5-min after CVVH start. Strong ion Difference (SID) and SC were calculated.
Results: During the in-vitro experiment, the SC of sodium (r:− 0.94, $p < 0.001$) and chloride (r: 0.88, $p < 0.001$) significantly varied linearly with the increase in albumin concentration. A positive association was found between the SIDpost filter and albumin concentration (β = 1.1, r = 0.77, $p = 0.003$) (Figure). In the in-vivo study, albumin concentration increased across the filter from 22 ± 5 to 31 ± 7 g/L, $p < 0.001$. SIDpre-filter (40 ± 4 mEq/L) resulted significantly higher ($p < 0.001$) than the SIDultrafiltrate (29 ± 3 mEq/L), and markedly lower than the SIDpost-filter (46 ± 4 mEq/L, $p < 0.001$).
Conclusions: This study demonstrated that impermeable charged molecules in the blood compartment of the filter linearly affected the SC of ions, altering the SID of the solution.

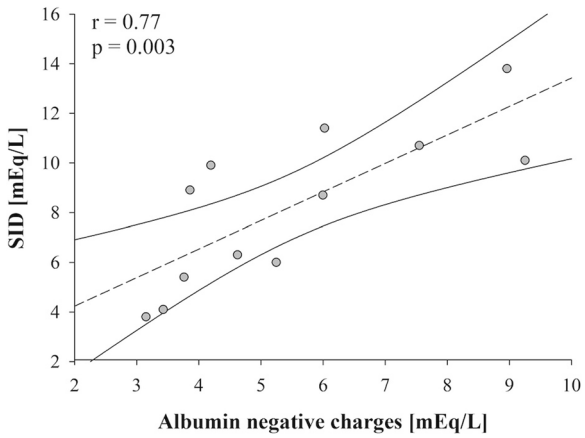

Figure (abstract P054) Relationship between post-filter strong ion difference (SID) and negative charges of albumin (β = 1.1, r = 0.77, $p = 0.003$)

P055

The underlying mechanism of platelet reduction in patients with continuous renal replacement therapy: a nationwide observational study in Japan

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Critical Care 2025, **29(S1)**:P055

Introduction: Continuous renal replacement therapy (CRRT) is essential for managing acute renal failure. Thrombocytopenia, commonly observed during CRRT, serves as an important marker of organ dysfunction and is included in major scoring systems. However, the mechanisms underlying platelet reduction during CRRT remain unclear. Suggested causes include disseminated intravascular coagulation (DIC) and mechanical damage from extracorporeal circuits, however, supporting evidence is limited. This study investigates the underlying mechanism of platelet reduction in patients with CRRT.
Methods: We conducted a retrospective observational study using the JMDC database in Japan. Patients who initiated CRRT within one week of hospitalization were included. Exclusion criteria included age under 18, missing platelet count data at admission or CRRT initiation, and death within 24 h of admission. Multivariate logistic regression was used to assess platelet reduction and its association with ISTH DIC.
Results: Among 3,235 patients included in this study, 58% had a ≥ 30% reduction in platelet count, while 42% had a reduction of < 30%. At CRRT initiation, only 283 patients (8.8%) met the ISTH DIC diagnostic criteria. The prevalence of ISTH DIC was similar between groups with platelet reductions of < 30% and ≥ 30% (8.6% vs. 8.9%, $p = 0.844$). Adjusted odds ratio for platelet reductions of ≥ 30% associated with the presence of ISTH DIC was 1.15 (95% CI, 0.74–1.78), indicating no significant association. A scatter plot of minimum platelet counts and maximum FDP levels during CRRT showed that 42.8% of patients exhibited platelet reduction without FDP elevation, suggesting the major mechanism of thrombocytopenia was not DIC with a hypercoagulable state.
Conclusions: Thrombocytopenia frequently occurred during CRRT, even in patients without DIC at CRRT initiation. The present study suggests that underlying mechanism other than DIC may significantly contribute to platelet reduction during CRRT.

P056

Effect of net ultrafiltration initiation strategies on clinical outcomes in patients with septic shock and renal replacement therapy. An observational analysis from the OUTCOMEREA multicenter cohort

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Critical Care 2025, **29(S1)**:P056

Introduction: Fluid overload (FO) is a frequent and serious complication in patients with septic shock and acute kidney injury (AKI) requiring renal replacement therapy (RRT). Net ultrafiltration (NUF) may help reduce FO, but its optimal timing in patients receiving vasopressors is still unclear [1]. We evaluated the effect of NUF initiation strategies on FO and clinical outcomes in patients with septic shock.
Methods: We conducted an analysis of the OUTCOMEREA prospective multicenter database, focusing on patients with septic shock requiring mechanical ventilation and RRT within 72 h of ICU admission. Patients were stratified based on norepinephrine infusion rates at the time of first NUF: high norepinephrine (≥ 0.5 µg/kg/min) and low norepinephrine (< 0.5 µg/kg/min). Primary outcome was FO at day 14. Secondary outcomes included ventilator-free days, length of stay, mortality, and RRT dependence. Tertiary outcomes evaluated life-threatening adverse events. We assessed these outcomes by subgroups of patients stratified by the SAPS II score on admission.
Results: Among 180 patients analyzed, 42 were in the high norepinephrine NUF group and 138 in the low norepinephrine NUF group (Table). Patients in the high norepinephrine NUF group exhibited lower FO at day 14, 12.4% [IQR: 0.5–30.2] compared to the low norepinephrine NUF group, 19.6% [IQR: 6.4–36] ($p = 0.03$). No significant differences were observed in ventilator-free days, length of stay, 30-day mortality, RRT dependence at day 90, or adverse events between groups. However, in patients with higher severity (SAPS II > 66), NUF initiation in the high norepinephrine group was associated with increased 30-day mortality, 61.1% vs. 36.1% ($p = 0.05$).
Conclusions: A strategy of initiating NUF with a high level of norepinephrine (greater than or equal to 0.5 µg/kg/min) provides better control of FO at day 14 in patients in septic shock, but without any obvious clinical benefit. However, this strategy was associated with higher mortality in the most severe patients.

Reference

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Table (abstract P056) Outcomes by norepinephrine dose at the initiation of net ultrafiltration

Characteristics	All (N = 180)	Low norepinephrine Net ultrafiltration (n = 138)	High norepinephrine Net ultrafiltration (n = 42)	*p* value
Fluid overload at day 14, %, median (IQR)	16.6 [4.8; 34.7]	19.6 [6.4; 36.0]	12.4 [0.5; 30.2]	0.03
Mortality at day 30, n (%)	69 (38.3)	50 (36.2)	19 (45.2)	0.29
Ventilator free days at day 30, median (IQR)	4.5 [0; 22.0]	5.5 [0; 22.0]	0.5 [0; 21.0]	0.24

Characteristics	All (N = 180)	Low norepinephrine Net ultrafiltration (n = 138)	High norepinephrine Net ultrafiltration (n = 42)	*p* value
ICU Length of stay in days, median (IQR)	14.0 [9.0; 23.5]	15.0 [9.0; 24.0]	12.5 [8.0; 23.0]	0.13
Need for RRT at day 90, n (%)	9 (5.1)	7 (5.1)	2 (5.1)	1.00
Ischemic complications during ICU stay	11 (6.1)	7 (5.1)	4 (9.5)	0.29
Mortality at day 30 in patients with SAPSII > 66,	37/90 (41)	26/72 (36.1)	11/18 (61.1)	0.05

P057

Introducing slow low efficiency daily hemodialysis (SLED): a quality improvement initiative looking at cost and quality metrics

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Critical Care 2025, **29(S1)**:P057

Introduction: SLED is the usual renal replacement therapy(RRT) modality in the larger of 2 hospitals in the trust. With potential cost saving & streamlined staff training, SLED was introduced at the second site in 2023 as the sole RRT modality. This 1 year quality improvement project outlines the qualitative & quantitative learning, quality metrics & the cost comparison with the former RRT modality continuous veno-veno hemodiafiltration (CVVHDf).
Methods: Using the plan do study act model SLED sessions were analyzed at intervals of 2 weeks, monthly, 3 and 6 months, reviewing:
• Compliance with trust SLED policy. SLED is prescribed and delivered by critical care team; 6 h duration, blood flow 150 mL/min, dialysate flow 300 mL/min, high flux dialysis filter with unfractionated heparin bolus' or infusion to sustain circuit lifespan. Deviations from this are directed by the Nephrologists but delivered and monitored by critical care
• Quality metrics—dose, timeliness, % circuit loss & blood transfusion, premature termination of SLED & delivery of ultrafiltration(UF)/SLED treatment targets
Results: From April 23–24, 133 SLED sessions were delivered.
• Unnecessary blood tests & anticoagulation infusion use reduced
• Improved compliance with SLED policy
• 89% SLED was timely (K < 6)
• Unplanned circuit loss reduced from 35 to 17% & 95% of blood was returned to the patient with no blood transfusion due to circuit loss
• Dose delivered—Median urea reduction ratio (URR) of 0.58/session. A URR of 0.69 for 3 sessions/week is recommended [1]
• 68% achieved the prescribed UF target & 73% SLED targets
• Costs—24 h of CVVHDF £250–425 v £50–70 for 6 h of SLED
Conclusions: Moving to SLEDD delivered timely, reliable, efficient acute dialysis at a significant cost saving.

Reference

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P058

From evidence to practice: declining use of renal replacement therapy in critically ill patients with acute kidney injury

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Critical Care 2025, **29(S1)**:P058

Introduction: Acute kidney injury (AKI) affects up to 50% of critically ill patients, often requiring renal replacement therapy (RRT). Significant advancements were made in the clarification of criteria for initiating RRT through large randomized controlled trials (AKIKI, IDEAL-ICU, STARRT-AKI). However, the impact of these trials on clinical practice remains underexplored. We hypothesize that the recent accumulation of high-quality data may have led clinician to reduce the use of RRT in critically ill patients with AKI.
Methods: This retrospective observational study analyzed data from the French CUB-Réa database (34 ICUs in the Paris area), using harmonized coding methods. Adult patients with AKI and who received invasive mechanical ventilation and/or catecholamine infusion were included. Patients with terminal chronic kidney disease (CKD), tumor lysis syndrome, or with intoxication requiring immediate RRT were not included. Temporal trends in RRT use were evaluated across three 4-year periods. Multivariate logistic regression assessed factors influencing RRT initiation.
Results: Among 48,518 ICU stays meeting inclusion criteria, RRT use declined significantly over the study period (from 39.3% in 2008–2011 to 36.6% in 2012–2015 and 34.9% in 2016–2019, $p < 0.001$) (Figure). Multivariate analysis confirmed this decrease (OR 0.90 [0.84–0.92] compared to baseline for 2012–2015 and 0.80 [0.77–0.85] for 2016–2019). Other factors associated with RRT use included CKD, male gender, chronic liver disease, heart and respiratory diseases, diabetes mellitus, and HIV infection.
Conclusions: The declining use of RRT over the last decade reflects the influence of high-quality evidence favoring conservative initiation strategies. These findings underscore the importance of aligning clinical practices with evolving evidence to optimize patient outcomes and resource allocation.

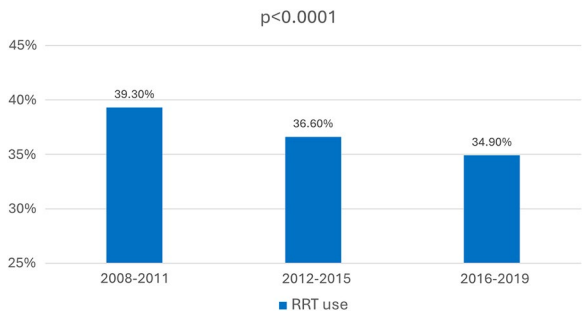

Figure (abstract P058) Evolution of renal replacement therapy use between 2008 and 2019

P059

Biomarkers to predict the need for renal replacement therapy in severe acute kidney injury: an ancillary analysis of a multicenter randomized controlled trial (MARKISIO study)

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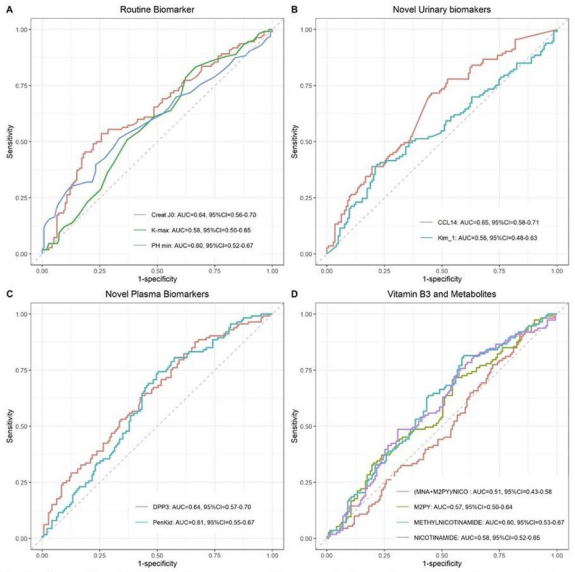
Critical Care 2025, **29(S1)**:P059

Introduction: Predicting the need for renal replacement therapy (RRT) in acute kidney injury (AKI) remains challenging. The utility of biomarkers was explored during previous studies which were biased as RRT indications relied on clinician opinion rather than evidence. Those studies preceded trials that clarified RRT initiation criteria. We aimed to assess biomarkers in predicting criteria for RRT initiation in severe AKI patients.
Methods: This is an ancillary study of the AKIKI2 trial [1]. Patients with severe AKI (stage 3) receiving invasive mechanical ventilation and/or vasopressors were included. Blood and urine samples were collected within 12 h after the occurrence of severe AKI. The primary endpoint was the onset of rigorous criteria for RRT initiation within 72 h after severe AKI. We analyzed routine serum biomarkers (pH, serum potassium, serum creatinine) and novel urinary and serum biomarkers (CCL14, KIM1, nicotinamide and its metabolites, cDPP3, plasma proenkephalin A 119–159).
Results: Among the 256 patients, 101 (39%) met at least one criterion for RRT initiation or died within 72 h. No biomarker demonstrated satisfactory predictive performance for the primary endpoint (Figure). Urinary CCL14 showed potential interest in toxic-induced AKI (AUC 0.74 [0.57–0.90]). No novel biomarker was significantly associated with the occurrence of MAKE60 (Major Adverse Kidney Event at day 60). In multivariate analysis, 'SAPSIII' and 'serum potassium level at D0' were significantly associated with the occurrence of MAKE60.
Conclusions: Neither routine nor novel biomarkers demonstrated conclusive predictive accuracy for the need for RRT in severe AKI patients. Given evidence-based criteria for initiating RRT, the tested biomarkers may not effectively guide RRT initiation.



Routine biomarkers (A) refer to pH, serum potassium concentration and serum creatinine concentration. Novel urinary biomarkers (B) refer to CCL14 and KIM1. Novel plasma biomarkers refer to DPP3 and PenKid (C). Nicotinamide (vitamin B3) and its metabolites are also considered as novel biomarker but are presented separately (D).
RRT: renal replacement therapy

Figure (P059) Area under the ROC curve (AUC) for prediction of the need for RRT within 72 h

Reference

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P060

Continuous veno-venous high volume hemodiafiltration in critical illness: a case series

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Critical Care 2025, **29(S1)**:P060

Introduction: Continuous veno-venous hemodiafiltration (CVVHDF) is a common method of extracorporeal blood purification in a number of critical illnesses. Renal indications for HDF: uremia/azotemia, fluid overload, oliguria, metabolic acidosis, hyperkalemia. Non-renal indications: chemical and biological toxins, lactic acidosis, hypernatremia, cardiac hyperhydration, temperature management, rhabdomyolysis, liver failure. The standard volume (SV) for CVVHDF is 25–35 mL/kg/h. High-volume (HV) CVVHDF is more than 35 mL/kg/h. There are studies using HDF from 50–70 to 100–120 mL/kg/h, which describe more effective removal of molecular components of the pathogenesis of critical conditions [1, 2].
Methods: From 2022 to 2024 we examined 23 patients (mean APACHE II—29.3, mean SAPS II—57.5) with renal and non-renal indications for CVVHDF. In cases of insufficient laboratory and clinical efficacy of SVHDF 25–35 mL/kg/h, we performed HVHDF 50–70 mL/kg/h. We assessed the dynamics of laboratory markers of critical illness and ultrasound protocol POCUS, mortality rates in the ICU and in the hospital on the 28th day, length of stay in the ICU and in the hospital.
Results: When conducting HVHDF, we recorded a faster and more effective improvement in the dynamics of laboratory markers and ultrasound POCUS protocol data, which made it possible to reduce the duration of patients' stay in the ICU by 24–48 h and in the hospital by 1–3 days. The predicted mortality rates were 55% (APACHE II) and 70% (SAPS II), respectively, and the observed 28-day mortality rate was 25.3%.

Conclusions: The obtained data showed high efficiency of the used HVHDF method. The problematic issues remain technical equipment, the possibility of providing high blood flow, the need for frequent filter replacement, fluid and electrolyte balance management, temperature management, and leaching of trace elements and drugs from the blood.

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P061

Standardization in pediatric extracorporeal therapies: a report from pediatric paracorporeal and extracorporeal therapies summit

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Critical Care 2025, **29(S1)**:P061

Introduction: Critically ill children with multiple organ dysfunction are supported by extracorporeal and paracorporeal therapies. Due to the heterogeneity of pediatric healthcare environments, the delivery and monitoring of these therapies can differ among patients. The Paracorporeal and Extracorporeal Therapies Summit (PPETS) was a NICHD sponsored two-part national summit aimed at breaking down boundaries between extracorporeal modalities. In the quality and standardization domain, PPETS faculty sought to create a national survey to inform standardization recommendations. The primary objective was to identify utilized nomenclature for paracorporeal and extracorporeal therapies in pediatric critical care. We hypothesized that nomenclature of these therapies would vary among respondents despite recommended nomenclature.
Methods: The target population was international healthcare professionals in critical care, extracorporeal life support (ECLS), and/or nephrology. The survey was electronic with 6 parts with 29 questions. Sample size was 531 participants. Survey content included ECLS and continuous renal replacement therapy (CRRT) circuit nomenclature, integrated circuits, and open-ended responses. The survey had pictures of circuits pointing to various structures.
Results: Response rate was 35% (188/531) with 98% pediatric health care professionals. Each respondent was given a separate link for accurate response rate. There was heterogeneity in ECMO terms; 41% used "return limb" and 45% used "arterial limb." In CRRT, there was consistency of structure and modality. Majority (66%) were able to identify tandem CRRT and slow continuous ultrafiltration (SCUF) but integrated dialysis in ECLS circuit was not equally recognized. In free text, respondents identified key barriers as lack of standardized training, platforms, and environments.
Conclusions: This national survey identified consistent nomenclature, however, there were still terms that varied widely prompting further work to standardize these complex therapies.

P062

The advanced organ support (ADVOS) hemodialysis system can remove myoglobin from blood: a proof-of-concept in vitro study

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Critical Care 2025, **29(S1)**:P062

Introduction: The increase and accumulation of myoglobin due to muscle destruction contributes to the development of acute kidney injury (AKI) in rhabdomyolysis. Reducing circulating levels can be beneficial for the kidneys. Renal replacement therapy (RRT) in the ICU has not significantly contributed to its elimination. The ADVOS multi hemodialysis system (ADVITOS GmbH, Munich, Germany) uses an albumin-enriched dialysate with customizable pH for the removal of water-soluble and protein-bound toxins. This device has already shown effective removal of middle molecules at low blood flows [1]. The present work aims to provide proof-of-concept of the removal of myoglobin in vitro.
Methods: 4 L of heparinized fresh porcine blood were spiked with 1000 µg/mL human myoglobin (BBI Solutions—DIARECT GmbH, Freiburg, Germany) and treated with ADVOS for 8 h. Various combinations of dialysate pH and blood (BF) and concentrate flows (CF) were tested. Pre- and post-dialyzer samples for blood and dialysate were analyzed with the Elecsys Myoglobin sandwich chemiluminescent immunoassay (Roche Diagnostics GmbH, Mannheim, Germany).
Results: Human myoglobin was effectively removed by ADVOS with all the settings tested. A clearance of 70 mL/min was observed with a combination of BF 300 mL/min, CF of 320 mL/min and a dialysate pH of 9.0. With BF 100 mL/min, CF 160 mL/min and a dialysate pH of 7.8, a clearance of 52 mL/min was measured. In every experiment around 60% of myoglobin was removed within 60 min. At 8 h between 93 and 98% of myoglobin was removed (Figure). The removal of myoglobin with the ADVOS system seems to be driven by a high dialyzing surface (2 filters of 1.9 m2 each) and favored by the convective effect of a higher concentrate flow.
Conclusions: An efficient removal of myoglobin in vitro by ADVOS at low flow rates is demonstrated. This was already shown in a case report [2] and for other middle molecules such as IL-6 [1].

References

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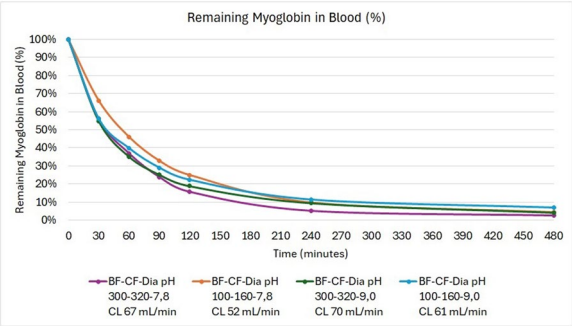

Figure (abstract P062) Course of myoglobin concentration during 8 h of treatment with ADVOS using different blood flows (BF), concentrate flows (CF) and dialysate pH (Dia pH) settings. The starting concentration was 1000 µg/mL

P063

Impact of augmented reality on re-training in continuous kidney replacement therapy

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Critical Care 2025, **29(S1)**:P063

Introduction: Continuous kidney replacement therapy (CKRT) is a complex ICU treatment requiring significant expertise, but training can be time-limited, lack hands-on practice, and long gaps between

training and device use can lead to skill degradation. Staff shortage and high turnover rates further hinder proficiency. Augmented reality (AR) is a promising solution by providing realistic, flexible, and standardized training. This study evaluated the impact of AR-based re-training on nurse performance, confidence, stress, and user acceptance for a CKRT device.
Methods: 34 ICU nurses received CKRT classroom training. After a 2–14-day decay period, participants were asked to perform the trained tasks in 2 groups with and without additional AR-training possibility. Performance for device setup and troubleshooting was measured with hands-on tasks. Perceived confidence, stress, and learning experience were assessed via structured questionnaires.
Results: Regarding task performance, data from 32 nurses could be analyzed, see the Table. The AR group outperformed the non-AR group and had higher completion rates for device setup & troubleshooting, with fewer average errors and faster median setup time. AR re-training resulted in higher confidence levels before performing tasks on the device and lower stress levels during use. The AR re-training was rated easy to use by 71% of participants, with 86% expressing interest in future use. Most participants valued flexibility and emphasized the importance of standardized content.
Conclusions: AR re-training showed potential to improve nurse performance, particularly for complex tasks like troubleshooting. Its ability to support procedure rehearsal may also enhance confidence and reduce stress levels.

Table (abstract P063) Results of task performance

Task performance	Non-AR Group	AR Group
Successful task completion device setup	88% (14/16)	94% (15/16)
Successful task completion trouble-shooting	6% (1/16)	69% (11/16)
Zero errors in device setup	12% (2/16)	36% (6/16)
Zero errors in troubleshooting	6% (1/16)	69% (11/16)
Ø number of errors/user setup	3.9/user (n = 16)	1.6/user (n = 16)
Ø number of errors/user trouble-shooting	4.5/user (n = 16)	0.6/user (n = 16)
Median device setup time	967 s (n = 14)	802 s (n = 13)

P064

The Tulip airway ~ man and manikin

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Critical Care 2025, **29(S1)**:P064

Introduction: This study compares the efficacy of the Tulip airway device in replacing the Guedel and facemask technique for airway management in both human and manikin subjects, targeting inexperienced users. The research aim was to assess the effectiveness of the Tulip airway device as a first-line airway management tool in comparison to traditional methods like the Guedel airway and facemask technique.
Methods: Two randomized, controlled, cross-over trials using Basic Life Support (BLS) airway providers, defined as inexperienced users, with annually trained Guedel airway and facemask skills, compared ventilation using either the Tulip airway or a Guedel airway (Figure) with facemask in 60 subjects, first in manikins and then in humans after the induction of anesthesia.
Results: In both studies 100% of inexperienced users were able to ventilate with a Tulip airway on their first ever contact with the device, with 0% requiring assistance in man or manikin but 25% of Guedel airway and Facemask users required assistance in the human study and 20% required assistance in the manikin study. 5% of Tulip users failed to achieve the required ventilation parameters in humans with total 41.7% of Guedel users failing to achieve adequate ventilation parameters in the same study. In humans, the Guedel and facemask users demonstrated 16.7% total failures and 25% inadequately ventilated patients (total 41.7%). With the Tulip airway 95% of users achieved the required outcome variables with 0% total failures and 5% inadequately ventilated patients.
Conclusions: With confirmation from our own manikin and human studies, we conclude that manikin studies are effective in the evaluation of new airway devices such as the Tulip airway which has now been shown to be significantly better than current equipment in both man and manikin.

Figure (abstract P064) The Tulip and Guedel Airways

P065

Predictors of high-flow oxygen therapy failure in adults with acute hypoxemic respiratory failure: a single-center retrospective study

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Critical Care 2025, **29(S1)**:P065

Introduction: This study investigates clinical and laboratory predictors of high flow oxygen therapy (HFOT) failure in adults with acute hypoxemic respiratory failure (AHRF), aiming to support early identification of patients who may require advanced respiratory support.
Methods: A retrospective cohort analysis was conducted at Chiayi Chang Gung Memorial Hospital, including 210 patients who received HFOT for AHRF between February and June 2024. Baseline characteristics, pre- and post-HFOT parameters, laboratory values, and clinical outcomes were compared. HFOT failure was defined as requiring intubation, non-invasive ventilation (NIV), or experiencing mortality while on HFOT.
Results: Of 210 patients, 121 (57.6%) experienced HFOT failure, while 89 (42.4%) succeeded. Logistic regression revealed several significant HFOT failure predictors ($p < 0.05$), including lower pre-HFOT PaO2 (odds ratio [OR] = 0.984, 95% confidence interval [CI]: 0.974–0.994, $p = 0.002$), higher blood urea nitrogen (BUN) (OR = 1.013, 95% CI

1.001–1.024, $p = 0.027$), and lower platelet count (OR = 0.997, 95% CI 0.994–1.000, $p = 0.022$). Vital sign predictors included increased post-HFOT heart rate (OR = 1.026, 95% CI 1.007–1.045, $p = 0.007$) and reduced systolic blood pressure (OR = 0.981, 95% CI 0.968–0.995, $p = 0.008$). Elevated chest X-ray (CxR) scores measured by the Brixia score (OR = 1.189, 95% CI 1.075–1.315, $p < 0.001$) and a lower ROX index at 2 h post-HFOT (OR = 0.82, 95% CI 0.696–0.966, $p = 0.017$) were also associated with HFOT failure. Mortality was significantly higher in the failure group (75.2% vs. 12.4%, $p < 0.001$), and HFOT failure patients had a longer hospital stay (26.87 ± 30.21 days vs. 19.92 ± 13.14 days, $p = 0.028$).

Conclusions: Lower PaO2, elevated BUN, reduced platelet count, increased heart rate, lower systolic blood pressure, higher CxR scores, and a decreased ROX index at 2 h post-HFOT are significant predictors of HFOT failure. These findings offer essential markers for early intervention in patients at risk for HFOT failure.

P066

Air finds the way: pneumomediastinum following elective tracheostomy

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Critical Care 2025, **29(S1)**: P066

Introduction: Pneumomediastinum is defined as the presence of air in the mediastinum. We aim to describe a case of a patient submitted to an elective tracheostomy for laryngeal malignant neoplasia management complicated with extensive pneumomediastinum and subcutaneous emphysema.

Methods: This is a case report with data collected directly from patient observation and consultation of patient records. Informed consent was obtained from patient.

Results: A 62-year-old male patient was submitted to vocal cord biopsies and surgical tracheostomy after the diagnosis of a vocal cord neoplasm suspicious for malignancy. Patient had a relevant medical history for tobacco and alcohol abuse, hypertension and COPD. The procedure was unremarkable and the patient was tracheostomized below the third tracheal ring with a number 8 cannula. After anesthesia emergence, agitation and respiratory distress with reactive cough and hypotension was noted. Sedation, local xylocaine and manual bag ventilation was provided. Shortly after, subcutaneous emphysema with mainly craniofacial extension and with little thoracic involvement was evident. A CT scan was then performed and an isolated large pneumomediastinum was diagnosed (Figure). Significant improvement was achieved after switching to a size 10 tracheostomy canula.

Conclusions: Postoperative complications following tracheostomies are uncommon. There is an estimated incidence of 1.4 percent of subcutaneous emphysema, usually associated with pneumothorax. This case highlights a rare case of extensive subcutaneous emphysema associated with isolated pneumomediastinum, likely precipitated by vigorous coughing effort against a tracheostoma with a likely small canula for size.

Acknowledgement: Informed consent was obtained from the patient.

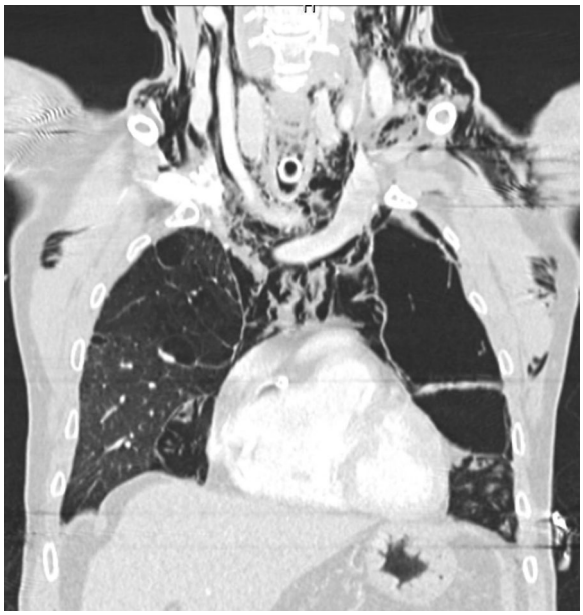

Figure (abstract P066) Extensive subcutaneous emphysema with isolated pneumomediastinum

P067

Assessing the validity of airway occlusion techniques to determine inspiratory effort during non-invasive ventilation in healthy subjects

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Critical Care 2025, **29(S1)**:P067

Introduction: Excessive respiratory effort can increase the risk of patient self-inflicted lung injury in patients receiving non-invasive ventilation (NIV) [1]. We undertook to establish whether non-invasive measures of respiratory effort (Pocc) and drive (P0.1) during positive airway pressure ventilation via facemask reflect respiratory effort and load?

Methods: Healthy volunteers were recruited. After placing an esophageal balloon, CPAP 1 cmH2O was applied on the Getinge Servo U ventilator. Key parameters of peak airway pressure, respiratory rate, tidal volume, flow, DPes, DPLdyn, Pocc and P0.1 were measured on the ventilator under varying conditions: CPAP 1 cmH_2O, after applying deadspace (300 cc), inspiratory resistance (6 mm), expiratory resistance (6 mm), deadspace with inspiratory resistance (6 mm), and at CPAP 5 cmH_2O and CPAP 10 cmH_2O. Pmus was computed from estimated chest wall elastance.

Results: Twenty subjects were enrolled. Pmus, Pocc, and P0.1 but not respiratory rate increased with applied inspiratory and expiratory resistance loads (Figure). P0.1 measured on the ventilator were correlated with Pmus (marginal R^2 0.21, conditional R^2 0.64, $p < 0.001$); the correlation between Pocc and Pmus was weaker (marginal $R^2 = 0.05$, conditional $R^2 = 0.56$, $p = 0.01$). Respiratory rate was inversely associated with respiratory effort (marginal $R^2 = 0.06$, conditional $R^2 = 0.48$, $p = 0.02$). P0.1 was sensitive and specific for the application of the high

load condition (inspiratory resistance + dead space; AUROC 0.90, 95% CI 0.83–0.98).
Conclusions: P0.1 may be a useful parameter to assess for elevated respiratory effort and load during non-invasive ventilation. Further validation in critically ill patients is required.

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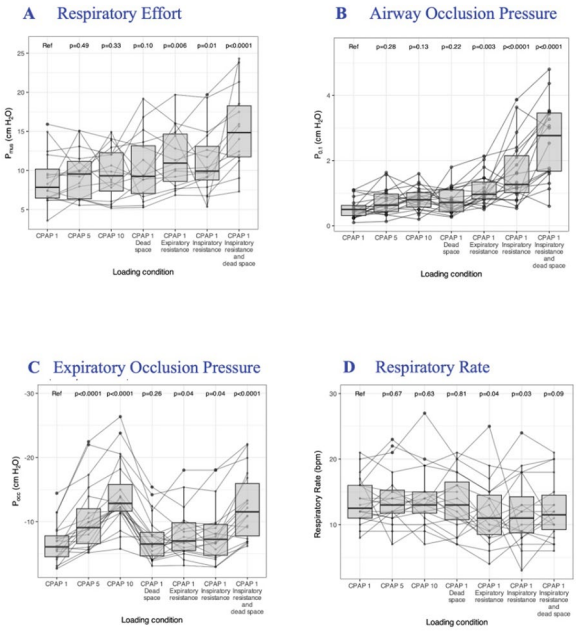

Figure (abstract P067) Drive and effort during CPAP

P068

Estimation of effort of breathing in critical care: experimental study on healthy volunteers

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Critical Care 2025, **29(S1)**:P068

Introduction: Effort of breathing (EOB) in spontaneously breathing patients with respiratory failure remains an important clinical problem. Detection of increased EOB can lead to therapeutic interventions and change in clinical outcome. The aim of the study is to generate a healthy volunteer's experimental model mimicking ICU patients and to register physiological shifts and changes in breathing pattern.
Methods: Experimental healthy volunteer's model was created to reflect the metabolic response to critical state. Increased metabolic load was achieved with an ergometer, model was successfully validated with notable increase in respiratory rate (RR), heart rate (HR) and VO_2. For evaluation of EOB impedance based thoracic cage excursion force belt was used. Change in respiratory mechanics was noted by employing mean, peak and time-product inspiratory Newton values (NTP). We enrolled healthy volunteers who each signed informed consent.
Results: Data of 28 volunteers with no chronic respiratory disease was analyzed. After 10 min of workload with ergometer, a 60% of maximum heart rate, i.e., on average 113 beats/min, was reached. Model was successfully validated with notable increase in RR (16.67 ± 4.62 vs 25.66 ± 6.69, $p < 0.001$), HR (82.04 ± 12.32 vs 113.0 ± 2.05. $p < 0.001$) and VO_2 (4.29 ± 1.18 vs 11.13 ± 2.09 $p < 0.001$). Change in respiratory mechanics was noted for mean (2.18 ± 1.017 vs 3.61 ± 1.50 $p < 001$) and peak (5.06 ± 2.40 vs 7.53 ± 3.73 $p < 0.001$) inspiratory Newton values, no change was noted in NTP (8.63 ± 6.41 vs 9.20 ± 7.53 $p = 0.668$).
Conclusions: This study presents results on EOB estimation by implementing a measurement of thoracic cage excursion force in healthy volunteer's experimental model. Creation of the model was successful. Respiratory mechanics changed in favour of rapid and more strenuous inspiration, retaining the same overall excursion force per breath.

P069

Optimizing non-invasive ventilation (NIV) benefits in the emergency department of acute respiratory failure (ARF) to reduce intensive care units (ICU) and ward admissions

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Critical Care 2025, **29(S1)**:P069

Introduction: The Emergency Department (ED) at King Fahad Armed Forces Hospital (KFAFH) has experienced a rise in the use of non-invasive ventilation (NIV) for managing acute respiratory failure (ARF) in patients with conditions such as pulmonary edema, congestive heart failure (CHF), and bronchial asthma exacerbation. NIV is vital for maintaining airway patency and reducing the need for invasive procedures like intubation [1]. However, ARF often leads to increased hospital admissions, intensive care unit (ICU) occupancy, and healthcare costs. Delays in NIV application can hinder patient stabilization and elevate complication risks. This study investigates how early optimization of NIV in the ED can aim to decrease admissions to wards and ICUs, ultimately enhancing patient outcomes and resource utilization.
Methods: A prospective observational study was conducted from January to August 2024, involving 84 adult patients with ARF. Data were collected over an 8-month period to monitor clinical outcomes and NIV effectiveness. The Plan-Do-Study-Act (PDSA) framework was employed for continuous performance monitoring.
Results: Of the 84 patients treated with NIV, 67% were successfully discharged home, showing significant clinical improvements in respiratory rates, oxygen saturation, blood gas levels, and overall symptoms (Figure). The study achieved a reduction in ICU and ward admissions, validating the effectiveness of early NIV optimization.
Conclusions: Optimizing the use of NIV in the ED for ARF patients significantly reduces hospital admissions while improving patient outcomes and healthcare resource utilization. Continuous training and structured protocols are essential for sustaining high-quality care.

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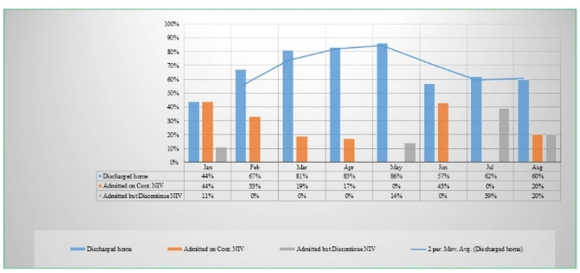

Figure (abstract P069) Percentage of patients discharged home & with improved outcome per month

P070

Development of a procedure to assess patient-ventilator synchrony in non-invasive ventilation

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Critical Care 2025, **29(S1)**:P070

Introduction: Lack of synchrony between the patient and the ventilator is a major limitation during non-invasive ventilation (NIV) in both the acute, intensive care unit (ICU) setting as well as in chronic cases during NIV at home. Patient-ventilator asynchrony affects millions of patients worldwide and may lead to adverse outcomes. Thus, assessing patient-ventilator interactions are essential to optimize NIV efficiency.
Methods: We developed a novel procedure to precisely analyze the interaction between patients and NIV, aiming to evaluate and improve the level of synchrony. We used two labeled and certified European devices to continuously record pressures at the output of the ventilator and at the mask during non-invasive bilevel ventilation with a single-tube system. Synchrony analysis algorithms were then developed by using MATLAB® (MathWorks, Massachusetts, USA) and further optimized in a laboratory setting with reference curves.
Results: Our newly developed synchrony parameters describe similarities and differences between the pressure curves for every single breath throughout the measurement. These measurements allow assessments of synchrony, the possible adaptation tolerance and the probable causes of existing asynchronies and their temporal distributions to relate them to other clinical parameters.
Conclusions: Thus, we introduce a novel method to precisely record and improve patient-ventilator synchrony in the setting of NIV. As synchrony is a key determinant of NIV therapy adherence and patient comfort and may improve patient outcomes, further studies will be required to address the affects of optimization of patient-ventilator synchrony on clinical endpoints in acute and chronic lung diseases requiring NIV.

P071

Tracheal intubation in lateral position in emergency medicine

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Critical Care 2025, **29(S1)**:P071

Introduction: Tracheal intubation (TI) is a common procedure often performed in patients with physiologically difficult airways or in critical conditions. Tracheal intubation in lateral position (TILP; Figure) has been recognized as an alternative to the traditional supine position, offering potential advantages in specific clinical scenarios.
Methods: Search approach: performed November 2023, there is a growing number of clinical research and application regarding TILP in maintaining airway patency, rapidly establishing artificial or mechanical ventilation, preventing and reducing complications associated with endotracheal intubation, and mitigating hemodynamic fluctuations and traction injuries caused by positional changes.
Results: Lateral position may alleviate upper airway obstruction, provide better glottic exposure and improve oxygen, thereby increasing the success rate of intubation. In difficult airway management, utilization of TILP becomes of considerable clinical interest. Cases also reported that lateral position may be superior to prevent pulmonary aspiration peri-intubation in patients at high risk of aspiration, as well as ventilator-associated pneumonia in critical ill patients with mechanical ventilation. Lung isolation technique is frequently used for patients with massive hemoptysis, lung abscess, or excessive sputum in bronchiectasis, placed in the lateral position for lung isolation may be effective. Furthermore, it has been demonstrated that the aspiration rate is lower in the semi-lateral or lateral position.
Conclusions: Tracheal intubation in the lateral position is a valuable technique in emergency medicine, particularly in patients who are in a forced lateral position require airway management, with known or anticipated difficult intubation, with predictating high risk of aspiration, or requiring lung isolation. Future studies are needed to evaluate the effectiveness of this technique and to develop evidence-based guidelines for its use in various clinical scenarios.

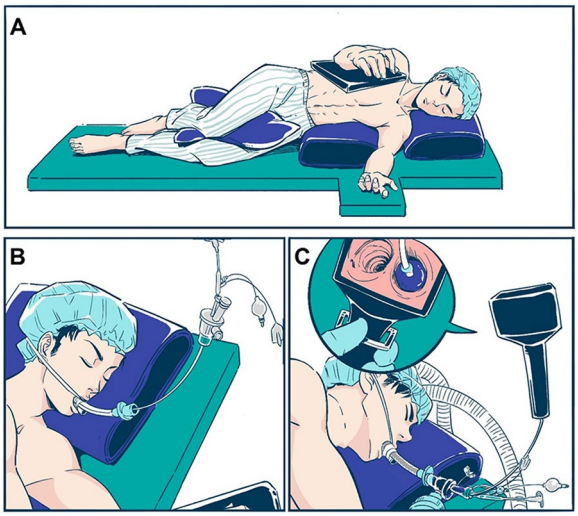

Figure (abstract P071) The process of bronchial blocker placement in the lateral position. A. The patient autonomously lies in lateral the position. B. Bronchial blocker introduced through single lumen tube. C. Bronchial blocker introduced using fiberoptic bronchoscope guidance after "give-away" was felt and positioned in the main bronchus. The image on the fiberoptic bronchoscope shows the right position of bronchial blocker in the main bronchus with the cuff inflated.

P072

The effect of automatic tube compensation on intracycle power: bench study

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Critical Care 2025, **29(S1)**:P072

Introduction: Intracycle power (ICP) has been reported as an indicator influencing ventilator-associated lung injury, defined as the instantaneous energy expressed as the flow rate and pressure product. Automatic tube compensation (ATC) estimates tube resistance and adjusts the ventilation pattern to offset this resistance, reducing inspiratory effort in spontaneous breathing. However, in passive ventilation, increased inspiratory flow may elevate ICP even at the endotracheal tube (ETT) tip.

Methods: Three respiratory mechanics models were created using a lung simulator (IngMar ASL-5000©) for an adult and an infant version. Adult: Normal lung model (compliance; C 50 mL/cmH_2O, airway resistance; R 6 cmH_2O/L/sec), obstructive lung model (C50R30), restrictive lung model (C20R6), and infant: normal (C3R50), obstructive (C3R200), and restrictive (C1R50). An ETT (8 mm ID for an adult and 3 mm ID for an infant) was inserted between the lung simulator and the ventilator (the Hamilton C6). The ventilator settings other than ATC were the same for each model. We measured the flow, airway pressure (at the mouth), airway pressure (at the tip of the ETT), and tidal volume and calculated the peak value of ICPtrachea; flow rate × airway pressure (at the tip of ETT), MPtrachea = 0.098 × ∮ICPtrachea × respiratory rate dt. As this was a simulator study, we defined a difference of 10% or more as significant in addition to a statistically significant difference.
Results: Data was collected for ten waveforms for each model. There was no significant difference in MPtrachea for either adults or infants, but the peak ICPtrachea was significantly higher in the ATC group than in the non-ATC group for adults with restrictive models and infants in all models (Figure).
Conclusions: ATC significantly increased ICPtrachea without increasing MPtrachea. The influence on lung injury with ATC may differ because of different instantaneous energy, even though the MPs are the same.

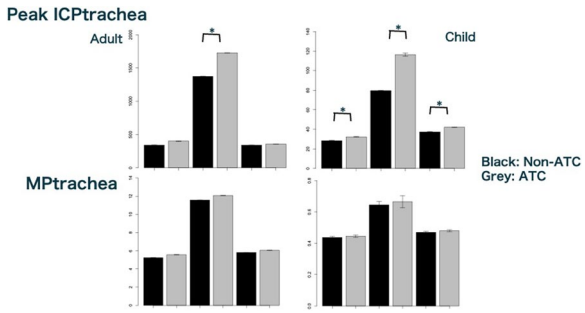

Figure (abstract P072) Peak ICPtrachea and MPtrachea, from left to right: Normal without ATC, Normal with ATC, Restrictive without ATC, Restrictive with ATC, Obstructive without ATC, Obstructive with ATC, * Significant difference.

P073

Feasibility of reinforcement learning algorithms in septic patients with respiratory failure

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Critical Care 2025, **29(S1)**:P073

Introduction: Acute respiratory failure is a common diagnosis in acutely ill, hospitalized septic patients. Clinical equipoise exists with regards to optimal timing of endotracheal intubation in patients with refractory respiratory failure. Reinforcement-learning (RL) algorithms may offer personalization to guide respiratory support. We studied feasibility of an RL model by examining several domains: feature missingness and measurement cadence.
Methods: In a retrospective cohort study of 14 hospitals in western Pennsylvania from 2013 to 2017, patients were included in the study if they met Sepsis-3 criteria within 6 h of hospital arrival. Patients were excluded if they did not develop respiratory failure, defined as a peripheral saturation < 90%, arterial partial pressure of oxygen < 70 mmHg, or requiring mechanical ventilation. Available data was organized into discrete 4-h epochs starting from onset of sepsis.
Results: This cohort included 82,820 septic patients who developed respiratory failure during hospitalization (mean age 67 (SD 16) years, 48% male, mean 24-h SOFA score 5 (SD 3), 10% in-hospital mortality, 40% requiring mechanical ventilation). Vital signs were likely to be recorded in the first and subsequent epochs (range of missing rate: 7–25%) (Figure). Laboratory parameters were missing between 47–86% in the first hour and less likely to be measured in later epochs (49–97% missing rate). Conversely, urine output was unavailable in 71% of the first epoch but became increasingly available during later epochs (missing rate of 43–63%).
Conclusions: In a multicenter cohort, many septic patients developed acute respiratory failure during hospitalization requiring mechanical ventilation. Features required for reinforcement learning model development are invariably present and have high missing rates. To address data sparsity, reinforcement learning methods that incorporate uncertainty, such as partially observable Markov decision process modelling are required to further clinical decision support.

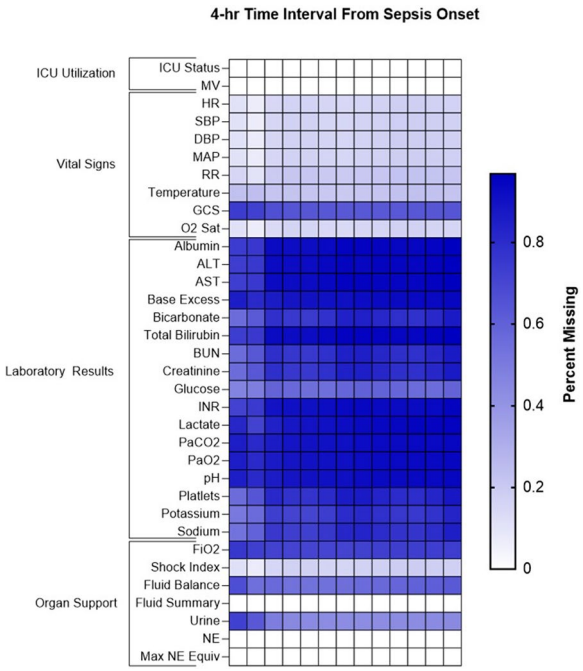

Figure (abstract P073) Heatmap of available features

P074

Lateral position as an alveolar recruitment maneuver in patients immediately after cardiac surgery

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Critical Care 2025, **29(S1)**:P074

Introduction: Evidence suggests that lateral positioning can reduce lung collapse [1]. This randomized clinical trial evaluates whether automated lateral positioning can serve as an alveolar recruitment maneuver without increasing positive airway pressure, the standard practice [2].
Methods: Forty-seven patients in the immediate postoperative period of cardiac surgery, under invasive mechanical ventilation and with a PaO_2/FiO_2 ratio < 250 mmHg, were randomized into two groups. The

intervention group (IG) underwent 30º automated lateral positioning, while the control group (CG) remained supine. Both groups later received an alveolar recruitment maneuver (ARM), steps of 5 cmH_2O, reaching a plateau pressure of 45 cmH_2O. PEEP levels were adjusted based on BMI, which were done based previous studies [3]. For lateralization, PEEP was increased by 2 cmH_2O to protect the dependent lung. If needed, PEEP was further increased, with a maximum cumulative increase of 4 cmH_2O. Patients were monitored via EIT and EV1000® to assess alveolar recruitment and hemodynamic effects.
Results: Median BMI-adjusted PEEP was 14 [13–15] cmH_2O. As shown in the Figure, driving pressure and lung collapse decreased significantly over time in the IG compared to the CG. In the CG, these reductions occurred only after the ARM, whereas in the IG, they were observed earlier during lateral positioning. No significant hemodynamic changes were noted over time or between groups. Drops in cardiac output and mean arterial pressure occurred only during the ARM but were similar between groups.
Conclusions: Lateral positioning at 30º demonstrates potential for alveolar recruitment with less hemodynamic impact compared to ARM with increased positive airway pressure in patients in the immediate postoperative period following cardiac surgery.

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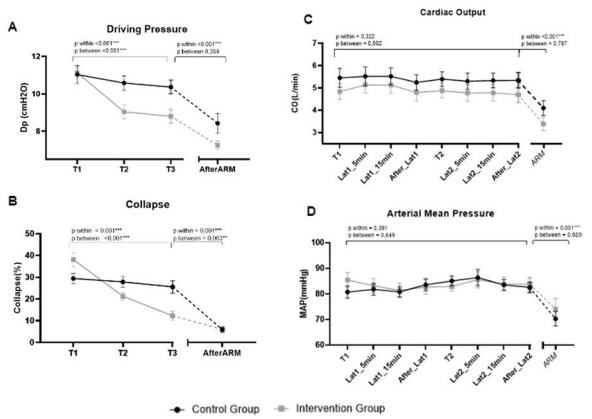

Figure (abstract P074) Graphs show (A) driving pressure over time (T1: supine before lateralization; T2/T3: after first/second lateralization; after ARM: after alveolar recruitment with increased pressure), (B) collapse over time (same points as A), (C) cardiac output, and (D) mean arterial pressure during the protocol (T1, Lat1/Lat2 at 5/15 min, After_Lat1/Lat2: supine after positions; ARM: during alveolar recruitment).

P075

Effect of sequential lateral positioning on alveolar recruitment measured by electrical impedance tomography

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Critical Care 2025, **29(S1)**:P075

Introduction: To analyze the effectiveness of sequential lateral positioning (SLP) on ventilatory parameters in patients requiring mechanical ventilation (MV) with suspected atelectasis.
Methods: Prospective observational study of all patients consecutively admitted to the ICU, who required MV for any reason, in whom atelectasis was suspected by clinical findings, chest X-ray or ultrasound. Patients ≥ 18 years old, requiring MV for more than 24 h, with a BMI ≤ 35 were included, and those with spinal fracture, pregnant women and multiorgan failure were excluded. Patients were sequentially positioned in lateral decubitus, in 30-min periods, with 5-min breaks in supine decubitus, for 4 cycles, elevating to 40° the hemithorax where atelectasis was suspected. Sociodemographic, clinical, electrical impedance tomography (EIT) and ventilatory variables were collected. Variables are expressed as means ± standard deviation and absolute and relative frequencies. Comparison between variables by paired samples t-test, calculating 95% confidence intervals.
Results: Five patients were analyzed, of which 3 (60%) were male. The mean age was 54.6 ± 19.1 years, and a mean BMI of 29.32 ± 3.2. EIT demonstrated by ROI an increase in initial mean percent ventilation in the atelectatic hemithorax from 49.8 ± 2.1 to 69.6 ± 16 (95% CI: 0.19,39.4, $p = 0.049$) at 120 min. Mean baseline compliance was 39.8 ± 18 and 43.8 ± 19.8 at 120 min (95% CI: −0.47, 8.47, $p = 0.068$), mean baseline plateau pressure was 17 ± 2.3 and 16 ± 1.8 at 120 min (95% CI: −4.4, 2.4, $p = 0.46$) and a baseline driving pressure of 11 ± 2.1 and 10 ± 2.4 at 120 min. No adverse effects were observed.
Conclusions: Sequential lateral positioning produced a significant increase in the ROI index of the elevated hemithorax, with an improvement of ventilation in the hemithorax with suspected atelectasis, with improvement of the measured respiratory parameters without statistical significance, possibly due to the small sample.

P076

An alternative diagnosis for vape induced lung injury—case report

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Critical Care 2025, **29(S1)**:P076

Introduction: A 17-year-old woman, presented to the emergency department with respiratory distress after three days of vaping up to 600 inhalations a day. The evening prior to admission, the patient experienced three episodes of acute breathlessness accompanied by wheezing and coughing, preceded by 4–5 days of headache and cold symptoms.
Methods: Upon admission she exhibited severe dyspnea and tachypnea with a silent chest. Despite receiving mechanical ventilation and the treatment for a potential status asthmaticus her condition continued to deteriorate, requiring extracorporeal membrane oxygenation (ECMO). Chest computed tomography revealed severe subcutaneous emphysema and pneumomediastinum as well as severe central and peripheral mucus plugs (Figure). After 17 days of ECMO support and 26 ventilation days she was transferred to the ward without supplemental oxygen.
Results: E-cigarette or vaping-associated lung injury (EVALI) is a clinical diagnosis that requires the use of an e-cigarette in the 90 days preceding the appearance of initial symptoms: pulmonary infiltrates on a plain chest radiograph or chest CT, and the absence of any other possible etiology, such as infection [1]. In the absence of pulmonary infiltrates and ground-glass opacities, a diagnosis of EVALI could not be stated. Notably, there was a significant amount of epithelial shedding and numerous mucus plugs present. With the absence of pulmonary edema and no response on asthma treatments, a near fatal asthmatic attack was unlikely [2]. This patient suffered from inhalation injury caused by vaping chemicals and temperatures that can reach 1000 degrees Celsius [3]. This lead to mucus production and epithelial denudation leading to airway obstruction.
Conclusions: This case demonstrates that severe respiratory distress caused by excessive vaping is not always attributable to EVALI. Inhalation injury from vaping is a serious condition.
Acknowledgement: Permission for publication was obtained from the patient.

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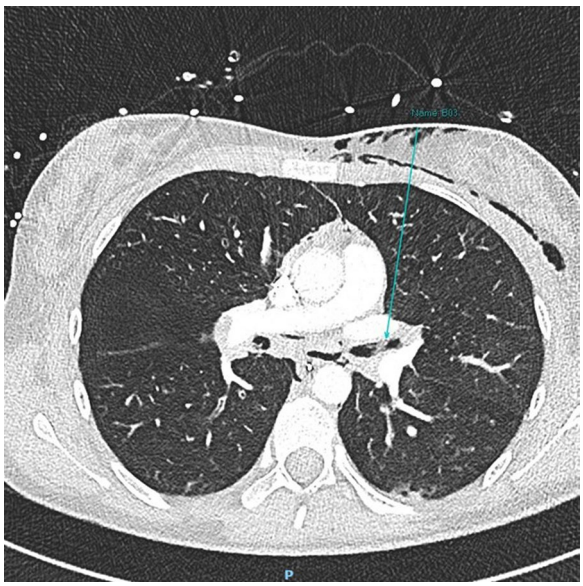

Figure (abstract P076) Severe central and peripheral mucus plugs

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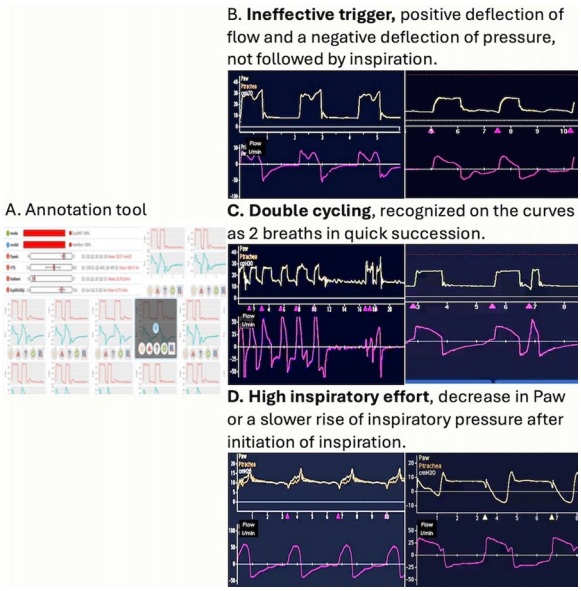

Figure (abstract P077) A. Annotation tool, the image shows videos of one cluster, the selected video to be annotated is highlighted in grey. B. Ineffective trigger: patient´s inspiratory efforts do not trigger inspiration C. Double cycling: defined as the triggering of two ventilator insufflations within a single inspiratory effort of the patient D. High inspiratory effort (flow dyssynchrony): caused by an abnormal drop of pleural pressure during inspiration

P077

Annotation of ventilator screen videos for detecting ventilator dyssynchronies with artificial intelligence

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Critical Care 2025, **29(S1)**:P077

Introduction: Annotation is the systematic practice of tagging and labelling data to train artificial intelligence (AI) models. The objective of the study was to provide annotations of screen videos that could be employed in the development of AI software for the detection of dyssynchronies.
Methods: Videos were exported from ventilator screens and uploaded to a server [1]. In the next step, the videos were clustered based on their similarity using Dynamic Time Warping (DTW) and Partition Around Medoids (PAM). We made a web-based annotation tool for editing and annotating videos. Two physicians labelled the videos with descriptions of dyssynchrony using predefined tags. In case of disagreement, an independent physician reviewed the data and made the final annotation. The physicians were trained to diagnose dyssynchrony.
Results: Three types of dyssychronies were annotated: ineffective trigger, double cycling, and high inspiratory effort (Figure). A total of 2092 video clusters were annotated. The two physicians agreed on 1226 clusters and the third physician had to decide the definitive annotation in 866 of the clusters.
Conclusions: The process of annotating ventilator screen videos was complex and required several steps, including definition of dyssynchronies, training physicians, development and implementation of an annotation tool, clustering of videos, and making the annotations themselves. The resulting process is crucial not only for the development of artificial intelligence, but potentially also for the validation of medical AI software.
Acknowledgement: Supported by Grant Ministry of Health, Czech Republic, AZV NU22-06–00625.

P078

Close-loop control provides more protective modes and optimization of diaphragm function than conventional weaning from MV in cardiac surgery patients with BMI > 35 kg/m^2

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Critical Care 2025, **29(S1)**:P078

Introduction: The main goal of ventilation management is to discontinue invasive ventilation as soon as possible, without delaying it too early or too late, until the patient is ready.
Methods: In this randomized controlled trial (NCT04973917) 32 adult cardio surgical patients with BMI > 35 kg/m^2 were included. In the postoperative period 16 of them were ventilated using the INTELLiVENT-ASV® mode and then weaned with "Quick Wean" option. Another 16 were ventilated using conventional ventilation modes and weaned using Pressure Support Ventilation (PSV). Hamilton G5 ventilators were used. Care in both groups was standardized, except management of mechanical ventilation. The primary goal of this part of the study was to understand could we optimize diaphragmatic function by using intellectual modes by considering airway occlusion pressure (P0.1), PS level; Rapid Shallow Breathing Index (RSBI).
Results: We have obtained significant differences in the P0.1 level between groups (1.7 (1.4–2.3) (Intellivent—ASV®) vs 1.5 (1–1.6) (PSV), *p*-0.03). Also PS (6 (5–6) vs 9 (8–9), *p*-0.0001) and PEEP (7 (7–8) vs 10 (8–10), *p*-0.0006) level was significantly lower in the Intellivent group. The RSBI was lower in the PSV group (34 (31–44) vs 28 (24–30),

$p = 0.04$), but we connect it with higher tidal volume level in the PSV group (8 (7.5–9) vs 10 (9–10), $p = 0.0004$). There were no significant differences in the SpO_2 and PaO_2/FiO_2 ratio, $PaCO_2$ during weaning process and after extubation of the trachea in the groups. In addition, there were no significant differences in the number of cases of atelectasis, diaphragm dysfunction, and the use of non-invasive ventilation (NIV) between the groups (Table).

Conclusions: Using intellectual modes during the weaning process in patients with BMI > 35 kg/m^2 allows for the selection of the optimization pressure support and PEEP level, as well as optimization of the diaphragm function. The evaluation of the potential benefits of using based on ASV modes to optimize diaphragm function requires further investigation.

Table (abstract P078) Main preoperative and postoperative data

Variable	Intellivent—ASV® group (n = 16)	Control group (n = 16)	*p*
BMI, kg/m^2	38 (37–41)	37 (36–39)	0.56
Euroscore II, %	1.72 (1.07–2.25)	1.89 (1.43–2.19)	0.53
ARISCAT, points	56 (55–65)	58 (56–58)	0.69
PaO_2/FiO_2 12 h after extubation of the trachea	319 (301–324)	300 (280–328)	0.44
Atelectasis, n (%)	7 (44%)	8 (50%)	0.74
Diaphragmatic dysfunction, n (%)	2 (12.5%)	2 (12.5%)	$p > 0.05$
NIV, n (%)	2 (12.5%)	5 (31%)	0.24

P079

Effect of sigh ventilation on postextubation hypoxemia after cardiac surgery: a randomized clinical trial

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Critical Care 2025, **29(S1)**:P079

Introduction: Pulmonary atelectasis remains a frequent event after cardiac surgery with surfactant alteration or depletion often preceding its formation. The protective role of adding sigh breaths to conventional lung protective ventilation among cardiac surgery patients is still uncertain.

Methods: An accessor-blind randomized clinical trial of sigh ventilation was conducted from February 2024 to August 2024 in a single hospital in China. Patients aged over 18 years and planned to receive cardiac surgery requiring CPB were included. Sigh ventilation (sigh breaths plus lung protective ventilation) by producing plateau pressure of 35 cmH_2O delivered once every 6 min. Conventional ventilation including low tidal volume of 6–8 mL/kg PBW and PEEP set according to the low PEEP/FiO_2 table. The primary outcome was time-weighted average SpO_2/FiO_2 ratio during the 1st postextubation hour. There were 10 secondary outcomes, including the severity of postoperative pulmonary complications and use of HFNC or NIV computed by postoperative day 7.

Results: 192 patients were enrolled. 96 patients randomized to the sigh ventilation group received sigh breaths for a median duration of 12 h with an initial median sigh volume of 1721 mL. The mean time-weighted average SpO_2/FiO_2 ratios were 380 in the sigh ventilation group and 338 in the conventional ventilation group (MD 42.1; 95% CI 16.7–67.5; $p = 0.0013$) (Table). By postoperative day 7, the severity of pulmonary complications was lower in sigh ventilation group compared with the conventional ventilation group with a common odds ratio for lower severity of 2.3 (95% CI [1.3 to 4.2]; $p = 0.005$). The proportion of patients with use of HFNC or NIV was lower in sigh ventilation group compared with conventional ventilation group (MD -13.5%; 95% CI − 23.2% to − 3.9%; $p = 0.007$).

Conclusions: Among patients undergoing cardiac surgery, the addition of sigh breaths significantly improved the SpO_2/FiO_2 ratios during the initial hour after extubation.

Table (abstract P079) Primary and secondary outcomes

Variables	Ventilation strategy		Odds ratio (95% CI) or absolute difference (95% CI)	*p* value Unadjusted
	Sigh (n = 96)	Conventional (n = 96)		
Primary outcome				
Time weighted average SpO_2/FiO_2 ratio, mean (SD)	380 (86)	338 (93)	42.1 (16.7–67.5)	0.001
Secondary outcomes				
Respiratory failure by PED7, No. (%)	34 (35.4)	50 (52.0)	2.2 (1.2–3.8)[†]	0.007[‡]
Pulmonary complication severity score	2 (2, 2)	2 (2, 3)	2.3 (1.3–4.2)[§]	0.005[‡]
Use of HFNC or NIV, No. (%)	7 (7.3)	20 (20.8)	− 13.5 (− 23.2 to − 3.9)	0.007[*]
Use of new IMV, No. (%)	1 (1.0)	2 (2.0)	− 1.0 (− 4.5 to 2.5)	0.56[*]
No ventilatory support days by POD 7, median (IQR), d	6.0 (5.8, 6.0)	5.9 (5.0, 6.0)	NA	0.03[‖]

PED, postextubation day; IMV, invasive mechanical ventilation; POD, postoperative day; HFNC, high-flow nasal cannula; NIV, non-invasive mechanical ventilation.

[†] Common odds ratio for a lower severe respiratory failure in the sigh vs conventional groups.

[‡] Ordinal logistic regression.

[§] Common odds ratio for a lower pulmonary complication severity score in the sigh vs conventional groups.

‖Mann-Whitney U test.

P080

Pulmonary cement embolism after transpedicular arthrodesis for osteoporotic vertebral fracture: a case report

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Critical Care 2025, **29(S1)**:P080

Introduction: Cemented transpedicular arthrodesis (CTA) is a widely used procedure for stabilizing osteoporotic vertebral compression fractures [1]. While effective in improving fracture stability and alleviating pain, it carries the risk of serious complications, such as pulmonary cement embolism (PCE). Although rare, this complication poses significant clinical risks [2].
Methods: A literature search was conducted using PubMed/MEDLINE, Web of Science, and Scopus, employing the MeSH terms "Pulmonary Cement Embolism" and "vertebroplasty". We describe a 64-year-old female with a history of hypertension, hypothyroidism, and osteoporosis, who sustained a pathological T11 vertebral body fracture after a fall. She underwent CTA without intraoperative complications. Postoperatively, she developed respiratory symptoms, including dyspnea and hypoxemia, requiring advanced airway management, hemodynamic support, and admission to the ICU. Chest CT revealed cement migration to the pulmonary vasculature (Figure). The patient's condition improved within 48 h, and she was discharged in stable condition with no further complications during outpatient follow-up.
Results: PCE is a rare but potentially life-threatening complication of CTA. Risk factors include thoracic vertebra involvement, large cement volumes, and venous leakage [1,2]. Early recognition and prompt management are essential to mitigate adverse outcomes. This case emphasizes the importance of meticulous cement administration and strict postoperative monitoring to prevent and effectively manage such complications.
Conclusions: This case underscores the need for heightened vigilance during CTA to minimize the risk of PCE and highlights the importance of a multidisciplinary approach when complications occur. Further research is needed to develop preventive strategies and refine procedural guidelines.
Acknowledgement: Written informed consent for publication was obtained from the patient.

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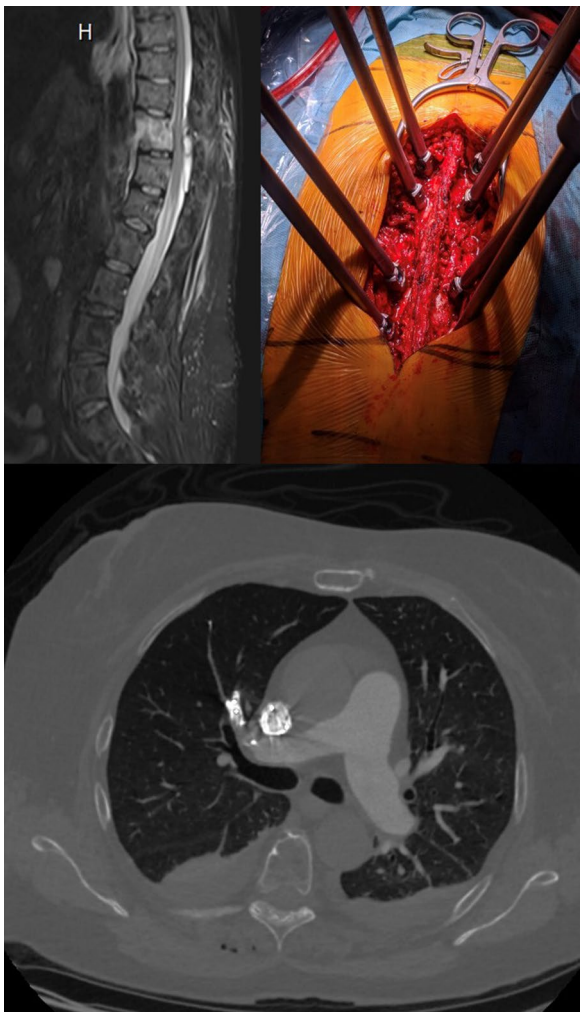

Figure (abstract P080) Chest CT with cement migration to the pulmonary vasculature

P081

Right ventricular function in mechanically ventilated patients: the influence of incremental PEEP trials during electrical impedance tomography

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Critical Care 2025, **29(S1)**:P081

Introduction: Positive end-expiratory pressure (PEEP) during mechanical ventilation can lead to hemodynamic consequences [1]. Incremental PEEP trials using electrical impedance tomography (EIT) can provide bedside evaluation of the distribution of pulmonary ventilation and is useful to optimize mechanical ventilation parameters [2]. The effects of increased pressure on right ventricular (RV) function during EIT are not well established. This study aims to examine the influence of incremental PEEP trials on RV function using transthoracic echocardiography in mechanically ventilated patients.

Methods: This prospective longitudinal observational study was conducted in mechanically ventilated patients with a normal right ventricular function. During the first 5 days of intubation, one EIT measurement was performed, which consisted of an incremental and decremental PEEP trial in steps of 2 cmH_2O. We performed four serial transthoracic echocardiograms, one prior to the incremental trial and during the highest, lowest and optimal PEEP levels (Figure). The association between echocardiography variables and PEEP levels before and during the highest, lowest and optimal PEEP level were analyzed using two-level linear mixed effects models with a random intercept and slope for PEEP level.
Results: Between October 2023 and October 2024, 22 patients were included. The median age was 62.0 years (IQR 51.0; 66.0). Preliminary results showed that per PEEP level tricuspid annular plane systolic excursion (TAPSE) decreased 0.31 mm (−0.45; −0.18, $p<0.001$). Moreover, per PEEP level, Doppler-derived tricuspid lateral annular systolic velocity (S') decreased 0.11 cm/sec (−0.19; −0.03 cm/sec, $p=0.008$).
Conclusions: The preliminary results suggest that the increase of PEEP caused a small decrease of RV function that was detectable in this longitudinal study.

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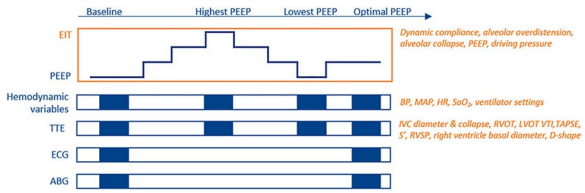

Figure (abstract P081) Overview measurement and collected variables on different moments during the EIT measurement. Abbreviations: ABG, arterial blood gas; BP, blood pressure; EIT, electrical impedance tomography; IVC, inferior vena cava; LVOT VTI, left ventricular outflow tract velocity time integral; RVOT, right ventricular outflow tract; RVSP, right ventricular systolic pressure; S', doppler- derived tricuspid lateral annular systolic velocity; TAPSE, tricuspid annular plane systolic excursion

P082

Lung recruitment strategies and their effect on postoperative oxygen saturation: a cohort study

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Critical Care 2025, **29(S1)**:P082

Introduction: Lung recruitment maneuvers (LRM) are techniques used to improve pulmonary mechanics and prevent alveolar collapse by applying continuous positive airway pressure [1]. Our objective was to evaluate the impact of lung recruitment maneuvers on postoperative oxygen saturation.
Methods: Retrospective cohort-type analytical study in patients undergoing noncardiac surgery between 2019 and 2021. All patients received protective mechanical ventilation. We analyzed those exposed to LRM and not exposed. LRM was performed as follows: 1. 10 min after intubation 2. 20 min prior to extubation with the following characteristics: ascending PEEP 10, 15, 20, 20, 25 cm/H_2O for 30 s and subsequently descending PEEP 25, 20, 15, 10 cm/H_2O for 30 s. The primary outcome was to evaluate postoperative oxygen saturation measured in postanesthesia recovery unit (PACU) and the requirement for rescue oxygen therapy. A descriptive analysis of the variables according to their distribution was carried out, and parametric and non-parametric tests were applied to analyze the hypotheses.
Results: We analyzed 221 patients, 49.7% were exposed to LRM and 50.3% were not exposed, the mean SpO_2 measured in PACU without supplemental O_2 was 92% (SD2.7), 24.4% presented desaturation during their stay at PACU, 26% of the patients required rescue oxygen therapy. The group exposed to LRM presented higher oxygen saturation levels (94.3% (SD2.1) vs 90.8% (SD2.4); $p=0.046$), however this did not significantly impact the use of rescue oxygen therapy ($p=0.790$). On the other hand, not being exposed to LRM was associated with greater desaturation during the recovery period ($p=0.040$) (Table).
Conclusions: LRM are useful to improve postoperative oxygenation indices.

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Table (abstract P082) Desaturation and mean SpO_2 according to exposure to recruitment maneuvers

Variable	Exposed (n = 110)	Not Exposed (n = 111)	*p* value
Desaturation($SpO_2 \leq 90\%$)			0.040
Yes	21(19.1)	33(29.7)	
No	89(80.9)	78(70.3)	
Media SpO_2			0.046
	94.3% (SD2.1)	90.8% (SD2.4)	

P083

Pathophysiological impact of delayed sternal closure on respiratory system in pediatric cardiac surgery patients: a prospective study

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Critical Care 2025, **29(S1)**:P083

Introduction: Delayed sternal closure (DSC) is commonly performed in pediatric cardiac surgery patients in the pediatric intensive care unit (PICU) to manage hemodynamic instability. While its circulatory effects are well studied, the impact on respiratory system remains unclear. A decline in respiratory system compliance (Crs) has been reported after DSC, but the absence of esophageal pressure (Pes) measurements limits its understanding of respiratory system. This study aimed to evaluate the impact of DSC on respiratory system through Pes measurements.
Methods: This single-center prospective observational study was conducted from January to November 2024. Pediatric patients admitted to the PICU after cardiac surgery who underwent DSC were included. Crs, lung compliance (CL), chest wall compliance (Ccw), end-expiratory Pes (eePes), ΔPes and end-expiratory transpulmonary pressure (Ptp) were measured at three time points: before DSC, immediately after DSC, and 3 h after DSC. Ccw and CL were calculated using Pes, assumed to approximate pleural pressure (Ppl) as the sternum was stabilized with bridging fixation and covered with film before DSC. eePes was determined using a modified version of Mojoli's method. The Friedman test assessed differences across time points, followed by Steel's multiple comparison test.
Results: Eight patients were enrolled. Median age and weight were 71.0 days and 3.8 kg. eePes values differed significantly across the three time points ($p=0.04$; Table). Steel's test revealed a significant increase in eePes between before DSC and 3 h after DSC ($p=0.003$). CL decreased 3 h after DSC, though the change was insignificant ($p=0.09$). No significant differences were found in Crs, Ccw, or ΔPes (Table).
Conclusions: DSC in pediatric cardiac patients significantly increases Ppl. CL exhibited a decreasing trend following DSC, suggesting insufficient PEEP to counter Ppl may have contributed to atelectasis. These findings highlight considerations for ventilation strategies after DSC.

Table (abstract P083) Changes in respiratory system measurements at three time points: before, immediately after, and 3 h after DSC

	Before DSC	Immediately after DSC	3 h after DSC	*p* value
Pplat (cmH_2O)	18.0 (17.0–19.3)	18.5 (17.0–19.5)	19.0 (17.8–20.0)	0.07
total PEEP (cmH_2O)	5.5 (5.0–6.0)	6.0 (5.0–6.0)	6.0 (5.8–6.0)	0.22
eePes (cmH_2O)	6.0 (4.8–7.0)	7.3 (5.8–9.3)	8.1 (6.8–10.1)	0.04
ΔPes (cmH_2O)	2.0 (1.9–2.2)	2.1 (1.3–2.5)	2.0 (1.3–2.7)	0.66
Crs (mL/ cmH_2O/kg)	0.58 (0.57–0.63)	0.64 (0.49–0.66)	0.55 (0.45–0.61)	0.50
CL (mL/ cmH_2O/kg)	0.73 (0.70–0.80)	0.73 (0.65–0.80)	0.62 (0.56–0.74)	0.09
Ccw (mL/ cmH_2O/kg)	3.26 (2.86–3.99)	3.93 (2.83–5.67)	3.81 (2.90–4.58)	0.61

P084

Setting positive end-expiratory pressure after lung transplantation

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Critical Care 2025, **29(S1)**:P084

Introduction: Respiratory failure following lung transplantation (LuTx) occurs in up to 20 to 30% of recipients and is associated with short-term morbidity, increased risk of chronic lung allograft dysfunction and overall mortality. Indications regarding how to manage mechanical ventilation in order not to aggravate PGD in the immediate postoperative period are based exclusively on experts' opinion.
Methods: All patients underwent double LuTx (excluded re-LuTx) at the Milan LuTx Center from January 2023 to November 2024 were included in the study. Within 24 h from LuTx, three steps (High = 14 cmH_2O; Medium = 10 cmH_2O; Low = 6 cmH_2O) prolonged (10 min/step) decremental PEEP trial was performed to investigate the effect of PEEP on lung mechanics, gas exchange and hemodynamics were assessed during each step. The percentages of regional collapse and overdistension were measured by electrical impedance tomography at each PEEP level. One-way ANOVA-RM was used for multiple comparison.
Results: Data from 35 patients out of 47 enrolled in the study are here analyzed. Most frequent indication for LuTX was pulmonary fibrosis (66%), followed by bronchiectasis/COPD (20%), cystic fibrosis (11%), and others (3%). Patients' LAS at LuTX was 39 [49–36]. Although no differences were observed in respiratory mechanics ($p = 0.686$) or PaO_2/FiO_2 ($p = 0.545$) (Figure) between the PEEP levels explored, EIT analysis showed significant degree of lung overdistension at High PEEP ($p < 0.001$) and of lung collapse occurred at Low PEEP ($p = 0.001$). At PEEP 10 cmH_2O PaO_2/FiO_2 was 290 [240–383] with 14% of recipients showed a $PaO_2/FiO_2 < 200$ mmHg. Cardiac output was 4.8 L/min [3.7–5.7] and SvO_2 68% [62–71]. No differences in cardiac output ($p = 0.853$) or SvO_2 ($p = 0.094$) were observed during the decremental PEEP trial.
Conclusions: In the immediate perioperative phase, an intermediate PEEP level (10 cmH2O) resulted in the best balance between lung collapse and overdistension without hemodynamics effects.

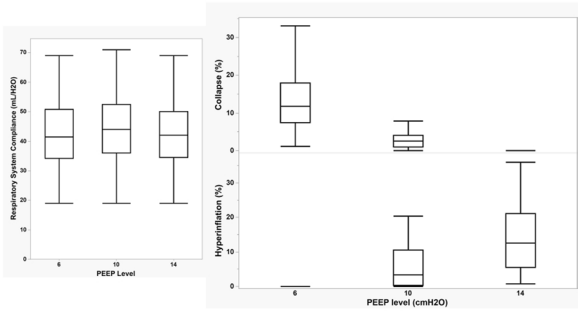

Figure (abstract P084) Respiratory system compliance, hyperinflation and collapse at three PEEP levels

P085

Ventilation-perfusion coupling after lung transplantation

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Critical Care 2025, **29(S1)**:P085

Introduction: During lung transplantation (LuTx) the two grafts are exposed to different degree of damage based on donor characteristics, duration of warm ischemia time, use and timing of ECMO support. Regional (right to left) distribution of ventilation and perfusion may give information regarding the site of damage.
Methods: All patients underwent double LuTx at the Milan LuTx Center from January 2023 to November 2024. Within 24 h from LuTx, in order to investigate ventilation to perfusion (Va/Q) matching simultaneous measurement of regional distribution of ventilation and perfusion (according to electrical impedance tomography) were performed. Intrapulmonary shunt and dead-space according to standard formula were measured as well. All measurement were repeated at three PEEP levels along a decremental PEEP trial (High = 14 cmH_2O; Medium = 10 cmH_2O; Low = 6 cmH_2O). One-way ANOVA-RM was used for multiple comparison.
Results: Data from 35 patients out of 47 enrolled in the study are here analyzed. Duration of warm ischemia time was 76 [63–106] and 74 [63–88] minutes respectively for the right and left graft. Intraoperative veno-arterial ECMO was used in 18 out of 35 patients. Intrapulmonary shunt was 7% [1–39] and alveolar dead space was 14% [1–34]. Between lungs difference in distribution of tidal volume was 10% [6–20] regardless the level of PEEP ($p = 0.984$), while difference in perfusion distribution was 15% [6–28] regardless the level of PEEP ($p = 0.788$). This determines regional Va/Q matching variability. Reducing the PEEP level moves distribution of both perfusion and ventilation from the dorsal to the ventral lung regions (Figure).
Conclusions: Variability in distribution of ventilation and perfusion between grafts occurs after LuTx. PEEP setting does not affect between grafts Va/Q matching. Regional Va/Q mismatch might represent a marker of lung graft damage and correlation to post operative outcome should be further investigated.

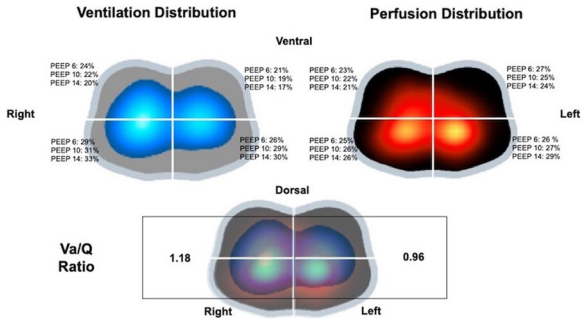

Figure (abstract P085) Distribution of ventilation and perfusion at high, medium and low PEEP

P086

Comparison of standard PEEP vs transpulmonary pressure guided intraoperative PEEP on postoperative PaO_2/FiO_2 ratio in patients undergoing laparoscopic lower abdominal surgeries: a randomized controlled trial

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Critical Care 2025, **29(S1)**:P086

Introduction: Comparison of low tidal volume ventilation with standard PEEP (5 cmH_2O) and transpulmonary pressure guided PEEP in patients undergoing laparoscopic lower abdominal surgeries during general anesthesia in terms of P/F ratio after extubation and PEEP titration, P(A-a) gradient after PEEP titration and extubation, respiratory system compliance after PEEP titration and 5 min prior to extubation, differences in hemodynamics, lung atelectasis 30 min after extubation.
Methods: This randomized controlled trial enrolled 70 patients scheduled for laparoscopic lower abdominal surgeries, randomized into a standard group (Group S) with a PEEP of 5 cmH_2O and a transpulmonary pressure guided group(Group T) with transpulmonary pressures guided PEEP titration. A positive end expiratory transpulmonary pressure (1 to 2 cmH_2O)was targeted in group T. Esophageal pressure was taken as a surrogate marker for pleural pressure.
Results: We observed improved P/F ratios in group T (mean ± SD of 467.91 ± 58.45 vs 332.71 ± 76.59 in group S). Significantly high PaO_2/FiO_2 ratios and reduced alveolar-arteriolar gradient were observed after PEEP titration in group T. Compliance was preserved in the transpulmonary group as compared to the standard group. Driving pressures were significantly lower in group T (mean ± SD of 13.66 ± 3.16 vs mean ± SD of 16.89 ± 2.95 in group S). Lung ultrasound scores showed better aeration in group T. No significant differences were seen in hemodynamic parameters.
Conclusions: Transpulmonary pressure guided titration of PEEP improved the oxygenation and respiratory mechanics in laparoscopic surgeries.

P087

Association of end-expiratory transpulmonary pressures and driving pressures with mortality in mechanically ventilated patients with hypoxemic respiratory failure

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Critical Care 2025, **29(S1)**:P087

Introduction: The ideal method to titrate PEEP in mechanically ventilated patients with acute hypoxemic failure is uncertain [1]. Ventilator-induced lung injury may potentially be minimized by balancing the benefits of lung recruitment with the risks of atelectotrauma and overdistension. We hypothesize that end-expiratory transpulmonary pressure (EELP) and driving pressure (DP) can be used to balance these risks and that both pressures in protective range will be associated with a better clinical outcome than any one alone.
Methods: We used the MIMIC-IV database to identify mechanically ventilated patients with a P/F ratio < 300 and a recorded EELP measured by esophageal manometry. EELP between −3 and 3 cmH_20 (EELP +) and DP < = 12 (DP+) were considered within protective range. Survival curves and cox regression analysis were used to analyze 60-day mortality.
Results: A total of 591 patients were included in the study. 207 patients had DP and EELP within protective range at baseline (EELP+/DP+), in 104 only DP was protective (DP+/EELP−), in 184 only EELP was protective (DP−/EELP+) and 96 were out of protective range for both (DP−/EELP−). 60-day mortality was higher in all groups when compared to the group in protective range (DP+/EELP−, HR 1.52, $p < 0.03$; DP−/EELP+, HR 1.62, $p < 0.01$; DP−/EELP−, HR 1.95, $p < 0.001$) (Figure). In 197 patients with a first EELP that was out of protective range and at least two measurements of esophageal manometry, 60-day survival was higher if the second measurement was within range compared to the group with a second measurement that was out of range (HR 1.62, $p < 0.03$).
Conclusions: The combination of EELP and DP within protective range is associated with survival in mechanically ventilated patients with hypoxemic respiratory failure when compared to patients with either one of these pressures out of protective range. If validated prospectively, EELP and DP in combination have the potential to guide protective lung ventilation.

Reference

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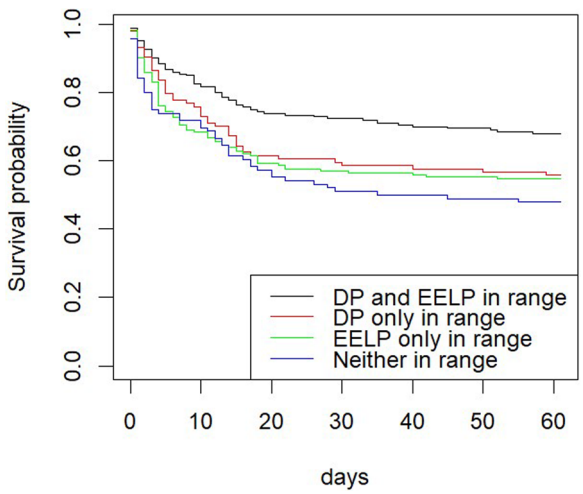

Figure (abstract P087) 60-day survival probability based on end-expiratory transpulmonary pressure and driving pressure within and out of protective range

P088

Individual PEEP titration using EIT and transpulmonary pressure in patients with AHRF/ARDS

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Critical Care 2025, **29(S1)**:P088

Introduction: Mechanical ventilation is essential for patients with AHRF and ARDS. Setting the positive end-expiratory pressure (PEEP) is crucial. This study compares EIT-driven PEEP strategies with transpulmonary pressure (TPP) to clarify their relation. The objective is to investigate the correlation between EIT-guided PEEP titration and end-expiratory transpulmonary pressure (PL,ee) of 0–2 cmH_2O.
Methods: Retrospective, single-center study included mechanically ventilated patients with AHRF/ARDS between January 2020 and December 2023. A decremental PEEP titration was performed using EIT and TPP monitoring. Two EIT strategies were compared: Collaps < 5% and crossing-point. The frequency with which each strategy resulted in a PL,ee of 0–2 cmH_2O was examined.
Results: A total of 26 patients were included, with a mean age of 55 years and a majority (65%) male, with an a mean BMI of 34. Upon admission, 73% of patients had a P/F ratio of < 100 mmHg. Most patients were admitted due to COVID-19 (69%), followed by bacterial pneumonia (23%). Using the collaps < 5% method, 23% of patients achieved the target PL,ee of 0–2 cmH_2O. Correlation analysis between PEEP and PL,ee showed an R^2 value of 0.370 and an R of 0.608 with a *p*-value < 0.001 (Figure). The collaps < 5% strategy numerically more often led to the target PL,ee of 0–2 cmH_2O compared to the crossing-point method (23% versus 19%), although these differences were not significant. Significant differences were found in both PEEP and PL,ee between the collaps < 5% method and the crossing point method (PEEP $p = 0.002$, PL,ee $p = 0.001$).
Conclusions: There is a moderate correlation between PEEP at a collaps < 5% and PL,ee. The collaps < 5% method more frequently achieves a PL,ee of 0–2 cmH_2O compared to the crossing point method. Significant differences in median PEEP and PL,ee exist between these methods. This study highlights the complexity of individual PEEP settings and provides valuable insights into different EIT methods and PL,ee.

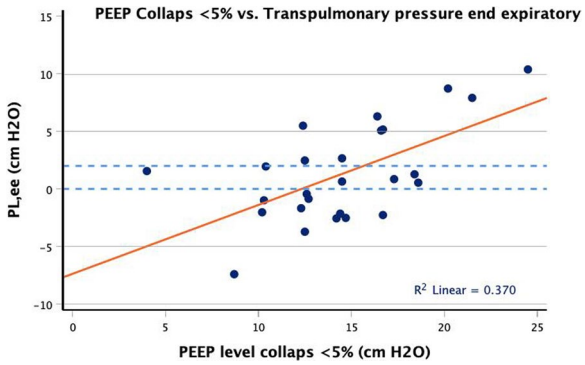

Figure (abstract P088) Scatterplot showing EIT-based PEEP level at < 5% collaps (cmH_2O) on the x-axis and transpulmonary end expiratory pressure (cmH_2O) on the y-axis with the blue dotted line as the 0–2 cmH_2O boundary. The correlation coefficients are $R^2 = 0.370$ and $R = 0.608$, with an ANOVA F-value of 14 and $p < 0.001$

P089

Real-time dynamic monitoring in ARDS: evaluating VE/VCO_2 as a surrogate for VD/VT in personalized medicine approaches

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Critical Care 2025, **29(S1)**:P089

Introduction: Acute respiratory distress syndrome (ARDS) remains a heterogeneous condition with high mortality, necessitating refined tools for personalized management. Dead space fraction (VD/VT) is a validated predictor of mortality but requires arterial blood gas analysis, limiting its utility in real-time clinical decision-making. Ventilatory equivalents for CO_2 (VE/VCO_2) and ventilatory ratio (VR) are emerging surrogates for VD/VT, with VE/VCO_2 holding promise due to its dynamic and continuous monitoring capability through capnography.
Methods: Data from 224 patients meeting the Berlin Definition for ARDS were analyzed. Spearman correlations assessed the relationships between VD/VT, VE/VCO_2, and VR. Cox proportional hazard regression models evaluated the association of VE/VCO_2, adjusted for APACHE II, Driving pressure (DP), and sex, with 28-day cumulative alive discharge. Mann–Whitney U tests examined differences in 28-day mortality and discharge outcomes between VE/VCO_2, VD/VT, and VR categories. Log-rank tests compared survival curves across VE/VCO_2 categories.
Results: VE/VCO_2 correlated strongly with VD/VT (rho = 0.76; $p < 0.001$), outperforming VR (rho = 0.51; $p < 0.001$; z = 3.30, $p < 0.001$) (Figure). Adjusted Cox regression showed VE/VCO_2 was not significantly associated with cumulative alive discharge at 28 days (HR = 0.82; 95% CI: 0.61–1.11; $p = 0.20$). Survival curves revealed no significant differences between VE/VCO_2 categories (log-rank, $p = 0.17$). However, significant differences in 28-day mortality and cumulative alive discharge were observed for VD/VT and VE/VCO_2, but not VR.
Conclusions: These findings highlight VE/VCO_2 as a potential dynamic, real-time surrogate for VD/VT in ARDS. Despite not being a significant independent predictor in this analysis, its ability to correlate strongly with VD/VT and distinguish key outcomes like mortality and discharge warrants further validation in larger cohorts. VE/VCO_2 represents a promising addition to personalized medicine approaches in ARDS management.

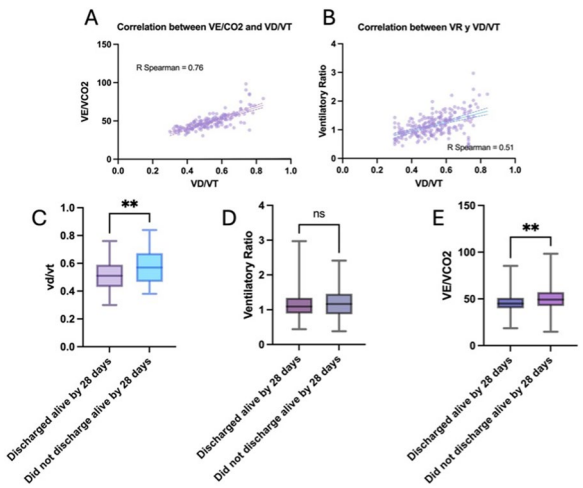

Figure (abstract P089) Correlations and comparative analyses of VE/VCO_2, VD/VT, and VR with 28-day outcomes in ARDS patients

P090

Peripheral oxygen saturation targets and risk of oxidative stress in critical care patients

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Critical Care 2025, **29(S1)**:P090

Introduction: Oxygen therapy is often applied with flexibility [1], disregarding recommended oxygen saturation targets [2]. However, hyperoxemia remains a significant concern due to its association with oxidative stress [3,4]. We aimed to evaluate the risk of oxidative stress by titrating peripheral oxygen saturation (SpO_2), using two partial pressure of oxygen (PaO_2) thresholds.
Methods: Retrospective observational trial involving patients receiving oxygen, regardless of type of ventilatory support. We analyzed blood gas samples alongside SpO_2 levels to evaluate the risk of hyperoxemia and identify SpO_2 thresholds linked to oxidative stress. Based on a review of the literature, we identified two hyperoxemia thresholds for consideration: PaO_2 16 kPa and 20 kPa. Additionally, we investigated the influence of pH on hemoglobin saturation, recognizing it as a significant shifting factor role in hyperoxemia risk.
Results: 6215 patients and 185,014 blood gas samples were included in the study between 01.11.2017 and 31.05.2019. Our findings (Figure) indicate that SpO_2 levels above 95–96% significantly increase the relative risk of oxidative stress at both selected PaO_2 thresholds. Notably, the risk of hyperoxemia was substantially higher under acidotic pH conditions.
Conclusions: SpO_2 titration at higher targets demands the same caution and precision as lower targets to minimize the risk of oxidative stress. This risk is particularly pronounced in acidotic patients, where hyperoxemia is often overlooked.

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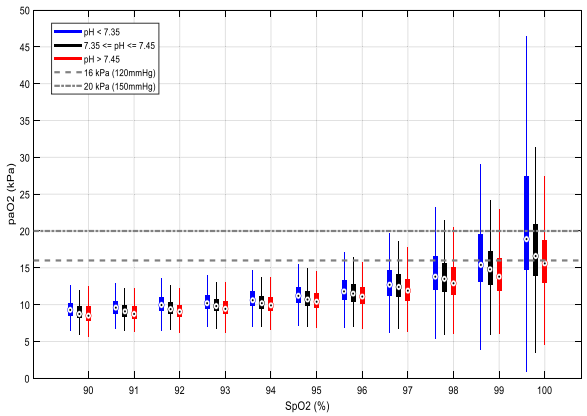

Figure (abstract P090) Relationship Between SpO_2 and PaO_2 across different pH levels

P091

Can changes in non-invasive hemoglobin level derived from photoplethysmographic signal detect hemoconcentration secondary to weaning-induced pulmonary edema?

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Critical Care 2025, **29(S1)**:P091

Introduction: Weaning induced pulmonary oedema (WIPO) is a common cause of weaning failure in intensive care unit [1] and can be diagnosed when increase in hemoglobin level (Hb) secondary to a spontaneous breathing trial (SBT) occurs [2]. The aim of the study is to test the reliability of a continuous non-invasive hemoglobin (SpHb) monitoring to detect WIPO.
Methods: This is a prospective, observational study including patients undergoing SBT. All SBTs were performed using T-piece. Patients were continuously monitored using the Radical-7 pulse co-oximeter (Masimo, Irvine, USA), which provides SpHb derived from photoplethysmographic signal. Data was collected before the SBT and at the end of it. We compared SpHb to Hb from complete blood count (HbCBC) and from blood gas analysis (HbBGA), using linear regression and Bland–Altman analysis. Increase in HbCBC $\geq$ 5% was used to define WIPO.
Results: Thirty-seven SBT, including six WIPO, were performed in 30 patients. Precision and least significant change of SpHb was 3.21($\pm$5.32)% and 4.28 ($\pm$7.40)%, respectively. Baseline HbCBC before SBT was 9.5 $\pm$ 1.6 g/dL. Considering absolute values of Hb (n = 74), the bias (lower to upper limits of agreement) were −0.7 (−4.1 to 2.7) g/dL between SpHb and HbCBC, and − 0.3 (− 3.8 to 3.1) g/dL between SpHb and HbBGA. There was no correlation between changes in SpHb and changes in HbCBC induced by SBT ($R^2 = 0.027$; $p = 0.15$), nor between changes in SpHb and changes in HbBGA ($R^2 = 0.007$; $p = 0.05$) (Figure). Furthermore, in patients with WIPO, HbCBC increased of 9.01 (6.25–12.03)%, HbBGA increased of 9.0 (6.2–11.7)% and SpHb increased of 4.1 (1.6–6.5)%.
Conclusions: Assessment of changes in hemoglobin using SpHb does not reliably detect WIPO. It might be due to the low amplitude of changes in hemoglobin secondary to WIPO. The study is ongoing.

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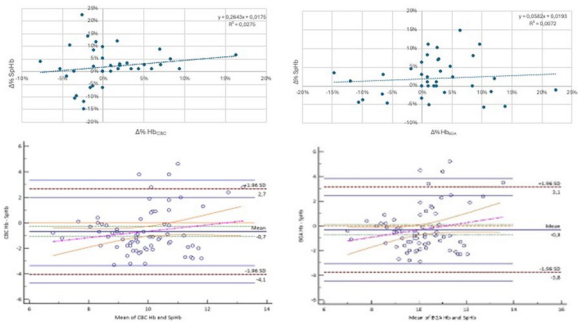

Figure (abstract P091) Correlation between changes in SpHb compared with changes in HbCBC and HbBGA. Below, Bland Altman analysis between SpHb and HbCBC and between SpHb and HbBGA

P092

Correlation of diaphragm ultrasound parameters and mechanical ventilation weaning

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Critical Care 2025, **29(S1)**:P092

Introduction: Diaphragm thickness fraction (DTF) and diaphragmatic excursion (DE) have been shown to be associated with the outcome of weaning and extubation [1,2]. The aim of this study was to determine the correlation of these parameters and combining them with rapid shallow breathing index (RSBI) for predicting successful weaning.
Methods: Patients on pressure support ventilation as a part of weaning process after a minimum 48 h of controlled ventilation were included. All demographic hemodynamic, ventilatory parameters along with RSBI were recorded. DE and DTF were recorded in a standardized manner during weaning trial [3]. At this stage patients were grouped into Successful weaning Versus Failed weaning groups. Patients in the Failed weaning group were switched back to controlled ventilation. Chi-square test, Fishers exact test and unpaired students T test were used for statistical analysis.
Results: 114 patients were included in this study. Mean age of patients was 59.04 ± 19.32 years. 78.1% cases had RSBI < 105 and 21.9% > 105. DTF was > 30% in 53.5% and < 30% in 46.5% DE was ≥ 1.4 cm in 52.3% and < 1.4 cm in 47.7%.RSBI, DTF and DE were studied independently and combined together to predict successful weaning. 30 patients had all 3 parameters predicted successful weaning i.e. RSBI < 105, DTF > 30% and DE > 1.4 cm whereas 18 patients had all 3 parameters predicted weaning failure i.e. RSBI > 105, DTF < 30% and DE < 1.4 cm. 66/114 patients either had only 1 or 2 variables predicting the success of weaning. Diagnostic efficacy measures of all 3 parameters combined together are as shown in the Table.
Conclusions: We conclude that combination of 3 indices viz DTF, DE and RSBI is associated with better prediction of weaning from mechanical ventilation.

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Table (abstract P092) Diagnostic efficacy of combination of RSBI, DTF and DE for predicting weaning success

Combination of weaning parameters	Weaning status		
	Weaning Successful	Weaning Failure	
RSBI < 105 DTF ≥ 30 DE ≥ 1.4 cm	26/30	4/30	PPV = 86.7%
RSBI ≤ 105 DTF < 30 DE < 1.4 cm	0/18	18/18	NPV = 100%
	Sensitivity = 100%	Specificity = 81.8%	Accuracy = 91.7%

P093

Visualizing respiratory therapy effects: an EIT-based assessment of lung physiology

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Critical Care 2025, **29(S1)**:P093

Introduction: The incentive spirometer (IS) is a respiratory therapy device used to improve lung function, especially after surgery. Studies show it improves pulmonary function and reduces complications [1], though the underlying physiological changes are not well researched. This study examines how IS and syringe 50 mL affect lung physiology.
Methods: This prospective pilot study included healthy volunteers (ages 18–60), divided into three age groups and randomly assigned to start with either IS or syringe devices. All participants used both devices, while lung function was measured using Electrical Impedance Tomography [2]. The tidal images derived from EIT screen were divided into 2 layers, representing ventral (V) & dorsal (D) regions. Our primary outcome was absolute difference between V&D regions: absolute (VD difference), a smaller difference means more homogeneity of ventilation.
Results: The study included 24 participants (62.5% female, median BMI 25). While vital signs and oxygen saturation remained stable post-intervention, dyspnea visual analog scale showed significant increases in 3-ball IS and syringe groups. In terms of lung physiology, analysis revealed 3-ball IS achieved the highest tidal volume, followed by the 50 mL syringe (both $p < 0.0001$) (Figure). Both 3-ball IS and 50 mL syringe groups demonstrated significant reductions in end-expiratory lung volume (EELV) ($p < 0.0001$). All devices increased dorsal ventilation compared to baseline ($p = 0.048$). The 3-ball IS configuration displayed the lowest absolute(ventral-to-dorsal difference), suggesting improved lung ventilation distribution and more homogenous, though this was not statistically significant ($p = 0.823$).
Conclusions: Both IS and 50 mL syringe increased tidal volume and dorsal ventilation from baseline, with 3-ball IS showing best results. Though improved lung homogeneity, larger studies are needed to confirm findings and explored clinical impact.

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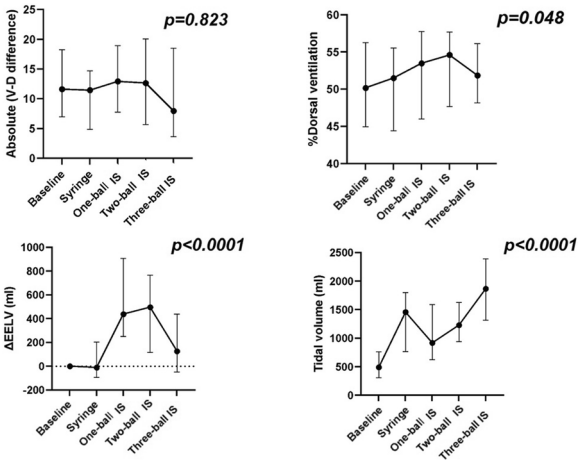

Figure (abstract P093) The physiologic parameters change during lung physiotherapy (mixed-method analysis)

P094

Investigating lung derecruitment using electrical impedance tomography during apnea test in patients with suspected brain death

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Critical Care 2025, **29(S1)**: P094

Introduction: The aim of this study was to assess whether lung derecruitment can be detected by electrical impedance tomography (EIT) during apnoea test (AT). The implementation of AT during brain death determination (BDD) varies widely among countries and centers [1]. Oxygen insufflation method (OIM) is an accepted form of apneic oxygenation achieved by continuous flow of oxygen delivered via cannula through an endotracheal tube or tracheostomy. OIM has been suggested as potential cause of lung derecruitment, but no previous study has assessed this using EIT.
Methods: We present preliminary results from a prospective pilot study. Patients undergoing BDD and AT were included. BDD was conducted according to the Hungarian regulatory law, which mandates oxygen insufflation during AT. EIT (PulmoVista 500, Dräger) was used to measure impedance reflecting lung ventilation before (T0) and after (T1) AT. Impedance values are reported in attributive units (AU), as relative values. Arterial blood gas parameters were obtained at the same time points as EIT measurements. The ratio of partial pressure of arterial oxygen to fraction of inspired oxygen (PaO_2/FiO_2) was used to reflect changes in oxygenation. Data are reported as medians with 25th and 75th percentiles.
Results: Nine AT-s were included in this preliminary analysis. None of the patients had a history of pulmonary disease. At baseline impedance measured by EIT was 9194 [5604–11888] AU, PaO_2/FiO_2 was 367 [236–554] mmHg. Impedance significantly decreased from T0 to T1: 9194 [5604–11888] AU vs. 7473 [4015–9678] AU, $p = 0.011$. PaO_2/FiO_2 tended to decrease between T0 and T1, but the difference did not reach statistical significance: 367 [236–554] mmHg vs. 321 [197–422] mmHg, $p = 0.086$.
Conclusions: AT with OIM leads to lung derecruitment, as detected by EIT. Further studies are needed to explore the potential role of EIT in individualized management of patients undergoing AT.

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P095

The effects of extubation failure rates on patient outcomes

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Critical Care 2025, **29(S1)**:P095

Introduction: While evidence points towards the potential harms of failed extubation [1], deferral or avoidance of extubation attempts may expose patients to the harms of prolonged invasive mechanical ventilation [2]. We aimed to study the effects of different extubation failure rates on patient mortality and ventilation free days (VFD) [3].
Methods: Adult patients admitted to the intensive care unit who underwent planed extubation were included. The primary outcome was 30 days mortality and secondary outcome was VFD. For each calendaric month, the average 30 days mortality rate or VFD was plotted against the extubation rate, with polynomial regression models of increasing complexity fitted to the data until no further increase in the adjusted R2 could be achieved. Propensity for extubation failure was calculated and matched for the survival analysis.
Results: 774 patients were included in the analysis. 33.8% failed extubation attempt. Matched by the propensity for extubation failure, 30 days survival analysis for both groups showed no significant difference (18.4% vs.16.2%, $p = 0.34$) (Figure). The relationship between monthly extubation failure rate and 30 days survival or VFD was best described by a quadratic regression model (adjusted R2 0.816 and 0.624, respectively). Based on this model, the optimal rate of extubation failure was calculated at 33.1% (for 30 days survival) and 28.8% (for VFD).
Conclusions: Our data supports the notion of an optimal extubation failure rate. The harms of extubation failure could be partially attributed to differences in disease severity at the time of extubation.

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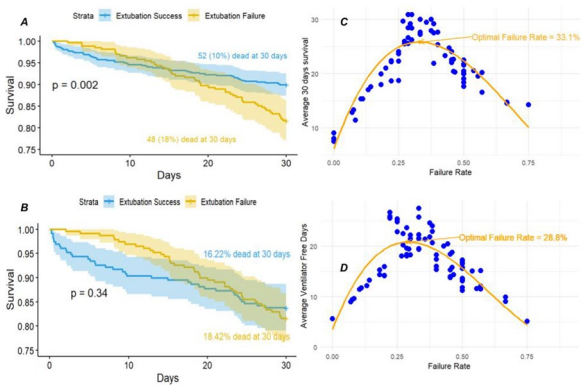

Figure (abstract P095) 30 days survival in those successfully weaned off ventilation (blue) and those who failed extubation (yellow) in the entire cohort (A) and propensity score matched sample (B). 30 days survival for patients extubated in a given calendaric month is plotted against the proportion of failed extubations. A yellow line delineates the regression line for this data (C). The number of days each patient was free from invasive ventilation for each month is plotted against the average extubation failure rate (D).

P096

Post-extubation polyuria: description of an underrecognized phenomenon

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Critical Care 2025, **29(S1)**:P096

Introduction: The transition from invasive mechanical ventilation (MV) to unassisted breathing involves significant physiological changes for patients admitted to intensive care units (ICUs). Discontinuation of MV impacts not only the respiratory system, but also affects hemodynamics and fluid balance. We hypothesized that patients experience an increase in urine output following extubation.
Methods: A prospective study was conducted at CASMU Medical Center (Uruguay). We included adult patients who required invasive MV for 1 to 15 days in the ICU and were subsequently extubated and placed on conventional oxygen therapy. Urine output was documented for the 48 h before and after extubation. Data is presented as n (%) or median (p25-p75).
Results: The study included 60 patients [22 (37%) female), with a median age of 58 (32–70) years and an APACHE II score of 14 (10–18). Patients received invasive MV for 2.5 (2.0–4.0) days and stayed in the ICU for 6 (4.0–9.5) days. Fluid balance at the time of extubation was 0.96 (−0.73–1.84) L. A significant increase in urine output was observed after extubation, both over a 6-h period [92 (60–148) vs. 142 (83–233) mL/h, $p < 0.0001$] and a 24-h period [88 (58–127) vs. 136 (100–194) mL/h, $p < 0.0001$]. When normalized to pre-extubation

values, the increase in hourly diuresis remained significant up to 30 h post-extubation. Polyuria (diuresis > 150 mL/h) was observed in 15 (25%) of patients during MV and in 30 (50%) after extubation ($p = 0.001$). Increased diuresis was not associated with hemodynamic or renal function impairment. Notably, the increase in urine output was more pronounced in patients with higher positive end-expiratory pressure (PEEP) prior to extubation. Results are shown in the Figure.
Conclusions: Discontinuation of MV is associated with a significant increase in urine output. Post-extubation polyuria may reflect the reduction in intrathoracic pressure and its impact on blood renal flow and fluid homeostasis.

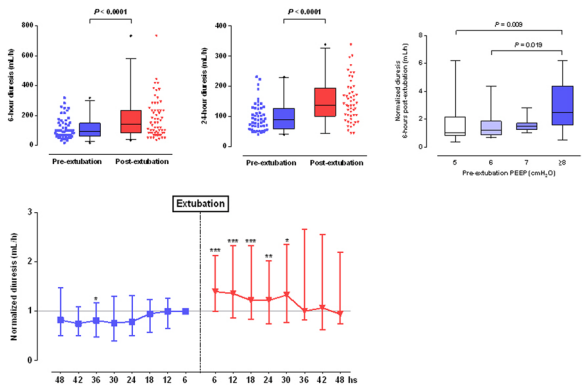

Figure (abstract P096) A-B) Hourly urine output during the 6-h (A) and 24-h (B) periods before and after extubation. C) Diuresis during the 6-h period post-extubation (normalized to pre-extubation diuresis) based on pre-extubation PEEP levels. D) Hourly urine output (normalized to pre-extubation values) over a 48-h period before and after extubation. Related variables were compared using Wilcoxon signed-rank test, and independent variables were compared using Kruskal–Wallis test. *$p < 0.05$; **$p < 0.01$; *$p < 0.001$.

P097

Role of comprehensive lung ultrasound in predicting postoperative pulmonary complications after emergency abdominal surgery

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Critical Care 2025, **29(S1)**: P097

Introduction: Postoperative pulmonary complications (PPCs) are common following major abdominal surgeries like emergency laparotomy (EL) and are associated with significant morbidity and mortality. Early detection using lung ultrasound (LUS) could enable timely prevention.
Methods: It was a single-center, prospective observational study which included 132 patients (≥ 18 years) undergoing EL under general anesthesia. Our aim was to evaluate the predictive ability of comprehensive LUS to predict PPCs. Bedside comprehensive LUS was performed on prespecified 12 lung areas preoperatively and within 24 h postoperatively by the trained primary investigator. Total lung aeration score, bilateral diaphragmatic thickening fraction (DTF), and bilateral parasternal intercostal muscle thickening fraction (ICMTF) were calculated. The primary end point was occurrence of first PPC (screened by Melbourne Group Scale (MGS) v2) within postoperative day 7.
Results: In our study, a total of 132 patients were enrolled, and the median (Interquartile range) age of the patients were 41 (32- 55) years. Amongst them 37.8% patients were female. Within the follow-up period, 25.7% (34 of 132) patients fulfilled MGS v2 criteria of PPC. Patients who developed PPC had higher preoperative and postoperative lung USG aeration score ($p < 0.001$ & $p < 0.001$), lower DTF ($p < 0.001$ & $p < 0.001$) and higher ICMTF ($p < 0.001$ & $p < 0.001$). Both preoperative & postoperative comprehensive lung USG based models were able to predict PPC (Table).
Conclusions: Both preoperative and postoperative comprehensive lung USG based models were able to predict PPCs with excellent accuracy. The lung USG parameters used in this study were simple and can be obtained at the bedside easily and therefore, can help in planning preemptive strategies for prevention of PPCs.

Table (abstract P097) Comprehensive lung USG based regression models for prediction of postoperative pulmonary complications

	OR (95% CI)	*p* value	Model characteristics
Preoperative Model			
Lung USG aeration score	1.6 (1.33- 1.94)	< 0.001	AUROC = 0.91, R^2MCF = 0.43, Accuracy = 0.89
Diaphragmatic thickness fraction	0.85 (0.69–1.04)	0.113	
Intercostal muscle thickness fraction	0.97 (0.704–1.33)	0.845	
Postoperative model			
Lung USG aeration score	1.57 (1.304–1.89)	< 0.001	AUROC = 0.93, R^2MCF = 0.4, Accuracy = 0.87
Diaphragmatic thickness fraction	0.95 (0.77–1.17)	0.632	
Intercostal muscle thickness fraction	0.92 (0.69–1.22)	0.560	

P098

Mechanical power and gas exchange parameters as predictors of ARDS severity: a preliminary step towards physiological subphenotyping

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Critical Care 2025, **29(S1)**:P098

Introduction: Acute respiratory distress syndrome (ARDS) affects 3 million patients annually, with a lethality of 30–46% [1]. This syndrome is caused by non-cardiogenic pulmonary edema and is highly complex and heterogeneous. Current diagnostic criteria, such as the Berlin Definition, have a low positive predictive value (PPV) for mortality (0.57%) and do not incorporate ventilatory mechanics or gas exchange variables [2], leading to frequent misclassification. This study aims to identify key predictors of ARDS severity as a foundational step towards physiological subphenotyping.
Methods: Data from 533 mechanically ventilated patients, of whom 224 met the Berlin Definition for ARDS, were analyzed. Logistic regression models were applied to determine associations between clinical and physiological variables and outcomes, including 28-day mortality and the cumulative incidence of 28-day alive discharge. Model performance was evaluated using receiver operating characteristic (ROC) curves.
Results: The strongest predictors for 28-day alive discharge were mechanical power (AUROC: 0.731), normalized mechanical power (AUROC: 0.726), driving pressure (AUROC: 0.642), VD/VT (AUROC: 0.576), and PaO_2/FiO_2 (AUROC: 0.351). Multivariate logistic regression identified driving pressure (Exp(β): 1.247, 95% CI: 1.055–1.473, $p = 0.01$), VD/VT (Exp(β): 3.829, 95% CI: 0.158–93.011, $p = 0.409$), and PaO_2/FiO_2 (Exp(β): 0.995, 95% CI: 0.991–0.999, $p = 0.009$) as predictors

of 28-day alive discharge (Table). These variables explained 24.7% of the variance in outcomes ($R^2 = 0.247$).
Conclusions: It is necessary to include ventilatory mechanics and gas exchange variables in predictive models to strengthen the diagnostic and categorization capacity currently used. We recommend considering the variables identified in this study to support personalized medical decision-making.

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Table (abstract P098) Statistical significance was determined using univariate and multivariate logistic regression models. Variables with $p < 0.05$ in the univariate analysis were included in the multivariate model

Predictor	Exp(β)	95% CI lower	95% CI upper	*p* value
Age	0.974	0.944	1.005	0.098
Male (gender)	1.183	0.596	2.349	0.631
APACHE II	0.922	0.881	0.965	< 0.001
Mechanical power (J/min)	1.077	1.011	1.147	0.022
PaO_2/FiO_2	0.995	0.991	0.999	0.009
Driving pressure (cmH_2O)	1.247	1.055	1.473	0.010
VD/VT	3.829	0.158	93.011	0.409

Values represent β coefficients, odds ratios (Exp(β)), and 95% confidence intervals (CI) for associations with the probability of 28-day alive discharge.

P099

The effect and mechanism of inhaled nitric oxide on oxygenation in patients with moderate to severe acute respiratory distress syndrome

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Critical Care 2025, **29(S1)**:P099

Introduction: To evaluate the effects of inhaled nitric oxide (iNO) on oxygenation and ventilation-perfusion (V/Q) distribution in patients with moderate to severe acute respiratory distress syndrome (ARDS).
Methods: Adult patients with moderate to severe ARDS diagnosed according to the Berlin definition and underwent mechanical ventilation were included. Throughout the study, patients were ventilated in volume-controlled mode, with tidal volume of 6–8 mL/kg and positive end-expiratory pressure (PEEP) titrated by the highest respiratory-system compliance. Respiratory mechanics, arterial blood gas analysis, hemodynamic parameters and electrical impedance tomography (EIT) data were collected at baseline and 30 min after iNO. Intrapulmonary shunt, dead space fraction, and V/Q matching were analyzed using EIT offline analysis. An increase in PaO_2/FiO_2 of at least 20% after iNO was defined as oxygenation response. Both between-group and within-group comparisons were performed.
Results: Twenty four patients were enrolled, with the median age of 75 [65, 83] years. In the overall population, PaO_2/FiO_2 increased (168.7 [150.1, 181.4] vs. 206.2 [159.6, 231.5] mmHg, $p < 0.001$) after iNO, accompanied by decreased intrapulmonary shunt (22.7 [11.6, 27.4] vs. 18.2 [11.5, 24.2]%, $p = 0.001$), and improved V/Q matching (71.1 [61.9, 79.3]% vs. 75.3 [65.6, 79.9]%, $p = 0.001$), while the dead space fraction was unchanged (Figure). A significant correlation was found between changes in PaO_2/FiO_2 and shunt fraction following iNO ($r = -0.461$, $p = 0.023$). Eleven patients were identified as iNO-responders. iNO significantly reduced the shunt fraction and improved V/Q matching among responders, whereas these effects were not significant in the non-responders.
Conclusions: The reduction in intrapulmonary shunt by iNO may contribute to the improvement of oxygenation in patients with moderate to severe ARDS.

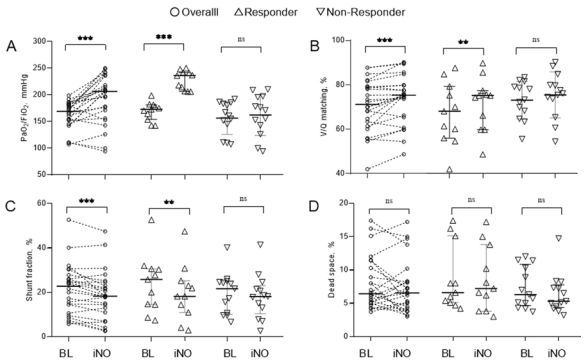

Figure (abstract P099) Comparisons of PaO_2/FiO_2 (A), V/Q matching (B), shunt fraction (C) and dead space (D) between baseline and after iNO in all patients,oxygenation responders and non-responders. BL = Baseline, iNO = inhaled nitric oxide

P100

Cathepsin K aggravates pulmonary fibrosis through promoting fibroblast glutamine metabolism and collagen synthesis

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Critical Care 2025, **29(S1)**:P100

Introduction: Fibroblast collagen synthesis is one of the key hallmarks during the pathogenesis and progression of pulmonary fibrosis (PF). However, which factors trigger the abnormal activation of the fibroblasts in the PF is still not well addressed.
Methods: We used proteomics, single-cell RNA sequencing, cathepsin K (CTSK) knockout mice, recombinant CTSK peptides (rCTSK) mice, metabolomics, protein identification and data from PF patients.
Results: By using proteomics and single-cell sequencing datasets screening, we detected the extra accumulation of CTSK in the periphery as well as in the fibroblasts in the lungs from PF mouse models. Addition of rCTSK aggravated collagen accumulation and PF progression in bleomycin-induced PF mice. Mechanically, CTSK underwent endocytosis through interaction with sorting nexin 9 (SNX9), which is engaged in transforming growth factor-β1 (TGF-β1) induced SMAD3 activation for downstream glutaminase 1 (GLS1) upregulation and glutamine enrichment (Figure). Extra glutamine in turn increased collagen synthesis in the fibroblasts. More significantly, serum CTSK levels are positively correlated with glutamine contents with a poor prognosis in acute respiratory distress syndrome (ARDS) patients bearing PF.
Conclusions: Our results thus identify CTSK as a novel regulator on fibroblast activation to remodel glutamine metabolism and promote collagen synthesis during PF pathogenesis. Correlation of periphery CTSK with glutamine implies their future feasibility in the prediction and prevention for PF progression.

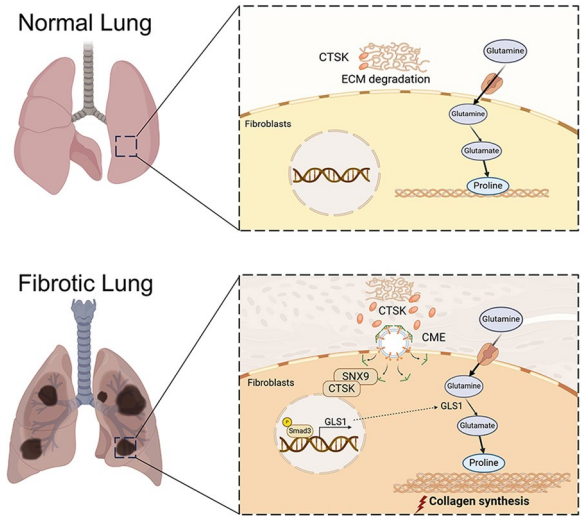

Figure (abstract P100) Schematic diagram

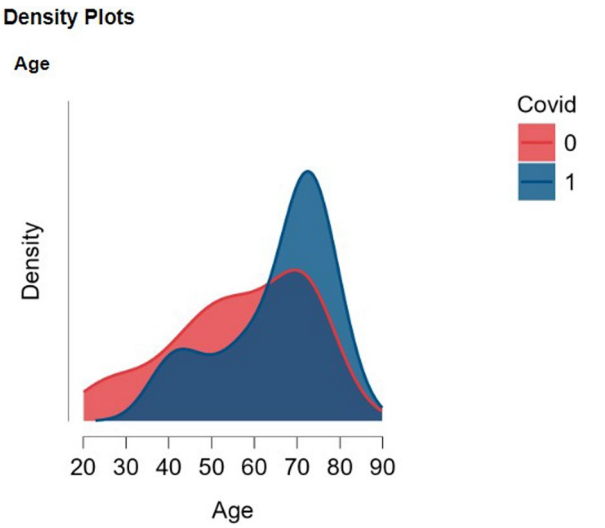

Figure (abstract P101) Age distribution of ARDS patients in post-pandemic period

P101

ARDS characteristics and outcomes: two years after pandemics sub-analysis

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Critical Care 2025, **29(S1)**:P101

Introduction: Important differences in epidemiology and outcomes were observed between pre-COVID ARDS (Classic ARDS) and ARDS patients during COVID-19 pandemics (COVID-ARDS) [1]. Aim of this study was to compare characteristics of ARDS patients after COVID-19 pandemics (post-COVID ARDS) with Classic-ARDS and COVID-ARDS patients.
Methods: A retrospective analysis included adult ARDS patients hospitalized in the ICU during three periods: Classic ARDS from 2006 until December 2019, COVID ARDS from November 2020 until March 2022 and post-COVID ARDS from January 2023 until October 2024. All patients met Berlin criteria for ARDS (2). COVID-19 diagnosis was confirmed with nasopharyngeal swab real-time PCR. Descriptive statistics were used to compare epidemiology and outcomes of ARDS patients between three periods. The primary endpoint was mortality at day 60.
Results: This analysis included 249 Classic ARDS, 171 COVID ARDS and 83 post-COVID ARDS patients. ARDS patients from post-COVID period included 17 subjects positive for SARS-CoV-2. COVID ARDS and post-COVID ARDS patients were older comparing to Classic ARDS [52.9 (IQR 23.8) vs 61 (IQR 23) vs 65 (IQR 18.5), $p < 0.001$] (Figure). Post-COVID ARDS patients had higher APACHE II [19.9 (IQR 9) vs 16 (IQR 9) $p < 0.001$] and SOFA scores [8 (IQR 4.5) vs 5 (IQR 3), $p < 0.001$], invasive mechanical ventilation was used more often comparing to COVID ARDS (98.8% vs 84.2%, $p < 0.001$) and similar to Classic ARDS. Mortality at 60 days observed for post-COVID ARDS patients was higher comparing to Classic ARDS (55.4% vs 42.2%, $p < 0.001$). Fourteen (76.5%) patients with ARDS positive for SARS-CoV-2 in post-COVID period died.
Conclusions: Our findings show that patients' characteristics and outcome of post-COVID ARDS patients are trending towards Classic ARDS patients with high mortality rate observed for patients with COVID-19 in post-pandemic period.

References

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2. Van der Ven et al. Respir Res. 2024;25:312

P102

CCL24 treatment alleviated acute respiratory distress syndrome by inhibiting immune-thrombosis

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Critical Care 2025, **29(S1)**:P102

Introduction: Acute respiratory distress syndrome (ARDS) is a severe respiratory syndrome which results in countless deaths worldwide. Although dysfunctional coagulation is a critical character of ARDS, the pathophysiological mechanism of ARDS-related clotting remains poorly understood.
Methods: We conducted a retrospective clinical study, recruited seventy-five patients with ARDS and divided them into two groups based on 28-day outcome. Clinical characters of them were compared to identify risk factors. Next, patients were grouped into D-dimerLow, D-dimerMedium, D-dimerHigh, their bronchoalveolar lavage fluid (BALF) was retrieved to separated cells for transcriptomic sequencing. Differentially expressed genes were screened for pathway enrichment, and verified by using public dataset (the Gisby cohort). To validate the therapeutic value of CCL24 in ARDS, we constructed the ARDS mice model by nasal-feeding LPS and compared the histo-morphological and structural changes of lung.
Results: Abnormal coagulation was more frequent in non-survived ARDS patients than survived patients, associated with higher D-dimer (Figure). Along with increased D-dimer, CCL24 was significantly decreased. Through validation by public data, reduced CCL24 was observed in severe cases and correlated with poorer outcome. Compared to massive accumulation of thrombi and immune infiltration in the lung of LPS-induced ARDS mice, the histo-morphology and structure were normalized in mice being intravenously injected with CCL24. More importantly, treatment with CCL24 reduced level of D-dimer and content of neutrophil in BALF.
Conclusions: Our study illustrates bi-functional of CCL24 in the treatment and prediction during ARDS. Treating with CCL24 is a potential treatment strategy to attenuated immune-thrombosis and lung damage of ARDS.

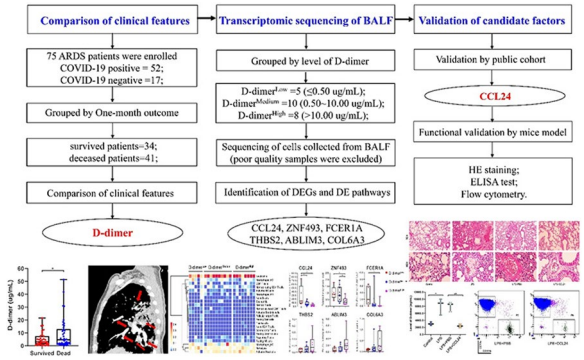

Figure (abstract P102) Graphic Summary

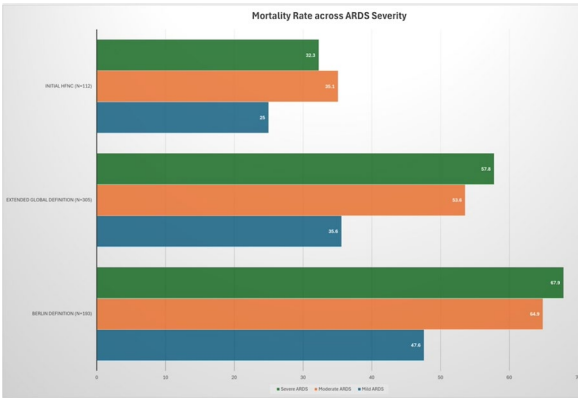

Figure (abstract P103) Percentages of mortality across ARDS severity

P103

Validation of updated diagnostic criteria of ARDS in COVID-19 patients: a retrospective study

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Critical Care 2025, **29(S1)**:P103

Introduction: A recent ARDS definition [1, 2] included patients receiving high flow nasal oxygen (HFNO) and fulfilling the oxygenation and radiological criteria of ARDS Berlin definition. However, outcome of patients treated may be better than those fulfilled the corresponding class of Berlin definition.
Methods: Data of laboratory confirmed severe COVID-19 adult patients intensive care units were recorded. Patients fulfilling WHO case definition [3] of severe COVID-19 infection requiring HFNO (at least 30 L/min of flow), non-invasive ventilation (at least a PEEP of 5 cmH_2O) or invasive ventilation (at least a PEEP of 5 cmH_2O) were included in this study provided they fulfilled oxygenation and radiological criteria of ARDS as per Berlin definition [4].
Results: All-cause hospital mortality rate in patients who fulfilled Berlin definition (n = 193) was 47.6% (mild ARDS), 64.9% (moderate ARDS) and 67.9% (severe ARDS) [$p = 0.23$, Fisher exact test] (Figure). In patients who fulfilled the extended Global definition (n = 305), all-cause mortality rate was 35.6% (mild ARDS), 53.6% (moderate ARDS) and 57.8% (severe ARDS) [$p = 0.04$]. Hazard of death was lower in patients who fulfilled extended definition [adjusted HR (95% CI) 0.60 (0.41–0.87), $p = 0.007$] even after adjustment for age and baseline PaO_2/FiO_2 ratio. Multiple pairwise comparison reported that hazard of death was lower in patients with moderate ARDS as per extended definition as compared to the moderate ARDS patients as per Berlin definition ($p = 0.024$). However, no difference was observed in patients of mild ($p = 0.39$) and severe ARDS ($p = 0.24$).
Conclusions: Outcome of patients fulfilling the extended definition of ARDS is largely different from those who fulfilled Berlin definition. Hence, multi-centric prospective validation is required before its bedside use.

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P104

Concurrent use of enoxaparin and aspirin on the outcome of COVID-19 patients in intensive care unit

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Critical Care 2025, **29(S1)**:P104

Introduction: We evaluated the association of common antithrombotic agents (enoxaparin and aspirin) used in the intensive care unit (ICU) on the outcome of COVID-19 pneumonia patients.
Methods: Retrospectively collected data of ICU patients admitted with SARS-CoV-2 pneumonia in the ICU of a major hospital in Dubai during the COVID-19 outbreak. 257 patients consecutively admitted to the ICU were included in the study. The study population was divided into two groups based on mono use of prophylactic anticoagulant or concurrent use with antiplatelet.
Results: Out of 257 patients included, 202 were male, and the mean age was 53.8 ± 13.58 years. The mean length of ICU stay was 24.95 ± 35.81 days. 151 patients had ICU mortality, 202 complicated with ARDS, 99 had acute kidney injury, and 33 had various thrombotic complications. 183 patients received enoxaparin, while 73 received enoxaparin with aspirin as thromboprophylaxis. We compare the mortality rate of both groups; concurrent use of aspirin with standard prophylactic anticoagulant (enoxaparin) did not show significant mortality reduction ($p = 0.868$) (Table). Serum D-Dimer level on ICU admission and peak D-Dimer level during ICU stay were statistically significantly higher between non-survivors (mean = 5.02, 11.87 respectively) compared to survivors (mean = 3.37, 8.59 respectively) with $p = 0.031, < 0.001$ respectively. Also, peak serum D-Dimer levels were significantly correlated to the length of ICU stay (r = 0.137, $p = 0.031$). D-dimer level on admission and peak level during ICU stay had a good prognostic value of outcomes of COVID-19 patients ($p = 0.018, < 0.001$ respectively) with area under the ROC curve = 0.588, 0.635 respectively.
Conclusions: Concurrent use of antiplatelet (aspirin) with standard prophylactic anticoagulant (enoxaparin) was not associated with a significant reduction in ICU mortality of COVID-19 patients. Elevated D-Dimer levels could be used as significant predictors of ICU mortality in COVID-19 patients.

Table (abstract P104) Mortality/discharge distribution among the studied groups

Group	Enoxaparin and aspirin group	Enoxaparin group	*P* value
	Count (%)	Count (%)	
Total	73 (28.4%)	182 (70.8%)	
ICU mortality	45 (61.6%)	106 (58.2%)	0.868
Discharge from ICU	28 (38.4%)	76 (41.8%)	

P105

Audit of asthma exacerbation management in an emergency department

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Critical Care 2025, **29(S1)**:P105

Introduction: Asthma is a serious illness seen regularly in emergency departments (ED) and hospitals frequently struggle to meet treatment guidelines. This study aims to audit the asthma exacerbation management in the ED [1].
Methods: Retrospective cohort study, including all adult patients admitted with asthma exacerbation to the ED of a tertiary care hospital, during 2022. The asthma management provided was compared with international GINA guidelines.
Results: There were 203 patients included in the study with a mean ± SD age of 51 ± 19 years, 152 (75%) were female and 194 (96%) had already an asthma diagnosis. There was no record on peak expiratory flow (PEF) measurement in any of the patients, the remaining clinical characteristics of the acute episodes allowed its classification in mild to moderate exacerbation in 92 (45%), severe in 102 (50%) and life-threatening in 9 (4%); 131 (64.5%) had at least one risk factor to increased mortality and despite the severity of the exacerbation only 2 (1%) were admitted to intensive care and 159 (78%) were discharged home. Concerning first approach: short-acting β-agonists (SABA) administration was register in 174 (86%), systemic corticosteroids in 171 (84%) and controlled oxygen in 197 (97%). Among those with severe and life-threatening asthma (n = 111): ipratropium bromide was administered in 100 (90%), magnesium sulfate in 34 (31%) and adrenaline in none. At discharge (n = 159), 88 (55%) had a short course of corticosteroids prescribed, in 10 (6%) the inhaler technic was review, in 37 (23%) the prescription plan was revised and 34 (22%) were oriented to follow-up.
Conclusions: This study identified as priority intervention areas the routine PEF measurement by healthcare professionals, to stratify the exacerbation of asthma, and planed discharge arrangements. An educational campaign directed towards emergency department physicians and nurses that attend these patients is being built to address these issues.

Reference

1. Global Initiative for Asthma, 2024

P106

Critical pneumocystis pneumonia

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Critical Care 2025, **29(S1)**:P106

Introduction: Pneumocystis pneumonia (PP) is a rare pulmonary infection of Pneumocystis jirovecii in immunocompromised patients. The PP patient's immune profile has shifted from a predominant human immunodeficiency virus (HIV) positive population to including those with hematologic malignancies or post-transplantation.
Methods: Retrospective cohort study involving 34 patients with PP admitted to intensive care unit (ICU) from 2016 to 2023. Baseline characteristics, acute outcomes and ventilation kinetics were analyzed.
Results: Median age was 57 years. Median SOFA and SAPSII scores were 8 and 55. Median ICU and Hospital length of stay were 9 and 15, respectively. Immune suppression was related to HIV infection in 47% and hematologic malignancies in 41%, most common were. Acute myeloid leukemia (64.2%) and non-Hodgkin lymphoma (21.4%). HIV patients had a median viral load of 341,000 copies/mL and CD4+ cell count of 23 cells/μL. Non-quantitative PCR of bronchoalveolar lavage (BAL) confirmed 88.2% of cases. BAL culture was negative in 88%, and 12% had co-infection. Treatment included sulfamethoxazole-trimethoprim in all patients, 20.5% also used atovaquone and 8.8% primaquine. The median duration of mechanical ventilation was 10 days. Acute respiratory distress syndrome (ARDS) occurred in 97% of cases, with a median P/F ratio of 125 mmHg. ICU mortality was 47%, while hospital mortality was 61%. Comparing HIV positive PP vs HIV negative PP, there was no significant difference in minimum P/F (151 vs 125, *p*-value = 0.102). The mortality was significantly higher in PP HIV negative patients (ICU 55% vs 35%, *p*-value < 0.001; Hospital 77% vs 43%, *p*-value < 0.001). The use of neuromuscular blockade (55% vs 33%. *p* value < 0.001) and prone positioning (50% vs 11%. *p*-value < 0.001) was higher in HIV positive PP.
Conclusions: PP requiring mechanical ventilation frequently progresses to ARDS. The higher mortality of HIV negative PP with lower ventilatory support may indicate pathophysiological mechanism dissociated from respiration.

P107

PD-L1 inhibitor-associated myasthenia gravis: insights from five ICU cases

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Critical Care 2025, **29(S1)**:P107

Introduction: PD-L1 inhibitors, pivotal in cancer therapy, can cause rare but severe immune-related adverse events (irAEs), including myasthenia gravis (MG). PD-L1-associated MG, characterized by profound respiratory or bulbar muscle weakness, frequently necessitates ICU care. This study reviews five ICU cases, focusing on clinical features, diagnostic challenges, and management strategies for this critical condition.
Methods: Five lung cancer patients undergoing PD-L1 inhibitor therapy were admitted to the ICU in Heraklion, Greece, with hypercapnic respiratory failure due to severe respiratory muscle weakness. Symptoms, including dyspnea, emerged one month after their last treatment. Evaluations included clinical assessments, biochemical tests (CPK), electromyography (EMG), and serological analyses for acetylcholine receptor (AChR) and muscle-specific kinase (MuSK) autoantibodies.
Results: All patients exhibited severe respiratory muscle failure requiring mechanical ventilation. Diagnoses of MG were supported by EMG findings, with differential diagnoses including myositis and myocarditis. Serological tests for AChR and MuSK antibodies were negative or borderline, complicating diagnosis. Treatment included corticosteroids and plasmapheresis, initiated on day 10 in four patients and day 4 in one. ICU stays lasted approximately one month. Respiratory muscle weakness persisted throughout, leading to hypercapnic respiratory insufficiency. Four patients died due to complications, including

infections and multiple organ dysfunction syndrome (MODS). The sole survivor required prolonged rehabilitation post-discharge.
Conclusions: PD-L1-associated MG is a life-threatening condition defined by refractory respiratory muscle failure and persistent hypercapnic respiratory insufficiency, with high morbidity and mortality. Further studies are essential to elucidate pathophysiological mechanisms, identify risk factors, and optimize management strategies.

P108

Rhu-plasma gelsolin phase 2 study in moderate/severe ARDS due to infection

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Critical Care 2025, **29(S1)**:P108

Introduction: Plasma gelsolin (pGSN), secreted by virtually every cell type, is an abundant, pleiotropic human protein, that modulates the immune system, scavenges toxic actin, interrupts the NLRP3 inflammasome, and boosts macrophage clearance of pathogens. pGSN levels plummet in patients with ARDS, the fall correlating with increases in mortality. Rhu-pGSN is identical to endogenous pGSN and has been safely administered to volunteers, reaching blood levels 10-times the normal range. BTI-203 (NCT05947955), is a randomized, double-blind, placebo-controlled, multicenter, Phase 2 study to evaluate the efficacy and safety of rhu-pGSN plus standard of care in ARDS.
Methods: 600 subjects with $PaO_2/FiO_2 \leq 150$ on high flow nasal oxygen, non-invasive or invasive mechanical ventilation, are eligible within 48 h of diagnosis of ARDS secondary to pneumonia or other bacterial or viral infection. The study is powered to detect a 30% relative decrease of the primary outcome (28-day mortality; from 35% to 24.5%) for placebo compared to rhu-pGSN. Subjects are randomized 1:1 to placebo or rhu-pGSN (24 mg/kg bolus, followed by 12 mg/kg daily for 5 days). Key secondary measures include the frequency of adverse events, the proportion without respiratory support at Day 28, Day 60 mortality, time to permanent discontinuation of respiratory support, and ventilator-free days through 28 days.
Results: 76 sites across North America and United Kingdom (33%) and Europe (67%) were selected based on previous participation in global studies, adherence to standard-of-care oxygen supplementation, paralysis, sedation, venous thrombosis prophylaxis, weaning protocol and prone positioning use, and enrolment projections. The first subject was enrolled in October 2024. Protocol details and the current trial status will be reported.
Conclusions: Rigorous site selection and randomization by site is expected to provide globally generalizable results of the efficacy and safety of rhu-pGSN in ARDS patients.

P109

Characteristics of acute respiratory distress syndrome under hyperferritinemia conditions

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Critical Care 2025, **29(S1)**:P109

Introduction: Angiotensin-converting enzyme 2 (ACE2) facilitates SARS-CoV-2 entry, driving hyperinflammation, lung injury, and systemic dysfunction in COVID-19. This study hypothesized that ACE2 inhibitors could mitigate ARDS progression in COVID-19 and other severe respiratory infections under hyperferritinemia (HF) conditions.
Methods: A retrospective cohort study was conducted from 2020 to 2021 at the First University Clinic in Tbilisi, Georgia, to evaluate the impact of ACE2 inhibitors on ARDS progression in critically ill patients with COVID-19 or other respiratory infections (e.g., pneumonia, systemic infections), stratified by hyperferritinemia severity.
Results: ACE2 inhibitors significantly reduced Ang II, CRP, and D-dimer levels in ARDS patients at moderate HF (COVID-19 group: Ang II from 1508.07 ± 26.68 to 48.51 ± 24.35, CRP from 233.92 ± 13.02 to 198.12 ± 11.88, D-dimer from 7.88 ± 0.47 to 6.28 ± 0.43; non-COVID-19 group: Ang II from 1000.14 ± 149.49 to 46.23 ± 88.21, CRP from 226.48 ± 13.81 to 183.52 ± 17.32, D-dimer from 6.39 ± 0.58 to 5.48 ± 0.69). At severe HF, similar reductions in Ang II and CRP were observed (COVID-19 group: Ang II from 1845.89 ± 89.37 to 49.64 ± 51.05, CRP from 209.28 ± 14.41 to 175.37 ± 9.84; non-COVID-19 group: Ang II from 1753.29 ± 65.95 to 49.76 ± 55.74, CRP from 287.10 ± 20.50 to 214.71 ± 17.32). IL-6 levels decreased at moderate HF (COVID-19 group: from 1977.23 ± 354.66 to 899.36 ± 323.76), and PCO_2 levels were also reduced at severe HF (COVID-19 group: from 69.80 ± 3.22 to 60.44 ± 2.20).
Conclusions: ACE2 inhibitors exhibit significant potential in reducing inflammation, correcting immune imbalances, and improving alveolar function in ARDS patients, particularly those with COVID-19. These findings support the therapeutic value of ACE2 inhibitors in managing severe respiratory conditions associated with hyperferritinemia.

P110

Effect of a 5-HT3 receptor antagonist on respiratory drive in patient under mechanical ventilation: a retrospective observational study

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Critical Care 2025, **29(S1)**:P110

Introduction: Promoting spontaneous breathing in ARDS could potentially offer multiples physiological advantages. Patient self-inflicted injury (P-SILI) can participate to the development and prolongation of ARDS. Clinicians are currently left with sedatives, analgesics and neuromuscular blockade, and their secondary effects, as their only options to try to get control of the excessive respiratory drive. One new potential therapeutic target could be modulate the effect of serotonin (5-hydroxytryptamine or 5-HT), which exerts a complex excitatory effect on respiration. We investigate the respiratory effect of ondansetron, a highly-selective 5-HT3 receptor antagonist, in critically ill mechanically ventilated patients.
Methods: We performed a retrospective observational study on 130 critically ill adults that received intravenous ondansetron during mechanical ventilation, selected by using the online MIMIC-IV database which is a relational database from a tertiary academic medical center in Boston, MA, USA. We used a mixed linear models to examine the minute volume and respiratory rate of this patients before and after being exposed to 4 to 20 mg of ondansetron.
Results: Comparing the 4 h before and after the administration of the ondansetron ($n = 130$), we found a significant reduction in minute ventilation (-0.795 L/min; CI [-1.286 to -0.303]; $p < 0.002$) and respiratory rate (-1.460 breath/min; CI [-2.514 to -0.407]; $p < 0.007$) after receiving ondansetron (median dose of 4 mg; IQR [4, 4]). We found no statistically significant difference on the tidal volume observed (-1.152 mL; CI [-24.128–21.825]; $p > 0.92$). $PaCO_2$, was statistically significantly increased, but only by 1.872 mmHg.
Conclusions: Ondansetron appears to be effective in reducing respiratory rate and minute ventilation. It could therefore be useful in decreasing respiratory drive. These data are based on a retrospective cohort study and warrant further investigations to assess efficacy of the treatment in an adequate population.

P111

Expression profiling of mechanosensitive ion channels based on single-cell RNA sequencing of lungs from ARDS mice

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Critical Care 2025, **29(S1)**:P111

Introduction: The objective of this study is to investigate the temporal dynamic expression of different cellular mechanosensitive proteins in ARDS.
Methods: This study employed the cecal ligation and puncture technique to construct a sepsis-induced ARDS model. The mice were randomly divided into two groups: a sham surgery control group and an ARDS model group. Subsequently, two mice were euthanized from each group, and lung tissue was collected for single-cell transcriptome sequencing. Mice were executed at different times, lung tissues were taken, and RT-qPCR was applied to detect the differences and trends of mRNA expression levels of mechanosensitive ion channels in lung tissues at different times.
Results: Piezo1 is predominantly expressed in monocytes, macrophages and lung endothelial cells. The expression of Piezo1 in the ARDS model group was markedly elevated in comparison to the control group. Piezo2 expression was markedly diminished in comparison to Piezo1, with only a minimal quantity observed in pulmonary endothelial cells. TMEM63a is predominantly expressed in macrophages and lung endothelial cells. The expression of TMEM63a in the ARDS model group was markedly elevated in comparison to the control group. The mRNA expression levels of Piezo1 and TMEM63a showed no significant difference between the 12 h ARDS model group and the control group, while the expression levels of Piezo2 and TMEM63b were significantly lower in the 12 h ARDS model group than in the control group. After 24 and 48 h, the expression of the four mechanosensitive ion channels in the ARDS model group was lower than that in the control group.
Conclusions: The spatiotemporal characteristics of mechanosensitive ion channels in the lungs are expressed differently at varying times and in different cells. It plays a significant role in the development of ARDS, and the precise mechanism of its action requires further experimental validation.

P112

Pulmonary arterial compliance evolution predicts mortality in COVID-19 patients failing prone positioning: a prospective observational study

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Critical Care 2025, **29(S1)**:P112

Introduction: Right ventricular dysfunction may complicate COVID-19 ARDS, particularly in prone positioning non-responders. We investigated whether these patients develop progressive right ventricular failure by evaluating the temporal evolution of hemodynamic parameters and their association with ICU mortality.
Methods: Single-center prospective observational study of consecutive COVID-19 patients admitted to the intensive care unit between March and December 2021. Inclusion criteria were age ≥ 18 years, confirmed SARS-CoV-2 infection, requirement for invasive mechanical ventilation, and non-response to prone positioning (defined as failure to improve PaO2 by ≥ 20 mmHg after a 16-h proning cycle). All patients underwent right heart catheterization with serial measurements of pulmonary arterial compliance (PAC), right atrial to pulmonary wedge pressure ratio (RAP/PAOP), and pulmonary artery pulsatility index (PAPi) at 0, 12, 24, 48, and 72 h. ICU mortality was the primary outcome. Statistical analysis included mixed-effects models for longitudinal data.
Results: Among the 17 patients (13 males) included, median age was 66 (IQR 58–72), median SAPS was 38 (IQR 31–44), and 10 (58.8%) died in the ICU. Temporal analysis revealed significant differences in PAC evolution between survivors and non-survivors ($p = 0.04$). Survivors demonstrated a progressive increase in PAC (mean slope + 0.007 mL/mmHg/hour), while non-survivors showed a decline (mean slope -0.004 mL/mmHg/hour). This divergence was most pronounced at 72 h (2.8 vs 1.53 mL/mmHg, $p = 0.00977$). PAPi and RAP/PAOP ratio trends did not significantly differ between groups over the 72-h observation period (Figure).
Conclusions: In COVID-19 patients failing to respond to prone positioning, the temporal evolution of pulmonary arterial compliance differentiates between survivors and non-survivors, suggesting that right ventricular-arterial uncoupling may be a key determinant of mortality in this population.

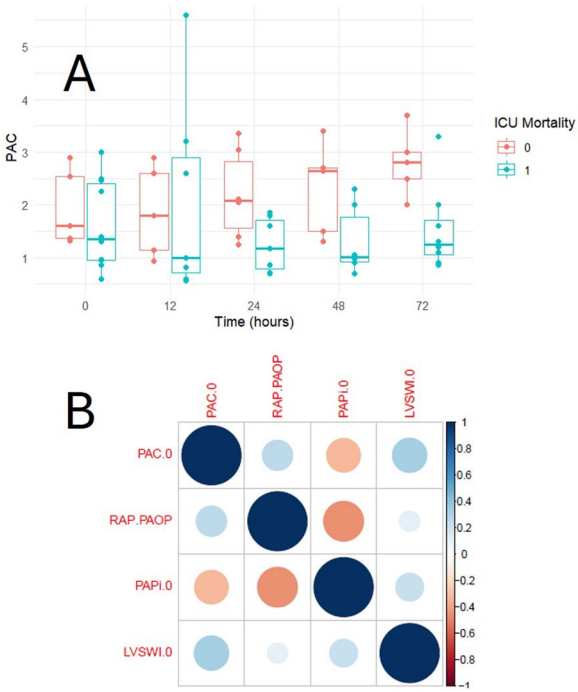

Figure (abstract P112) Temporal evolution of pulmonary arterial compliance (PAC) in survivors and non-survivors (A); Correlation matrix of baseline hemodynamic parameters (B)

P113

Preoperative RV free-wall longitudinal strain and intraoperative ECMO in lung transplant: preliminary results from a prospective observational study

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Critical Care 2025, **29(S1)**:P113

Introduction: The purpose of the study is to evaluate the prevalence of right ventricular (RV) dysfunction by RV free-wall longitudinal strain (RVFWLS) and its relationship with intraoperative extracoporeal membrane oxygenation (ECMO) needs in lung transplant (LUTX) candidates. LUTX candidates have subclinical RV dysfunction, which has not yet been assessed by speckle-tracking echocardiography (STE)-RVFWLS derived. Patients with subclinical RV dysfunction may have higher risk of periprocedural cardiac failure and increased needs of intraoperative ECMO.
Methods: In a single-center prospective observational cohort study, from November 2021 to November 2024, all consecutive adult patients enlisted for primary non-urgent bilateral LUTX underwent cardiac catheterization, standard and STE. The diagnostic accuracy of tricuspid annular plane excursion (TAPSE), fractional area change (FAC), tricuspid peak annulus systolic velocity (S'), and RVFWS in predicting ECMO use were computed.
Results: Of the 118 patients enlisted for LUTX during the study period, 68 were included (i.e., male (60%), age 53 [39–60], LAS 38.8 [34.9–46.25], 22.6% COPD, 22.6% pulmonary fibrosis), 53 patients had available window for STE. Median RVFWLS was − 20% [− 22% to − 17.5%], being impaired in 24 (45%) of the patients. To now, 36 patients undergone LUTX, in 19 cases (47%) needed ECMO. Echocardiography was not predictive of intraoperative ECMO use (see Table). Still, patients with severely depressed RVFWLS (i.e., > −16, n = 4), had higher odds for intraoperative ECMO use (75% vs. 43%, OR 3.86 [0.36–41]).
Conclusions: Preliminary results of this study suggest that severely impaired RVFWLS might be associated with higher odds of intraoperative ECMO use. We expect at least 6 months for completion of the analyses, and final results of the study.

Table (abstract P113) Results

	ECMO INTRAOP		*p* value
	No	Yes	
	Median [quantiles25- quantiles75]	Median [quantiles25- quantiles75]	
PAPm	24 [19–28.25]	21.5 [17.75–25.75]	0.797
TAPSE (mm)	19 [17–21]	20 [15.75–23.5]	0.736
RV TVI S' wave (cm/s)	11 [9–14]	10 [10–12]	0.858
Fractional Area Change (%)	38 [31–44]	40 [30.5–47.75]	0.911
RVFWLS (tot)	− 20 [− 21.3 to − 17]	− 20.2 [− 23.9 to − 16.45]	0.834

PAPm mean pulmonary arterial pressure, TAPSE tricuspid annular plane excursion, RV TVI S' wave tricuspid peak annulus systolic velocity, FAC fractional area change, RVFWLS right ventricular free-wall longitudinal strain.

P114

Predictive factors for long-term ECMO support in patients with severe COVID-19

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Critical Care 2025, **29(S1)**:P114

Introduction: COVID-19-related severe respiratory failure frequently requires prolonged ECMO support; however, the characteristics of patients who require long-term ECMO management (≥ 14 days) are not yet clear. The purpose of this pilot study is to investigate the predictive factors for patients with COVID-19 who require long-term ECMO management.
Methods: We conducted a retrospective observational study from April 2020 to December 2022 at the emergency ICU of a tertiary university hospital and enrolled patients who survived after being treated with ECMO for severe respiratory failure due to COVID-19. Short-term support was defined as ECMO for < 14 days, and long-term support was defined as ECMO for more than 14 days. A receiver operating curve (ROC) analysis, including area under the receiver operating curve (AUROC), was performed to examine significant variables in predicting long-term ECMO support.
Results: Of the 29 participants, 41.4% (12/29) were included in the long-term ECMO group (≥ 14 days). The time from first symptom to ECMO and the time from intubation to ECMO were significantly longer in the long-term group than in the short-term group (10 days [IQR, 7–12 days] vs. 15 days [IQR, 11.5–23.5 days], 2 days [IQR, 1–2 days] vs. 4.5 days [IQR, 2–7.3 days], $p < 0.05$, respectively). Moreover, the AUROC of time from first symptom to ECMO and time from intubation to ECMO was 0.79 (95% CI, 0.63–0.96) and 0.73 (95% CI, 0.54–0.93), respectively. The optimal cutoff value for long-term ECMO support was time from first symptom to ECMO and time from intubation to ECMO of > 12 days (sensitivity, 76.5%; specificity, 66.7%) and > 2 days (sensitivity, 76.5%; specificity, 58.3%), respectively.
Conclusions: The time from first symptom to ECMO and the time from intubation to ECMO can be predictive factors for long-term ECMO management (≥ 14 days) in patients with severe COVID-19.

P115

Prevalence and risk factors of post-intensive care syndrome in severe COVID-19 patients—a single-center prospective observational study

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Critical Care 2025, **29(S1)**:P115

Introduction: Patients in ICU are at risk of developing post-intensive care syndrome (PICS), resulting in long-term physical, cognitive, and psychological impairments after discharge. Previous studies have reported a PICS rate of approximately 60% in severe COVID-19 patients requiring mechanical ventilation; however, few studies have focused on COVID-19 patients treated with ECMO. This study aimed to examine the frequency of PICS and its risk factors in severe COVID-19 patients treated at our ECMO center.
Methods: This single-center observational study included adult patients with severe COVID-19 admitted between April 2020 and August 2022 who survived to discharge. PICS was assessed through questionnaires at 6 months and 1 year post-discharge. Physical function was measured with the Barthel Index (BI), cognitive function with the Short-Memory Questionnaire (SMQ), and psychological state with the Hospital Anxiety and Depression Scale (HADS). PICS was defined by any of the following: BI < 90, SMQ < 40, HADS-anxiety > 8, or HADS-depression > 8. Primary outcomes were PICS prevalence at 6 months and 1 year. Secondary outcomes examined PICS risk factors and we

identified independent risk factors using group comparisons and multivariate analysis.
Results: A total of 37 patients, including 17 (45.9%) treated with ECMO, were analyzed. PICS prevalence was 59.5% at 6 months and 56.8% at 1 year. Delirium was the only factor significantly associated with PICS, with a 1-year prevalence of 66.7% in the PICS group and 25% in the non-PICS group ($p<0.05$). In multivariate analysis, PICS presence was the dependent variable, and age, ventilation duration, and delirium presence were explanatory variables, with delirium identified as an independent risk factor for PICS at 1 year (odds ratio 7.09, 95% CI 1.54–32.7, $p<0.05$).
Conclusions: About 60% of severe COVID-19 patients continued to experience PICS at 1 year post-discharge, with delirium identified as an independent risk factor.

P116

Use of bivalidurin as anticoagulation in critical SARS-CoV-2 patients who were supported with VV-ECMO

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Critical Care 2025, **29(S1)**:P116

Introduction: Patients with COVID-19 on VVECMO are at increased risk of thromboembolic events due to blood contact with the membrane, requiring anticoagulants. Heparin is commonly used, but newer treatments like bivalirudin, a direct thrombin inhibitor, are emerging. Our objective is to identify patients with HIT and compare the safety and effectiveness of heparin vs bivalirudin.
Methods: This observational retrospective cohort study includes patients admitted to the Medical ICU of German Trías Pujol University Hospital who underwent ECMO during the 6 waves of the SARS-CoV-2 pandemic (03/2020–02/2022). Statistical analysis used descriptive statistics, normality tests (Shapiro–Wilk), and univariate tests (Chi-Squared, Fisher, T-test, Kruskal–Wallis).
Results: N: 62. Days of ECMO: 31 (IQR 35). Maximum flow: 4.7 (SD 1) L/min. Inhaled NO before ECMO: 19.4% (95% CI: 9.5–29.2). Steroids: 95.2% (95% CI: 89.8–1). Vasopressor therapy: 48.4% (95% CI:36–61). CRRT: 29% (95% CI: 17.7–40.3). Anticoagulation: 100%. Heparin (40/62) 64.5% (95% CI:52.6–76.4), Bivalirudin (22/62) 35.5% (95% CI: 20.6–44). AntiPF4 Ab suspected: 22/62. AntiPF4 positive: (8/22) 36.4% (95% CI: 16.3–56.5). Bleeding complications: major bleeding (45.2%, 95% CI: 32.8–57.5), hemothorax (9.7%; 95% CI: 2.3–17), lung bleeding (22.6%, 95% CI:12.2–33). Pulmonary embolism: 24.2% (95% CI: 13.5–34.9). ICU length of stay: 63.5 (SD33) days. Hospital length of stay: 78 (SD 35) days. Alive at ICU discharge: 61.3% (95% CI: 49.2–73.4). Significative differences between heparin and bivalirudin treatment: 32.5% of patients treated with heparin vs 77.7% of patients treated with bivalirudin needed vasopressor treatment ($p=0.001$); 4.5 L/min vs 5 L/min maximum pump blow ($p=0.01$); 12.5% vs 40.9% of lung bleeding ($p=0.01$); 25 vs 43 days of ECMO therapy ($p=0.04$); 48 vs 77 of ICU length of stay (0.01).
Conclusions: Patients treated with bivalirudin needed more vasopressor therapy, suffered more lung bleeding, needed more days of ECMO therapy and stayed longer in ICU. AntiPF4 Ab were confirmed in 36.4%.

P117

Optimal fluid balance in extracorporeal membrane oxygenation: a systematic review and meta-analysis

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Critical Care 2025, **29(S1)**:P117

Introduction: Fluid balance is critical in ECMO management, as excessive fluid can worsen outcomes by increasing mortality and complications like pulmonary edema and prolonged ICU stay. Negative fluid balance has been associated with improved outcomes in critically ill patients, but optimal fluid management strategies for ECMO remain undefined. This meta-analysis examines the impact of fluid balance on survival and other clinical outcomes in ECMO patients, aiming to identify effective fluid management practices.
Methods: A systematic review and meta-analysis were conducted according to PRISMA guidelines (PROSPERO: CRD42024611001), including observational studies examining fluid balance in ECMO patients. Risk ratios (RR) and mean differences (MD) were calculated using a random-effects model, with sensitivity analyses conducted to ensure result stability.
Results: Eleven studies met inclusion criteria [1–11]. Negative fluid balance over three days showed a significant association with survival (MD −1696.84 mL, 95% CI: −3028.75 to −364.94, $p=0.01$; $I^2=99\%$). At 60 days, mortality was lower in patients with negative fluid balance (RR 0.62; 95% CI: 0.46–0.84; $p<0.01$) (Figure). Higher cumulative urine output over three days was significantly associated with survival (MD 1613.69 mL, 95% CI: 133.96–3093.43, $p=0.03$).
Conclusions: Negative fluid balance and enhanced urine output are associated with reduced mortality in ECMO patients. Conservative fluid management, potentially supported by CRRT, may improve outcomes in this population. Further research should establish specific fluid management protocols tailored to ECMO patients.

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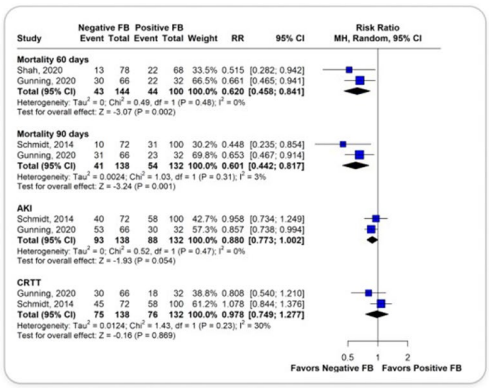

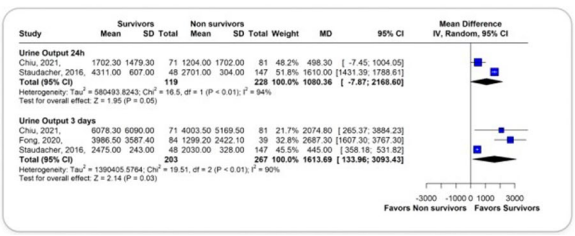

Figure (abstract P117) Fluid balance and urine output outcomes during extracorporeal membrane oxygenation

P118

Outcomes of transplant patients requiring ECMO for COVID-19 related respiratory failure: an ELSO registry study

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Critical Care 2025, **29(S1)**:P118

Introduction: ECMO outcomes in COVID-19-related respiratory failure among solid organ transplants (SOT) and hematopoietic stem-cell transplants recipients (HSCT) are poorly described. We investigated: 1) whether transplant patients (SOT/HSCT) with COVID-19 have worse outcomes than non-immunocompromised (IC) COVID-19 patients, and 2) whether among transplant recipients (SOT/HSCT), those with COVID-19 have worse outcomes than those with non-COVID-19-related respiratory failure. Additionally, we aimed to identify factors independently associated with mortality among COVID-19 transplants.
Methods: Retrospective analyses of the Extracorporeal Life Support Organization Registry from 1/1/2017 to 31/07/2023. Two comparisons were made: (1) transplant COVID-19 versus non-IC COVID-19, and (2) transplant COVID-19 versus transplant non-COVID-19 patients. Outcomes were analyzed using propensity score (PS)-adjusted, multivariable, and PS-matched analyses, adjusting for a priori identified confounders. Primary outcome was inhospital mortality.
Results: Among 38,270 runs, 146 transplant COVID-19, 12,552 non-IC-COVID-19 and 886 transplant non-COVID-19 runs were identified. In-hospital mortality in transplant COVID-19 patients was 75.3% and the risk was invariably increased compared to non-IC-COVID-19 and transplant non-COVID-19 patients (Figure). Mortality difference remained stable over time. Older age independently associated with higher mortality. This was consistently accompanied by a higher need for renal replacement therapy compared to non-IC-COVID-19 patients. Compared to transplant non-COVID-19 patients, ECMO runs and time-to-live discharge were invariably prolonged. Hemorrhagic, metabolic, pulmonary and infectious complications consistently occurred more frequently.
Conclusions: Mortality was exceptionally high in COVID-19 transplant ECMO patients, warranting cautious use of ECMO in this population.

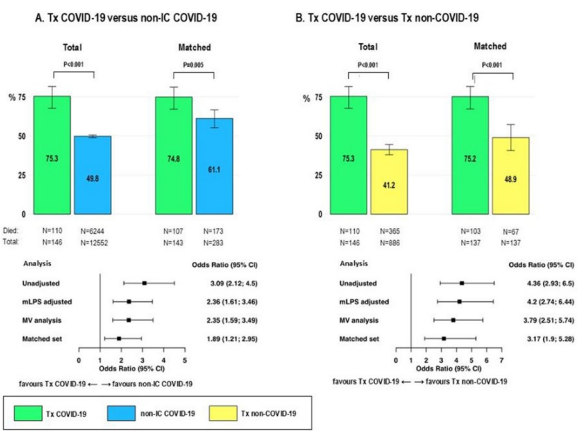

Figure (abstract P118) Hospital mortality for total and matched population in A. Tx-COVID-19 versus non-IC-COVID-19 patients; B. TxCOVID-19 versus Tx-non-COVID-19 patients. Bar charts report incidences with 95% confidence intervals. Odds ratios are provided for Tx-COVID-19 patients, using as a reference: A. non-IC-COVID-19 patients; B. Tx-nonCOVID-19 patients

P119

Bloodstream infections in patients undergoing extracorporeal membrane oxygenation support: a retrospective cohort study

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Critical Care 2025, **29(S1)**:P119

Introduction: This study aims to determine the incidence, clinical characteristics, risk factors, and microorganisms associated with bloodstream infections (BSI) during ECMO support at the Azienda Ospedaliera Universitaria Integrata of Verona.
Methods: This retrospective observational cohort study was conducted at a single center, analyzing patients undergoing V-A and V-V ECMO support between December 2021 and March 2024. Inclusion criteria were age $\geq$ 18 years, ECMO implantation during the study period, ECMO duration > 48 h. The diagnosis of BSI during ECMO support required at least the presence of a positive blood culture or two positive blood specimens if the pathogen was a common commensal, along with systemic signs of infection. Episodes of bacteremia during ECMO were included in the study from 48 h after ECMO implantation to 48 h after decannulation.
Results: During the study period, a total of 107 patients were supported by ECMO in our center. Of these, 74 patients met the inclusion criteria, contributing to a total of 491 ECMO days. Fifteen patients were diagnosed with BSI. The prevalence of BSI-positive patients was 20.3%, while the incidence of BSI was 34.5 per 1000 ECMO days. A statistically significant difference was found between the infected and non-infected groups concerning the following variables: type of ECMO, ICU days, ECMO days, and duration of total mechanical ventilation. Logistic regression analysis identified the following as predictors of BSI: V-V ECMO configuration, ICU days, ECMO days, total mechanical ventilation, valvular disease, and transfusions. The mean onset of infection was calculated to be 8.9 $\pm$ 5.8 days. In our study, BSI was not a predictor of mortality. The main microorganisms isolated were Gram-positive bacteria, predominantly Coagulase-negative staphylococci.
Conclusions: This study has demonstrated the key role of screening and prevention protocols in managing BSI, with a particular focus on local epidemiology.

P120

First prospective clinical study of PrismaLung+, a new $ECCO_2R$ device applied in mild or moderate ARDS patients to allow ultra-protective lung ventilation

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Critical Care 2025, **29(S1)**:P120

Introduction: In patients with mild to moderate ARDS receiving mechanical ventilation (MV), a tidal volume (VT) of 4 mL/kg of predicted body weight is suggested to minimize lung injury. Extracorporeal CO_2 removal ($ECCO_2R$) is proposed to help manage the resulting

hypercapnic acidosis. This study evaluated the safety and performance of PrismaLung+ (PL+), a new $ECCO_2R$ device (membrane lung area 0.8 m^2).
Methods: A prospective interventional cohort study in France enrolled ARDS patients using PL+ connected to a PRISMAX machine for ultra-protective lung ventilation. VT was reduced stepwise from 6.0 to 4.0 mL/kg (100% O2 at 10 L/min) starting when $PaCO_2 \geq 50$ mmHg. Data was evaluated at 8 h and 24 h after the start of $ECCO_2R$.
Results: Data is shown as median [IQR]. From APR 2021 to DEC 2023, 58 ARDS patients with a PaO_2/FiO_2 of 163.3 [135.0–204.7] mmHg were enrolled (PL+ = 42 patients; CRRT+ PL+ = 16 patients). The median age was 63.5 [55.0–69.0] yrs and the SOFA score was 8.5 [6.0–11.0]. During VT reduction and before starting sweep gas, peak hypercapnic acidosis was measured at a pH of 7.30 [7.24–7.36] and $PaCO_2$ of 53.0 [50.0–55.0] mmHg. VT at the start of sweep gas was 4.5 [4.1–5.0] mL/kg. Blood flow, MV, and arterial blood gas parameters are shown in the Table. At 8 h, PL + CO_2 clearance was 79.3 [69.0–87.5] mL/min (N = 34). With a reduced VT of 4.0 mL/kg and the use of PL+ at a blood flow of 350 [300–400] mL/min, driving pressure decreased from 12.0 [10.0–16.0] to 10.0 [8.0–13.0] cmH_2O and the ventilatory ratio decreased from 1.7 [1.5–2.1] to 1.3 [1.0–1.6] after 24 h, without respiratory acidosis or hypoxemia. $ECCO_2R$ therapy duration was 43.1 [24.1–69.3] h. No major bleeding events were observed. There were 23 filter clotting events in 16 (27.6%) patients, of whom only 1 patient (6.3%) was in the CRRT+ PL+ group.
Conclusions: This study demonstrated the safety and performance of PL+ in the clearance of CO_2 and establishing ultra-lung protective ventilation without hypercapnic acidosis.

Table (abstract P120) Blood flow, mechanical ventilation, and arterial blood gas parameters during $ECCO_2R$

Parameters*	Baseline (N = 58)	8 h (N = 53)	24 h (N = 44)	*p***
VT, mL/kg	6.0 [6.0–6.1]	4.0 [4.0–4.2]	4.0 [4.0–4.3]	< 0.0001
RR, breaths/min	26.0 [23.0–29.0]	24.5 [21.0–30.0]	26.0 [21.5–28.0]	0.7078
Driving pressure, cm/H_2O	12.0 [10.0–16.0]	10.0 [7.5–12.0]	10.0 [8.0–13.0]	0.0001
Ventilatory ratio	1.7 [1.5–2.1]	1.2 [1.0–1.6]	1.3 [1.0–1.6]	< 0.0001
pH	7.38 [7.31–7.43]	7.36 [7.30–7.40]	7.38 [7.34–7.42]	0.2704
$PaCO_2$, mmHg	42.0 [39.0–46.0]	46.1 [42.1–50.5]	45.2 [41.0–50.1]	0.0025
PaO_2/FiO_2, mmHg	163.3 [135.0–204.7]	151.5 [133.0–183.5]	163.0 [117.7–205.0]	0.5347

P121
The safety profile of a new $ECCO_2R$ device applied to allow ultra-protective lung ventilation in mild or moderate ARDS patients
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Critical Care 2025, **29(S1)**:P121

Introduction: Extracorporeal CO_2 removal ($ECCO_2R$) is intended to control $PaCO_2$ and respiratory acidosis in patients with ARDS or acute exacerbated COPD. Recent publications suggest that $ECCO_2R$ may be linked to significant complications, mainly bleeding [1,2]. This study evaluated the incidence of adverse events in ARDS patients treated with a new $ECCO_2R$ device, PRISMALUNG+ (PL+) (membrane area 0.8 m^2).
Methods: A prospective interventional cohort study in France enrolled ARDS patients using PL+ connected to a PrisMax machine for ultra-protective lung ventilation. VT was reduced from 6 to 4 mL/kg while controlling the resulting hypercapnic acidosis. Adverse events were collected from enrolment up to Day 28.
Results: Data is shown as median [IQR]. From APR 2021 to DEC 2023, 58 patients with a PaO_2/FiO_2 of 163 [135–205] mmHg were enrolled (PL+ alone = 42 patients; CRRT+ PL+ = 16 patients). The median age was 63.5 [55.0–69.0] yrs and the SAPS II was 45 [39–63]. All patients received IV heparin anticoagulation. $ECCO_2R$ duration was 43.1 [24.1–69.3] h. Extracorporeal blood flow was 350 [300–400] mL/min. No device malfunctions, major bleeding, or hemorrhagic stroke events occurred (Table). 3 minor bleeding events at the cannula site were reported: 2 during $ECCO_2R$ and 1 on ECMO post-$ECCO_2R$. Only 1 infection at the catheter insertion site was noted. 2 patients experienced minor ischemic stroke after $ECCO_2R$. Haptoglobin levels remained stable during treatment. There were 23 membrane clotting events in 16 (26.7%) patients, 7 (12.1%) of whom discontinued $ECCO_2R$. Only 1 (6.3%) patient in the CRRT+ PL+ group had filter clotting. The mortality rate at Day 28 was 31% (lower than the expected rate of 40% based on SAPS II). $ECCO_2R$ was not directly related to mortality.
Conclusions: This study demonstrated a favorable safety profile of $ECCO_2R$ with PL+, with no events of intracerebral bleeding as reported in other studies.

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Table (abstract P121) $ECCO_2R$-related adverse events (from enrolment up to Day 28)

ECCO2R-related adverse event	n (%) (N = 58)	Comments
Bleeding—Major	0 (0.0)	
Bleeding—Minor	3 (5.2)	
Hemorrhagic stroke	0 (0.0)	
Ischemic stroke	2 (3.4)	Attributed to atrial fibrillation
Infection at catheter insertion site	1 (1.7)	Arterial line
Membrane clotting	16 (27.6)	23 events
Pump malfunction	0 (0.0)	

P122
Femoral dual-lumen cannula for $ECCO_2R$ in hypercapnic respiratory failure: efficacy and safety evaluation
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Critical Care 2025, **29(S1)**:P122

Introduction: This study assesses the efficacy of femoral vein placement of a bi-caval dual lumen cannula (Avalon Elite®, Getinge, Sweden) for extracorporeal-CO_2 removal ($ECCO_2R$) in adult patients with hypercapnic respiratory failure. $ECCO_2R$ removes CO_2 via dual-lumen or separate venous cannulas. Our tertiary referral center ICU adopted femoral insertion of the bi-caval dual lumen cannula instead of the conventional internal jugular vein insertion. This approach may simplify positioning and potentially enhance patient mobilization.
Methods: This retrospective study analyzed 16 adult patients treated with $ECCO_2R$ via femoral dual-lumen cannulation (20 or 23 Fr) in our ICU between January 2018 and August 2024. Anticoagulation followed institutional guidelines with unfractionated heparin (aPTTr 1.5–2). Data on demographics, respiratory parameters, $ECCO_2R$ settings and complications were collected. Primary outcomes included changes in arterial blood gases, respiratory mechanics, mechanical ventilation duration and adverse events.
Results: Median age was 62 [54–65] yo, with 62% male and 81% diagnosed with chronic lung disease. At $ECCO_2R$ initiation, median $PaCO_2$ was 68 [62–95] mmHg and pH 7.20 [7.16–7.27]. After 2 h, $PaCO_2$ dropped to 49 [45–56] mmHg and pH rose to 7.36 [7.33–7.41]. Median blood flow was 1.5 [1.2–2.2] L/min, with CO_2 removal rates of 195 [163–228] mL/min at 2 h, decreasing to 147 [130–168] mL/min by day 1 (Figure). Minimal recirculation did not affect CO_2 removal efficiency. Median $ECCO_2R$ duration was 5 [4–7] days. 9 patients avoided intubation, 7 were extubated on day 1, with one requiring reintubation. Adverse events included one minor bleeding and one membrane clotting, with no other thrombotic events or cannula displacements.
Conclusions: Femoral vein placement of a dual-lumen cannula for $ECCO_2R$ showed a favorable safety profile with minimal complications, supporting its feasibility in patients with refractory hypercapnia. Further studies are needed to confirm these findings.

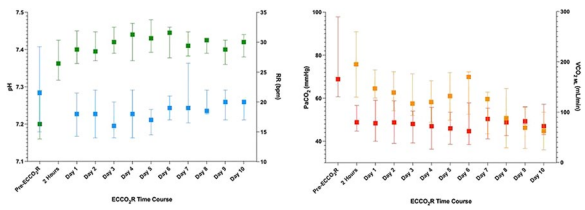

Figure (abstract P122) Results. RR: blue; pH: green; $PaCO_2$ red; VCO_2: orange

P123

Evaluation of clinical scores, laboratory parameters, and ventilation settings in patients with acute hypercapnic respiratory failure undergoing minimally-invasive extracorporeal carbon dioxide removal

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Critical Care 2025, **29(S1)**:P123

Introduction: Lung-protective ventilation employing low tidal volumes are standard for managing patients with acute respiratory distress syndrome (ARDS) and may result in hypercapnia due to insufficient carbon dioxide (CO_2) clearance. Minimally-invasive extracorporeal CO_2 removal ($miECCO_2R$), utilizing ultra-low blood flow rates (100–400 mL/min) may effectively reduce CO_2 levels while maintaining lung-protective ventilation. Clinical trial registration: ClinicalTrials.gov. NCT04351906.
Methods: In this prospective, observational study, a total of 22 patients with mild-to-moderate ARDS (Berlin definition) and refractory hypercapnia (arterial $PCO_2 > 55$ mmHg) were included. Patients underwent $miECCO_2R$ therapy for at least 48 h at the medical intensive care unit of the University of Giessen Lung Center between May 2020 and March 2024 using a renal replacement therapy (RRT) platform to provide either standalone $miECCO_2R$ or combined with continuous RRT (CRRT). Blood gas parameters, ventilator settings and clinical scores (SOFA, APACHE II, and SAPS II) were analyzed.
Results: $miECCO_2R$ facilitated a rapid and substantial reduction in arterial PCO_2 and bicarbonate levels, with normalization of blood pH within hours. In the subgroup of patients undergoing combined $miECCO_2R$ and CRRT, a similar reduction in arterial PCO_2 was observed. Lung-protective ventilation settings could be sustained in the presence of $miECCO_2R$ and in some patients a further reduction of driving pressure and tidal volume could be achieved while maintaining physiological arterial PCO_2 levels. Clinical scores remained stable with no significant changes over 48 h. Importantly, no severe $miECCO_2R$-related adverse events were reported during the study period.
Conclusions: $miECCO_2R$ represents an effective adjunctive therapy for CO_2 clearance in patients with hypercapnic respiratory failure refractory to conventional ventilation strategies. Further investigations are warranted to elucidate its impact on clinical outcomes and ventilatory mechanics.

P124

Transesophageal echocardiography-guided cannulation for extracorporeal membrane oxygenation, fashion or necessity

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Critical Care 2025, **29(S1)**:P124

Introduction: The process of cannulation of extracorporeal circulation membrane is usually performed in surgery or hemodynamics rooms, under fluoroscopy-guided vision, but the severity and the impossibility of transferring patients to these places, makes the ECMO cannulation process be performed in cardiovascular intensive care units (ICU), which is why the intensivist physician must have the training and experience to perform transesophageal echocardiography (TEE) and guide the cannulation using ultrasound [1,2].
Methods: We performed a prospective cohort study of patients who were to be transferred to VA ECMO at the Fundación Cardioinfantil—La Cardio. Patients were included in the study if cannulation was performed in the ICU under TEE guidance and any complications related to cannulation, including the need for repositioning.
Results: Eight patients who were cannulated for VA-ECMO in the cardiovascular intensive care unit were included. In 100% of cases, TEE was used as a guide for proper positioning of the arterial cannula in the aortic arch using a midesophageal descending aorta view at 0° and an Upper esophageal aortic arch view at 0°, as well as a midesophageal bicaval view at 90° to achieve proper positioning of the venous cannula in the superior vena cava (Figure). No complications of the procedure or displacement of the cannulas were recorded.
Conclusions: ECMO cannulation requires precise placement of cannulas to ensure proper flow dynamics. Patients may be safely cannulated for VA ECMO using point of care critical care transesophageal echocardiography without the need for transport or coordination of numerous clinical providers.

References

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2. Douflé G et al. Crit Care 2015;19:326

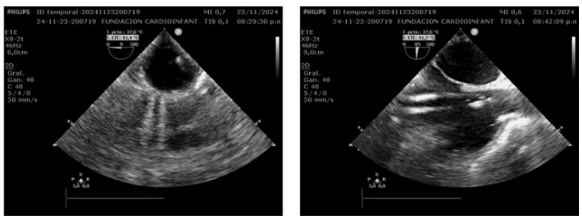

Figure (abstract P124) Left panel: Midesophageal descending aorta view. Right panel: midesophageal bicaval view

P125

Clinical characteristics of fever after extracorporeal membrane oxygenation decannulation: differentiating infectious from non-infectious causes of fever and their impact on outcomes

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Critical Care 2025, **29(S1)**:P125

Introduction: Fever is one of the important signs affecting patient outcome with the various etiologies in post-decannulation period of extracorporeal membrane oxygenation (ECMO), but the cause has not been fully understood. This study aimed to investigate the characteristics and clinical implications of fever following ECMO decannulation in critically ill patients.
Methods: We conducted a retrospective, single-center study of adult patients who were successfully weaned off venoarterial (VA) or venovenous (VV) ECMO. Decannulation fever was defined as fever occurring within 72 h of ECMO decannulation. The peak and duration of fever was followed for two weeks from decannulation and the relation to infection of the fever was reassessed.
Results: A total of 47 patients were included (22 [46.8%] with VA ECMO and 25 [53.2%] with VV ECMO). During the two weeks of follow-up period, only 5 patients stayed without fever. There were 35 (74.5%) patients with decannulation fever, which was more common in VA ECMO patients (20 [90.9%] vs. 15 [60.0%], $p=0.020$), and was not related with duration of ECMO ($p=0.961$) (Figure). However, only sixteen (34%) among all experienced active infection during the two weeks of the following period. The fever of patients with active infection lasted longer than the fever of patients without active infectious (11 [interquartile range: 2–7] d vs. 4 [interquartile range: 1–7]) d, $p=0.023$). Active infection was associated with increased mortality (odds ratio [OR] 6.067, 95% confidence interval 1.1289–32.644, $p=0.036$) whereas decannulation fever was not (OR 0.156, 95% confidence interval 0.025–0.977, $p=0.047$), rather hypothermic patients during decannulation period was associated with higher mortality (OR 6.67, 95% CI 1.376–32.290, $p=0.017$).
Conclusions: Fever is an important sign following ECMO decannulation. However, the different timing and duration of fever in post-decannulation period of ECMO may have various implications for patient outcomes.

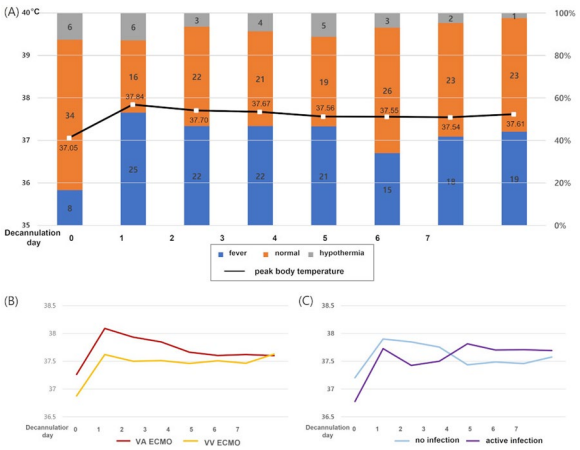

Figure (abstract P125) Number of patients with fever, normal temperature and hypothermia, and mean peak body temperature of patients after extracorporeal membrane oxygenation decannulation (A); Changes of peak body temperature during first 7 days from extracorporeal membrane oxygenation decannulation in patients with venoarterial and venovenous extracorporeal membrane oxygenation patients (B) and patients without active infection and with active infection (C)

P126

Monitoring of oxygen consumption using bedside indirect calorimetry during V-A ECMO provides informative control of the heart-machine interaction and has a prognostic value

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Critical Care 2025, **29(S1)**:P126

Introduction: We present two clinical cases of demonstrating the role of indirect calorimetry in monitoring cardiorespiratory function during V-A ECMO.
Methods: Oxygen consumption (VO_2I) was measured using COSMED Quark RMR metabolic cart. Cardiac output was measured by echocardiography.
Results: Case 1: A 36-year-old male patient with type I aortic dissection, extending to the coronary arteries, complicated by acute myocardial infarction (AMI) of the right and left ventricles. Operation: prothesis of descending aorta ("frozen elephant trunk"), brachiocephalic artery replacement and Bentall de Bono procedure. ECMO was initiated on the 1st postoperative day because of cardiogenic shock and maintained for 23 days, with a pump flow rate of 3.5 L/min (Figure). The initiation of ECMO was associated with a 30–50% increase in oxygen delivery (DO_2I) from 240 to 480 mL/min/m^2 and 40–45% reduction in VO_2I (from 223 to 129 mL/min/m^2). Gradual weaning from ECMO on 23rd day resulted in a proportional increase in VO_2I to baseline levels, with unchanged DO_2I values. ECMO was discontinued on the 25th postoperative day. The patient was then discharged from ICU for further rehabilitation.
Case 2: A 72-year-old female underwent aortic valve replacement and coronary artery bypass. On the second postoperative day her state complicated by AMI of the inferior and septal walls of the left ventricle. ECMO was initiated and maintained for 2 days, with a flow rate of 5 L/min. On the complete ECMO performance VO_2I remained extremely low, averaging 17.5 mL/min/m^2. Increase of circulatory or inotropic support did not lead to an increase in VO_2I, and metabolic disturbances worsened (blood lactate—17 mmol/L), indicating refractory shock and the patient died on the 4th postoperative day.

Conclusions: Measurement of oxygen consumption using indirect calorimetry during ECMO can be used for monitoring and prognosis assessment in the patients with cardiogenic shock.
Acknowledgement: Written consent to publish was received from the patients or their next of kin.

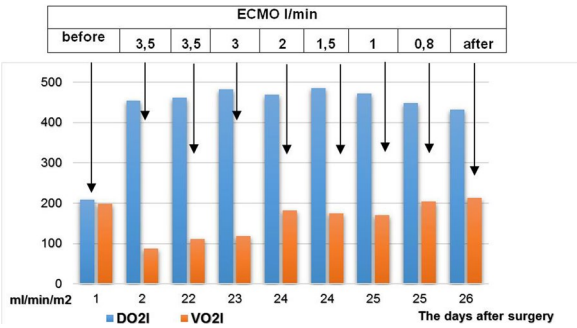

Figure (abstract P126) Dynamics of cardiopulmonary oxygen transport of the 1st patient

P127

Neurological outcomes in younger adults treated with extracorporeal membrane oxygenation: a secondary analysis of SAVE-J II study

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Critical Care 2025, **29(S1)**:P127

Introduction: Extracorporeal cardiopulmonary resuscitation (ECPR) for out-of-hospital cardiac arrest (OHCA) is expected to improve survival and neurological outcomes. However, the impact of age on improving ECPR outcomes remains insufficiently investigated. The primary SAVE-J II study found increasing age to be significantly associated with higher mortality and poorer neurological outcomes. Few studies have specifically focused on younger adult patients. This study aimed to evaluate neurological outcomes in younger adult patients treated with ECPR compared to older patients.
Methods: This was a secondary analysis of SAVE-J II registry including patients with OHCA implementation ECPR in Japan. Favorable neurological outcome was defined as a cerebral performance category score of 1 or 2 at 30 days. Exclusion criteria were in-hospital cardiac arrest, achieved return of spontaneous circulation (ROSC) before extracorporeal membrane oxygenation (ECMO) initiation, missing data on outcomes, diagnoses, age, or location of cardiac arrest, or no ECMO implementation. Multivariate logistic regression was used to analyze 30-day neurological outcomes by age group.
Results: Overall 1,865 patients were included in this study; 1,686 patients aged > 41 years and 179 patients aged ≤ 40 years. Adjusted odds ratios (OR) for favorable neurological outcomes showed no significant difference between younger patients and older patients (OR 1.02 [95% CI 0.95–1.09]). Prehospital ROSC and bystander cardiopulmonary resuscitation (CPR) were significantly associated with outcomes in older patients (ROSC: 2.97 [2.00–4.37], CPR: 1.69[1.20–2.41]), while no significant association was observed in younger patients (ROSC: 1.68 [0.32–7.44], CPR: 1.55 [0.69–3.59]).
Conclusions: Younger adult patients with OHCA may achieve favorable neurological outcomes regardless of prognostic factors typically associated with older patients, such as prehospital ROSC and bystander CPR.

P128

Mortality risk stratification based on age in postcardiotomy VA ECMO patients

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Critical Care 2025, **29(S1)**:P128

Introduction: Postcardiotomy shock (PS) patient's population ages and becomes more complex, what contributes to higher mortality rate. There are still no clearly defined risk stratification criteria reflecting the efficacy of VA ECMO support in these patients [1]. The aim of our study was to compare the discriminatory ability of the different pre-ECMO risk scores for in-hospital mortality among younger and older postcardiotomy ECMO (PC ECMO) patients.
Methods: This was a retrospective study on all consecutive adult PC ECMO patients during 16 years period in a tertiary care center. Age was split into groups per 5-year intervals. These groups were analyzed for rates of mortality in each group, determining the cut-off age of increasing mortality. All patients were divided into two groups (≤ 60 years (younger) and > 60 years old (older)) according to the obtained cut-off. SOFA, SAPS II, EuroScore II, Clinical frailty score (CFS), IMPACT and SAVE scores were entered into ROC-AUC analysis for each group.
Results: A total of 214 subjects (> 18 years of age) were enrolled for the final analysis. 155 patients (53.7%) were successfully weaned from ECMO therapy, and 55 (25.7%) survived till hospital discharge (hospital mortality rate was 74.3%). Higher mortality rate was registered in patients above 60 years old (older group, n = 137(survivors 28 (50.9%) vs non-survivors 109 (68.9%), Pearson Chi-Square = 5.523, $p = 0.019$). These patients were exposed to two times higher mortality risk (OR 2.18, CI95% 1.087–4.372, $p = 0.028$. ROC-AUC curves for prognostication of mortality for both groups are presented in the Figure.
Conclusions: Risk stratification differs according to increasing age in PC ECMO patients. EuroScore II, SOFA and IMPACT scores are more suitable for younger patients, while SAVE, CFS, SAPS II, SOFA and IMPACT are for older. SAVE was the most accurate score with ROC-AUC of 0.734 [0.634- 0.835], $p < 0.001$ in > 60 years group in our study.

Reference

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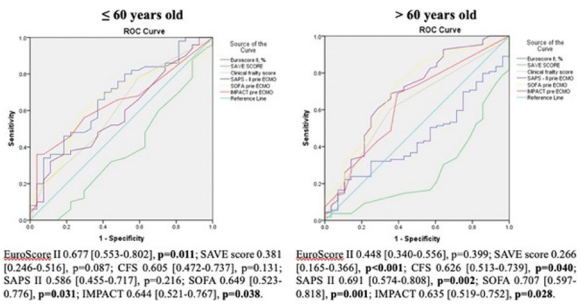

Figure (abstract P128) ROC-AUC curves for prognostication of in-hospital mortality for younger (≤ 60 years) and older (> 60 years) PC ECMO patients

P129

Delirium in the ICU: which factors matter most?

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Critical Care 2025, **29(S1)**:P129

Introduction: Delirium in intensive care units (ICU) is common, yet often underdiagnosed. It is associated with prolonged ICU and hospital stays, increased mortality, long-term cognitive impairments, diminished quality of life, and results from a complex interplay of factors. The aim of this study was to determine the incidence of delirium in the ICU, to assess its impact in patients' outcomes, and to identify the major modifiable risk factors.
Methods: This retrospective study included adult patients admitted to an ICU over a 2-year time period (2022 and 2023), who developed delirium. Delirium was identified using the Confusion Assessment Method for the ICU (CAM-ICU). Different risk factors were evaluated, including severity of illness, time and depth of sedation, mechanical ventilation, and pre-existing conditions, such as age, gender, substance addiction, cognitive vulnerabilities and other pre-existing comorbidities. Outcomes assessed included ICU and hospital length of stay, and mortality.
Results: From a total of 866 ICU patients included, 83 were diagnosed with delirium (9.6%), from which most were described as hyperactive delirium. There was a higher incidence among men (11.1% men vs 6.8% women), patients with hypertension (64% vs 56%) and COPD (22% vs 6%), patients admitted with TBI (16% vs 8%), sepsis (55% vs 46%) and level 3 critical care (81% vs 70%), patients who required vasopressor therapy (61% vs 44%) and mechanical therapy (78% vs 60%). 52% of patients had records of sleep deprivation, and 29% completed sleep-inducing therapy as a pharmacological measure. Delirium was associated with longer ICU stays (16 ± 13 days vs 8 ± 11 days), lower mortality in the ICU (6% vs 22%) but increased hospital mortality (13% vs 9%).
Conclusions: Delirium in the ICU is still an underdiagnosed condition. Preventing and managing it requires a multifaceted approach, including optimizing sedation protocols, minimizing environmental stressors, promoting early mobilization, and managing underlying medical conditions.

P130

The relationship between hormone replacement therapy and delirium in an intensive care setting.

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Critical Care 2025, **29(S1)**:P130

Introduction: The prevalence of delirium in critical care remains high. The acute withdrawal of routine medication can cause delirium. Studies on the influence of sex on delirium have been conflicting [1]. We aimed to explore the relationship between acute cessation of hormone replacement therapy (HRT) and incidence of delirium in female patients admitted to intensive care after cardiac surgery.
Methods: We conducted a retrospective analysis of data extracted from the electronic patient record of all female patients admitted to a single intensive care unit (ICU) after cardiac surgery between 01/01/2022 and 30/06/2023. Delirium assessment was based on the ICU routine practice that includes multiple daily assessment using the CAM-ICU delirium tool. No hospital policies were in place in relation to HRT treatment on admission, but it is routinely discontinued. We compared pre-admission drugs with drugs administered up to the discharge from ICU. We considered a single positive episode of delirium identified as a patient experiencing delirium.
Results: We reviewed 766 consecutive female patients. The youngest patient treated with was 45y and the oldest 81y. We compared rate of delirium in relation to HRT cessation in the 541 patients aged between 45 and 82y old (Table): 18% on HRT experienced at least one single episode of delirium vs 26% of those not routinely treated. This difference was not statistically significant (Chi-square, level of significance $p > 0.05$). Patients on HRT stayed had significantly longer duration of ICU stay (T test, level of significance $p < 0.05$).
Conclusions: We explored the relationship between HRT therapy and delirium in a small retrospective analysis. A potential difference in delirium incidence was not confirmed. Patients on HRT had longer duration of ICU stays. Multiple confounders should be included to refine our analysis.

Reference

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Table (abstract P130) Delirium and hormone replacement therapy incidence

	Delirium (+) HRT (+)	Delirium (−) HRT (−)	Delirium (+) HRT (−)	Delirium (−) HRT (+)
Age 45–81	10	360	126	45
Age 45–69	9	148	64	29
Age 70–81	1	212	62	16
Duration ICU stay (days)	4.3	3.7	3.8	4.1

P131

Semantic variation in the language of delirium

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Critical Care 2025, **29(S1)**:P131

Introduction: Delirium is a neurocognitive dysfunction that can only be described with words. However, words are subject to semantic shift and interpretation. The "gold standard" reference for delirium, the diagnostic and statistical manual of mental disorders is also a collection of words and has evolved significantly through successive editions. We hypothesized that the language of delirium is subject to semantic shift. We further hypothesized that the words used to describe the behaviors associated with delirium may vary between doctors and nurses. Finally, we hypothesized that natural language processing (NLP) could be used to study this phenomenon.
Methods: We obtained progress notes and profession (doctor or nurse) of the note taker for a cohort of critically ill patients admitted to our ICU over eleven years. Using a validated NLP methodology, we scanned the notes for words indicating a patient may have experienced disturbed behaviour and possible delirium [1]. The rate of occurrence of each word for each profession for each year was determined and standardized against the number of notes recorded that year.
Results: We studied 199,648 progress notes of 12,375 patients admitted between 2010 and 2021. We found significant variations in word use between professions. Doctors used the word "delirium" an average of 0.041/note compared with nurses 0.013/note, whereas nurses used "restrained" an average of 0.026/note compared with doctors 0.002/note. Further, the use of several words increased over time. Doctors used "delirium" 0.015/note in 2010 and 0.062/note in 2021. Similarly, nurses' usage increased from 0.003/note in 2010 to 0.026/note in 2021.
Conclusions: Our study is the first to use NLP to investigate semantic variation in the language used to describe disturbed behaviour and possible delirium in critically ill patients. Further, our study is the first to consider differences in words used by doctors and nurses to describe such a neurocognitive syndrome.

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P132

Biomarkers of postoperative delirium and subsequent central nervous system damage in the surgical intensive care unit

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Critical Care 2025, **29(S1)**:P132

Introduction: Postoperative delirium (POD), which leads to high mortality and morbidity, can follow to the blood–brain barrier (BBB) disruption and microglial activation. We revealed that BBB adhesion molecules are associated with POD and subsequent the central nervous system (CNS damage), which promote neurotoxic immune cell infiltration into the CNS [1–6]. Our present aim was to identify relationships among serum potential biomarkers affecting the BBB and POD.
Methods: Blood samples were obtained from 117 patients on the third postoperative day. Serum apolipoprotein-E (Apo-E) and matrix metalloprotease-9 (MMP-9), indicating BBB disruption, and neuron-specific enolase (NSE) and S100 calcium binding protein B (S100B), indicating microglial dysfunction, were measured. Based on previous studies, CNS axonal damage was detected by measuring phosphorylated neurofilament heavy subunit (pNF-H), with a cut-off value of 70.5 pg/mL and up. POD was clinically diagnosed with the Confusion Assessment Method for the Intensive Care Unit. We explored the contribution of these to the incidence of POD and CNS damage, by conducting multivariate analyses and the path analysis.
Results: Of the 117 patients, 41 POD and 30 pNF-H positive patients were identified. NSE, but not S100B, showed significant associations with both POD (OR: 54.0, 95% CI: 3.0–973.0, $p = 0.007$) and pNF-H positivity (OR: 9.35, 95% CI: 1.62–53.80, $p = 0.012$). Further, ten-fold NSE levels exacerbated POD by 64% and pNF-H positivity by 33%. MMP-9 contributed to increased NSE, as well as POD incidence and CNS damage. Conversely, Apo-E reduced NSE levels.
Conclusions: NSE was identified as a relevant key regulator of POD and subsequent CNS damage, which was modulated by MMP-9 and Apo-E in opposing manners.

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P133

Low-dose ketamine and hallucinations in critically ill patients

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Critical Care 2025, **29(S1)**:P133

Introduction: Low dose ketamine (LDK) (< 0.2 mg/kg/h) is used as an analgesic for critically ill patients [1]. The relationship between LDK and hallucinations in the critically ill has been studied, however no randomized trials have been conducted to investigate this association. Natural language processing (NLP) has been found to be useful for studying clinical phenomena that can only be described through words [2]. We hypothesized that NLP could be used to detect words such as "hallucination" in progress notes thereby identifying patients who experienced such phenomenon. We further hypothesized that this data, when combined with LDK medication data could be used to study the epidemiology of hallucinations in LDK patients.
Methods: We obtained progress notes, baseline and LDK data for a cohort of critically ill patients. Using a validated NLP methodology [3] we scanned the notes for words indicating a patient may have experienced hallucinations. We further identified patients who had received LDK. We used this data to study the association between LDK and hallucinations in the critically ill.
Results: We studied 7514 patients. We found the median dose of LDK was 0.11 (0.08–0.15) mg/kg/h. We further found within 30 days, hallucinations were more frequent in LDK than non-LDK patients(26% vs. 7%; $p < 0.001$). Finally, we found after adjusting for cofounders, LDK was independently associated with an increased risk of hallucinations (OR, 6.46 [95% CI, 5.17 to 8.07]; $p < 0.001$).
Conclusions: Our study is the first to use NLP to investigate the association between LDK and hallucinations in critically ill patients. In a large cohort of patients, we found that within 30 days of admission one in four LDK patients hallucinated compared with one in fourteen not receiving LDK.

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P134

Incidence of enzyme induction drug interactions after phenobarbital administration for alcohol withdrawal in the ICU

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Critical Care 2025, **29(S1)**:P134

Introduction: Phenobarbital (PHB) is an alternative to benzodiazepines for treatment of alcohol withdrawal syndrome (AWS). It is a strong inducer of cytochrome (CYP) P450 enzymes. There is little data about the prevalence of enzyme induction interactions in clinical practice [1]. This study aimed to illustrate the potential drug interaction related risk(s) of using PHB in ICU patients.
Methods: This single-center retrospective study examined the prevalence of CYP enzyme induction related drug-drug interactions occurring in patients admitted to the ICU who received PHB for the treatment of AWS from 01/09/2020 to 01/08/2024. The primary outcome was the median number of drug interactions per patient. Secondary outcomes included the number and nature of drug interactions with prior to admission, hospital, and new discharge medications.
Results: There were 1384 unique drug interactions occurring in 321 patients. This included 970 interactions with hospital medications, 282 interactions with home medications, and 132 interactions with new medications. The median number of drug interactions per patient was 4 (Figure). There were 60 unique interacting medications identified, including 516 (37.3%) category D and 2 category X interactions. The most common category D interacting medications were oxycodone, fentanyl, hydromorphone, quetiapine, and risperidone. Interactions with new antidepressants, antipsychotics, antiseizure, and anticoagulant medications were frequently observed. The median number of drug interactions per patient increased with length of stay.
Conclusions: ICU patients given PHB were at risk for numerous drug interactions. The number and clinical significance of drug interactions observed increased with increasing length of hospital stay.

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	Patients (N)	Total drug Interactions, median (IQR)	Home Med interactions, median (IQR)	Hospital Med Interactions, median (IQR)
All patients	321	4.0 (2.0-6.0)	1.0 (0.0-2.0)	3.0 (1.0-4.0)
LOS 1 to 5 days	109	2.0 (1.0-4.0)	1.0 (0.0-2.0)	1.0 (1.0-2.0)
LOS 6 to 10 days	96	3.5 (2.3-5.0)	1.0 (0.0-2.0)	3.0 (1.0-4.0)
LOS 11 to 15 days	43	5.0 (3.0-6.0)	1.0 (0.0-2.0)	3.0 (2.0-5.0)
LOS 16 to 20 days	25	6.0 (4.5-8.5)	1.0 (1.0-2.0)	5.0 (3.0-7.0)
LOS ≥21 days	48	8.0 (6.0-9.8)	2.0 (1.0-3.0)	6.0 (4.0-7.0)
		<0.001*	**<0.001***	**<0.001***

*Kruskal-Wallis

Figure (abstract P134) Median number of drug interactions per patient. LOS = Length of Stay

P135

Opioids and vasopressors: impact on critical outcomes in thoracic surgery

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Critical Care 2025, **29(S1)**:P135

Introduction: Anesthetic management in thoracic surgery represents a clinical challenge owing to its impact on the respiratory and cardiovascular functions of patients. Vasopressors and opioid drugs are widely used during the intraoperative period [1]; however, their impact on critical outcomes remains unknown. This study aimed to evaluate the critical outcomes of patients undergoing thoracic surgery who received these drugs.
Methods: A historical cohort-type analytical study was conducted on patients who underwent thoracic surgery between 2022 and 2024. We analyzed the exposure to opioids (Remifentanil or Fentanyl) and vasopressor support during the transoperative period, as primary outcome we analyzed the requirement of intensive care unit (ICU) admission, the secondary outcomes were: ICU stay, pain at 12 h and early ambulation (< 24 h). Confounding variables were adjusted for using multivariate analysis. Descriptive statistics and bivariate analyses were performed. The chi^2 or Fisher test was used to explore associations between qualitative variables, and Student's t-test or Mann Whitney test was used for quantitative variables, depending on normality.
Results: A total of 320 patients were analyzed. Regarding opioids, 87.8% were exposed to remifentanil and 12.2% to fentanyl; 60% were exposed to vasopressors, and 40% were not exposed. Patients exposed to remifentanil had less ICU admission ($p < 0.001$), shorter ICU stay (M: 4 IQR: 2.5–8.5 vs M: 10 IQR: 5–17; $p = 0.002$) and earlier ambulation ($p = 0.035$), there were no differences when assessing pain at 12 h ($p = 0.749$). Patients exposed to intraoperative vasopressors had more ICU admissions ($p < 0.001$), there were no significant differences in ICU stay.
Conclusions: Transoperative use of remifentanil positively affects critical outcomes in thoracic surgery patients, while the requirement of transoperative vasopressor support suggests a worse prognosis.

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P136

Comparison of remimazolam and propofol for rescue treatment for acute tolerance to the EEG effect of propofol on total intravenous anesthesia

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Critical Care 2025, **29(S1)**:P136

Introduction: Propofol is the most widely used drug by anesthesiologists for total intravenous anesthesia (TIVA) [1]. Some reports remain that the continuous use of propofol in the total intravenous anesthesia (TIVA) induces acute tolerence to EEG effect. Remimazolam is a novel short-acting GABA-A receptor agonist. It is an ester-based benzodiazepine. This meta-analysis aims to clarify the efficacy and safety of remimazolam versus propofol for rescue treatment for the situation of acute resistance situation of TIVA anesthesia to EEG effect.
Methods: Surgical patients (n = 100) with a BIS score 60 or higher, starting anesthesia with propofol TIVA were selected. Rescue drugs were added randomly to two groups. Remimazolam (R group) started with continuous infusion of intravenous (IV) until the BIS score dropped to 60 at 6 mg/kg/h and then adjusted appropriately by adding 1 mg/kg/h until the end of surgery. Propofol (P group) is administered to BIS 60 with slow bolus of 2.0–2.5 mg/kg, followed by a continuous infusion of adding 4–10 mg/kg/h until the end of surgery. Efficacy was measured through the total time for reaching BIS < 60 without need for rescue sedatives. When MAP was under 65, vasoconstrictive drug was injected (propofol was anesthetized with 4 mcg/mL of propofol effect-site concentration(Ce with target-control infusion, followed by 2.5–3 mcg/mL of Ce).
Results: The time to reach to BIS under 60 was shorter in R group than P group (R group 2 min ± 30 s, P group 5 min ± 30 s $p < 0.05$) Decreased blood pressure occurred in 21% of patients treated with R group compared with 48% of patients receiving propofol, which induced the use of vasoconstrictive drug which frequencies were 10%, 35%, respectively.
Conclusions: This study showed remimazolam for rescue treatment was superior than adding propofol for acute tolerance on EEG effect.

Reference

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P137

Impact of continuous intravenous opioids in mechanically ventilated adults: a systematic review and meta-analysis

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Critical Care 2025, **29(S1)**:P137

Introduction: Continuous intravenous (IV) opioids are widely used in ICU adults for pain, sedation, and facilitate mechanical ventilation despite persistent questions on efficacy and increasing safety concerns [1]. We aimed to systematically review and summarize evidence on efficacy and safety of continuous IV opioids in mechanically ventilated ICU adults.
Methods: We included randomized-controlled trials (RCT) of mechanically ventilated ICU adults comparing continuous IV full opioid agonists versus non-continuous IV opioids. The primary outcome was mechanical ventilation duration. Secondary efficacy outcomes were ICU length of stay (LOS), ICU pain reduction and short-term mortality. The secondary safety outcome was ICU delirium incidence. We performed inverse variance random-effects meta-analyses using the Grading of Recommendations of Assessment, Development and Evaluating Approach.
Results: We included 10 RCTs enrolling 945 patients. Continuous IV opioids use may increase mechanical ventilation time (3 RCTs, 421 patients, standard mean difference (SMD) = 3.63 h, 95% confidence interval (CI) 2.27 to 4.99, very low certainty) (Figure), but do not affect ICU LOS (3 RCTs, 358 patients, SMD = 0 days, 95% CI -0.03 to 0.04, very low certainty) or ICU pain reduction (5 RCTs, 583 patients, no difference, low certainty). Continuous IV opioids may reduce short-term mortality (3 RCTs, 315 patients, odds ratio (OR) = 0.46, 95% CI 0.23–0.92, low certainty) and delirium incidence (3 RCTs, 315 patients, OR = 0.28, 95% CI 0.16–0.47, low certainty). Subgroup analysis was not feasible.

Conclusions: In this review, we found that continuous IV opioids use may increase mechanical ventilation time but reduce short-term mortality and delirium in mechanically ventilated ICU adults. We observed low or very low certainty evidence for outcomes of interest. Large prospective RCTs are required to evaluate the efficacy and safety of continuous IV opioids in ventilated ICU adults.

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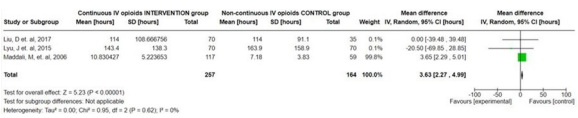

Figure (abstract P137) Forest plot for mechanical ventilation time using RevMan with inverse-variance random effects model

P138

Safety and efficacy of sublingual and buccal buprenorphine in mechanically ventilated patients

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Critical Care 2025, **29(S1)**:P138

Introduction: Buprenorphine is a partial mu-opioid receptor agonist and opioid receptor antagonist with a ceiling effect that is used for the treatment of acute pain and opioid use disorder. Use in critically ill patients has been limited [1, 2]. Retrospective studies in critically-ill populations included only 35–56% patients on mechanical ventilation (MV) and found that buprenorphine significantly reduces opioid requirements [3, 4]. This study describes the safety and efficacy of sublingual (SL) and buccal (BU) buprenorphine in patients on MV.
Methods: This single-center retrospective analysis examined adult ICU patients that received SL or BU buprenorphine while on MV from 1/9/2019 to 1/9/2024. The primary outcome was non-buprenorphine morphine milligram equivalents (MME) 24 h prior to buprenorphine initiation compared to MME at the maximum buprenorphine dose while in the ICU. Secondary outcomes included incidence of precipitated withdrawal, dental or oral complications, buprenorphine discontinuation, duration of continuous opioid infusions after first buprenorphine dose, and days receiving opioids after first buprenorphine dose.
Results: This study included 17 patients. The median MME 24 h prior to buprenorphine initiation was 185.3 MME compared to 0 MME at the maximum buprenorphine dose ($p=0.006$). Precipitated withdrawal was documented in 3 patients. There were no reports of new onset dental or oral complications during hospitalization.
Conclusions: SL and BU buprenorphine led to a significant decrease in daily MME in patients on MV. Larger studies are needed to determine the safety and efficacy of SL and BU buprenorphine during MV.

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P139

A natural language processing informed target trial emulation of dexmedetomidine for the treatment of agitation in critically ill patients

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Critical Care 2025, **29(S1)**:P139

Introduction: Dexmedetomidine has been proposed as an agent for managing agitated behavior in the critically ill. However, no randomized control trials have specifically evaluated this association within ICU [1]. Recently, natural language processing (NLP) emerged as a tool for studying the epidemiology of disturbed behavior in the ICU [2]. We hypothesized that NLP could detect relevant words thereby identifying patients who experienced agitated behavior and that this data could inform a target trial emulation (TTE) to investigate the epidemiology of dexmedetomidine in these patients [3,4].
Methods: We obtained demographics, electronic notes and data on the timing and dosage of dexmedetomidine for a cohort of critically ill patients. Using NLP, we scanned the notes for terms indicating hyperactive behavior and determined the onset and resolution of such behavior. We then performed a TTE, to assess the impact of early dexmedetomidine use in patients with agitated behavior.
Results: We studied 7525 patients. Of these, 2052 (27.3%) developed agitated behavior and were eligible for inclusion in the TTE. At 30 days, patients treated with dexmedetomidine had more rapid resolution of agitation (94% vs. 72%; $p<0.001$) and lower mortality (5% vs. 9%; $p=0.033$). Furthermore, early administration of dexmedetomidine increased resolution (risk ratio [RR], 1.13 [95% CI, 1.03–1.21]; risk difference [RD], 9.8% [95% CI, 2.6–15.4%]); extubation (RR, 1.03 [95% CI, 1.02–1.04]; RD, 3.1% [95% CI, 2.2–4.2%]); and decreased the risk of mortality (RR, 0.21 [95% CI, 0.00–0.85]; RD, −6.3% [95% CI, −8.9% to −1.2%]).
Conclusions: Using TTE informed by NLP, we found early administration of dexmedetomidine reduced agitation, resulted in higher levels extubation and lowered rates of tracheostomy and mortality in ICU patients at 30 days.

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P140

Impact of dexmedetomidine on cardiac surgery patients

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Critical Care 2025, **29(S1)**:P140

Introduction: Dexmedetomidine is associated with improved postoperative outcomes in cardiac surgery, such as reduced hospital stay and mortality [1,2]. This study aimed to evaluate whether dexmedetomidine influences postoperative outcomes in a population of patients undergoing cardiac surgery.
Methods: This was a historical, analytical cohort study, in which we included patients who underwent cardiac surgery over 18 years of age with a complete medical history. Two groups were analyzed: those exposed to intraoperative dexmedetomidine administration and those who were not. We analyzed demographic variables (sex, age, body mass index (BMI), ASA classification) and postoperative outcomes of patients in both the exposed and unexposed groups, such as intensive care unit (ICU) stay, reoperation, and mortality. Descriptive statistics were used to characterize the sample, and bivariate tests (Chi-square, Student's t-test, and Mann–Whitney U test) were used to analyze the association between the variables of interest and the outcomes, establishing a significance level of $p<0.05$.
Results: 122 patients were analyzed, and the most frequent procedure was vascular reconstruction (69.67). Among the demographic measures, we found a high representativeness of male sex (77.05%), and most of the patients had an overweight BMI (45.9%). Regarding our

established exposure, patients who received DM had shorter ICU stay (59.26% vs. 37.89%, $p = 0.040$). No significant differences were found in 30-day mortality ($p = 0.673$), re interventions ($p = 0.495$), ICU readmissions ($p = 0.606$), or early ambulation ($p = 0.423$) (Table).
Conclusions: The use of DM in cardiac surgery in our population was associated with a shorter ICU length of stay but did not significantly affect other postoperative outcomes. These findings suggest the potential benefits of dexmedetomidine in reducing ICU burden, warranting further investigation to explore its impact.

References
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Table (abstract P140) Impact of dexmedetomidine on cardiac surgery

Parameter		*p*-value
ICU stay < 3 days		
DM use	16 (59.26%)	$p = 0.040$
Not DM	11 (40.74%)	
ICU stay > 3 days		
DM use	36 (37.89%)	
Not DM	59 (62.11%)	

P141
What are the individual effects of preoperative anemia and red blood cell transfusion on postoperative mortality after cardiac surgery? A Netherlands Heart Registration analysis
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Critical Care 2025, **29(S1)**:P141

Introduction: Preoperative anemia is associated with higher mortality after cardiac surgery, yet the extent to which this is mediated by red blood cell (RBC) transfusion remains unclear. Understanding the pathway from anemia to RBC transfusion and its contribution to postoperative mortality is important, as both are modifiable risk factors. Elderly patients may be particularly vulnerable to the adverse effects of anemia and transfusion. This study assessed the association between preoperative anemia and postoperative mortality, the extent mediated by RBC transfusion, and whether these effects differ in elderly patients.
Methods: This nationwide study included adult cardiac surgery patients from January 2016 to July 2022 using data from the Netherlands Heart Registration. Preoperative anemia was defined by WHO criteria, and RBC transfusion as any transfusion during hospital stay. The main endpoint was 120-day mortality. Mediation analysis was conducted to assess the direct effect of anemia on mortality and the proportion mediated by RBC transfusion. Subgroup analysis was performed based on age groups: < 70 years and ≥ 70 years.
Results: Among 71,053 patients, 20% (n = 14,452) had preoperative anemia. RBC transfusion was received by 53% (n = 7,621) of anemic patients versus 18% (n = 9,930) of non-anemic patients ($p < 0.001$). Preoperative anemia was associated with higher mortality (aOR 1.56, 95% CI 1.38–1.75). RBC transfusion mediated 59% of the anemia-mortality association. While this association was consistent across age groups, the mediated proportion was greater in patients ≥ 70 years (77%) compared to those < 70 years (39%).
Conclusions: A significant proportion of the mortality risk from preoperative anemia in cardiac surgery patients is mediated through RBC transfusion, with a more pronounced effect in elderly patients. These findings highlight the importance of treating anemia and judiciously using transfusion, particularly in older individuals.

P142
Contact activation of coagulation in newly inserted indwelling catheters
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Critical Care 2025, **29(S1)**:P142

Introduction: When plastic catheters come into contact with blood, the coagulation system is activated and subsequent catheter bound thrombus formation is not uncommon. Furthermore, correct blood sampling technique from newly inserted catheters is important to avoid preanalytical errors. The primary aim of the present study was to investigate any coagulation and platelet activation in blood samples collected from newly inserted catheters.
Methods: In this cross-sectional observational study, blood samples were collected from newly inserted central venous, arterial, and peripheral intravenous catheters in adult hospitalized patients after informed written consent. Sample 1 was collected from the first blood that passed through the lumen, immediately after insertion. Sample 2 was collected directly after Sample 1 but after proper saline flush and discard of 5 mL blood. A carefully selected set of hemostatic assays (ROTEM-NATEM clotting time (CT), clot formation time (CFT), a-angle and maximum clot firmness (MCF); PT-INR, aPTT, platelet count, FVII, FXII, thrombin–antithrombin complex (TAT) and P-selectin) were then performed and the results for Sample 1 and 2 compared per catheter type.
Results: In total 10 patients per catheter type were included. For central venous catheters, there was a strong difference for CT, CFT, a-angle, PT-INR, FVII and TAT in Sample 1 compared to Sample 2, demonstrating a hypercoagulable state (Figure). Peripheral venous catheters were less prone to activate coagulation and almost no coagulation activation was seen for arterial catheters.
Conclusions: Strong coagulation activation was observed in whole blood and plasma analyses aspirated immediately from newly inserted central venous catheters. The results also enhance the understanding of central venous catheter-related thrombosis formation, as the same activation of the coagulation system described in this study, is likely to also occur on the outer surface of the catheter.

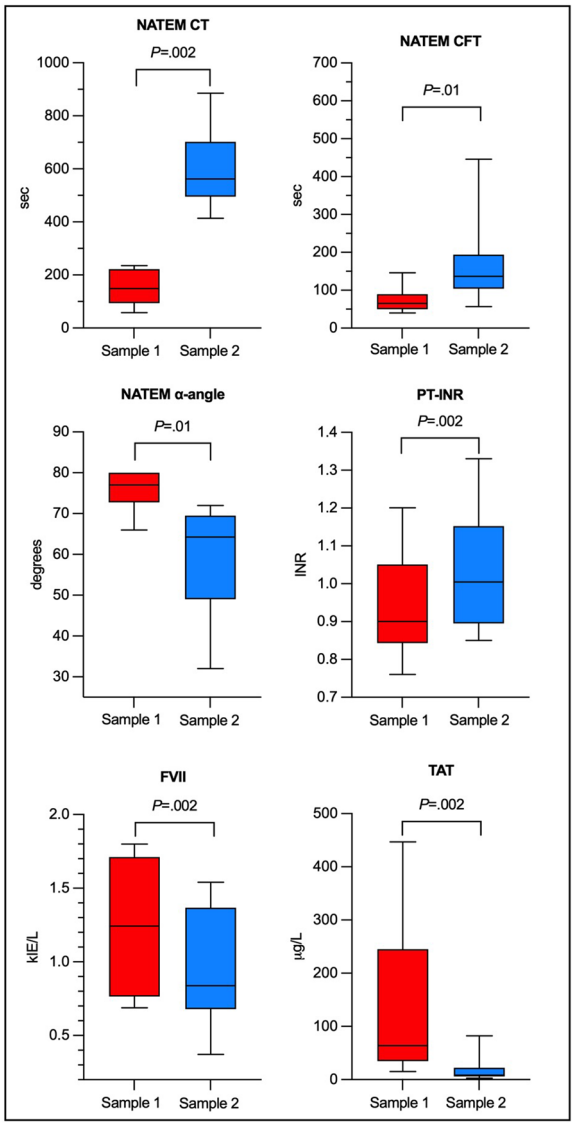

Figure (abstract P142) Comparison of Sample 1 and Sample 2 from central venous catheters

P143

Coagulopathy associated with extracorporeal life support: physiological response to circuit exchange and removal

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Introduction: Disseminated intravascular coagulation (DIC) is a complication in patients receiving ECLS. Manifestations of circuit-associated DIC (DICcir) include thrombocytopenia and hypofibrinogenemia. DICcir needs transfusions, circuit exchange(CE), or circuit removal(CR). Objective: Determine the incidence of DICcir in ECLS, evaluate the hematological reaction to CE or CR in DICcir, and analyze the impact on the consumption of blood products.
Methods: Retrospective study of patients treated with ECLS at Clínica Alemana between July 2014/May 2024. DICcir:Platelets < 150,000/mm^3, fibrinogen < 200 mg/dL, or decrease ≥ 25% in one or both compared to baseline. The decision of CE or CR was clinical.
Results: 112 patients;41(37%) presented DICcir, 17(15%) had non-DIC-cir-related events, and 54 (48%) had no events. DICcir patients had 61 events. Coagulopathy types were hypofibrinogenemia (24.5%), thrombocytopenia (23%), and combined (52.5%). Of the events, 29 underwent CE and 32 CR; 93% of the CE events (CEe) and 88% of the CR events (CRe) had DICcir remission. In CEe, fibrinogen was significantly lower on day 0 (intervention day) compared to previous and following days (Figure). Platelets had no significant decrease prior to exchange, but a significant increase after the intervention. In CRe, fibrinogen and platelets showed the same trend described in CEe. About transfusion needs, the CEe and CRe required more transfusions days -1/0 compared to the days after. We compared the DICcir patients with those without events; there were significant differences in APACHE II and ECLS duration, being both lower in DICcir group. ECLS modality in the DICcir group was predominantly ECMO VV(85%). No patient with AV $ECCO_2R$ presented DICcir.
Conclusions: 37% of patients with ECLS presented DICcir,being more prevalent in VV ECMO. DICcir was associated with the duration of support and inversely related to severity. Recovery of hemostasis, transfusion needs, were similar in DICcir patients after CE or CR. Patients with ECLS without a pump (AV $ECCO_2R$) did not present DICcir.

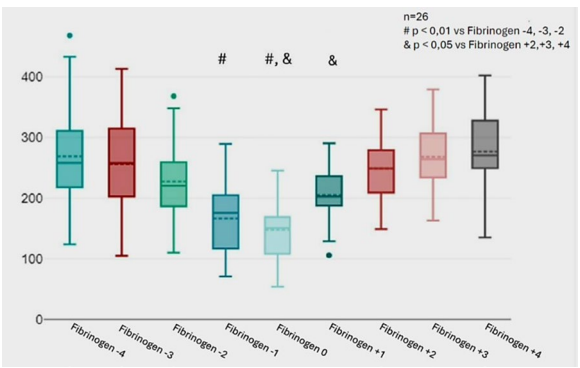

Figure (abstract P143) Fibrinogen response to circuit exchange

P144

Pseudothrombotic microangiopathy secondary to severe vitamin B12 deficiency due to pernicious anemia

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Introduction: Thrombotic microangiopathy (TMA) secondary to vitamin B12 deficiency, known as pseudothrombotic microangiopathy (pseudo-TMA), is a rare and uncommon clinical form accounting for less than 2.5% of total cases of pernicious anemia [1]. Pseudo-TMA is misdiagnosed in up to 40%.
Methods: Case report.
Results: A 54-year-old woman presented with adynamia and malaise for one month, worsening 3 days before admission with a syncopal episode. Laboratory tests showed pancytopenia, macrocytosis, microangiopathic hemolytic anemia, non-immune thrombocytopenia and elevated lactate dehydrogenase levels; peripheral blood smear revealed anisocytosis, poikilocytosis and schistocytosis, along with hypersegmented neutrophils. Initially it was interpreted as primary acquired TMA and treatment was started with plastic replacement therapy after taking disintegrin and metalloproteinase with thrombospondin type 1, number 13

activity (ADAMTS-13), systemic glucocorticoids, vitamin B12 supplementation (1000 mcg intramuscular daily). After obtaining the results of ADAMTS-13 activity (32.7%), vitamin B12 (37.57 pg/mL) and folic acid (19.2 ng/mL) levels, the diagnosis was corrected and it was determined that it was a pseudo-TMA secondary to vitamin B12 deficiency, plasma exchange therapy was suspended, systemic glucocorticoids, 7 days after starting B12 supplementation, hemoglobin levels, platelets and hemolysis panel improved. The diagnosis of pernicious anemia was confirmed by detection of antibodies against gastric parietal cells.

Conclusions: Pseudothrombotic microangiopathy due to severe vitamin B12 deficiency can present with features similar to primary acquired thrombotic microangiopathy. Prompt and accurate diagnosis is crucial to avoid inappropriate treatment, providing adequate vitamin B12 supplementation is sufficient to reverse the paraclinical abnormalities in these cases.

Acknowledgement: The patient and family have given written consent.

Reference

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P145

Short and long-term outcomes of patients with hematologic malignancies and acute hypoxemic respiratory failure

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Introduction: Acute respiratory failure (ARF) is the leading cause for intensive care unit (ICU) admission in patients with hematologic malignancies (HM). Although short-term survival has improved, notably in high volume centers, relevant long-term outcomes remain largely undefined.

Methods: Retrospective, observational, single-center study conducted in a tertiary hospital, of patients with HM admitted to the ICU with hypoxemic ARF from 2014 to 2023. Survival and functional status were measured up to 1 year.

Results: A total of 110 patients were included. The median age was 58 years and 63.6% were male. Most patients had lymphoma (41.8%) or acute leukemia (32.7%). There were 77.1% of patients with active disease, 20% were allogeneic stem cell recipients and 15.2% received chemotherapy in the ICU. ARF etiology was identified in 78.2% of patients. Main ARF etiologies were infections (43.6%) or lung involvement by hematologic disease (18.2%). In the first 48 h of ICU stay, 42.4% of patients were intubated. Ultimately 62.7% of patients required invasive mechanical ventilation (IMV), 40% high-flow oxygen (HFNC), 28.2% noninvasive ventilation (NIV) and 7.7% veno-venous ECMO. ICU mortality was 52.7% and hospital mortality was 59.2%, while 90 days and 1 year mortality were 73.6% and 83.3%, respectively. There was no survival benefit associated with HFNC or NIV. Both IMV and ARF of undetermined cause were predictors of mortality in the ICU and at one year ($p < 0.001$) on multivariate analysis. Baseline frailty was associated with 1 year mortality ($p = 0.022$). Among ICU survivors 20 patients were alive at one year, 61% in complete remission and 87% with an ECOG of 0 or 1.

Conclusions: In this population of patients with HM admitted to the ICU with ARF, 18% of the entire cohort and 38% of ICU survivors were alive at 12 months. IMV and ARF of undetermined etiology had a statistically significant negative impact on short and long-term outcomes. More research is needed on the mechanisms of critical illness that impact HM survival.

P146

Change in fibrinogen during cardiopulmonary bypass following cardiac surgery

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Introduction: Fibrinogen is a crucial component of hemostasis, particularly during cardiac surgery, where the maintenance of optimal blood coagulation is essential for ensuring patient safety and achieving surgical success. Being a part of a stable clot, fibrinogen is also adsorbed to artificial surfaces during CPB. Cardiac surgery is associated with major bleeding, hence, the monitoring of fibrinogen level is paramount.

Methods: We conducted prospective observational study, designed to evaluate changes in fibrinogen levels. The study included adult patients aged 18 years and older who were scheduled for elective open heart surgery with CPB. Exclusion criteria encompassed individuals with a history of coagulopathy, those currently receiving anticoagulant therapy, off pump surgery.

Results: The sample size comprised 269 patients. Mean time of CPB was 97.7 min. The study observed a decrease in fibrinogen level. Assessment during immediate postoperative period demonstrated 24% reduction in fibrinogen (3.23 g/L vs 2.45 g/L, $p < 0.001$). Change of hematocrit level was from 41.2% to 33.8%. The decline in fibrinogen level may be attributed to hemodilution and blood loss during the surgery. Majority of patients with decrease in fibrinogen by < 1 g/L had less blood loss (< 500 mL) intraoperatively compared to the group of patients with the loss of fibrinogen by > 1 g/L (500–1000 mL).

Conclusions: Fibrinogen concentration decreases after CPB, which could be explained by blood loss, dilution, and consumption by non-physiological surfaces. Further studies that define functionality of fibrinogen after CPB are needed.

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P147

Fibrinogen concentrate treatment reduced transfusion requirements and hospital length of stay, with similar safety to other treatments, in adult patients with acquired fibrinogen deficiency: a systematic review and meta-analysis

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Introduction: Fibrinogen concentrate (FC) is recommended in adult patients with acquired fibrinogen deficiency (AFD). The safety profile is well established in AFD; however, how FC therapy compares to other treatments in reducing transfusion requirements remains disputed. In a systematic literature review and meta-analysis (PROSPERO: CRD42024602804), we evaluated if FC provides improved outcomes, versus other treatments, in patients with AFD.

Methods: Randomized controlled trials and prospective/retrospective observational or cohort studies in which adult patients received FC for AFD were included in a literature search of PubMed, Web of Science, and the Cochrane Library databases (January 2003–September 2024).

We retrieved English-language, comparative studies that included evaluation of at least one of the following: use and quantity of additional blood products (red blood cells [RBCs], fresh frozen plasma [FFP], or platelets); mortality; thromboembolic events (TEEs); or hospital length of stay (LOS). Meta-analyses were conducted on pooled data to provide a single estimate of the differences in outcome between FC and all other treatments.
Results: Overall, 48 studies involving 13,814 patients (4,434 received FC) were analyzed. All outcomes had considerable heterogeneity, except TEEs. Significantly fewer RBC and FFP units, 21% and 24% less, respectively, were given to FC recipients versus patients who received any other treatment (Figure). Hospital LOS was significantly reduced by 24% (ratio: 0.76; 95% CI: 0.62–0.92; $p = 0.006$) for FC recipients. No significant difference in mortality, TEEs, use of additional blood products, or platelet quantity was found between FC versus other treatments.
Conclusions: FC therapy led to a reduction in the quantity of RBC and FFP used, reduced hospital LOS, and did not increase TEEs or mortality, compared with other treatments. These analyses indicate FC may reduce transfusion requirements and improve outcomes for patients with AFD.

Outcome	Number of studies	Heterogeneity (p-value, I²)	Treatment effect (RR* or Ratio† [95% CI], p-value)
Use of RBC	22	<0.001, 92%	0.95* (0.79–1.15), 0.62
Use of FFP	13	<0.001, 96%	1.24* (0.79–1.95), 0.36
Use of platelets	14	<0.001, 95%	1.12* (0.60–2.08), 0.73
Quantity of RBC	14	<0.001, 97%	0.79† (0.64–0.96), **0.02**
Quantity of FFP	8	<0.001, 95%	0.77† (0.60–0.97), **0.03**
Quantity of platelets	4	<0.001, 94%	0.64† (0.36–1.13), 0.13

*Calculated as values in fibrinogen concentrate group relative to any other treatment; RR was calculated for use (yes/no) of RBC, FFP, or platelets. †Calculated as values in fibrinogen concentrate group relative to any other treatment; treatment effect ratio was calculated for the quantity of RBC, FFP, or platelet use. CI, confidence interval; FFP, fresh frozen plasma; RBC, red blood cell; RR, risk ratio.

Figure (abstract P147) Meta-analysis Results: use and quantity of blood products

P148

Efficacy and safety of intra-operative use of a human fibrinogen concentrate in patients undergoing spinal or abdominal surgery: top-line results of the phase 3, randomized ADFIrst trial

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Introduction: Fibrinogen concentrates may be used during management of acute bleeding episodes in patients with acquired hypofibrinogenemia during surgeries or trauma. The AdFIrst trial investigated the efficacy and safety of a new human plasma-derived fibrinogen concentrate (BT524, Biotest) for the management of uncontrolled severe hemorrhage in patients with acquired hypofibrinogenemia undergoing major surgeries (EudraCT:2017-001163-20).
Methods: This was a randomized, prospective, active-controlled, pivotal phase 3, non-inferiority trial. Adult patients undergoing major spinal or abdominal surgery with clinically relevant blood loss were randomized (1:1) for blinded intravenous administration of human fibrinogen concentrate or center's standard of care, fresh frozen plasma (FFP) or cryoprecipitate. The primary efficacy endpoint was the intra-operative blood loss measured after the decision to treat until the end of surgery in the per protocol set.
Results: Of the 339 patients screened at 15 sites, 222 were randomized to receive either human fibrinogen concentrate (n = 110) or FFP/cryoprecipitate (n = 112). Baseline characteristics (full analysis set) were similar between groups (mean age 61 years; 59% female; body mass index, 27.9). Human fibrinogen concentrate demonstrated non-inferiority efficacy to FFP/cryoprecipitate in reducing intra-operative blood loss: mean (standard deviation) of 1444.4 (992.77) mL in the human fibrinogen concentrate group and 1735.1 (1029.17) mL in the FFP/cryoprecipitate group ($p < 0.001$; least square mean difference −279.4 mL, 95% confidence interval [−552.38, −6.48]). The incidence of treatment-emergent adverse events was similar between groups. A lower incidence of thromboembolic events was observed in the human fibrinogen concentrate group.
Conclusions: Fibrinogen concentrate was hemostatically efficacious, safe, and well tolerated as a complementary therapy for the management of uncontrolled severe hemorrhage in patients with acquired hypofibrinogenemia.

P149

Altered thrombin generation following the use of prothrombin complex concentrate is not depicted by viscoelastic testing: an in vitro study

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Critical Care 2025, **29(S1)**:P149

Introduction: Bleeding guidelines currently recommend the use of viscoelastic tests (VETs) to direct hemostatic resuscitation in severe hemorrhage. However, VET-derived parameters of clot initiation, such as clotting time (CT) and activated clotting time (ACT), may not adequately reflect a clinically relevant interaction of procoagulant and anticoagulant activity, as depicted by thrombin generation (TG) assays [1]. The aim of this study was to evaluate the ability of CT/ACT to indicate TG activity.
Methods: Citrated whole blood obtained from 13 healthy volunteers underwent a 50% crystalloid dilution (DL-50%) followed by spiking with 4-factor prothrombin complex concentrate (DL-50% + 4F-PCC). The changes in TG activity were compared with i) the VET parameters CT/ACT derived from four commercially available viscoelastic devices (ROTEM® Delta, ClotPro®, TEG®6 s and Quantra®) and ii) the results from standard coagulation tests (SCTs).
Results: DL-50% resulted in a marked increase in velocity index, peak height and endogenous thrombin potential (all $p < 0.01$), with a further substantial increase after spiking with 4F-PCC (all $p < 0.001$) (Figure). In contrast, CT/ACT were significantly prolonged in response to DL-50% on all devices (all $p < 0.05$). Subsequent spiking of diluted blood with 4F-PCC had no impact on CT/ACT derived from VET analysers, but it restored SCTs without reaching baseline values (all $p < 0.01$).
Conclusions: The current study demonstrates that upregulated TG parameters were not displayed by both CT/ACT and SCTs. Neither VETs nor STCs were associated with TG parameters following PCC spiking. Our results do not support treatment algorithms using prolonged CT/ACT as a trigger for the administration of PCC to augment TG.

Reference

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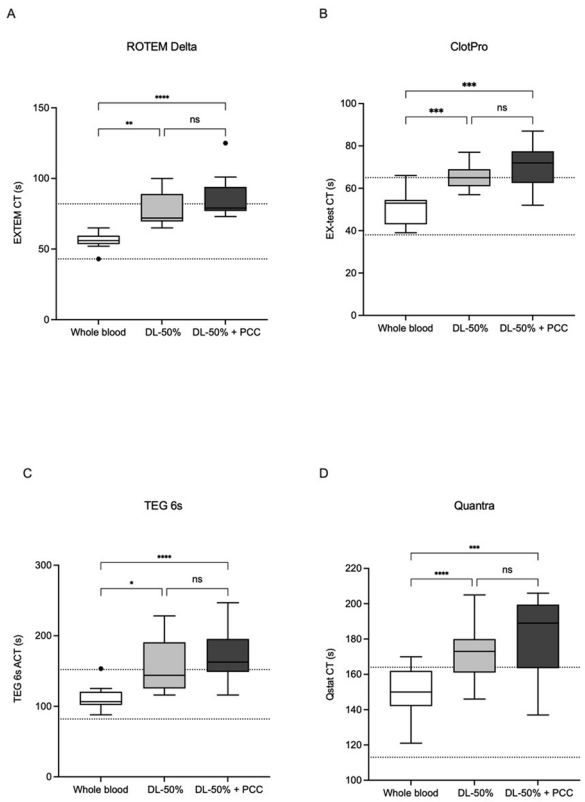

Figure (abstract P149) Viscoelastic parameters of clot initiation. ACT, activated clotting time; CT, clotting time; DL-50%, dilution; DL-50% + PCC, dilution + prothrombin complex concentrate. Data are presented as box plots and whiskers using Tukey's method. Single dots represent outliers. Dotted lines denote reference ranges, respectively. ns not significant *$p < 0.05$ **$p < 0.01$ *** $p < 0.001$ ****$p < 0.0001$.

P150

High-dose four-factor prothrombin complex concentrate for international normalized ratio > 6 shows efficacy and safety in surgical patients requiring rapid vitamin K antagonist reversal in the randomized controlled LEX-209 study

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Critical Care 2025, **29(S1)**:P150

Introduction: In the LEX-209 study, the investigational prothrombin complex concentrate (4F-PCC, Octaplex/BALFAXAR, Octapharma) was hemostatically non-inferior to the control 4F-PCC (Beriplex/Kcentra, CSL Behring) for rapid vitamin K antagonist (VKA) reversal for urgent surgery. This sub-analysis evaluated the hemostatic efficacy and safety of a high dose of 50 international units (IU)/kg 4F-PCC in patients with an international normalized ratio (INR) > 6 before urgent surgery.

Methods: LEX-209 (NCT02740335) was performed across 24 hospitals (U.S., Russia, Georgia, Belarus, Ukraine, Romania) in 208 patients aged ≥ 18 years on VKA therapy with an INR ≥ 2.0 and a significant bleeding risk (≥ 50 mL expected blood loss). Randomized patients (1:1) received a single intravenous infusion of 25, 35, or 50 IU/kg of 4F-PCC for baseline INR 2– < 4, 4–6, or > 6, respectively. The primary endpoint of hemostatic efficacy was assessed by a blinded independent endpoint adjudication board. The INR correction and safety were secondary endpoints.
Results: Twenty-three patients (15 female, 8 male) with baseline INR > 6 (mean ± SD, 9.1 ± 3.2) were included. Median (range) age was 72 (44–90) years and weight was 70 (50–115) kg. The mean ± SD 4F-PCC dose administered was similar in the investigational (n = 15) and control (n = 8) 4F-PCC groups. Surgery location, dosing, and time from 4F-PCC administration to surgery are shown in the Table. Effective hemostasis was achieved in 100.0% of patients in both groups. INR correction to ≤ 1.5 at 30 min post-infusion was achieved in all patients (proportion difference − 0.067; 95% CI − 0.247, 0.114). No drug-related treatment-emergent adverse events or thrombotic events were reported in either group.
Conclusions: In the LEX-209 study, investigational 4F-PCC administered at the highest permitted dose exhibited good safety and was effective for rapid INR (> 6) reversal in urgent surgery patients with significant bleeding risk.

Table (abstract P150) Surgery location, dosing, and time to surgery start. 4F-PCC, four-factor prothrombin complex concentrate; IU, international units; N, number of patients; SD, standard deviation

	Investigational 4F-PCC (N = 15)	Control 4F-PCC (N = 8)
Type of surgery, n (%):		
Gastrointestinal	8 (53.3)	5 (62.5)
Musculoskeletal	3 (20.0)	0 (0.0)
Cardiovascular	0 (0.0)	1 (12.5)
Other	4 (26.7)	2 (25.0)
4F-PCC dose (IU factor IX/kg), mean ± SD	49.7 ± 1.2	49.2 ± 2.3
Time from 4F-PCC to surgery start (min), mean ± SD	95.3 ± 48.8	83.8 ± 29.7

P151

Fibrinogen measurement of diluted and Fibryga spiked blood and plasma samples using different technologies

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Introduction: The aim of this study was to determine the suitability of a point-of-care (POC) fibrinogen monitoring system [1] compared to the stationary state of the art Fibrinogen ACL Clauss system to evaluate the fast analysis of blood samples outside of a stationary laboratory environment. Therefore, blood and plasma measurements of healthy donors as well as spiking experiments were executed with both methods. Octapharma's fibrinogen concentrate Fibryga [2] was used in the spiking experiments to mimic the substitution of patients. As additional information, the fibrinogen data were correlated with parameters from the global hemostatic rotational thromboelastometry (ROTEM).
Methods: The POC Fibrinogen monitoring system was used to measure full blood samples, as well as partly diluted by Fibrinogen deficient plasma, to cover the concentration range of 1 to 4 g/L. Comparability of the spiking analyses was given by Fibryga and a fixed spiking volume. Plasma directly generated from the same samples was measured

according to the Fibrinogen Clauss method on an ACL device. ROTEM analyses were also performed with full, diluted, and spiked blood samples.
Results: Results obtained with POC Fibrinogen from blood and Clauss from frozen plasma are comparable within the expected range and correlate with ROTEM read out parameters. The measurement of fibrinogen spiked samples resulted in a dose dependent increase of the MCF of ROTEM and both thrombin triggered assays confirmed the added amounts of fibrinogen (Figure).
Conclusions: Taking into account the manufacturer's instruction the POC device shows good comparability to FibClauss and is well suited for fibrinogen monitoring in the range of 1 to 4 g/L. The use of Fibryga in a hypofibrinogenemia patient was mimicked by spiking and the successful substitution proven with all three methods applied.

References

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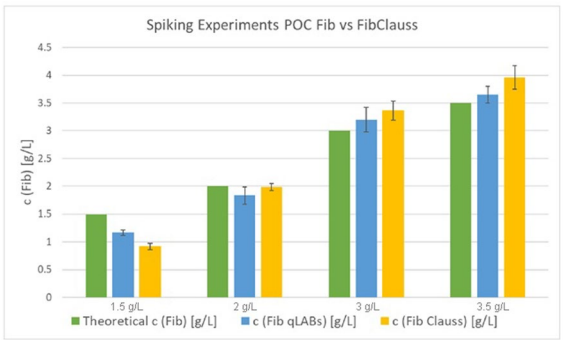

Figure 1: Comparison between diluted (1.5 g/L) and subsequent spiked samples (2 g/L, 3 g/L, 3.5 g/L) of 6 different donors with POC Fib and FibClauss measurements. Theoretical fibrinogen dilution/spiking concentrations: 1.5 g/L, 2 g/L, 3 g/L, 3.5 g/L.

Figure (abstract P151) Spiking experiments POC Fib vs FibClauss

P152

The shock index as an intra-hospital predictor of traumatic hemorrhagic shock and trauma induced coagulopathy: a comparative analysis with blood gas parameters, base excess, and lactate levels

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Introduction: The Shock Index (SI), the ratio of heart rate to systolic arterial pressure, is one of the most used indicators in pre-hospital settings to assess hemorrhagic risk in severe trauma patients. Values ≥ 0.9 correlate with higher risk of transfusions and mortality, with an increased positive predictive value compared to systolic blood pressure values and ABC score. Our study examines the correlation between SI value, onset of trauma induced coagulopathy (TIC) and increased hemorrhagic risk, comparing these results with the values of base excess (BE) and blood lactates, parameters that currently guide the decision-making algorithm in severe trauma patients.
Methods: It is a retrospective observational study on 262 blunt trauma patients with an Injury Severity Score (ISS) > 15, admitted to San Camillo Hospital ICU (Rome, Italy) between January 1, 2023, and August 31, 2024. Upon arrival, we recorded SI, BE, lactate, and fibrinogen levels for each patient, using the following pathological cut-offs: SI ≥ 1, BE $\leq$ -6, lactate > 5 mmol/L, and fibrinogen ≤ 200 mg/dL. We also documented the need for Damage Control Surgery (DCS) and blood product consumption.
Results: Among patients with SI ≥ 1, 77% underwent DCS (vs. 25.3% with SI < 1), and 41% required massive transfusions (vs. 1.8% with SI < 1) ($Chi^2 = 61{,}09$;Chi2 = 51.58) ($p < 0.001$). Our results demonstrated a higher positive predictive value for SI compared to BE and lactate levels in identifying patients with greater hemorrhagic risk (Figure). Regarding the association between SI and TIC, the results showed a correlation between SI ≥ 1 and hypofibrinogemia (Pearson $r = -0.25$, $p < 0.05$) which, though, was not stronger than the one observed with BE ($r = 0.31$, $p < 0.001$) and lactate levels ($r = -0.32$, $p < 0.005$).
Conclusions: SI is an easily measurable parameter, whose high predictive capacity for hemorrhagic risk and TIC makes it a valuable tool for early trauma management, especially in resource-limited settings with restricted access to advanced diagnostic tools.

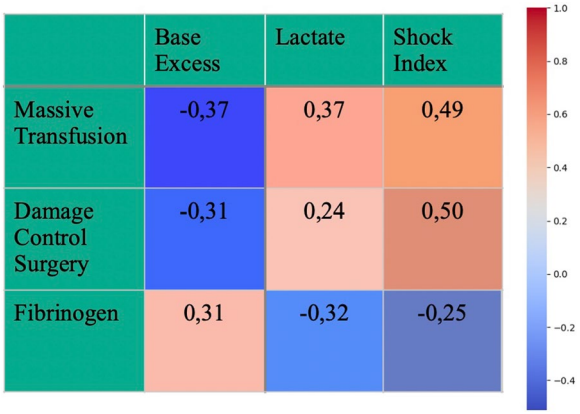

Figure (abstract P152) Correlation matrix displays the correlation coefficients for different variables

P153

How to fix a broken heart: a diagnostic and therapeutic challenge in critical care management of traumatic blunt cardiac injury

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Introduction: Blunt cardiac injury (BCI) is a challenging diagnosis in polytrauma patients. Given the high energy transfer required at a specific given time, such as early systole when mitral valve is closed while aortic valve is opening, isolated valve injuries are mostly secondary to motor vehicle collisions (MVC). These injuries are under-reported in trauma due to lethal concomitant injuries producing high out-of-hospital mortality. This case demonstrates the challenging management of valve injury in the setting of multisystem injuries.
Methods: We present a case report of mitral and tricuspid valve injury in a 46-year-old male who presented following a MVC on 9/1/2024. We reviewed the patient's clinical course including laboratory, imaging studies, procedures and surgeries.
Results: The patient presented with bradycardia and hypotension. Diagnostics demonstrated bilateral rib fractures, pulmonary contusions, sternal fracture and an acetabular fracture. Relevant laboratory values included lactate of 4 mmol/L, troponin of 10 ng/L. Arterial blood gases showed worsening hypercapnic, hypoxemic acidosis. ECG demonstrated type II heart block, and echocardiogram revealed findings consistent with valvular injury (Figure). Due to hypoxia and hypercarbia, the patient was placed on a veno-venous extracorporeal membrane oxygenation (ECMO) then transitioned to veno-arterial ECMO for cardiac support. After stabilization, he underwent a mitral valve replacement and commisuroplasty of tricuspid valve on hospital

day 7. Despite a successful operation, the patient suffered an ECMO circuit complication leading to anoxia.
Conclusions: Our case highlights the difficulty in early detection and diagnosis of BCI with imaging findings and treatment algorithm for a rare diagnosis of valve injury following a blunt chest trauma. To date, there is a paucity of reported successful management of valvular injury in the critical care trauma literature.
Acknowledgement: Written consent to publish was obtained from the patient's family.

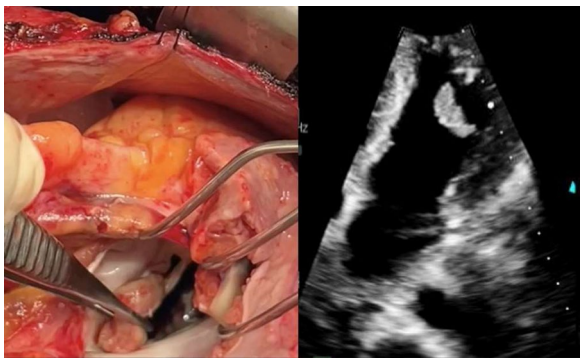

Figure (abstract P153) Concordant ECHO and intra-operative findings

P154
Predictors of mortality for blunt trauma patients in intensive care: a retrospective cohort study
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Critical Care 2025, **29(S1)**:P154

Introduction: Major trauma places substantial demand on critical care services, is a leading cause of death in under 40-year-olds and causes significant morbidity and mortality across all age groups. Various factors influence patient outcome and predefining these could allow prognostication. The aim of this study was to identify predictors of mortality from major trauma in intensive care.
Methods: This was a retrospective study of adult trauma patients admitted to general intensive care between January 2018 and December 2019. We assessed the impact on mortality of patient demographics, patterns of injury, injury scores (Glasgow Coma Score (GCS), Charlson's comorbidity index (CCI), Acute Physiology and Health Evaluation II (APACHE II), Injury Severity Score (ISS) and Probability of Survival Score (Ps19)), number of surgeries and mechanism of injury using logistic regression.
Results: A total of 414 patients were included with a median age of 54 years (IQR 34–72). Overall mortality was 18.6%. The most common mechanism of injury was traffic collision (46%). Non-survivors were older, had higher ISS scores with lower GCS on admission and probability of survival scores. Factors independently predictive of mortality were increasing age (OR 1.06, $p < 0.001$) and GCS < 15 on admission (OR 7.21, $p < 0.001$). Ps19 was the best predictor of mortality ($p < 0.001$ for each score category), with an AUROC of 0.90.
Conclusions: The significant mortality predictors were age, fall from < 2 m, injury of head or limbs, GCS < 15 and Ps19. Contrary to previous studies CCI and APACHE II did not significantly predict mortality. Although Ps19 was found to be the best current prognostic score, trauma prognostication would benefit from a single validated scoring system incorporating both physiological variables and injury patterns.

P155
The mortality predictors and trauma scoring performance in elderly Chinese trauma patients: a retrospective cohort study
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Critical Care 2025, **29(S1)**:P155

Introduction: Elderly trauma patients often have poorer prognoses due to unique pathophysiological characteristics, but research on mortality risk factors and trauma scoring systems for this group in China is lacking. This study evaluates mortality predictors in elderly Chinese trauma patients and the predictive accuracy of existing trauma scoring systems.
Methods: This retrospective cohort study collected records of elderly trauma patients admitted through the emergency department from January to December 2023. Over 30 clinical variables were collected, including physiological characteristics, admission vital signs, trauma scores, and biochemical indicators. Logistic regression assessed associations between variables and mortality, with multivariate modeling for adjustment. The predictive performance of four common trauma scoring systems was compared.
Results: A total of 624 elderly trauma patients were included, with a mortality rate of 6.57%. Key mortality predictors were blood transfusion within 24 h [aOR (95% CI): 4.02 (1.27–12.75)], ICU admission [aOR (95% CI): 13.32 (4.50–39.46)], international normalized ratio (INR) [aOR (95% CI): 13.55 (1.75–104.83)], Glasgow Coma Scale (GCS) [aOR (95% CI): 0.85 (0.75–0.96)], Injury Severity Score (ISS) [aOR (95% CI): 1.07 (1.02–1.13)], Revised Trauma Score (RTS) [aOR (95% CI): 0.59 (0.39–0.88)], Trauma Score and Injury Severity Score (TRISS) [aOR (95% CI): 0.07 (0.01–0.55)], and Geriatric Trauma Outcome Score (GTOS) [aOR (95% CI): 1.03 (1.01–1.05)]. GTOS demonstrated the highest predictive accuracy, with an area under the receiver operating characteristic curve (AUROC) of 88.5%, outperforming TRISS (87.4%), ISS (84.0%), and RTS (83.2%).
Conclusions: In Chinese elderly trauma patients, blood transfusion, ICU admission, and INR were significantly associated with mortality. GTOS showed superior predictive performance among trauma scoring systems. Early identification of these predictors may enhance prognosis in these patients.

P156
Overcoming combined shock—the role of hydrocortisone in adrenal insufficiency following trauma: a case report
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Critical Care 2025, **29(S1)**:P156

Introduction: Combined shock is a critical consideration in the management of complex injuries. Distributive shock, particularly due to adrenal insufficiency, is often overlooked. Misdiagnosing this condition as hemorrhagic shock, the most common cause of shock in trauma, can lead to excessive fluid resuscitation and subsequent complications.
Methods: This case report highlights a patient with severe polytrauma involving multiple organ injuries, including the adrenal gland, and subsequent combined shock.
Results: A 36-year-old male sustained blunt thoracoabdominal injuries following a motor vehicle accident. Abdominal computed tomography showed a grade II pancreatic injury, a grade II splenic injury, a grade IV kidney injury, and a left adrenal gland hematoma. During admission, the patient complained of abdominal pain and generalized guarding. An exploratory laparotomy with splenic vein repair was performed. Patient developed hypotension. Fluid resuscitation was initiated, along with the administration of noradrenaline. The cortisol level was measured, revealing a value of 7.86 µg/dL. Therefore, hydrocortisone was infused, resulting in a gradual reduction of vasopressor support and stabilization of the patient's hemodynamic status.

Conclusions: Severe trauma can result in combined shock. In cases of unilateral adrenal gland injury leading to low cortisol levels, prompt administration of hydrocortisone assists in improving the patient's condition, as demonstrated in this case.
Acknowledgement: Written informed consent for publication was obtained from the patient.

P157

Whispers from the community: differences in primary care utilization before critical illness

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Critical Care 2025, **29(S1)**:P157

Introduction: The early identification of patients at risk of critical illness may allow for preventative intervention [1]. Here we explore whether primary care activity may indicate future risk of critical illness.
Methods: We performed a retrospective observational study using the Secure Anonymised Information Linkage (SAIL) Databank [2–4] which contains linked health data for the population of Wales. For all adults in 2016–2018, we extracted dates where at least one data point (e.g. general practice appointment, prescription, etc.) was recorded in their primary care electronic healthcare record (EHR); these dates are collectively referred to as General Practice Events (GPEs). We compared the total number of GPEs and the median time interval between consecutive GPEs for those admitted to ICU versus the general population. We report the median values and [interquartile ranges (IQR)] for each group.
Results: 1,400,014 patients met study inclusion criteria with 3268 undergoing an emergency ICU admission in the year 2018 (outcome rate of 0.23%). Patients admitted to ICU were older (62 [23] vs 60 [27] years), had more GPEs (128 [165] vs 48 [52]) and a shorter median time interval between GPEs (5 [3] vs 9.5 [11] days). These differences were greater in younger age groups and tended to converge for patients aged over 85 (Figure).
Conclusions: We have shown that patterns of primary care activity are different for 2 years prior to an emergency ICU admission. The trajectory towards critical illness may evolve over a number of years, opening the possibility for very early identification of at-risk individuals.

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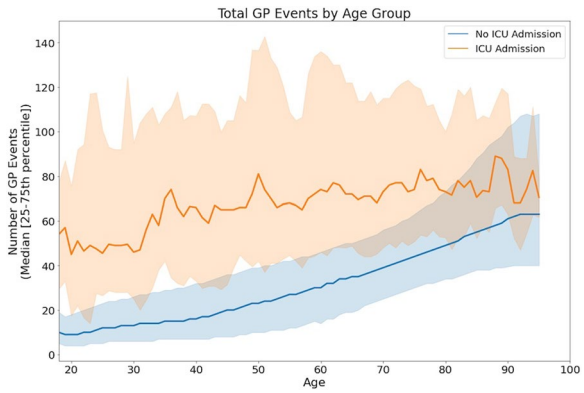

Figure (abstract P157) Total GP events prior to outcome date

P158

Empowering emergency department nurses in early sepsis care

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Critical Care 2025, **29(S1)**:P158

Introduction: Our earlier multisite study identified knowledge and practice gaps among emergency department (ED) nurses in sepsis recognition and management [1]. This study evaluated the impact of a multimodal sepsis program on ED nurses' knowledge, confidence and clinical performance in managing suspected sepsis.
Methods: All ED nurses at a Singapore acute hospital completed a multimodal sepsis training program, including a sepsis practical pocket guide, two 360° simulation videos, and a sepsis serious game developed by the research team. A nurse-driven sepsis screening and management protocol was also implemented. During the study, 83 nurses left the ED and 18 new hires joined. Nurses' sepsis knowledge and confidence were assessed at baseline, post-intervention, and 3-months later. Sepsis process indicators and outcomes were evaluated through retrospective chart reviews of suspected sepsis cases 3 months before (n = 770) and after the intervention (n = 719).
Results: Of 100 participating nurses (response rate: 74%) in the research study, sepsis knowledge and confidence significantly improved at the 3-month follow-up compared to baseline (knowledge: 11.3 ± 2.0 vs 11.9 ± 1.7, $p < 0.05$; confidence: 18.1 ± 3.0 vs 20.2 ± 2.9, $p < 0.001$). Compliance with 3-h sepsis process indicators (blood cultures, serum lactate, IV antibiotics, and fluid administration) remained relatively high (≥ 80%) with no statistically significant changes (Table). Hospital mortality rate decreased from 9.7% to 8.6%, though not statistically significant, and no differences were observed in hospital or ICU length of stay.
Conclusions: Multimodal education effectively sustained improvements in nurses' sepsis knowledge and confidence, with active learning and nurse-driven protocols supporting knowledge retention and clinical application. High pre- and post-intervention compliance with sepsis process indicators suggests strong baseline adherence. Despite reduced nurse staffing, clinical outcomes were maintained.

Reference

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Table (abstract P158) Comparison of sepsis process indicators and outcomes

	Pre-intervention (n = 770)	Post-intervention (n = 719)	*p* value
Take blood culture within 3 h	81.0%	79.4%	0.39
Measure lactate within 3 h	93.4%	93.0%	0.92
Administer IV broad-spectrum Abx within 3 h	88.7%	87.4%	0.29
Administer IV fluids within 3 h	89.5%	87.9%	0.07
Hospital Length of stay, day	7.0 [4.0–14.0]	7.0 [4.0–11.0]	0.72
ICU length of stay, days	2.0 [1.8–4.0]	2.0 [2.0–4.0]	0.16
In-hospital mortality rate	68 (9.7%)	57 (8.6%)	0.97

P159

Evaluation of low urgency patients according to Australasian Triage Scale management from triage-fast track care area compared to the main emergency department. A retrospective study

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Critical Care 2025, **29(S1)**:P159

Introduction: Emergency department (ED) overcrowding is a major public health problem worldwide. Fast track (FT) areas decrease overcrowding, improve length of stay (LOS), and achieve effective resource allocation for low-acuity patients. This study investigated the feasibility and efficiency of managing low-urgency patients (category 5) per Australasian classification (ATS) in the Triage-FT area compared to the main ED. We aimed to assess the reduction of waiting times and resource utilization while ensuring comparable hospitalization and readmission rates.
Methods: This retrospective study included 91 patients (Triage group 57; ED group 34). Patient metrics, including LOS, waiting times, resource utilization, hospitalization rates, and readmission rates, were statistically analyzed. Time-to-intervention analysis was also conducted.
Results: The Triage group performed significantly better, improving median LOS (101.0 min; IQR: 59.0–136.5) compared to the ED group (189.0 min; IQR: 145.0–238.0; $p < 0.001$), waiting time for admission to ED (FT median: 5.0 min; IQR: 3.5–15.0, ED median: 31.0 min; IQR: 18.0–49.0; $p < 0.001$) and resource utilization (FT median: 2.0; IQR: 1.0–3.0, ED median: 3.5; IQR: 3.0–4.0; $p < 0.001$) (Table). Hospitalization (Triage: 3.51%, ED: 5.88%; $p = 0.628$) and readmission rates (Triage: 3.58%, ED: 29.41%; $p = 0.630$) were similar between groups, suggesting no additional risks associated with triage-based management. Among patients requiring intervention, the time to intervention was shorter in the Triage group (median: 7.0 min; IQR: 6.0–13.0) compared to the ED group (median: 30.0 min; IQR: 20.0–54.0), but not statistically significant ($p = 0.067$).
Conclusions: Fast track care-based management of patients with low-urgency conditions can significantly improve efficiency in emergency care by reducing waiting times and resource usage while ensuring comparable clinical outcomes. These findings advocate for broader adoption of such protocols.

Table (abstract P159) Comparison of parameters between triage and ED groups

Parameter	Triage (n = 57)	ED (n = 34)	*p* value
Length of Stay (min)	Median (IQR): 101.0 (59.0–136.5)	Median (IQR): 189.0 (145.0–238.0)	< 0.001
Waiting time for admission to ED (min)	Median (IQR): 5.0 (3.5–15.0)	Median (IQR): 31.0 (18.0–49.0)	1.06 × 10–9
Hospitalization (n, %)	2 (3.51%)	2 (5.88%)	0.628
Readmission within 1 month (n, %)	14 (3.58%)	10 (29.41%)	0.630
Resource utilization	Median (IQR): 2.0 (1.0–3.0)	Median (IQR): 3.5 (3.0–4.0)	< 0.001
Required intervention (n, %)	3 (5.26%)	7 (20.59%)	0.036
Time to intervention (min)	Median (IQR): 7.0 (6.0–13.0)	Median (IQR): 30.0 (20.0–54.0)	0.067

P160

Qualitative evaluation of emergency nurse´s endotracheal suctioning in simulation

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Critical Care 2025, **29(S1)**:P160

Introduction: Endotracheal suctioning (ETS) is one of the most common procedures performed by nurses, but the application of improper techniques can result in significant complications. Previous studies have reported low adherence to ETS guidelines among nurses, and it is anticipated that this will be similarly low in the emergency department (ED) due to overcrowding and urgent situations. This study aimed to observe ED nurses' suctioning practices, identify factors that impede adherence to guidelines, and propose specific strategies to improve guideline compliance.
Methods: We observed ED nurses conducting ETS in a simulated setting and evaluated their adherence to ETS guidelines. Afterwards, we interviewed all participants.
Results: A total of 19 ED nurses participated in the simulation and interview. Most participants did not adhere to the recommended standards of hand hygiene and contaminated the catheter during handling. Furthermore, they used catheters that were larger than the recommended size and inserted them at a depth that exceeded the recommended insertion depth. Many participants applied a suction pressure that was higher than the recommended level and indicated that the recommended pressure was insufficient to effectively remove secretions. According to the interview, participants proposed that tailored education, with a rationale for each item in the guidelines, should be provided on a regular basis to enhance adherence.
Conclusions: This study revealed that ED nurses demonstrated poor compliance with ETS guidelines, particularly regarding catheter size, aseptic technique, and suction pressure. Accordingly, there is a clear need to reinforce training on these specific topics. This study is of value not only because it replicates findings from previous studies but also because the interviews identified the specific reasons why ED nurses do not adhere to ETS guidelines.

P161

Patients with rare diseases in the emergency department: a patient perspective from a cross-sectional survey

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Critical Care 2025, **29(S1)**:P161

Introduction: In the European Union, 36 million patients are affected by rare diseases (RDs) [1], with a disease being defined as rare if no more than 5 in 10,000 people are affected [2]. Patients with RDs can present (as potentially critically ill patients) to the emergency department (ED); however, specific emergency care characteristics are lacking. This study aimed to characterise rare but treatable diseases in the ED and increase the awareness of RDs in the emergency care context.
Methods: A descriptive cross-sectional survey was conducted. Patients (> = 16 years, German-speaking) with an RD of a predefined set were asked via patient advocacy groups and outpatient clinics to fill out a 30–40 min questionnaire. The considered set of RD combined rare but treatable diseases that can be seen and diagnosed in the ED in adolescents and adults with existing diagnostic and treatment options available and the need for timely diagnosis to prevent deterioration, further complications or fatal outcomes.
Results: A total of 151 questionnaires were analyzed. The median age at symptom onset was 23.0 years (IQR 22.0), median diagnostic delay 2.8 years (IQR 14.8). Of the participants, 77.5% had sought treatment at an ED because of their RD, 59.6% visited an ED before diagnosis with symptoms related to their subsequently diagnosed RD and 31.1% visited more than once. Potential red flags indicating an underlying RD in the ED were recurrent ED visits, multiple organ systems affected,

positive family history, appointable trigger factors and avoidance of activities.
Conclusions: Our findings indicate that RDs are frequently overlooked in the ED. Emergency physicians need to be aware of rare but treatable diseases in patients presenting to the ED. When common diagnoses are excluded, the consideration of a rare differential diagnosis is crucial, especially in critically ill patients.

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P162

No idea: improving the recognition, investigation and management of nitrous oxide toxicity in the emergency department—a quality improvement project

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Critical Care 2025, **29(S1)**:P162

Introduction: Nitrous oxide (N_2O) is the second most misused illicit drug in the UK [1], yet knowledge of toxicity related to this drug is low. The Royal College of Emergency Medicine (RCEM) produced Best Practice Guidelines in 2023 [2] for this presentation. A Quality Improvement Project was designed to improve the adherence to these guidelines in a district general hospital ED in the UK.
Methods: An order set on the electronic patient record was created. This ordered the correct investigations, initial management, and referral to relevant teams. Teaching sessions were delivered to doctors working in ED to improve knowledge of N_2O toxicity, and to promote use of the order set. A data set of patients who presented to ED between April '23–October '24 was created. Patients where N_2O toxicity was deemed to be a reasonable differential were included. Adherence to the Best Practice Guidelines was audited pre- and post-intervention. A survey was sent to doctors working in ED to assess confidence in managing N_2O toxicity using a 1–5 Linkert scale.
Results: After teaching, confidence in investigating and managing N_2O toxicity increased. The likelihood of doctors including N2O toxicity in differential diagnoses of patients with neurological symptoms without obvious cause increased. There was an increase in compliance to RCEM Best Practice guidelines across all recommendations (Figure). Correct investigations were sent for 50.0% of patients, and 33.3% had correct treatment started prior to return of (increasing from 28.6% and 4.8%, respectively).
Conclusions: Clinician confidence in managing N_2O toxicity improves with teaching sessions. A comprehensive order set that addresses all RCEM Best Practice recommendation improves adherence. However, further work is needed to improve this as average compliance remains low (52%).

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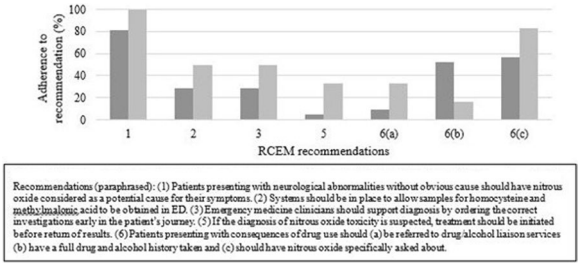

Figure (abstract P162) Percentage adherence to RCEM recommendations pre-intervention (dark gray) and post-intervention (light gray)

P163

Violence against healthcare workers as depicted in medical TV-series

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Critical Care 2025, **29(S1)**:P163

Introduction: Violence against healthcare professionals (HCP) is a significant challenge, with many experiencing physical, verbal, psychological, or sexual aggression. Despite its prevalence, societal awareness remains limited. Medical TV series, offer a lens to examine public perceptions of violence in HCP.
Methods: This study analyzes 1,198 episodes from medical TV series (Grey's Anatomy, ER, House M.D., Chicago Hope, and The Good Doctor) using a standardized questionnaire. Data collection used streaming platforms and DVD`s. The analysis examines types, frequency, and contexts of violence, profiling perpetrators and victims while considering gender, motives, and pre-existing conditions. Both qualitative and quantitative methods were applied, with inclusion and exclusion criteria outlined in a structured flowchart.
Results: So far, 94 episodes have been analyzed. In 46.2% of cases, violence originated from staff, while 53.8% was perpetrated by patients or relatives. Male perpetrators (92.3%) dominated, 69.2% of whom were White. Medical or psychological conditions influenced 30.8% of perpetrators. Staff comprised 84.6% of victims, 53.8% of whom were male. Support came from HCP or police. Violence often occurred on general wards (46.2%) and in ERs (30.8%). Verbal aggression (46.2%) was most common, followed by physical (38.5%), psychological (38.5%), and sexual violence (15.4%). Notably, 76.9% of cases lacked preventive strategies or post-incident discussions, and in 92.3% of cases, perpetrators faced no consequences.
Conclusions: Findings suggest medical TV series romanticize violence, emphasizing dramatic scenarios while overlooking the everyday aggression HCP face, such as incidents in emergency department waiting areas. This portrayal misrepresents the challenges HCP encounter. Comparing these depictions with real-world data reveals discrepancies and highlights the socio-cultural impact of entertainment media on public understanding of violence in healthcare.

P164

Role of right ventricular dysfunction and embolic burden assessment via pulmonary angioCT scan in risk stratification for adverse events at 72 h in pulmonary embolism in the emergency department

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Critical Care 2025, **29(S1)**:P164

Introduction: Risk stratification in pulmonary embolism (PE) mainly relies on ESC guidelines [1] based on hemodynamic state, right ventricular (RV) dysfunction assessment on transthoracic echocardiography (TEE) or CT scan, PESI score and troponin measurement. However RV function is rarely assessed on CT scan reports in daily practice. Aim of the study is to determine the role of RV dysfunction assessment and embolic burden (EB), via pulmonary angioCT scan (CTPA), in predicting adverse events within 72 h (AE72h).
Methods: We conducted a single-center, retrospective, observational study including patients diagnosed with PE in our emergency department (ED) in 2022 and 2023. RV dysfunction and EB were retrospectively assessed by dedicated radiologists. RV dysfunction was quantified by RV and right atrium (RA) diameter, volume values and their ratio, presence of right chambers thrombus and inferior cava vein reflux. EB was categorized in massive or not. Data regarding AE72h were collected. They were defined as: upgrade in oxygen supplement, need for inotropes, transfer to ICU, embolectomy, thrombolysis, death.
Results: Hundred-twelve patients were included, 19 (16.9%) experienced AE72h. RV dysfunction was more frequently detected with CTPA (97, 86.6%) than with TEE (33, 29.4%), but neither of them was significantly associated with increased rate of AE72h ($p=0.120$ and $p=0.268$), while EB was ($p=0.003$). Troponin (hs-cTn), creatinine and positivity for HESTIA criteria were significantly associated with a worse outcome ($p=0.016$, $p=0.022$ and $p=0.017$), but in a bivariate logistic regression analysis only EB remained significant (OR 5.11, IC 95%, 1.65–15.81, $p=0.005$).
Conclusions: EB assessed via CTPA, but not RV dysfunction, is associated with increased rate of AE72 h and should guide risk stratification and early management of PE, together with hs-cTn, creatinine and HESTIA criteria.

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P165

Intra-hospital transport of critically ill patients with a specialized transport team: adverse events and risk factors

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Critical Care 2025, **29(S1)**:P165

Introduction: Intra-hospital transport (IHT) of critically ill patients is often required for diagnostic or therapeutic procedures. However, adverse events (AEs) during transport are common and can lead to significant complications [1]. Therefore, assessing the benefit-risk balance of IHT and identifying risk factors is essential for patient safety [2]. This study aimed to describe the incidence of AEs during IHT of critically ill patients and determine the associated risk factors.
Methods: This retrospective cohort study analyzed data from January to June 2023, focusing on all cases of IHT for diagnostic and therapeutic purposes at a large hospital with eight adult intensive care units. Data collected included patient demographics, clinical characteristics, and transport-related factors. AEs and associated factors were evaluated. Statistical analysis included the χ2 -test or Fisher's exact test, Mann -Whitney U test, and logistic regression.
Results: A total of 2,723 IHTs involving 944 patients were performed by a specialized transport team during the study period. The majority of AEs during IHT involved hemodynamic instability (3.4%), psychomotor agitation (2.3%), and respiratory insufficiency (1.8%). Significant risk factors for AEs included MRI at the transport destination, presence of pacemaker or implantable cardiac defibrillator, use of catecholamines, high-risk group (needed physician escort), and longer transport time (Table). Clinical conditions remained unchanged in 99.5% of patients compared with baseline. Importantly, no serious injury or death occurred during or after IHT with the specialized transport team.
Conclusions: IHT of critically illness patients was associated with AEs, and several risk factors for AEs were identified. Use of a specialized transport team may help mitigate risk and reduce the incidence of AEs during IHT.

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Table (abstract P165) Risk factors for transport-related adverse events during Intra-hospital transport

Variables	OR	95% CI	*p*
Destination of IHT (MRI)	1.907	1.092–3.331	0.023
Ambu-bagging	0.684	0.463–1.012	0.057
Pacemaker / ICD	2.173	1.092–4.326	0.027
Use of catecholamines	1.598	1.145–2.230	0.006
High-risk group (needed physician escort)	2.362	1.489–3.747	< 0.001
Transport time (minutes)	1.026	1.018–1.033	< 0.001

P166

Diastolic shock index as a predictor of outcomes in severe burn patients: a 12-year single-center retrospective study

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Critical Care 2025, **29(S1)**:P166

Introduction: Systemic inflammatory response syndrome (SIRS) is a life-threatening condition in burn patients. Early identification and resuscitation are crucial processes in the management of burn patients involving 20% or more of total body surface area (TBSA). Diastolic Shock Index (DSI), defined as the ratio of heart rate to diastolic blood pressure, has a significant predictive value for mortality in various conditions involving SIRS. However, its role in severe burn patients remains underexplored.
Methods: We conducted a retrospective analysis of severe burn patients admitted to the burn intensive care unit (ICU) from November 2012 to August 2024. DSI was calculated at baseline and at 24, 48, and 72 h after admission. Patients were categorized based on the DSI at 24 h after admission: DSI < 2 and DSI ≥ 2. The primary outcome was 28-day mortality. Secondary outcomes included ICU and hospital length of stay, organ support, and complications during hospitalization, such as ARDS and infections. Multivariable logistic regression was performed to identify independent predictors of 28-day mortality. The results were reported as odds ratio (OR) with 95% confidence interval (CI).

Results: A total of 131 patients were included, 108 patients with DSI < 2 and 23 patients with DSI ≥ 2. The median TBSA of burns involved was 40%. Mortality at 28 days (9.3% vs 34.8%, $p = 0.004$) and 90 days (14.8% vs 52.2%, $p < 0.001$) were significantly higher in patients with DSI ≥ 2 compared to those with DSI < 2. From the multivariable logistic regression model, DSI ≥ 2 at 24 h after admission was independently associated with 28-day mortality (OR 5.79; 95% CI, 1.20–27.97; $p = 0.029$) and 90-day mortality (OR 7.67; 95% CI, 1.46–40.29; $p = 0.016$). Patients with DSI ≥ 2 had longer duration of mechanical ventilation and higher infections.
Conclusions: DSI of 2 or higher at 24 h after admission is an independent predictor of 28-day mortality in patients with severe burns. DSI may be useful in identifying high-risk patients.

P167

Redefinition of myocardial infarction after cardiac surgery: clinical feasibility of the European Association for Cardio-Thoracic Surgery algorithm for the diagnosis of perioperative myocardial injury and infarction

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Critical Care 2025, **29(S1)**:P167

Introduction: This study investigated the impact of the newly proposed European Association for Cardio-thoracic surgery (EACTS) algorithm for diagnosis of perioperative myocardial injury (PMI) and infarction (MI).
Methods: This is a prospective multicenter cohort study in adult patients undergoing cardiac surgery. High sensitivity troponin T was measured before induction of anesthesia, at the end of surgery and on the first, second and third postoperative morning. Postoperative ECGs to detect new myocardial ischemia were made per protocol and on indication. PMI or MI were diagnosed with the EACTS algorithm and the Fourth Universal Definition of Myocardial Infarction (4UD). One-year mortality relative risks (RR) were calculated for perioperative biomarker elevation (PBE), PMI and MI versus no myocardial injury.
Results: 1,155 patients were included for analysis. Median age was 66 [IQR 60–71] and 79.9% was male. Median EuroSCORE II was 6.2% [IQR 4.0%–10.4%]. Surgery types were coronary artery bypass grafting (CABG) (53.0%), CABG with aortic valve replacement (10.2%), single valve procedures (24.4%) and other procedures (12.4%). The EACTS algorithm classified 2.5% (n = 29) of patients as MI (versus 2.7%, n = 31 in 4UD), 29.7% (n = 342) of patients as PMI (versus 84.4%, n = 975 in 4UD), 30.3% (n = 350) as no myocardial injury (versus 12.9%, n = 149 in 4UD) and 37.4% (n = 432) to the newly defined PBE group (Figure). One-year mortality incidences for EACTS were 0.8% for no myocardial injury, 1.9% for PBE, 4.0% for PMI and 12.0% for MI. For 4UD incidences were 0.9% for no myocardial injury, 2.3% for PMI and 15.4% for MI. Crude RR for one-year mortality for EACTS was 2.6 (95% CI 0.6–10.9) for perioperative biomarker elevation, 5.3 (95% CI 1.3–20.9) for PMI and 16.0 (95% CI 3.3–76.2) for MI and for 4UD 2.6 (95% CI 0.5–15.3) for PMI and 17.2 (95% CI 2.7–111.5) for MI.
Conclusions: The EACTS algorithm led to a slightly decreased MI incidence and a significant reduction of PMI diagnosis.

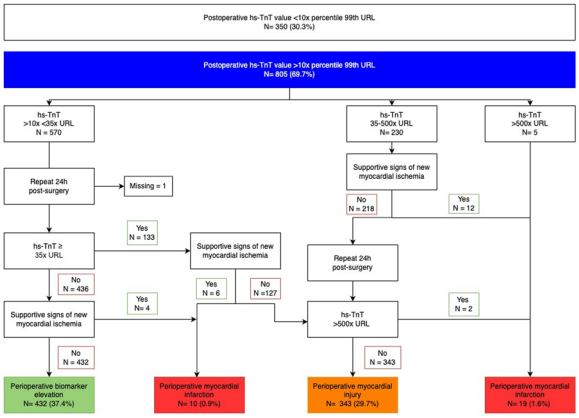

Figure (abstract P167) Diagnosis of myocardial injury and infarction in patients after cardiac surgery using the EACTS algorithm

P168

Machine learning-based identification of stress cardiomyopathy using 12-lead electrocardiograms

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Introduction: Stress cardiomyopathy (SCM) is an acute cardiac condition triggered by physical or psychological stress [1]. SCM closely resembles acute myocardial infarction (AMI) in presentation, leading to frequent misdiagnoses [2]. This study aims to distinguish SCM from non-SCM and AMI by using 12-lead ECG waveforms and electronic health record (EHR) data, making it the first study to leverage raw ECG waveforms in SCM identification.
Methods: Within the MIMIC-IV dataset, 352 SCM and 71,817 non-SCM patients with ECG data and discharge notes were identified. The non-SCM group included 4,597 AMI and 70,129 non-AMI patients. Two binary classification tasks were conducted: (1) SCM vs. Non-SCM and (2) SCM vs. AMI. For each task, two models were developed: an ECG-only model using raw waveforms and a fusion model combining ECG waveforms with clinical features such as age, gender, lab measurements, medical history, comorbidities, and ECG machine measurements.
Results: Despite severe class imbalances, the models achieved AUPRCs of 0.21 (SCM vs. Non-SCM) and 0.31 (SCM vs. AMI), outperforming baseline AUPRCs of 0.005 and 0.07, respectively (Table). Fusion models outperformed ECG-only models, highlighting the importance of integrating clinical features. SHAP (SHapley Additive exPlanations) analysis on clinical features showed that female gender, comorbidity of congestive heart failure, and ECG machine measurements were the most influential features, which aligns with previously known clinical risk factors of SCM. The Gradient-Weighted Class Activation Mapping (Grad-CAM) heatmap allowed for the identification of ECG segments relevant to the classification decision.
Conclusions: ECG waveforms, when combined with clinical features, can significantly aid in detecting SCM. Implementing this model in clinical settings can streamline SCM screening, especially in low-resource environments where advanced diagnostics are not available.

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Table (abstract P168) Model performance. Task 1 indicates SCM vs. non-SCM while Task 2 indicates SCM vs. AMI

Metric	Task 1, ECG-only model	Task 1, Fusion model	Task 2, ECG-only model	Task 2, Fusion model
Baseline AUPRC	0.005	0.005	0.07	0.07
AUPRC	0.08	0.21	0.19	0.31
AUROC	0.83	0.88	0.65	0.74
Sensitivity	0.20	0.33	0.31	0.42
Precision	0.14	0.28	0.18	0.25

P169

Improving resuscitation outcomes with mechanical cardio-pulmonary ventilation compared to standard bag-valve ventilation: a retrospective study

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Critical Care 2025, **29(S1)**:P169

Introduction: This study hypothesizes that the implementation of mechanical cardiopulmonary ventilation (CPV) will result in a higher rate of ROSC compared to manual bag ventilation (MBV). Initiating high-quality CPR is critical [1]. Evidence indicates that passive ventilation alone is insufficient for gas exchange during CPR [2]. A multicentric study showed an increase in ROSC with the use of CPV [3] but was biased by an uneven distribution of CPV throughout centers, we aimed to assess outcomes, within a single center, thereby mitigating the center effect.
Methods: A retrospective analysis was performed on all OHCA managed by the EMS of CHU Saint-Pierre from January 2017 to June 2024. Data were sourced, focusing on the epidemiological data, interventions, and outcomes. We excluded minors, pregnant women, and patients with a traumatic arrest. CPV provides an automated pressure-controlled ventilation with default settings that align with guideline recommendations, requiring no specific human intervention [1]. This study was approved by the Saint-Pierre Ethical Committee (CE/24–11-12). To account for potential confounding variables, regression models were adjusted for age, sex, initial rhythm, no-flow time, low-flow time and ranking score. Adjusted odds ratio and 95% confidence intervals are reported for each variable.
Results: A total of 678 patients were included in the analysis, with 366 patients receiving mechanical CPV ventilation. Multivariate analysis adjusted for known confounders and center-specific characteristics showed that the use of CPV during CPR was associated with increased rate of ROSC, with an aOR of 2.21 (Table).
Conclusions: This study demonstrates that the use of a CPV system is associated with higher rates of ROSC compared to MBV. However, further research is required to better understand the underlying mechanisms contributing to the increased ROSC rates.

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Table (abstract P169) Unadjusted and adjusted analysis of factors associated with ROSC

	ROSC	No ROSC		
No. of observations	275	403	adjusted odds ratio	95% CI and p value
CPV mech ventilation, No. (%)	175 (57.1)	209 (51.9)	2.21	1.35–3.65; 0.002
Age, median (IQR), y	65 (54–77)	68 (55–78)	0.98	0.96–1; < 0.001
Initial rhythm, No. (%)	81 (29.5)	45 (11.2)	1.89	0.99–3.6; 0.055
No flow median (IQR), min	5 (1–9.5)	8 (2–14)	0.93	0.90–0.96; < 0.001
Low flow median (IQR), min	17 (12–24)	30 (23–38)	0.90	0.87–0.92; < 0.001
Rankin Score before arrest, median (IQR)	1(0–2)	1 (0–3)	0.81	0.68–0.99; < 0.001

Abbreviations: AED, Automated external defibrillator, CPR, Cardiopulmonary resuscitation, CPV®, Cardio-pulmonary ventilation, IQR, Interquartile range, ROSC, Return of spontaneous circulation

P170

Relationship between serum sodium concentration trajectories and neurological outcomes in patients with out-of-hospital cardiac arrest resuscitated by ECMO; a secondary analysis of the SAVE-J II study

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Critical Care 2025, **29(S1)**:P170

Introduction: In out-of-hospital cardiac arrest (OHCA), cerebral edema is a potential treatment target. Reperfusion after return of spontaneous circulation (ROSC) may disrupt the blood–brain barrier (BBB), causing vasogenic edema. The impact of serum osmolality on cerebral edema before and after BBB disruption is unclear. This study examines the relationship between acute-phase serum sodium changes and neurological outcomes in extracorporeal cardiopulmonary resuscitation (ECPR)-treated OHCA patients.
Methods: This secondary analysis of the SAVE-J II registry included ECPR-treated OHCA patients in Japan admitted between 1 January 2013 and 31 December 2018. Favorable neurological outcome was defined as a cerebral performance category (CPC) score of 1 or 2 at 30 days. Exclusion criteria included in-hospital cardiac arrest, ROSC at ECMO initiation, unknown outcomes, do-not-attempt-resuscitation (DNAR) orders, death within ICU day 4, or missing sodium data. Serum sodium levels up to ICU day 4 were analyzed using linear regression to calculate slopes and means, followed by K-means++ clustering into four groups. Multivariate logistic regression was used to assess neurological outcomes.
Results: Among 2,157 patients, 400 were analyzed, divided into corrected-hyponatremia (n = 91), normal-range (n = 156), overcorrected (n = 48), and high-trend (n = 105) groups. Adjusted odds ratios (OR) for good outcomes in the normal-range (0.89 [95% CI 0.50–1.58], $p = 0.69$), overcorrected (0.64 [95% CI 0.29–1.41], $p = 0.27$), and high-trend (1.13 [95% CI 0.62–2.08], $p = 0.69$) groups showed no significant association compared to the corrected-hyponatremia group. Independent factors for good neurological outcomes included age (OR 0.97 [95% CI

0.96–0.99]), male (OR 0.42 [95% CI 0.23–0.75]), bystander CPR (OR 0.51 [95% CI 0.32–0.83]), and transient ROSC (OR 0.53 [95% CI 0.28–0.98]).
Conclusions: Serum sodium trajectories within 4 days of ECMO initiation were not associated with neurological outcomes at 30 days in ECPR-treated OHCA patients.

P171

Association between hospital case volume and outcomes in out-of-hospital cardiac arrest: a multilevel analysis using Japanese registry data

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Critical Care 2025, **29(S1)**:P171

Introduction: While previous studies have examined the volume-outcome relationship in out-of-hospital cardiac arrest (OHCA) using categorical classifications [1,2], the continuous relationship between case volume and outcomes remains unclear.
Methods: We conducted a retrospective analysis using the OHCA registry in Japan from June 2014 to December 2021. Adult patients (≥ 18 years) with non-traumatic OHCA were included. The exposure variable was annual hospital case volume of OHCA patients, analyzed as a continuous variable. The primary outcome was 30-day favorable neurological outcome, defined as Cerebral Performance Category (CPC) 1 or 2. The secondary outcome was 30-day survival. We employed multilevel generalized additive models with hospital-level random effects, adjusting for potential confounding factors. Spline curves were generated to visualize the relationship between case volume and outcomes. Subgroup analyses were performed based on initial rhythm (shockable vs. non-shockable) and registration years (2014–2017 vs. 2018–2021).
Results: Among 66,768 patients included in the analysis, the median age was 76 years, 60.1% were male, and 9.0% had initial shockable rhythm. Favorable neurological outcome was achieved in 2.9% of cases, and the overall 30-day survival rate was 6.0%. Both multilevel generalized additive models and spline curve analysis showed no significant association between hospital case volume and 30-day favorable neurological outcome ($p = 0.06$) or 30-day survival ($p = 0.29$) (Figure). The relationship remained consistent across subgroup analyses.
Conclusions: We found no significant continuous relationship between hospital case volume and patient outcomes in OHCA. These findings suggest that the improved quality of resuscitation care in the Japanese emergency medical system may have reduced the impact of case volume on OHCA patient outcomes.

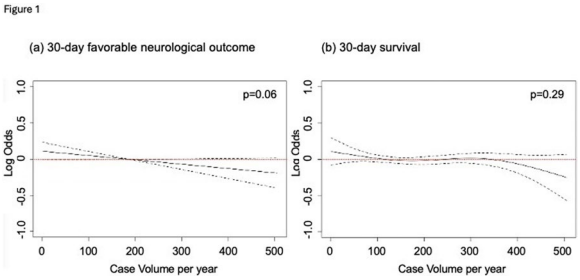

Figure (abstract P171) Spline curves to visualize the relationship between case volume and outcomes. (a) The 30-day favorable neurological outcome (b) The 30-day survival

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P172

Cold choices after resuscitation. Temperature strategies after cardiac arrest, impact on survival and support

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Critical Care 2025, **29(S1)**:P172

Introduction: In the Netherlands circa 300 out of hospital cardiac arrest (OHCA) cases occur each week. Targeted temperature management (TTM) is a commonly used therapeutic approach for postresuscitation patients, where body temperature (temp.) is regulated to minimize further damage. Clinical studies such as the TTM1 [1], HYPERION [2], TTM2 [3] have explored the effectiveness of different temp. targets, with mixed results, highlighting the need for personalized treatment. This study evaluated the outcomes of postresuscitation patients assigned to different target temp. groups.
Methods: This retrospective before-after single-center study was conducted in a Dutch teaching hospital. Postresuscitation adult patients were included. Prior to Dec 2019 patients with a target temp. between 33 and 34 °C with adjustments made for hemodynamic instability, severe brady/tachy arrhythmia and/or difficult to treat hypotension. From Jan 2020 onwards patients were cooled to 36 °C. The primary outcome was ICU mortality, secondary outcomes were in hospital, 30/90 days mortality, hemodynamic support, differences in lactate or pH.
Results: A total of 164 patients were included. A higher mortality rate was observed in the 33 °C group of 61% of 28 patients, as compared to a mortality rate of 39% of 59 patients in the 36 °C group with no significance. No significant differences were found in lactate or pH levels and ICU- or hospital length of stay. In hemodynamic support the 33 °C-switch group received significant lower doses of dobutamine. Other vasopressors were not significantly different. In the 33 °C-switch group 62% of 77 patients underwent temp. adjustment because of hypotension or bradycardia.
Conclusions: In conclusion, this study found no significant differences in mortality. Between the cooling protocols investigated, despite some variation in secondary outcomes, only doses of dobutamine has significance.

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P173

Absence of return of spontaneous circulation prior to emergency department admission predicts mortality in ≥ 80 years OHCA patients: a multicenter retrospective analysis

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Critical Care 2025, **29(S1)**:P173

Introduction: Survival following out-of-hospital cardiac arrest (OHCA) in patients aged ≥ 80 years remains exceedingly poor, with a rising incidence anticipated due to Europe's aging population. This study investigates survival and neurological outcomes based on the presence of return of spontaneous circulation (ROSC) at emergency department (ED) arrival, aiming to guide decisions on the appropriateness of further medical intervention, such as an intensive care admission.
Methods: A retrospective cohort analysis was conducted on 177 patients aged ≥ 80 years presenting with OHCA to Catharina Hospital (2015–2024) and Anna Hospital (2018–2024). Data on demographics, resuscitation parameters, survival rates, and neurological outcomes, measured using the Cerebral Performance Category (CPC) scale, were analyzed using Chi-square and Mann–Whitney U tests.
Results: Survival was exclusively observed in patients achieving ROSC at ED arrival. None of the 44 patients without ROSC at ED admission survived. Median resuscitation time was longer in non-ROSC patients (48 min; IQR: 25) compared to ROSC patients (15 min; IQR: 17). Shockable rhythms were more prevalent among ROSC patients (50.4% vs. 31.8%). In the ROSC cohort, survival rates were 32% at discharge, 26% at six months with 80% (27 of 34) achieving a CPC score of ≤ 2, and 25% at 12 months. Of those discharged, 47.6% returned home without additional care.
Conclusions: This multicenter Dutch study emphasizes the absence of ROSC at ED arrival as a predictor of zero survival in OHCA patients aged 80 or older. These poor outcomes align with existing literature and suggest that continued treatment in non-ROSC cases may not be justified. Revising hospital referral criteria and ED care protocols for this population could optimize medical resource utilization and minimize futile interventions, while ensuring a focus on patient-centered care.

P174

Prognostic factors for out-of-hospital cardiac arrest patients with prolonged low-flow time undergoing extracorporeal cardiopulmonary resuscitation

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Critical Care 2025, **29(S1)**:P174

Introduction: This study aimed to examine factors associated with favourable neurological outcomes in out-of-hospital cardiac arrest (OHCA)patients with low-flow time (LFT) exceeding 60 min following extracorporeal cardiopulmonary resuscitation (ECPR).
Methods: This was a secondary analysis of the SAVE-J II study, a retrospective, multicenter, registry study involving 36 participating institutions in Japan. OHCA patients ≥ 18 years old who underwent ECPR in Japan between January, 2013 and December, 2018 were registered. This study selected the non-hypothermic patients with LFT ≥ 60 min. The primary outcome was a favourable neurological outcome (cerebral performance categories 1–2). Multivariable logistic regression analyses were performed to assess the factors associated with a favourable neurological outcome.
Results: In total, 708 patients met the inclusion criteria, with favourable neurological outcomes at hospital discharge in 71 cases (10.0%). Age, shockable rhythm on hospital arrival, signs of life (SOL) on hospital arrival, and transient return of spontaneous circulation(ROSC) were significantly associated with a favourable neurological outcome.
Conclusions: Approximately 10% of OHCA patients who underwent ECPR with LFT ≥ 60 min had favourable neurological outcomes. ECPR for non-hypothermic OHCA patients might be considered even with prolonged LFT based on age, shockable rhythm on hospital arrival, SOLs on hospital arrival, and presence of transient ROSC before ECMO initiation.

P175

Outcomes of ECPR two years after program initiation: a retrospective analysis of 24 patients

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Critical Care 2025, **29(S1)**:P175

Introduction: Mortality rates following cardiac arrest remain high. Extracorporeal cardiopulmonary resuscitation (ECPR) aims to provide circulatory support to patients who suffer a cardiac arrest and do not respond to conventional resuscitation. Objectives: To evaluate the outcomes of our ECPR program 2 years after its implementation. To identify factors related to survival.
Methods: Retrospective cohort study. Inclusion criteria: patients undergoing ECPR (2023–2024). Statistical analysis: Descriptive: percentages (95% CI). Quantitative: mean (SD) or median (IQR). Normality distribution was analyzed by Shapiro–Wilk test. Univariate analysis: Chi-Squared or F-Fisher test (qualitative variables); Student's T or Kruskal Wallis (quantitative variables).
Results: N = 24. Male 83.3% (95% CI 68.4–98.2). Mean age 51.3 (SD 11.6). Comorbidities: 50% none, 33% cardiopathy. Days of ICU stay 3 (IQR 8).
Descriptive analysis: Cardiac arrest (CA): heart attack 41.6%. OHCA: 58.3%. Initial rhythm: PEA 50%; VF/VT 33%; asystole 16,7%. Low-flow time: 53 min (IQR 26). Reperfusion within 4 h: 58.3%. Cerebral Performance Category (CPC): full recovery or mild disability (CPC 1): 6/24 (25%); severe disability (CPC 3): 1/24 (4.2%); coma (CPC 4): 1/24 (4.2%), who was a multiorgan donor, and death (CPC 5): 16/24 (66.6%). ICU survival: 29.2% (7/24). Main causes of death: multiorgan failure 35.2% and hemorrhage 35.2%.
Bivariate analysis Alive vs Dead: Heart attack 42.8% vs 41.2% pulmonary embolism 28.6% vs 23.5% and arrhythmia 11.7 vs 0 ($p = 0.9$). IHCA 57.1% vs 35.3% and OHCA 42.9% vs 64.7%, $p = 0.3$. VF/VT 42.9% vs 29.4%, PEA 51.7% vs 47.1% and asystole 0 vs 23.5%, $p = 0.6$. Low flow time < 40 min 57.1% vs 11.8%, $p = 0.03$ and reperfusion < 4 h 86.7% vs 47.1%, $p = 0.04$.
Conclusions: ICU survival was 29.2%, most of them with full recovery or mild disability (CPC 1). The only patient who remained in a coma become a multiorgan donor (5 organs donated). Patients with low-flow time < 40 min and reperfusion within 4 h had significantly better outcome.

P176

Life satisfaction and return to work after extracorporeal cardiopulmonary resuscitation (ECPR)

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Critical Care 2025, **29(S1)**:P176

Introduction: While ECPR can save lives, there is very limited data on the long-term outcomes related to survivors´ satisfaction with their saved lives. We assessed life satisfaction and return to work after ECPR as primary outcomes, along with quality of life, anxiety, depression, fatigue and cognitive function.

Methods: Survivors ≥ 1 year after ECPR treatment at Sahlgrenska University Hospital (2010–21) were evaluated through interviews and questionnaires. A visual analog scale (VAS), from 1 to 10, assessed life satisfaction. Functional outcomes were assessed by the Modified Rankin Scale (mRS), cognitive function by the Montreal Cognitive Assessment (MoCA), emotional problems by the Hospital Anxiety and Depression Scale (HADS), fatigue by the Mental Fatigue Scale (MFS) and health-related quality of life by the EuroQol Five Dimension Five Levels (EQ-5D-5L) and Short-Form Health Survey (SF-36). SF-36 scores are reported as T-scores, (population norm = 50) combined into Physical Component Summary (PCS) and Mental Component Summary (MCS). Wilcoxon rank test was used. Continous variables are reported as median (IQR).
Results: Of 120 patients treated with ECPR, 33 were alive at follow-up and, 27 (82%) participated in the study 5 (2–7) years after ECPR. The age at ECPR was 53 (45–56.5) years. Before ECPR 21/27 (78%) individuals were working (full-time, part-time or studying). After ECPR, 18/21 (85%) returned to work at a median time of 8.5 (6–14.5) months. Life satisfaction was 8 (6.5–9), comparable to the pre-ECPR life satisfaction of 9 (7–9.5), $p = 0.52$. EQ-5D-5L VAS was 82% (70–90). 26% showed combined impairment on MoCA, HADS and MFS, with EQ-5D-5L VAS 85% (50–90) and life satisfaction 8 (5–9), similar to the rest of the cohort (Table).
Conclusions: To our knowledge, this is the largest and most comprehensive study on long-term outcomes after ECPR. Survivors reported a high life satisfaction and 85% returned to work. Life satisfaction remained high, even in those with signs of anxiety, fatigue and cognitive impairment.

Table (abstract P176) Results in functional outcome (mRS), cognitive function (MoCA), anxiety (HADS-A), depression (HADS-D), fatigue (MFS), health related quality of life (SF-36)

	Median	IQR	Impairment*	Impairment (nr / %)
mRS	1	0–2	≥ 4	1 / 3.7
MoCA	25	23–28	< 26	14 / 52
HADS-A	6	1.5–9.5	≥ 11	3 / 11
HADS-D	2	1–4	≥ 11	0
MFS	8.5	3.8–16.3	> 10	13 / 48
SF-36 PCS	44.5			
SF-36 MCS	60.5			

*Standardized cut-off values defining impairment for each test.

P177

A retrospective audit of post-cardiac arrest care in the intensive care unit

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Critical Care 2025, **29(S1)**:P177

Introduction: We completed a retrospective audit of patients admitted to the Intensive Care Unit at Sandwell and West Birmingham Hospitals (SWBH), to assess compliance with our trust's guideline for the management of in & out of hospital cardiac arrests in adult critical care, with a specific focus on temperature management (& pyrexia avoidance), neuroprognostication, & functional outcome. Our local guideline is based upon the 2021 ESCIM post arrest guidelines [1], and was introduced in 2021.
Methods: 108 patients met inclusion criteria. Data was collected from a review of the patients' medical records.
Results: The average age of patients was 56 years (± 14). Male:female 60:40. 70% presented with a non-shockable rhythm. Median time to ROSC was 15 min. 6 month survival was 35%. 70/108 patients had continuous temperature monitoring. 79/108 developed a mild hypothermia within 72 h of admission. 28/79 were warmed with a forced air blanket, of which two became pyrexial. 34/108 patients became pyrexial, of which 17 were not actively cooled. 19/34 had paracetamol prescribed. 8/34 had no continuous temperature monitoring. At 6 months 14/34 had a cerebral performance category (CPC) of 1–2, 3/34 CPC 3–4, 17/34 CPC 5. In all patients, at 6 months, CPC: 1–28%, 2–4%, 3–2%, 4–1%, 5–66%. 64 patients were extubated prior to day 3. 29/44 met the pre-conditions for neuroprognostication. Adherence to the neuroprognostication pathway was 100%. SSEP were rarely requested (7/29). Neuronal specific enolase was rarely requested (8/29)and results were frequently not available in a timely fashion. EEGs were not reported using the agreed nomenclature.
Conclusions: Continuous temperature monitoring was not well utilized. A number of patients were inappropriately warmed. Active cooled devices and IV paracetamol were underused. Following this audit, an intensive education program has commenced on our unit. Neuroprognostication was performed well. SSEP and NSE were underused.

Reference

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P178

The relationship between cardiopulmonary resuscitation duration and one-month survival in out-of-hospital cardiac arrest patients due to asphyxiation

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Critical Care 2025, **29(S1)**:P178

Introduction: Previous studies have shown that longer CPR (cardiopulmonary resuscitation) duration leads to lower survival rates in patients with out-of-hospital cardiac arrest (OHCA). However, there has been limited research about CPR duration specifically in cases where cardiac arrest occurs due to asphyxiation. This study investigated the influence of CPR duration on patient outcomes in cases where cardiac arrest was caused by asphyxiation.
Methods: A retrospective cohort study was conducted utilizing data from the Japanese Association for Acute Medicine OHCA registry during June 2014 to December 2020. The study cohort included adult patients with asphyxiation-induced OHCA who received emergency medical services-initiated CPR and achieved return of spontaneous circulation in either pre-hospital or in-hospital settings. Primary and secondary endpoints were one-month survival and favorable neurological outcome at one month (defined as cerebral performance category 1 or 2), respectively. Dynamic probability analysis was employed to identify the threshold at which survival probability decreased to 1%. The association between CPR duration and outcomes was evaluated using multivariate logistic regression analysis with adjustment for potential confounders.
Results: The analysis included 2,594 cases of asphyxiation-induced OHCA. Median CPR duration was 26 min (interquartile range: 17–35 min). At one month, 515 patients (19.9%) survived, while 62 patients (2.4%) achieved favorable neurological outcomes. Survival probability diminished to 1% after 28 min of CPR. The adjusted odds ratios per minute of CPR duration were 0.88 (95% confidence interval: 0.87–0.89) for one-month survival and 0.74 (95% confidence interval: 0.69–0.80) for favorable neurological outcome.
Conclusions: In asphyxiation-induced OHCA, extended CPR duration demonstrated a strong inverse correlation with survival and neurological outcomes. These findings suggest that prolonged resuscitative efforts beyond certain thresholds may be futile.

P179

Predicting neurological outcome following out-of-hospital cardiac arrest: MIRACLE2 performance in a tertiary single center

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Critical Care 2025, **29(S1)**:P179

Introduction: Neurological outcome (NO) prediction following out-of-hospital cardiac arrest (OHCA) is challenging. Standard neuroprognostication protocols (SNP) integrate clinical, laboratory and imaging findings over 72 h. The MIRACLE2 is an alternative score to predict NO based on simple variables routinely included in the initial assessment of these patients.
Methods: In this study, we assessed the performance of the MIRACLE2 score in predicting NO after OHCA. Retrospective data was collected from our Intensive Care Department over a period of 5 years. One hundred forty patients were included. SNP category, Cerebral Performance Category (CPC) at hospital discharge and Cardiac Arrest Hospital Prognosis (CAHP) score were determined. A poor NO was defined as a CPC score between 3 and 5. MIRACLE2 accuracy in predicting NO and its correlation with SNP class (poor, undetermined, favorable) was established.
Results: Most patients were male (73%), aged 61–70 years. OHCA was found to be of cardiac origin in 66% of patients, in half of these related with acute myocardial infarction. Witnessed OHCA occurred in 87%, with a median no-flow time of 4 min and a low-flow time of 25 min. A MIRACLE2 score ≥ 5 (high risk) was found to correlate with unfavorable NO [sensitivity of 85%; specificity 100% (AUC 0.94; 95% CI: 0.9–0.97; $p < 0.0001$)]. High MIRACLE2 score value accurately correlated with a poor SNP category [92% sensitivity, 88% specificity (AUC 0.85; 95% CI: 0.81–0.90; $p < 0.0001$)]. The MIRACLE2 score was more accurate than the CAHP score in identifying patients with a poor CPC outcome.
Conclusions: MIRACLE2 score can be easily calculated from information available at hospital admission. It allows the definition of neurological outcomes categories that are similar to the categories derived from the SNP. This is particularly valid for patients with higher scores and poor outcome (CPC 3–5), suggesting that its use might support earlier prognostic clinical decisions.

P180

10-year mortality of patients with pre-existing and new-onset atrial fibrillation during critical illness

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Introduction: Critically ill patients frequently develop new-onset atrial fibrillation (NOAF) following admission to the intensive care unit (ICU) [1] and a significant proportion of patients with an established diagnosis of atrial fibrillation (AF) require critical care. It is unclear what the long-term risks for thromboembolic events and mortality are in patients with pre-existing (PeAF) or new-onset atrial fibrillation (NOAF) compared to patients without atrial fibrillation (No-AF). This study aimed to assess ten-year mortality and one-year thromboembolic outcomes in these three cohorts.
Methods: This was an observational retrospective cohort study in a tertiary British University teaching hospital. We collected data on patients admitted to the critical care units between December 2007 and January 2014. The primary outcome was ten-year mortality. We also collected data on ICU admission variables and outcomes. Time-to-event analysis was performed for outcomes and Kaplan–Meier survival curves were generated for each cohort.
Results: There was no significant ten-year mortality difference between patients with PeAF and NOAF. However, in both AF cohorts, mortality was higher than in patients without AF. The ten-year survival probabilities for the No-AF, PeAF, and NOAF cohorts were 0.42, 0.21, and 0.21, respectively ($p \leq 0.001$). The cumulative incidence of thromboembolic events at one year was 0.08, 0.12, and 0.14 in the No-AF, NOAF, and PeAF cohorts, respectively ($P \leq 0.05$).
Conclusions: Both PeAF and NOAF confer significant risk of ten-year mortality. There is limited evidence guiding management and follow up for patients with NOAF during and after critical illness. Further research is required to help clinicians guide 1) initial management strategy 2) decision making for anticoagulation 3) follow-up pathways. Therefore, further research is justified to answer these questions.

Reference

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P181

Phenotypes of preoperative heart failure: is ventricular wall stress associated with functional outcome after cardiac surgery?

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Critical Care 2025, **29(S1)**:P181

Introduction: This study aimed to investigate phenotypes of preoperative heart failure in relation to functional outcome after cardiac surgery.
Methods: A prospective cohort study including elective cardiac surgical patients divided in four phenotypes based on left ventricular ejection fraction (LVEF: $\geq 50\%$ or $< 50\%$) and NT-proBNP (≥ 400 or < 400 ng/L). The primary outcome was new disability, defined as an increase in World Health Organization Disability Assessment Schedule 2.0 (WHODAS 2.0) score of $> 5\%$ after 120 days, compared to baseline. Patients who died were considered 100% disabled. Phenotype outcome distributions were compared with a $\chi 2$-test, and odds-ratios (OR) were calculated with a logistic regression, adjusted for age, gender, kidney function and type of surgery.
Results: We included 956 patients: 77.9% was male, median age was 66 years [IQR 61–72] and median preoperative NT-proBNP was 124 ng/L [IQR 36–447]. Most common surgery types were coronary artery bypass grafting (49.2%) and aortic valve replacement (20.3%). New disability occurred in 25.3% of the population. Phenotypes of heart failure were distributed as follows: 58.4% of patients had a normal LVEF and low NT-proBNP (NormalLow); 16.8% a normal LVEF and high NT-proBPNP (NormalHigh); 13.9% a reduced LVEF and low NT-proBNP (ReducedLow) and 10.9% a reduced LVEF and high NT-proBNP (ReducedHigh). The incidence of new disability was 23.5% in NormalLow, 34.8% in NormalHigh, 21.8% in ReducedLow and 25.0% in ReducedHigh ($p = 0.023$). Adjusted ORs for new disability were 1.64 (95% CI 1.09–2.46) for NormalHigh, 0.90 (95% CI 0.56–1.41) for ReducedLow and 1.00 (5% CI 0.59–1.63) for ReducedHigh, compared to NormalLow.
Conclusions: Cardiac surgery patients with a preoperative heart failure phenotype of normal LVEF with elevated NT-proBNP are at increased risk for new postoperative disability.

P182

Valve replacement vs. coronary revascularization: impact and clinical outcomes

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Critical Care 2025, **29(S1)**:P182

Introduction: Complex cardiovascular procedures such as coronary revascularization and valve replacement present significant variations in postoperative outcomes. Despite improving cardiac function, these procedures carry unique perioperative risks [1]. This study aimed to analyze the possible associations between these procedures and outcomes.
Methods: An analytical study and historical cohort of patients undergoing coronary revascularization and valve replacement were included, excluding patients with incomplete clinical history. We analyzed demographic variables (sex, age, body mass index [BMI], and comorbidities) and clinical variables (surgical setting and type of anesthesia). A descriptive study was performed to characterize the sample, as well as bivariate tests to study the association between outcomes and the type of procedure. Statistical significance was set at $p < 0.05$.
Results: A total of 216 patients were analyzed, including patients older than 18 years with complete postoperative outcomes who had undergone surgery between 2022 and 2024. A total of 67.59% underwent vascular reconstruction and 32.41% underwent valve replacement. Elective procedures were more frequent in the reconstruction group (78.7%) than in the valve replacement group (88.57%) ($p = 0.08$). A stay of less than three days was more frequent in the reconstruction group, with a statistically significant relationship ($p = 0.025$). The presence of pulmonary hypertension as a comorbidity was associated with 30-day mortality in the valve group ($p = 0.03$) (Table). No significant differences were found in terms of reoperation ($p = 0.573$) or ICU readmission ($p = 0.122$).
Conclusions: Age and pulmonary hypertension were associated with longer ICU stay and mortality in patients undergoing valvular replacement. There were no significant differences in readmission or postoperative intervention compared with vascular reconstruction. These findings may guide perioperative management strategies.

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Table (abstract P182) Valve replacement outcomes

	ICU stay (< 3 days)	ICU stay (> 3 days)	Mortality over 30 days (Yes)	Mortality over 30 days (No)
Age < 60	7	8		
Age > 60	8	51		
p value of Age	0.001			
Pulmonary hypertension (Yes)			2	6
Pulmonary hypertension (No)			1	61
p value of Pulmonary hypertension				0.033

P183

Right ventricular dysfunction score in prognostic evaluation of patients with sepsis and septic shock

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Critical Care 2025, **29(S1)**:P183

Introduction: Right ventricular dysfunction(RVD) in sepsis carries poor prognosis and there is marked heterogeneity in the methods used for its evaluation. RVD score incorporating various domains of RV function was originally designed to grade severity in chronic heart failure [1]. We aimed to determine the ability of RVD Score to predict 28-day all-cause mortality among patients with sepsis and septic shock.
Methods: In this prospective observational study, 189 adult patients were recruited within 48 h of diagnosis of sepsis and septic shock by Sepsis 3 criteria. At recruitment, RVD Score was computed using 5 trans-thoracic echocardiographic measurements—Doppler Pulmonary Artery Systolic Pressure-PASP, RV End Diastolic Area/Body Surface Area, Tricuspid Annular Plane Systolic Excursion-TAPSE, Tricuspid Regurgitation Grade and Inferior Vena Cava Collapsibility. One point was assigned to each component if the measured value deviated from the pre-defined cut-off. Further, TAPSE/PASP ratio, a marker of right sided ventriculo-arterial(RV-PA) coupling was calculated. Patients were followed up for prognostic outcomes.
Results: Amongst the study participants, 39.68% were non-survivors. RVD Score > 2 predicted 28-Day mortality with an AUROC of 0.857(95% CI-0.801–0.914) (Figure). There was a significant linear correlation between RVD Score and mechanical ventilation duration ($\rho = 0.39$, $p < 0.0001$),ventilator free days ($\rho = -0.46$, $p < 0.0001$), vasopressor free days ($\rho = -0.35$, $p < 0.0001$) and number of sessions of RRT needed ($\rho = 0.37$, $p < 0.0001$).TAPSE/PASP ratio ≤ 0.44 predicted 28-day mortality with an AUROC of 0.883 (95% CI 0.829–0.937). However, the predictive ability of RVD Score and TAPSE/PASP ratio did not differ (difference between AUROC − 0.026, $p = 0.09$).
Conclusions: The 5-parameter RVD Score has prognostic utility in predicting 28-day all-cause mortality among patients with sepsis and septic shock. The performance of TAPSE/PASP ratio is similar and can be used with relative ease.

Reference

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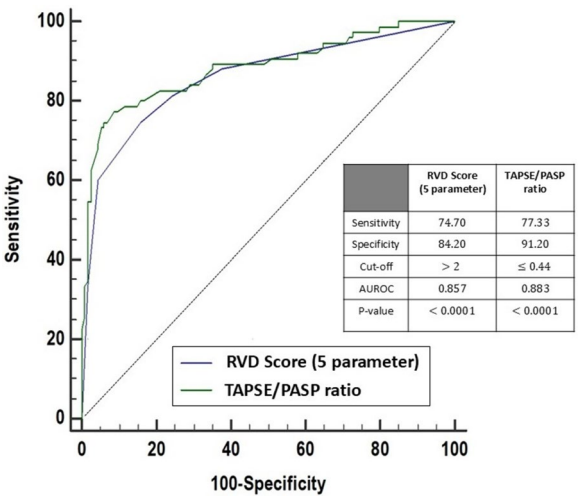

Figure (abstract P183) Area under receiver operating characteristic curve for predictive ability of RVD Score and TAPSE/PASP ratio

P184

Evaluation of diastolic shock index and cardiac index as mortality predictors in post infarction cardiogenic shock. A retrospective cohort study

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Critical Care 2025, **29(S1)**:P184

Introduction: Cardiogenic shock (CS) following myocardial infarction is associated with high mortality. In this context, the use of reliable and relevant markers to predict mortality as cardiac index (CI) and diastolic shock index [1], is crucial for stratifying high risk patients and guiding therapeutic interventions. Objective: To compare the effectiveness of DSI and CI in predicting 28 day mortality in patients with post infarction CS.
Methods: We analyzed the data of 40 patients in post infarction cardiogenic shock admitted to University hospital ICU between 2011 and 2017. The patients were 65 ± 15 years old, were mechanically ventilated and monitored with transpulmonary thermodilution. We recorded, we measured and calculated DSI, CI, mean arterial pressure (MAP), SOFA score, blood lactate and $ScvO_2$, PcO_2 gap at T0, T4H, T8H, T12H, T24h, T48H, T72H and T96H. We performed a comparative analysis of DSI and CI between survivors and non survivors.
Results: Statistical analysis used Mann Whitney test and results expressed as mean $\pm$ standard deviation (Figure). We observed that DSI at 48 h was higher in non survivors than in survivors respectively 3.2 ± 0.5 vs 2.7 ± 0.4, $p < 0.03$. CI at 48 h was lower in non survivors than in survivors respectively 1.8 ± 0.3 vs 2.4 ± 0.4, $p < 0.01$. When we performed ROC curve for DSI and CI, we observed AUC of 0.80 for DSI and 0.90 for CI emphasizing the superiority of CI to predict mortality in post infarction CS.
Conclusions: DSI and CI offer valuable insights [2,3] into the hemodynamic status of patients with post myocardial infarction CS Our analysis suggests that CI demonstrates superior predictive performance for mortality reflecting its direct relationship with cardiac output and tissue perfusion. Further studies are warranted to establish the robustness of this novel prognostic parameter in CS patients and its therapeutic implications.

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Parameters at 48H	All Patients (40)	Survivors (20)	Non- Survivors (20)	P
Lactate (mmol/L)	4.5+-1.2	3.8+-1.0	5.2+-1.1	0.02
MAP (mmHg)	65+-10	70+-8	60+-9	0.01
DSI	2.9+-0.6	2.7+-0.4	3.2+-0.5	0.03
CI (L/mn/m2)	2.1+-0.5	2.4+-0.4	1.8+-0.3	0.01
Pco2 gap		6.5+-1.2	9.2+-2.0	P<0.01

Figure (abstract P184) Variables in relation with outcome in survivors and non survivors

P185

Effectiveness of glucagon in reversing cardiogenic shock post-beta-blocker intoxication. A retrospective cohort study

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Critical Care 2025, **29(S1)**:P185

Introduction: In systematic reviews, glucagon has been noted for its positive inotropic effects in severe beta-blocker induced cardiogenic shock (CS) [1]. Nevertheless some studies underlined a variability in its documented efficacy and did not show an superiority over high dose insulin therapy (HDI). Objective: to evaluate the efficacy of glucagon in reversing CS following betablocker overdose.
Methods: We analyzed the data of 40 patients with CS following beta-blocker overdose admitted in university hospital ICU between 2010 and 2017. We compared 2 groups of patients: A first group of 2O patients who received only standard care (Control group) including inotropic agents, norepinephrine and high dose insulin. A second group of 20 patients who received glucagon and standard care (glucagon group). Glucagon was administered intravenously with a first dose of 50 mcg/kg followed by continuous infusion of 3 to 10 mg/h titrated to clinical response. At admission to ICU, all the patients have the same severity scores, were 33 ± 15 years old, were under mask with a high concentration of oxygen and monitored with transpulmonary thermodilution. We recorded mean arterial pressure (MAP), cardiac index, blood lactate, $ScvO_2$ every hour at 8 h, 16 h, 24 h and 48 h. We evaluated shock reversal within 48 h defined as hemodynamic stabilization (MAP > 65 mmHg and cardiac index (CI) > 2.2 L/min/m^2).
Results: Statistical analysis used Mann Whitney test and results expressed as mean $\pm$ standard deviation (Figure). Shock reversal at 48 h was higher in glucagon group than in control group respectively 80% of patients vs 40%, $p < 0.01$. Glucagon increased CI and MAP and decreased blood lactate significantly compared to control group (Figure).
Conclusions: Glucagon administration was associated with a significantly higher rate of shock reversal, improved MAP, CI and lower lactate levels suggesting that this drug may be effective in reversing CS due to beta-blocker intoxication and synergistic with high dose insulin.

Reference

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Parameters	Glucagon group	Control group	P
Shock reversal at 48h (%)	80% (16/20 patients)	40% (8/20 patients	0.01
MAP at 48h(mmHg)	72+-8	65+-9	0.03
CI at 48h (L/mn/m2	2.5+-0.3	2+-0.4	0.02
Lactate(mmol/L) at 48h	3.5+-1	4.8+-1.2	0.04

Figure (abstract P185) Variables in relation with outcome in glucagon and control group

P186

Altered capillary refill time is associated with intolerance to enteral nutrition in critically ill patients regardless of vasopressor dose

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Critical Care 2025, **29(S1)**:P186

Introduction: Enteral nutrition (EN) is a fundamental part of the treatment of critically ill patients, and early initiation is related to better outcomes. In critically ill patients with hemodynamic instability, the initiation of EN is still controversial due to the increased risk of non-occlusive intestinal ischemia due to increased intestinal metabolic demand [1]. Our study aims to evaluate the use of capillary refill time (CRT) with intolerance to EN in critically ill patients.
Methods: A prospective cohort study was conducted in the ICU of Hospital Mãe de Deus (Porto Alegre). Patients over 18 years of age who initiated EN were included. Patients with TPN or recent abdominal surgery were excluded. Demographic data were collected via medical

records. CRT was considered altered when it was greater than 3 s and was assessed at the time of the indication for the initiation of EN, and every 12 h for 72 consecutive hours. Intolerance to EN was considered when there was vomiting, diarrhea, abdominal distension, gastric residual volume > 300 mL/6 h or intestinal ischemia by imaging.
Results: A total of 104 patients were included between January and April 2024. Of these, 8 (7.7%) patients presented intolerance to EN, while 96 (92.3%) had no complications. Of the total, 17 (16.3%) patients presented altered CRT at the beginning of EN, as well as 24 (23.1%) at some point in the 72 h monitored, showing a positive association with the intolerant group ($p = 0.023$; $p = 0.002$ respectively). There was no association of the mean dose of norepinephrine between the tolerant and intolerant groups (0.08 and 0.16 mcg/kg/min respectively; $p = 0.454$).
Conclusions: In critically ill patients, altered CRT is associated with intolerance to enteral nutrition, but not to norepinephrine dosage.

Reference
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P187
A new hand-held vital microscope, called the OxyCam, for quantitative measurement of tissue perfusion and oxygenation

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Critical Care 2025, **29(S1)**:P187

Introduction: Hand-held vital microscopy (HVM) has been used for many decades in clinical and experimental studies providing important insights into critical illness. However, quantitative automatic analysis of images and the lack of information regarding the oxygenation of the red blood cells of the microcirculation is still wanting. We introduce a new generation HVM, called OxyCam with embedded clinically validated automated software (MicroTools, MT [1]) for instant calculation of sublingual microcirculatory parameters identified by the ESICM taskforce as being needed for point-of -care clinical analysis of sublingual HVM images [2]. Ratio imaging of green (GR) and blue (BL) illuminated microcirculatory images by OxyCam, allows calculation of microcirculatory hemoglobin saturation images [3]. In this study we validate the OxyCam by comparison of the total vessel density (TVD) of the GR and BL images calculated by MT, to that of the GR illuminated CytoCam (current standard HVM).
Methods: Muscle microcirculation was imaged using the CytoCam and the OxyCam (GR and BL illumination) in the hind leg of 8 rats during hemorrhagic shock (MAP < 40 mmHg) and albumin resuscitation (4% 10 mL/kg/hr). Ethics approval CCD 2312733. Images were taken at time points T0 baseline, T1 Shock start resuscitation, T2+ 60, T3+ 120 and T4+ 180 min. TVD (mm/mm2) values were calculated automatically using MT.
Results: The Figure shows equivalent TVD values during the different time points between the CytoCam (GR; A) and OxyCam (GR B; BL C). TVD from GR CytoCam and GR OxyCam images show good agreement (D).
Conclusions: The OxyCam HVM device shows equivalence between GR and BL illuminated images. A good correlation ($p < 0.0002$, $r = 0.6139$) was found between the TVD calculated by MT of CytoCam images and the OxyCam images.

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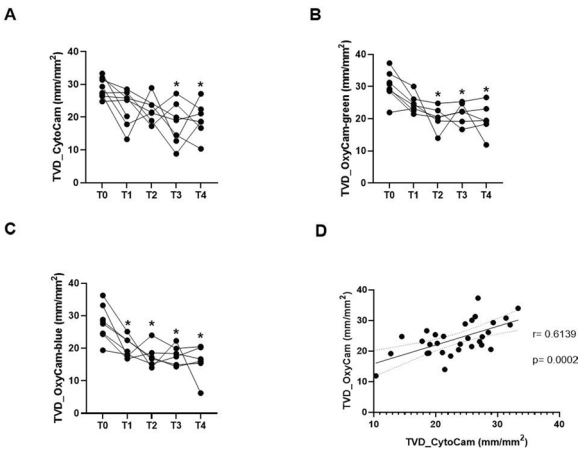

Figure (abstract P187) TVD (mm/mm^2) calculated by MT of the muscle microcirculation of the rat hind limb muscle is shown at T0 (baseline), T1 (shock when MAP reaches 40 mmHg start of resuscitation), T2 60 min after albumin resuscitation), T3 120 min after onset of resuscitation, and T4 at 180 min. A: the TVD from CytoCam (green), B: the OxyCam TVD (green), C: OxyCam TVD (blue). D. Shows the correlation between the green illuminated images of the CytoCam and OxyCam. $*p < 0.05$ in comparison to T0.

P188
Clinical proof-of-concept for arterial waveform analysis to reveal underlying causes for hemodynamic instability in critically ill patients

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Critical Care 2025, **29(S1)**:P188

Introduction: Differentiating in the underlying cardiovascular pathophysiology of hemodynamic instability to provide effective targeted treatment remains a significant challenge. A recent in-silico simulation study suggested that automated peripheral arterial waveform analysis could aid in distinguishing various causes of hemodynamic instability [1]. We hypothesize that we can validate these findings on clinical data by determining the distinctive morphological changes in the arterial waveform features after preload, afterload, and contractility modulation.
Methods: Representing changes in preload, afterload, and contractility, a total of 92 fluid boluses from 55 patients, 97 norepinephrine increases from 73 patients, and 18 dobutamine increases from 15 patients were included, respectively. Arterial waveform morphology was characterized using 28 different features and statistically compared before and after the interventions.
Results: Changes in preload were distinctively and significantly indicated by diastolic blood pressure, (relative) dicrotic notch pressure, and the diastolic runoff slope (Figure). Changes in afterload were characterized by nine features, including pulse pressure, downstroke pressure, relative total beat area, relative systolic area, (maximum) systolic upstroke, and systolic downstroke time (Figure). No significant waveform alterations were observed in response to changes in contractility, likely due to the small sample size of dobutamine interventions ($n = 18$).
Conclusions: This clinical proof-of-concept study demonstrates that distinct morphological changes are present in arterial waveforms

of hemodynamically instable critical care patients after cardiac surgery when altering preload via fluid administration and afterload via norepinephrine.

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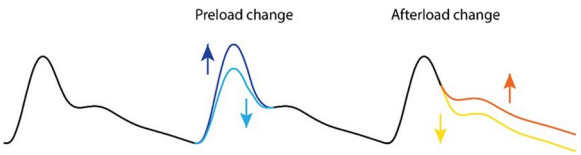

Figure (abstract P188) Schematic representation of the preload and afterload changes in the arterial blood pressure waveform morphology

P189

Dynamic arterial elastance for predicting mean arterial pressure response to fluid bolus in hypotensive mechanical ventilated critically ill surgical patients: prospective observational study

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Critical Care 2025, **29(S1)**:P189

Introduction: Postoperative hypotension is associated with an increased risk of myocardial infarction and mortality. Dynamic arterial elastance (Eadyn) has been proposed as functional assessment of arterial load and potential index for fluid management in hypotensive patients.
Methods: This prospective observational study included postoperative hypotensive patients, with hemodynamic parameters recorded before and after a fluid bolus. Mean arterial pressure (MAP) responsiveness was defined as increase in MAP of ≥ 15%, while fluid responsiveness was defined as increase in cardiac output of ≥ 10%, as measured by transthoracic echocardiography. Pulse pressure variation was obtained via an arterial line and stroke volume variation was derived from non-calibrated pulse contour analysis of stroke volume. The primary objective was to assess the predictive ability of Eadyn for MAP response to a fluid bolus. The secondary objective was to compare the predictive ability of Eadyn, systemic vascular resistance (SVR), and the diastolic shock index (DSI) for MAP response.
Results: Seventy-three hypotensive events were analyzed; of these, 55 hypotensive events were MAP-responsiveness. Eadyn value of ≥ 1.02 effectively differentiated MAP responders from non-responders, with an area under the receiver operating characteristic (ROC) curves (AUC) of 0.78 (95% CI 0.72–0.85), sensitivity of 56.4% and specificity of 100% (Figure). Positive and negative predictive values were 100% and 42.9%, respectively. SVR and DSI showed limited predictive ability, with AUCs of 0.548 (95% CI 0.401–0.695) and 0.565 (95% CI 0.434–0.697), respectively. Eadyn demonstrated significantly better predictive ability for MAP responsiveness compared to SVR and DSI ($p = 0.003$).
Conclusions: Eadyn effectively predicted MAP responsiveness to fluid bolus in postoperative hypotensive patients. Further randomized controlled trial are required to validate the predictive ability of Eadyn.

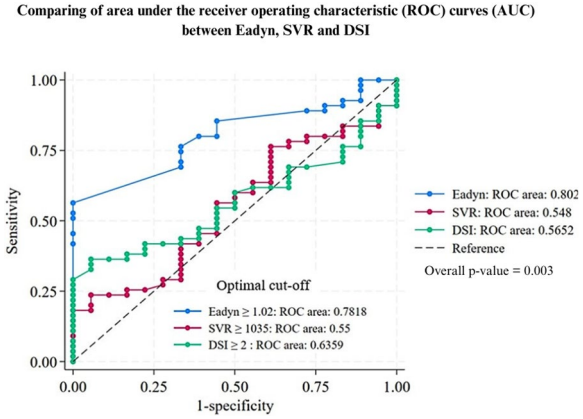

Figure (abstract P189) Comparing of area under the receiver operating characteristic (ROC) curves (AUC) between Eadyn, SVR and DSI

P190

Evaluation of intrathoracic blood flow using electrical impedance tomography during apnea tests in patients suspected of brain death

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Critical Care 2025, **29(S1)**:P190

Introduction: The primary aim of the study was to determine whether electrical impedance tomography (EIT) can detect reduction in intrathoracic blood flow associated with increasing arterial partial pressure of carbon dioxide ($PaCO_2$) [1] during apnea tests (AT). EIT is a non-invasive imaging technique that monitors fluctuations in bioimpedance. Performing an AT with accumulating levels of $PaCO_2$ is a crucial step in confirming brain death. The changes in impedance observed during the AT are primarily linked to variations in thoracic blood flow.
Methods: Patients suspected of brain death were enrolled in this prospective observational trial, conducted in compliance with Hungarian directives. Continuous EIT was recorded by a Dräger PulmoVista 500. The initial $PaCO_2$ was set between 38 and 42 mmHg. After a 10-min pre-oxygenation period, patients were disconnected from the ventilator, while oxygen insufflation was maintained through the endotracheal tube. Arterial blood gas samples were collected at the beginning (T0) and at the end (Tend) of the AT. AT was deemed positive, and the patient was reattached to the ventilator if the $PaCO_2$ level exceeded 60 mmHg in the absence of spontaneous respiratory movements.
Results: 22 ATs from 10 patients were analyzed. Data are presented as median (25th-75th) or mean ± standard deviation, with impedance values reported in attributive Units (AU). $PaCO_2$ significantly increased from T0 to Tend: 40 ± 2 vs. 65 ± 4 mmHg, $p < 0.001$. Impedance related to intrathoracic blood flow was significantly lower in the last minute of the AT compared to the first minute: 343 (231–697) vs. 1252 (721–1789) UA, $p < 0.001$. Additionally, multiple linear regression analysis indicated a significant decrease in impedance over time: χ2 (degrees of freedom, sample size), χ^2 (1, 190) = 10.32, $p < 0.001$.

Conclusions: EIT may emerge as a capable tool for investigating the PaCO2 induced, vasoconstriction-related decrease in thoracic blood flow during the AT. (#872,488 DCPM).

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P191

Use of Acumen system with HPI for the prediction of hypotension in TAVI patients: a randomized controlled clinical trial on 40 patients

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Critical Care 2025, **29(S1)**:P191

Introduction: The development of new technological tools, able to predict the onset of an hypotensive event like hypotension prediction index (HPI), seems to appear an attractive instrument for the management of hemodynamic changes also in the field of catheter laboratory and, in particular, of transcatheter aortic valve implantation (TAVI). The aim of the study is to evaluate, through a non invasive hemodynamic monitoring system, the efficacy of HPI as a tool to reduce intraoperative hypotension (IOH), adverse events and 30-day complications in patients undergone TF TAVI procedure.
Methods: Using the Acumen non invasive hemodynamic monitoring system (Edwards Lifesciences, Irvine, CA), patients have been divided into 2 groups: a control group in which the HPI algorithm has not been applied; an intervention group with HPI application for the management of hypotension. At the end of every single case, data have been collected and stored in the Acumen analytics software. In the following 30 days we have evaluated the onset of complications: delirium, AKI, stroke, new onset arrhythmias, myocardial infarction, heart failure, surgical and valvular complications and all-cause mortality.
Results: The total mean MAP under 65 mmHg measured was higher in the intervention group and the number of patients who have developed hypotensive events was lower in this subgroup compared to the control one, although the total number of IOH events was higher in intervention group. SVRI were statistically higher in the study group (4350(813) vs 3290(910), $p=0.001$), meanwhile CI was lower in this subgroup (2.08 vs 1.74, $p=0.02$). AKI was statistically lower in the intervention group ($p=0.02$), on the other hand delirium was seen with lower prevalence in the control one ($p=0.04$).
Conclusions: The study has given us some encouraging results, explaining the potential usefulness of predictive algorithms in improving intraoperative hemodynamic management and reducing post operatory complications such as AKI.

P192

Towards personalized cerebral autoregulation based hypotension prediction: coupling the hypotension prediction index (HPI) with the cerebral autoregulation index (CAI)

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Critical Care 2025, **29(S1)**:P192

Introduction: Hypotension occurs when the central perfusion pressure is too low to ensure adequate flow to individual organs. Current guidelines recommend maintaining intraoperative mean arterial pressure (MAP) above 60 mmHg, however they acknowledge that MAP thresholds for hypotension can vary across patients [1]. Recent literature suggests that MAP targets should be set based on the patient specific lower limit of cerebral autoregulation (LLA), defined as the pressure below which cerebral blood flow regulation becomes impaired [2]. Here we propose a framework where the individual patient's LLA is first identified and then fed into the hypotension prediction index software (HPI, BD®) to allow for personalized hypotension prediction at the bedside.
Methods: The Cerebral Autoregulation Index (CAI, BD®) is a novel parameter that quantifies the dynamic relationship between MAP and cerebral oxygen saturation; values of CAI ≥ 45 indicate impaired autoregulation and values <45 indicate intact autoregulation [3]. A patient's LLA can be determined by observing the CAI vs MAP plot and identifying where CAI transitions from below 45 to above 45 as MAP decreases. This LLA value can then be used to set the hypotension threshold within the HPI software, which can predict different LLA thresholds using arterial pressure waveform and patient demographics.
Results: We conducted a prospective observational study in surgical patients where LLA was identified on 47 patients and found to vary between 34 to 113 mmHg (mean $\pm$ SD, 66 $\pm$ 18). The Figure shows the distribution of LLA across the study subjects as well as an illustrative application of the proposed framework for one subject.
Conclusions: A combination of CAI and HPI allows for real-time prediction of hypotension based on patient specific LLA. This may represent the next generation personalized predictive monitoring.

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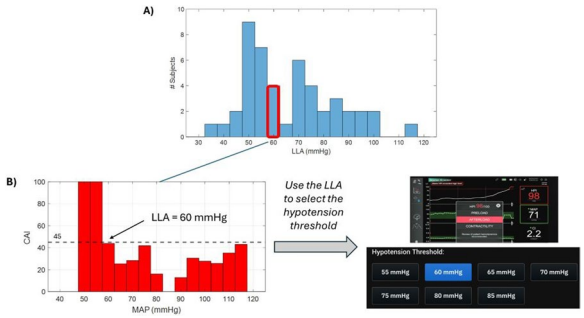

Figure (abstract P192) A) Distribution of LLA across the study subjects; B) Illustrative example of the proposed framework for one of the study subjects: LLA is first identified from the CAI-MAP plot, and then the HPI software is used to predict hypotension based on the LLA

P193

Performance of the hypotension prediction index as an early indicator of hypotensive hemodynamic instability in surgical patients

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Critical Care 2025, **29(S1)**:P193

Introduction: The hypotension prediction index (HPI) is a machine learning algorithm that was designed to detect alterations in the cardiovascular physiological control mechanisms that may lead to hypotension. Hypotension is a physiological condition where the central perfusion pressure in the cardiovascular system is too low to ensure adequate flow regulation of local organs and its threshold is the pressure at the lower limit of autoregulation. We hypothesize that HPI is an early indicator of hypotension in a broader hemodynamic sense including broader pressure range. We thus conducted a retrospective analysis to investigate the performance of HPI as an early indicator of hemodynamic instability related to hypotension and hypoperfusion.
Methods: A dataset of 1,683 cardiac and non-cardiac surgical patients were analyzed, including 871 patients monitored with invasive arterial line and 812 monitored with non-invasive finger cuff. Hemodynamic instability was defined as mean arterial pressure <65 mmHg, stroke

volume variation ≥ 13%, cardiac index ≤ 2 L/min/m^2, or systemic vascular resistance ≤ 800 dyn/s/cm^5.
Results: There were 19,685 and 21,097 HPI alerts at the HPI threshold of 85 and 50, respectively. In the invasive A-line dataset, 94.6% of the HPI alerts at threshold of 85 are followed in 15 min by hemodynamic instability related to hypotension, and 91.4% of HPI alerts at threshold 50 are followed by hemodynamic instability related to hypotension. In the non-invasive finger cuff dataset, they are 96.2% and 94.1% for HPI alerts at threshold 85 and 50, respectively.
Conclusions: The HPI alerts are early indicators of the upcoming hypotensive hemodynamic instability events with high accuracy. Further research is needed to investigate whether HPI alerts guided treatment of hemodynamic instability improves patient outcomes.

P194

Next generation of assisted fluid management software using deep learning model

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Critical Care 2025, **29(S1)**:P194.

Introduction: Fluid therapy is often used to stabilize patients' vital signs and improve organ function, by increasing the circulating blood volume. However, heterogeneity of clinical practice can result in insufficient or excessive fluid administration which is associated with complications [1]. It has been reported that only 30% of the time, the patient's stroke volume (SV) increased with administered fluids [2]. The Acumen Assisted Fluid Management (AFM, BD) software uses an algorithm to make individualized fluid recommendations based on patients' current hemodynamic profile and response to past fluid administration, which significantly increases the response rate of fluid boluses. We have developed a supervised deep learning model, that uses arterial waveform features as input, to further increase the AFM's accuracy. The aim of this work is to validate the new algorithm.
Methods: We retrospectively analyzed 307 patients and 423 fluid boluses from a multicenter, single-arm cohort study that was intended to investigate the original AFM software's accuracy. These patients had moderate-to high-risk noncardiac surgery that required mechanical ventilation [1]. We computed the response rate of software-recommended boluses which is defined as the percent of boluses that produced suitable increases in SV.
Results: The response rate and 95% confidence interval of the original AFM software was 66.0 [61.4, 70.5]%, and the response rate increased to 81.2 [77.2, 85.3]% using the deep learning model enhancement.
Conclusions: A new deep learning model was developed as an enhancement to the existing AFM software. The enhanced algorithm significantly increased the accuracy of the AFM software in recommending fluid boluses that generate desired SV increase. Automated assessment of fluid responsiveness may help clinicians optimize intraoperative fluid management.

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P195

Volume kinetics in a translational porcine model of stabilized sepsis with fluid accumulation

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Critical Care 2025, **29(S1)**:P195

Introduction: Fluid dynamics during and after a septic event is complex, but better knowledge could guide both fluid resuscitation and fluid removal. We aimed to compare fluid dynamics before and after sepsis in a clinically relevant mono-bacterial porcine model (Figure).
Methods: Twelve sows with a mean body weight of 56 kg were anesthetized, mechanically ventilated, and invasively monitored. Sepsis was induced with an intravenous infusion of *P. aeruginosa*. Animals were resuscitated during the acute septic phase according to a protocolized algorithm. Volume kinetics was studied before the bacterial infusion (baseline) and 24 h later (late sepsis), and both consisted of an infusion of 1,500 mL of 0.9% saline over 20 min with repeated hemoglobin and albumin measurements and urine quantification.
Results: The kinetic analysis at baseline showed transient volume expansion of the central fluid compartment (the plasma) and a fast-exchange interstitial space, while gradually more fluid accumulated in the remote "third fluid space" with very slow turnover. In the late sepsis phase, hypoalbuminemia and slight hypovolemia was observed. As compared with baseline, fluid kinetics showed improved plasma expansion, and more expansion of the fast-exchange interstitial space rather than the slow-exchange space. The rate constant k21 describing return flow to the circulation was increased during the late sepsis phase, and hemoglobin-albumin dilution difference suggested that interstitial albumin recruitment occurred with the fluid infusion. The model predicted that high cardiac index and sepsis-induced weight gain were associated with greater fast-exchange compartment expansion.
Conclusions: After sepsis, fluid was accumulated in the slow-exchange compartment, and further fluid administration distributed preferentially to the fast-exchange compartment with acceleration of lymph flow, improved plasma expansion, and recruitment of interstitial albumin.

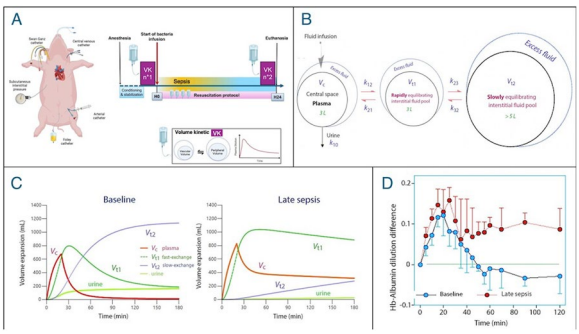

Figure (abstract P195) A. Study design; B. The kinetic model used for the analysis of fluid distribution; C. Distribution of fluid over 20 min between the extracellular body fluid compartments. The base model without covariates was applied for the two series of experiments separately; D. The Hb-albumin dilution difference (no unit). A positive value implies that more albumin enters the plasma via the lymph than is filtered out to the interstitium. Median and IQR are shown

P196

Using mixed venous oxygen saturation (SvO_2) and cardiac output to predict global hypoperfusion

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Critical Care 2025, **29(S1)**:P196

Introduction: SvO_2 has been shown to have significant clinical value. Holm et al., reported ICU patients with a SvO_2 less than 60% had higher 30-day mortality, lower 5-year survival, and higher incidence of

perioperative myocardial infarction, renal failure, and stroke [1]. Given this, an algorithm was built for prediction of global hypoperfusion.
Methods: For development and validation of the algorithm, data from 1239 patients were collected. A total of 510 ICU patients were used to develop the algorithm, which contains a logistic regression model that utilizes features derived from SvO_2 and cardiac output. The remaining 729 patients, which included OR and ICU patients across 14 different clinical sites, were used to validate the algorithm. Validation was centered around the ability to predict global hypoperfusion events, defined as SvO_2 less than 60% for 1 min straight.
Results: The predictive capability of the algorithm was calculated on the 30-min period of data preceding all global hypoperfusion events. The performance is split in 5-min predictive windows and is shown in the Table. At the prediction window of 10 to 15 min the algorithm had a sensitivity of 74.2%, specificity of 93.4%, and AUCROC of 0.93. A clinically standard model using a threshold of 65% for SvO_2 had a sensitivity of 76.4%, specificity of 80.5%, and ROCAUC of 0.74 at the same prediction window.
Conclusions: With a sensitivity of 74.2%, specificity 93.4%, and ROCAUC of 0.93 the developed algorithm accurately predicts global hypoperfusion up to 15 min in advance. The increased specificity of the algorithm, as compared to the clinical standard, produces a prediction of global hypoperfusion with less false alarms. Given this, the developed algorithm provides significant clinical value and benefit to patients.

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Table (abstract P196) Sensitivity, specificity, and ROCAUC for the algorithm when using a threshold of 75

Prediction window (minutes)	Sensitivity (%)	Specificity (%)	ROCAUC
0–5	99.1	93.4	0.97
5–10	81.0	93.4	0.94
10–15	74.2	93.4	0.93
15–20	68.9	93.4	0.92
20–25	69.0	93.4	0.91
25–30	68.4	93.4	0.90

P197
Evaluation of plethysmographic variability index (PVI) as measure of fluid responsiveness in patients undergoing elective oncosurgeries
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Critical Care 2025, **29(S1)**:P197

Introduction: Clinical assessment of fluid responsiveness remains quite challenging. Studies suggest dynamic measures such as pulse pressure variation (PPV) and stroke volume variation (SVV) are better predictors of fluid responsiveness [1,2]. We compared plethysmographic variability index (PVI) to PPV and SVV to detect fluid responsiveness during major oncosurgeries.
Methods: We included adults undergoing elective, major oncosurgeries under general anesthesia. Parameters such as PPV, SVV, stroke volume, PVI, were recorded at baseline, before and after fluid bolus. The tidal volume was transiently increased from 6 to 8 mL/kg PBW during observations. Fluid responsiveness was defined as increase in SV by 10% after fluid bolus. Whenever clinically indicated a fluid bolus of 250 mL Ringers Lactate (4 mL/kg) was given over 10 min.
Results: We included 240 sets of measurements from 65 adults. The mean age of patients was 50.5 ± 11 years and most patients (87%) had gastrointestinal malignancies. Out of 240 readings, 65.4% were fluid responders while 34.6% were non responders. ROC analysis before fluid bolus showed a sensitivity and specificity for PPV (0.866 and 0.337, AUC 0.605 (0.528, 0.682) ($p = 0.007$), SVV (0.87 and 0.25, AUC 0.573 (0.496, 0.65) ($p = 0.063$), PVI (0.866 and 0.301, AUC 0.607 (0.531, 0.683) ($p = 0.006$) (Figure).
Conclusions: In our study plethysmographic variability index did not predict fluid responsiveness better than other routinely used dynamic parameters such as PPV and SVV in patients undergoing major onco-surgeries.

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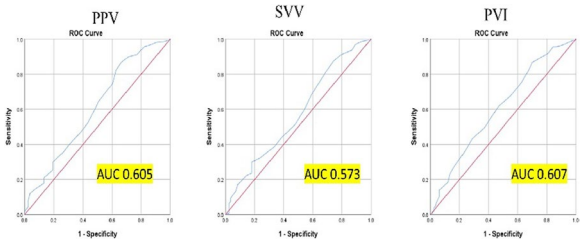

Figure (abstract P197) ROC curves for PPV, SVV and PVI parameters before fluid bolus

P198
Infection source influences initial fluid requirements in septic shock
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Critical Care 2025, **29(S1)**:P198

Introduction: Recent guidelines recommend initiating volume resuscitation of septic patients infusing at least 30 mL/kg of fluid. However, infection site may highly influence the fluid requirements of each patient. Thus, we aimed to quantify the fluid volume required by septic shock patients before they reach preload unresponsiveness, according to sepsis source.
Methods: In a prospective observational study, conducted at three centers in France, Italy and China, we systematically evaluated the preload responsiveness of patients, during the initial phase of septic shock resuscitation, by assessing either the cardiac output response to volume expansion or using previously validated tests of preload responsiveness (as passive leg raising test, end-expiratory occlusion test, tidal volume challenge).
Results: We enrolled 106 patients: median age 67 (60–77) years, male/female ratio 77/29. Among them, 48 (45%) patients had lung infection, 33 (31%) abdominal infection, 17 (16%) infection of the urinary tract and 8 (8%) skin or soft tissues infection. At the time of inclusion, they had already received 15 (5–23) mL/kg of fluid. Preload unresponsiveness was reached after the infusion of 25 (15–35) mL/kg of fluid from shock onset: 23 (12–34) mL/kg for the lung group, 29 (22–44) mL/kg for patients with abdominal infection, 23 (8–30) mL/kg for the group with urinary tract infection and 31 (21–36) mL/kg for the skin and soft tissues group ($p = 0.041$) (Figure). Sixty-eight (64%) patients became preload unresponsive after receiving less than 30 mL/kg of fluid (median 20 [10–25] mL/kg).
Conclusions: The volume of resuscitation fluid required by septic shock patients during the early phase may depend on the site of

infection, with pulmonary and urinary tract sepsis often requiring less volume than the others. Moreover, a significant proportion of patients with septic shock needs less than 30 mL/kg of fluid before reaching a state of preload unresponsiveness.

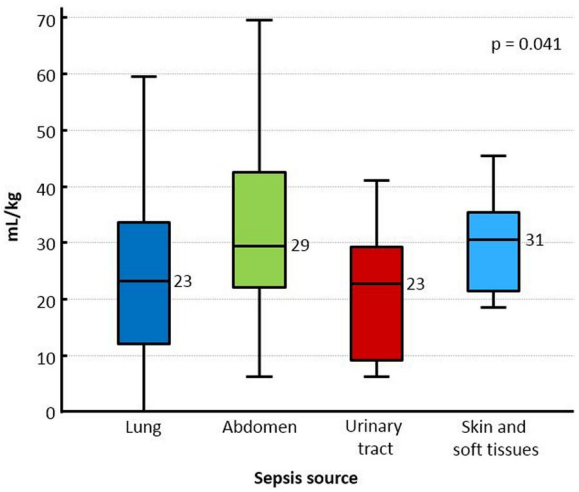

Figure (abstract P198) Volume of resuscitation fluid (median and IQR) infused between shock onset and the occurrence of preload unresponsiveness, according to source of infection

P199

Association between cumulative fluid balance to estimated colloid oncotic pressure ratio and outcome in post-surgical patients requiring intensive management

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Critical Care 2025, **29(S1)**:P199

Introduction: A decrease in plasma oncotic pressure might contribute to enhanced extravascular leak, which when compounded by a higher positive fluid balance, might lead to poor outcomes in post-surgical patients requiring intensive management.
Methods: This study was designed to identify the association between cumulative fluid balance (CFB) to estimated colloid oncotic pressure (eCOP) ratio at 48 h and postoperative complication after emergency abdominal surgery. Daily cumulative fluid balance and estimated colloidal oncotic pressure were noted in n = 200 patients and all patients were followed till hospital discharge (or death) for any postoperative complications as per Clavien-Dindo grade. Estimated COP was derived from serum albumin, globulin and total protein by a previously described polynomial equation.
Results: After adjustment of relevant baseline variables, CFB/eCOP ratio at 48 h was an independent predictor of Clavien-Dindo complications grade IV a/b or V [OR (95% CI) 1.003 (1.001–1.005), $p = 0.012$]. Ordinal logistic regression reported that a higher CFB/eCOP ratio at 48 h was independently associated with a higher grade of complications [OR (95% CI) 1.002 (1.001–1.00), $p = 0.009$]. However, no independent association was found between CFB/eCOP ratio at 48 h and in- hospital mortality [OR (95% CI) 1.002 (0.999–1.004), $p = 0.160$] and postoperative AKI [OR (95% CI) 1.001 (0.999–1.002) $p = 0.583$].
Conclusions: CFB/eCOP ratio at 48 h was strongly associated with higher degree of postoperative complications irrespective of baseline disease severity. Overzealous fluid administration should be discouraged in this group of patients, especially when serum protein is low.

P200

Intrarenal venous flow patterns: guiding fluid removal strategies in ICU patients

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Critical Care 2025, **29(S1)**:P200

Introduction: Transitioning from stabilization to de-escalation in ICU fluid management remains challenging due to the lack of precise tools to determine optimal timing. This study evaluated the utility of Doppler ultrasound—particularly intrarenal venous flow (IRVF) patterns and venous excess ultrasound (VExUS) scores—as predictive tools for guiding fluid removal and examined their correlation with clinical outcomes.
Methods: This prospective observational study included ICU patients undergoing fluid removal. Baseline IRVF patterns and VExUS scores were assessed, with follow-ups conducted daily until day 3. The primary outcome was the ability of IRVF patterns to predict successful fluid removal, defined as achieving a negative fluid balance for at least two consecutive days within three days. IRVF patterns were compared with other parameters, including inferior vena cava indices, hepatic venous flow patterns, portal venous pulsatility, and VExUS scores. Secondary outcomes included correlations with central venous pressure (CVP), NT-proBNP levels, cumulative fluid balance, and clinical outcomes.
Results: Among the 52 patients, 31 (60%) achieved successful fluid removal. Discontinuous IRVF patterns at baseline were significantly associated with successful fluid removal compared to continuous patterns (87.1% vs. 42.9%, $p = 0.014$). Baseline IRVF patterns demonstrated the highest accuracy among all parameters, with a sensitivity of 87.1% and a specificity of 42.9%. Decreases in VExUS scores from baseline to Day 3 were significantly correlated with reductions in CVP ($p = 0.036$) and cumulative fluid balance ($p = 0.006$). However, changes in IRVF or VExUS scores were not associated with significant differences in other clinical outcomes, including 28-day mortality, ventilator-free days, or ICU length of stay.
Conclusions: The initial IRVF pattern appears to be a promising tool for predicting successful fluid removal in critically ill patients. However, larger-scale studies are warranted to validate its clinical utility.

P201

Restrictive fluid management and early fluid de-escalation versus usual care in critically ill patients, a feasibility RCT study (REDUCE trial)

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Critical Care 2025, **29(S1)**:P201

Introduction: Optimal fluid management in critically ill patients is varies based on the phases of fluid therapy. This study evaluated the feasibility of incorporating restrictive fluid management with early de-escalation into standard care for critically ill patients with circulatory shock.
Methods: We conducted a single-center feasibility randomized controlled trial. Patients with circulatory shock were randomly assigned in a 1:1 ratio. The intervention group followed a protocol for fluid management, aiming for near-zero fluid balance over three days through the restriction of all fluid sources, the use of diuretics, or mechanical fluid removal as needed. The control group received usual care. The primary outcome was the cumulative fluid balance at three days. Secondary outcomes included intensive care unit (ICU) and hospital length of stay (LOS), duration of mechanical ventilation, incidence of acute kidney injury (AKI), need for renal replacement therapy (RRT), and mortality.
Results: One hundred patients were randomized to either the restrictive (n = 50) or usual care (n = 50) group. The restrictive group achieved significantly lower cumulative fluid balances by day 3 (− 2353.50 mL

vs. 792.50 mL, $p < 0.001$), a difference that persisted through day 7 (−3031.50 mL vs. 1125.00 mL, $p < 0.001$). ICU and hospital lengths of stay were shorter in the restrictive group (7 vs. 10 days, $p = 0.006$; 16 vs. 22 days, $p = 0.02$, respectively), and 30-day mortality was lower (10% vs. 28%, $p = 0.022$). No significant differences were observed in the incidence of AKI or the requirement for renal replacement therapy (RRT) between the groups.
Conclusions: Restrictive fluid management combined with early fluid de-escalation is both feasible and has the potential to reduce fluid accumulation, shorten ICU and hospital stays, and lower 30-day mortality without increasing adverse events in critically ill patients with circulatory shock.

P202

Assessing preload responsiveness in intensive care unit patients: the role of remote ischemic conditioning

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Critical Care 2025, **29(S1)**:P202

Introduction: While passive leg raising (PLR) is a widely used test to assess fluid responsiveness, it requires specific conditions and equipment. Remote ischemic conditioning (RIC), involving repeated cycles of brachial cuff inflation and deflation, not only demonstrates therapeutic benefits but also offers a practical alternative by inducing hemodynamic changes via neural pathways. We hypothesized that inflating a blood pressure cuff during the RIC procedure would result in an increase in stroke volume index (SVI) and that these changes would correlate with hemodynamic responses observed during PLR in intensive care unit (ICU) patients.
Methods: This prospective, single-center study was conducted in a general ICU at university hospital. A total of 48 adult ICU patients (aged > 18 years) monitored with PiCCO2 and scheduled for PLR tests were included. SVI was measured at several time points: before and during PLR, as well as in the supine position both before and during RIC (3 cycles of brachial cuff inflation to 200 mmHg for 5 min followed by 5 min of deflation). Preload responsiveness was defined as SVI increase ≥ 10% during PLR.
Results: 32 (67%) patients were in septic shock. Preload responders comprised 46% (22 out of 48). Inflation of the brachial cuff during RIC resulted in a significant increase in SVI ($p < 0.001$), with a strong correlation between PLR- and cuff first inflation- induced SVI changes ($r = 0.79$, $p < 0.001$). SVI increase > 5% during the cuff first inflation predicted PLR responsiveness (≥ 10% SVI increase) with 95% sensitivity and 84% specificity. The area under the receiver operating characteristics curve of the cuff first inflation assessed by SVI to detect preload responsiveness was 0.95 (0.89–0.99).
Conclusions: Brachial cuff inflation-induced changes in SVI during RIC demonstrated a novel and promising non-invasive approach for assessing preload responsiveness in ICU patients.
Acknowledgement: Study was funded by the Research Council of Lithuania (LMTLT), No S-MIP-23–79.

P203

The effectiveness of clinical decision support systems is dependent on compliance

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Critical Care 2025, **29(S1)**:P203

Introduction: Compliance to effective protocols can improve patient outcome [1]. For optimal perioperative fluid management, it is not only administering the appropriate amount of fluid but also delivering it at the right time. An ad-hoc analysis of data collected in the clinical validation of the Acumen Assisted Fluid Management (AFM) software was conducted to assess the impact of compliance to AFM fluid suggestions on patient hemodynamics. The AFM software is a clinical decision support system that resides on an advanced hemodynamic clinical monitor, and it notifies the caregiver when a patient may be in a fluid responsive state by providing a suggestion on the monitor screen.
Methods: In a pragmatic study across nine US sites, 330 subjects undergoing major non-cardiac surgery were included [2]. Caregivers were provided with AFM guidance during surgery, and it was their choice to give fluid in response to AFM suggestions. In the study, 289 cases had AFM fluid suggestions. These cases were grouped by compliance to AFM suggestions. High, Moderate and Low compliance were defined as delivering fluid in response to an AFM suggestion > 75%, > 25% and ≤ 75%, and ≤ 25% of the time.
Results: Whereas SV and MAP did not change consistently as compliance increased, SV variation trended lower as compliance increased (Table). There was also a trend to give more volume in response to AFM suggestions, and less volume as maintenance, as compliance increased while the overall amount of fluid administered was similar between all three groups.
Conclusions: The vigilance of a computerized clinical decision support system such as AFM has the potential to assist in patient care but the advice from these systems needs to be followed to be effective. Compliance with AFM suggestions is associated with more time in a fluid-independent state without giving additional volume.

References

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2. Maheshwari K et al. Anesthesiology. 2021;135:273–283

Table (abstract P203) 1 Hemodynamics and administered fluid volume for the three compliance groups

Compliance Subgroup	High (N = 114)	Moderate (N = 137)	Low (N = 38)	All (N = 289)
Compliance (%)	100 [92, 100]	53 [43, 67]	17 [5, 23]	67 [43, 100]
SV (mL/beat)	75 ± 20	73 ± 23	74 ± 25	74 ± 22
MAP (mmHg)	83 ± 14	84 ± 15	82 ± 15	83 ± 15
SVV (%)	10 ± 4	11 ± 6	12 ± 6	11 ± 5
All Fluid (mL)	2201 [1550, 3000]	2430 [1546, 3333]	2153 [1000, 3263]	2300 [1516, 3154]
Fluid boluses (mL)	1103 [550, 1550]	1125 [700, 1813]	763 [350, 1250]	1061 [588, 1700]
Maintenance fluid (mL)	905 [600, 1710]	1100 [470, 1763]	1236 [0, 2400]	1022 [538, 1810]

Data is presented as either the mean ± SD or median [IQR].

P204

Bioelectrical impedance analysis, fluid balance, and capillary leak index in critically ill patients

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Critical Care 2025, **29(S1)**:P204

Introduction: Fluid management is crucial in critically ill patients. Bioelectrical impedance analysis (BIA) measures total body water (TBW), intracellular water (ICW), and extracellular water (ECW). The Capillary Leak Index (CLI), derived from CRP and albumin, reflects endothelial permeability. This study examines their relationship with fluid balance.
Methods: This study included 15 critically ill patients with 62 BIA measurements over three days. BIA metrics were obtained at the bedside, and cumulative fluid balances were retrieved from electronic health records. CLI and BIA parameters were analyzed using Spearman's rank correlation.
Results: Significant correlations were found between CLI and both TBW ($\rho = 0.431$, $p < 0.001$) and ECW ($\rho = 0.435$, $p < 0.001$) (Table), indicating that higher CLI values are associated with extracellular fluid accumulation. CLI did not significantly correlate with the ECW/ICW ratio ($\rho = 0.089$, $p = 0.489$) or ECW percentage ($\rho = 0.089$, $p = 0.489$). Cumulative net fluid balance positively correlated with TBW ($\rho = 0.506$, $p < 0.001$), ICW ($\rho = 0.442$, $p < 0.001$), and ECW ($\rho = 0.495$, $p < 0.001$). Delta changes in cumulative fluid balance and body water compartments showed weak, non-significant correlations, likely due to the challenges of detecting short-term fluid shifts with BIA or limitations in fluid balance data accuracy.
Conclusions: BIA-derived parameters, including TBW, ICW, and ECW, correlated with cumulative fluid balance, confirming their role in assessing fluid status and extracellular shifts in critically ill patients. Associations with CLI highlight BIA's ability to capture systemic fluid changes linked to endothelial dysfunction. However, weaker correlations for changes in fluid balance and body water compartments reflect the complexity of short-term fluid dynamics. Unlike previous BIA studies, this research integrates CLI to enhance understanding of fluid shifts and systemic inflammation, offering new insights into fluid management and endothelial permeability in critical care.

Table (abstract P204) Spearman: correlation between Capillary Leak Index (CLI) and BIA-derived metrics (1–4) and correlation between cumulative fluid balance and BIA metrics (5–7); CLI is calculated as (CRP [mg/dL]/albumin [g/L]) × 100;—Cumulative fluid balance represents total intake minus total output recorded since ICU admission

Parameter	Spearman´s ρ	*p* value
1. TBW (L)	0.431	< 0.001
2. ECW (L)	0.435	< 0.001
3. ECW (%)	0.089	0.489
4. ECW/ICW Ratio	0.089	0.489
5. TBW (L)	0.506	< 0.001
6. ICW (L)	0.442	< 0.001
7. ECW (L)	0.495	< 0.001

P205

Fluid overload kidney injury score (kFOKIS): propensity score matching to predict mortality in the pediatric intensive care unit (PICU)

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Critical Care 2025, **29(S1)**:P205

Introduction: Observational studies in children have demonstrated the additive negative effects of oliguria, serum creatinine elevation, nephrotoxin exposure, and fluid overload on mortality. The current approach to management of acute kidney injury (AKI) relies on lagging biomarkers such as elevations in serum creatinine that lack specific actions for clinicians. We aim to identify children at highest risk of prolonged kidney dysfunction using an informatics-enabled clinical support tool, kFOKIS, that can suggest modifiable actions to prevent additional kidney injury. kFOKIS includes AKI based on KDIGO definition but gives separate points for fulfilment of oliguria and creatinine criteria, degrees of fluid overload, and nephrotoxin exposure (Table).
Methods: We conducted a single-center, observational cohort study of all patients admitted to the Texas Children's Hospital PICU, from January 1, 2021 through May 31, 2022. Our primary outcome was PICU mortality comparing patients who experienced a peak kFOKIS ≥ 4 to those with peak kFOKIS < 4. We conducted propensity score matching to control for confounding factors, matching patients based on comorbidities, primary diagnosis, receipt of mechanical organ support, and illness severity score upon admission.
Results: We included 4,254 patients in the primary analysis and matched 2,074 patients. Median age was 6.6 years, 33.6% of patients received invasive mechanical ventilation, and ICU mortality occurred in 118 cases (5.7%). Respiratory (33%), neurologic (12%), and infectious (11%) comprised the majority of primary diagnoses. Peak kFOKIS ≥ 4 was associated with an increased risk of mortality, adjusted OR 2.54 (1.42, 4.56).
Conclusions: Patients with elevated kFOKIS at any point in their PICU admission were more likely to experience mortality. Future prospective studies targeting reduction of kFOKIS are warranted to examine whether this clinical support tool can be used to modify clinical management strategies and improve patient outcomes.

Table (abstract P205) kFOKIS components. Fluid overload is calculated as peak net fluid balance indexed to admission weight

kFOKIS	0	1	2	3
Creatinine	no AKI	KDIGO Stage 1	KDIGO Stage 2	KDIGO Stage 3
Oliguria	no AKI	KDIGO Stage 1	KDIGO Stage 2	KDIGO Stage 3
Fluid overload	< 15%	15–20%	20–25%	> 25%
Nephrotoxin exposure*	< 3 nephrotoxins	3 nephrotoxins	4 nephrotoxins	5 or more nephrotoxins

P206

Impact of fluid balance on short-term mortality in critically ill patients with cardiogenic shock: comparison with septic shock

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Critical Care 2025, **29(S1)**:P206

Introduction: Fluid management is crucial in cardiogenic and septic shock, yet optimal strategies to improve survival remain unclear. This study evaluates the impact of cumulative fluid balance on short-term mortality (14 and 28 days) in cardiogenic shock and compares findings with septic shock data to propose practical recommendations.
Methods: Cardiogenic shock: Data from 385 ICU patients were analyzed, examining weekly fluid balances and their correlation with mortality at 14 and 28 days. Logistic regression assessed the relationship between cumulative fluid balance and survival probability.
Septic shock: Data from 778 patients [1] and the Surviving Sepsis campaign guidelines [2] were synthesized to define optimal and critical fluid thresholds.
Results: In cardiogenic shock, patients who died before day 28 had a lower cumulative fluid balance than survivors (+1731 mL vs. +4633 mL, $p < 0.001$). Logistic regression confirmed a significant inverse relationship between cumulative balance and 28-day mortality ($p < 0.001$); each 1 L increase reduced mortality risk (coefficient: −6.111e−05). However, fluid balance alone explained limited variability in outcomes (pseudo $R^2 = 0.03$). In septic shock, a fluid balance of ~3 L within 12 h improved survival, while overload (>11 L in 4 days) increased mortality. These findings suggest differing tolerances for fluid management between the two shock types (Table).
Conclusions: A more positive fluid balance improves survival in cardiogenic shock, while septic shock requires a restrictive approach. Tailored interventions and dynamic monitoring are essential to optimize outcomes, prevent overload, and improve survival in critically ill patients.

References

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2. Evans L et al. Crit Care Med. 2021;49:1063–1143

Table (abstract P206) Fluid balance thresholds and mortality comparison between cardiogenic and septic shock

Parameter	Cardiogenic shock	Septic shock
Number of patients	385	778
Optimal fluid balance	+4633 mL (survivors at day 28)	~3 L within the first 12 h
Critical fluid balance	>10 L cumulative over 7 days (increased mortality)	>11 L cumulative over 4 days (increased mortality)
Risk reduction per liter	-6.111e-05 (logistic regression)	Not available in synthesized studies
28-day mortality rate	28% (optimal fluid balance)	40% (fluid balance >11 L)
Key recommendations	Dynamic monitoring and weekly fluid balances	Initial resuscitation at 30 mL/kg + dynamic monitoring

P207

Endothelium protective effect of 5% human albumin-based fluid therapy in perforation peritonitis patients undergoing emergency laparotomy: a randomized controlled trial

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Critical Care 2025, **29(S1)**:P207

Introduction: Fluid resuscitation has been found to be associated with glycocalyx degradation. Albumin based fluid therapy may have protective effect on endothelial glycocalyx as it carries red blood cell derived sphingosine-1-phosphate (S1P) to the endothelium, where it can prevent glycocalyx breakdown by suppressing matric metalloprotease activity. However, no clinical model has evaluated effect of human albumin on endothelial dysfunction and glycocalyx shedding.
Methods: Adult patients undergoing emergency laparotomy for perforation peritonitis were recruited in this study. Patients received either 5% human albumin or Plasma-Lyte therapy as per randomization. Serum endothelial glycocalyx shedding products and inflammatory bio- markers were analyzed at baseline, 6 h and 24 h postoperatively.
Results: In this study, n = 50 patients were randomized and complete data of n = 48 patients were available. Baseline demographic, clinical and laboratory variables were comparable between the two groups. Median (IQR) values of syndecan-1, heparan sulphate, TNF-α, IL-1β, IL-6 & IL-10 were comparable at all time points (Figure). Repeated measured two- way ANOVA reported a significant interaction in heparan sulphate ($p = 0.026$), TNF-α ($p = 0.027$) and IL-10 ($p = 0.02$) between time point of measurement and type of fluid therapy. There was also a significant interaction in syndecan-1 between time points of measurement, type of fluid therapy and APACHE II score ($p = 0.015$). None of the secondary clinical outcomes were different between the study groups.
Conclusions: Albumin based intravenous fluid therapy may be associated with a time dependent decrease in syndecan-1 level in peritonitis patients undergoing emergency laparotomy. However, there was no improvement in any clinical outcome with albumin therapy. Our findings need validation in larger clinical trial.

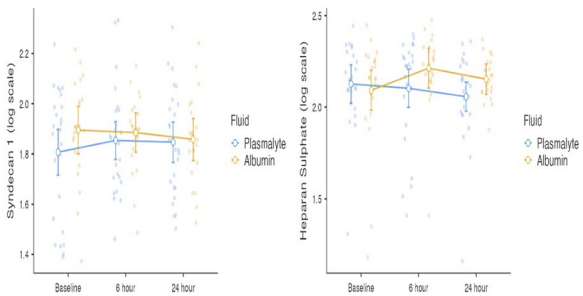

Figure (abstract P207) Syndecan-1 and heparan sulphate level in two groups

P208

Salt and survival: a novel approach to extreme hypernatremia in competitive sports

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Critical Care 2025, **29(S1)**: P208

Introduction: Hypernatremia, defined as serum sodium > 145 mmol/L, is common in critically ill patients. Extreme hypernatremia (> 190 mmol/L) is rare, with high mortality [1]. While typical causes include dehydration and salt ingestion, extreme weight-cutting practices in competitive sports are underreported. This case highlights the challenges and adaptations needed in hypernatremia management.
Methods: A 29-year-old athlete presented with seizures and unresponsiveness after severe dehydration via hot baths and fluid restriction to cut weight for competition. Initial serum sodium exceeded 190 mmol/L (Table), with acute kidney injury and metabolic encephalopathy. ICU management required deviations from standard hypernatremia protocols, including using a hypertonic dialysate in continuous veno-venous hemodiafiltration (CVVHDF). The dialysate initially matched the patient's serum sodium and was gradually reduced by titrating hypertonic saline, ensuring a slower correction rate. Multidisciplinary care addressed systemic complications.
Results: Sodium was cautiously lowered by approximately 8–10 mmol/L/day to avoid osmotic demyelination syndrome. Imaging revealed metabolic brain injury. Despite metabolic stabilization, neurological deficits required prolonged ICU care. Neurorehabilitation resulted in assisted walking after two months, though mild motor deficits persisted.
Conclusions: This case emphasizes the risks of extreme weight-cutting and the critical need for flexible, individualized sodium correction strategies when standard protocols are inadequate. By tailoring CVVHDF, we safely managed sodium correction. Multidisciplinary care was essential to address systemic and neurological sequelae. Greater awareness and proactive intervention are crucial to prevent similar cases.
Acknowledgement: Written consent to publish was received from the patient.

Reference
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Table (abstract P208) Parameters

Marker	On admission	24 h	48 h	7 days
Sodium (mmol/L)	> 190	185	171	140
Potassium (mmol/L)	6	3.9	4.5	4.3
pH	7.17	7.3	7.32	7.33
Anion gap (mmol/L)	Could not compute	26.3	18.4	8.7
Hematocrit (%)	0.64	0.54	0.47	0.28
Urea (mmol/L)	20.7	24.7	21.6	7.5
Creatinine (µmol/L)	642	826	802	358

P209

Prevalence of septic cardiomyopathy in sepsis and septic shock using echocardiography-based tools

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Critical Care 2025, **29(S1)**:P209

Introduction: Septic cardiomyopathy (SCM) is a reversible myocardial dysfunction in sepsis or septic shock, with a widely variable incidence of 10% to 70% due to the lack of specific diagnostic criteria. This study aimed to evaluate the prevalence of SCM using different echocardiography-based diagnostic tools.
Methods: A single-center, prospective observational study was conducted at a tertiary reference hospital from March to September 2024. Transthoracic echocardiography (TTE) and hemodynamic assessment were performed within 48 h of enrolment. The diagnosis of SCM was made using four diagnostic criteria: left ventricular ejection fraction (LVEF < 50% or ≥ 10% reduction from baseline), cardiac power output (CPO < 0.6 W), afterload-related cardiac performance (ACP < 80%), and left ventricular stroke work index (LVSWI < 33 J/m^2) following values reported in the literature.
Results: Seventy patients (mean age 60 ± 16 years; 60% males) were enrolled in the study. The median SOFA score was 10 [9–11], mean APACHE II score was 20 ± 6, mean SAPS II score was 45 ± 14, and median VIS was 40[20–59]. The lowest rate of SCM was observed in patients diagnosed using LVEF, at 16 (22.9%). For CPO-based diagnosis, 21 (31.3%) patients had SCM, while the SCM rate in the ACP group was 41 (61.1%). The highest rate of SCM was observed in the LVSWI group, at 22 (66.6%). LVEF, as the conventional criterion for SCM, was used as the standard for comparison. Fisher's exact test was performed to compare the incidence of SCM diagnosed using LVEF and CPO ($p = 0.207$) and LVEF and LVSWI ($p = 0.375$). Pearson's Chi-square test was used to compare LVEF and ACP ($p = 0.914$). These analyses revealed no significant correlation between SCM diagnosed using LVEF and other diagnostic criteria.
Conclusions: SCM rates vary depending on the diagnostic criteria used. Compared to the conventional LVEF-based criterion, all other methods showed higher and differing rates of SCM diagnosis, potentially reflecting clinically significant factors associated with clinical outcomes.

P210

Transthoracic echocardiography for hemodynamic evaluation and survival prognostication in patients with sepsis and septic shock

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Critical Care 2025, **29(S1)**:P210

Introduction: Transthoracic echocardiography (TTE) evolved as a readily available, reliable and precise method for hemodynamic evaluation in intensive care. In septic patients, cardiac involvement is evident but poorly described. This study aimed to evaluate cardiac function in septic patients and link it to clinical outcomes.
Methods: A single-center, prospective observational study was conducted at a tertiary reference hospital from March to September 2024. This study included mixed ICU patients with de novo cases of septic shock receiving at least 0.1 mcg/kg/min norepinephrine infusion. TTE was performed within 48 h of enrolment to assess left ventricular ejection fraction (LVEF), cardiac output (CO), cardiac index (CI), cardiac power output (CPO), cardiac power index (CPI), and afterload-related cardiac performance (ACP). Twenty-eight days of survival was selected as a clinical outcome. ROC AUC analysis was performed to determine which TTE parameters can be employed as survival predictors.
Results: Seventy patients were included in the analysis, comprising a critical care cohort with a mean age of 62 ± 16 years, APACHE II score of 20 ± 6, and SOFA score of 10 ± 2. The TTE parameters measured were LVEF (55 ± 11)%, CO (5.0 [3.8–6.8]) L/min, CI (2.1 [1.7–2.9]) L/min/m^2, CPO (0.86 [0.71–1.21]) W, CPI (0.39 [0.31–0.50]) W/m^2, and ACP (78 ± 13)%. In ROC-AUC analysis LVEF ($p = 0.716$), CPO ($p = 0.087$), CPI ($p = 0.117$), ACP ($p = 0.102$) and CI ($p = 0.06$) were not significant determinants of survival. However, CO emerged as a determinant of survival, with a ROC AUC of 0.647 (95% CI: 0.51–0.78, $p = 0.039$).
Conclusions: TTE is a valuable tool for assessing hemodynamic parameters in septic patients, with TTE-derived CO showing promise for survival prognostication. Further analysis with a larger sample

group is needed to validate these findings and assess the potential of other TTE diagnostic applications.

P211

Safety, tolerability and pharmacokinetics/-dynamics of the dipeptidyl peptidase 3 antibody procizumab in a first-in-human, placebo-controlled, phase 1 trial

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Critical Care 2025, **29(S1)**:P211

Introduction: Dipeptidyl peptidase 3 (DPP3), an aminopeptidase that degrades several key cardiovascular mediators, may induce and exacerbate hemodynamic instability during cardiogenic shock. Procizumab is a first-in-class humanized monoclonal antibody, which inhibits DPP3. In placebo-controlled preclinical shock models, procizumab was shown to increase angiotensin metabolite levels, and improve cardiovascular function as well as survival. The present trial evaluated the safety, tolerability, and pharmacokinetics (PK)/-dynamics of procizumab in a first-in-human phase 1 trial.
Methods: Twenty-four healthy male volunteers were enrolled in a randomized, double-blind, placebo-controlled phase 1 trial. Subjects received placebo or one of three doses of procizumab (n = 6 per group). Subjects were monitored clinically for 24 h after drug administration, as well as 6 follow-up visits performed during a 28 day period (Figure).
Results: Procizumab exhibited an excellent safety profile, demonstrated by local tolerability, vital signs, laboratory parameters and ECGs. No serious adverse events (SAEs) occurred during the trial. In all three dose groups, the Cmax was attained at or shortly after termination of infusion. Dose-proportional increases in Cmax and AUC0–∞ were observed. A small volume of distribution indicates that procizumab predominantly remains within the circulation. Procizumab exhibited a short half-life compared to other monoclonal IgG antibodies (terminal elimination T½ of ~ 53 h in the high dose group). This short half-life could be a characteristic of the antibody or caused by target mediated drug disposition (TMDD), with procizumab-DPP3 complexes tending towards rapid clearance kinetics, as known for DPP3.
Conclusions: Administration of procizumab was safe and well tolerated in healthy males. Results of this trial will be followed up by a phase 1B safety and optimal dose finding trial in cardiogenic shock patients, which will be initiated in early 2025.

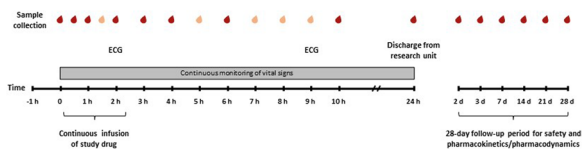

Figure (abstract P211) Summary of all procedures performed in the first-in-man trial. ECG = electrocardiography, h = hour, d = day

P212

Angiotensin II in the management of refractory septic shock

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Critical Care 2025, **29(S1)**:P212

Introduction: Septic shock may not respond to a single vasopressor. Angiotensin II (AT-II) has been studied as vasopressor in shock since 1960s. ATHOS-3 study evidenced how shocked patients treated with AT-II significantly reached aimed pressure response significantly than controls [1]. Post-hoc analyses of the ATHOS-3 study shed a light on possible best subgroup responders. We aimed at evaluating how AT-II treatment may reduce other vasopressor doses (norepinephrine and vasopressin) and improve hemodynamic profile within 48 h in patients with refractory septic shock.
Methods: Adult septic shock patients, belonging to the REINSURE-ARDS Registry (Prog 1946CESC, Prot 72485), refractory to 2 vasoactive agents, despite adequate volume resuscitation and without cardiac dysfunction, were eligible to be trated with AT-II [GIAPREZA, Viatris]. We asked CTAV authorization for every patient. Patients with arterial ischemic syndrome and/or venous thrombosis within 6 months were excluded. We recorded clinical and hemodynamic variables (TPTD, VolumeView, Edwards Lifesciences) before AT-II infusion, after 2 h from infusion start and then every 8 h.
Results: 9 patients (6 men) were included in this study, median age 64 (58,74) yrs, median BMI 28.3 (24.1,34.2), median APACHE II score 22 (20,30); 5 patients had a history of hypertention and 5 were treated with ACEi/ARB drugs. All patients had sepsis related AKI. AT-II infusion was related to a significant decrease in NE and VP dose ($p = 0.007$ and 0.247, respectively); MAP and SVRI increased ($p = 0.008$ and 0.071, respectively), while HR decreased ($p = 0.305$). Ea increased during the first hrs of treatment, decreasing significantly after 24 h ($p = 0.025$) (Figure). No adverse effects were recorded.
Conclusions: Beside obvious limitations of our study, AT-II demonstrated to act as an interesting tool to treat refractory septic shock and treat adrenergic overload side-effects.

References

1. Khanna A et al. N Engl J Med. 2017;377:419–30.
2. Legrand et al. Crit Care 2024;28:389

Variable	G0 - T0	G0 - T1	G0 - T2	G0 - T3	G1 - T1	G1 - T2	G1 - T3	p value *
Angiotensin II ng/kg/min	0.00 (0.00, 0.00)	20 (20, 20)	20 (10, 30)	15 (5, 25)	25 (15, 38)	30 (20, 30)	20 (10, 30)	0.014
Norepinephrine mcg/kg/min	0.60 (0.60, 0.80)	0.40 (0.30, 0.60)	0.25 (0.20, 0.50)	0.30 (0.20, 0.50)	0.45 (0.23, 0.60)	0.18 (0.05, 0.33)	0.25 (0.15, 0.35)	0.007
Vasopressin UI/min	0.03 (0.03, 0.04)	0.03 (0.01, 0.04)	0.02 (0.00, 0.03)	0.00 (0.00, 0.00)	0.03 (0.00, 0.04)	0.02 (0.00, 0.03)	0.01 (0.00, 0.02)	0.247
CI l/min/m^2	3.3 (2.7, 4.6)	3.6 (3.4, 4.7)	3.4 (3.1, 5.1)	5.0 (4.0, 5.2)	3.9 (2.8, 4.7)	3.9 (3.3, 5.5)	4.9 (4.1, 6.0)	0.297
Ea (mmHg/mL)	1.4 (0.9, 1.5)	1.5 (1.3, 1.5)	1.8 (1.2, 2.1)	1.6 (1.5, 1.8)	1.4 (1.1, 1.8)	1.4 (1.0, 1.8)	1.1 (0.9, 1.2)	0.025
HR bpm	119.0 (107.0, 128.5)	107.5 (96.5, 127.0)	118.0 (98.0, 126.0)	113.0 (115.0, 115.0)	97.0 (89.0, 116.0)	102.5 (96.0, 110.0)	103.0 (96.0, 108.5)	0.305
MAP mmHg	66.5 (57.0, 71.5)	80.5 (63.0, 87.5)	78.0 (75.0, 86.0)	82.0 (80.0, 94.0)	71.0 (65.0, 80.0)	82.5 (66.0, 86.0)	69.0 (66.0, 80.5)	0.008
SVI ml/beat/m^2	37.0 (31.0, 41.0)	40.0 (29.0, 43.0)	32.0 (29.0, 48.0)	43.0 (36.0, 45.0)	39.5 (29.5, 48.5)	38.0 (33.0, 48.0)	42.0 (37.0, 53.0)	0.524
SVRI (dyne x s/cm^5)	942.0 (562.0, 1,339.0)	1,152.0 (949.0, 1,509.0)	1,373.0 (875.0, 1,841.0)	1,024.0 (932.0, 1,527.0)	1,213.5 (958.5, 1,481.5)	1,333.0 (707.0, 1,588.0)	982.0 (932.0, 1,011.0)	0.071

Figure (abstract P212) Angiotensin II infusion related changes

P213

Angiotensin 2 in septic shock, non-responders fail to RAAS?

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Critical Care 2025, **29(S1)**:P213

Introduction: A post-hoc analysis of the ATHOS 3 trial showed an association with a high baseline renin and a reduction in mortality for patients treated with angiotensin 2 [1]. We assessed the renin–angiotensin–aldosterone-system (RAAS) in patients treated with angiotensin 2.
Methods: Patients with septic shock and a noradrenaline dose > 0.2 µg/kg/min were included and treated with angiotensin 2 for at least 24 h. Blood samples were drawn before start, after 3 and 24 h. A target MAP of ≥ 65 mmHg was maintained and patients were

deemed a responder to angiotensin II if a reduction in noradrenaline dose of > 25% was achieved.
Results: Ten patients were included, six patients responded to angiotensin 2 with a median reduction of noradrenaline dose of 72%. Non-responders showed higher median baseline SOFA score 13 (IQR 10.8–15.3) versus 8.5 (IQR 6.5–9.8), noradrenaline dose 0.23 (IQR 0.20–0.26) versus 0,51 (IQR 0.41–0.64) mcg/kg/min. The Figure shows the RAAS cascade over time. Baseline renin was higher in non-responders (446 (IQR 273–691) versus 282 (IQR 95–369) µU/mL). Baseline angiotensin I/II ratio was similar between responders and non-responders (2.1 versus 2.3) suggesting similar ACE activity. Median angiotensin II dose was higher in non-responders at 3 h (37.4 versus 23.8 ng/kg/min) and 24 h (40 versus 18 ng/kg/min), accordingly the angiotensin II plasma concentration was also higher at 3 h (1021.4 (IQR 593–1069) versus 612 (IQR 314–886) µU/mL). Patients responding to angiotensin 2 showed a decline in plasma renin concentration at 24 h.
Conclusions: In conclusion, in non-responders there seemed an inability to activate the angiotensin-2-receptor or its downstream pathway, illustrated by successfully achieving a high plasma concentration of angiotensin II with an absence of a negative feedback mechanism.

Reference

1. Bellomo R et al. Am J Respir Crit Care Med. 2020;202:1253-1261.

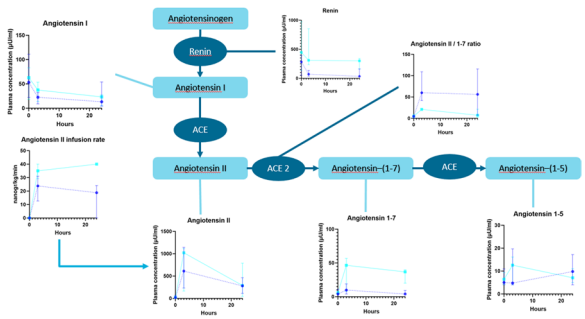

Figure (abstract P213) A simplified representation of the renin–angiotensin–aldosterone system. The plasma concentrations of renin, angiotensin 1 and angiotensin 2 are displayed as well as the angiotensin 2 dose; straight light blue lines represent non-responders to angiotensin 2, dashed dark blue lines represent responders to angiotensin 2

P214

Early Giapreza (angiotensin II) impact on microcirculation in decompensated septic distributive shock—pilot study

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Critical Care 2025, **29(S1)**:P214

Introduction: Angiotensin II (ATII) effect on microcirculation is only a hypothesis and was never compared in clinical trials. The aim of this study was to evaluate microcirculation in distributive septic shock patients, while using ATII as a second vasopressor.
Methods: Patients hospitalized in the general intensive care unit of the Hospital of Lithuanian University of Health Sciences Kaunas Clinics with distributive shock, noradrenaline (NA) higher than 0.2 mcg/kg/min and need for a second vasopressor to maintain mean arterial pressure (MAP) were included. Primary endpoint was to compare microcirculation changes within an hour after initiation of ATII. We analyzed microcirculation using Automatic Vascular Analysis software 3.2. Flow characteristics of the microvasculature were quantified using the microcirculatory flow index (MFI) according to the recommendations from the consensus on microcirculatory imaging by De Backer et al. [1].
Results: 7 patients were analyzed. Median of predicted in hospital mortality by simplified acute physiology score (SAPS) II was 89.9% (73.6; 98.4). The doses of ATII differed from 15 ng/kg/min to 40 ng/kg/min. There were no statistically significant differences comparing microcirculation before trial and 1 h after (MFI, $p = 0.851$; total vessel density, $p = 0.576$; perfused vessel density, $p = 0.494$; proportion of perfused vessels, $p = 0.758$). No statistically significant differences were observed in microcirculation parameters before and after ATII administration. Otherwise, a tendency towards improving microcirculation was observed in all analyzed parameters. (Figure).
Conclusions: This pilot study suggests that ATII may have a positive influence on microcirculation in distributive septic shock patients.

Reference

1. De Backer D et al. Crit Care. 2007;11:R101

Figure (abstract P214) Changes of microcirculation

P215

The impact of angiotensin II on hemodynamic stabilization in refractory septic shock: a single-center experience

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Critical Care 2025, **29(S1)**:P215

Introduction: Septic shock is a life-threatening condition characterized by refractory hypotension despite standard therapy. Angiotensin II (AT2) has been introduced as a vasopressor for managing these critical cases. This study evaluates the hemodynamic and metabolic effects of AT2 in patients with septic shock.
Methods: This study included 14 critically ill patients treated with AT2 in the ICU of the Clinic for Infectious Diseases, University Medical Centre Ljubljana. Data on demographics, sepsis etiology, APACHE II and SOFA scores, mean arterial pressure (MAP), lactate levels, and clinical outcomes were analyzed.
Results: The median age of patients was 58 years, with 11 (78.6%) being male. Common sepsis sources were pulmonary (42.9%) and abdominal (21.4%). The median APACHE II score was 25.5, and the median SOFA score was 13.0, reflecting severe illness. Median MAP increased from 65.0 mmHg before AT2 to 69.0 mmHg after therapy. Median lactate levels were 16.0 mmol/L. AT2 was initiated at a mean

norepinephrine dose of 0.92 µg/kg/min (range: 0.4–1.3 µg/kg/min). Despite partial hemodynamic improvements, mortality was 78.6%. Survivors showed better baseline stability (higher MAP, lower APACHE II and SOFA) and improved metabolic responses (lactate). No significant ischemic events or arrhythmias were observed.
Conclusions: This analysis highlights that included patients were critically ill, as evidenced by high APACHE II and SOFA scores, and that AT2 therapy was initiated relatively late. While AT2 provided partial stabilization, the high mortality underscores the severity of septic shock. Early and aggressive interventions, including optimal timing of AT2, may improve outcomes.

P216

Variation in reinforcement learning-guided treatment by clinical sepsis subtype

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Critical Care 2025, **29(S1)**:P216

Introduction: Sepsis is a heterogenous syndrome, and the leading cause of mortality among hospitalized patients. Reinforcement-learning (RL) algorithms are proposed to individualize resuscitation for septic patients in intensive care. It is unknown how these RL models perform across different clinical sepsis subtypes.
Methods: In a retrospective cohort study of 14 hospitals in Western Pennsylvania from January 1, 2013, to December 31, 2017, patients were categorized into four clinical sepsis subtypes (α, β, γ, δ) based on characteristics at time of admission to intensive care following the Sepsis Endotyping in Emergency Care (SENECA) approach. A validated RL model (AI Clinician) was implemented to generate a precision treatment policy of intravenous (IV) fluids and vasopressors for the entire cohort during the initial 48 h of intensive care. The recommended treatment policies and a bootstrapped estimate of expected 90-day mortality were compared between the AI Clinician and clinical team by sepsis subtypes.
Results: A total of 6,136 patients (mean age 64 (SD 16) years, 50% male gender, mean Elixhauser comorbidity index: 5.2 (SD 2.3), mean SOFA score: 6.6 (SD 3.2)) were included. Compared to the clinical team, the AI Clinician recommended, on average, less intravenous fluids (15.6% vs. 31.9% recommended > 700 mL) and more vasopressors (1.3% vs 0.8% recommended > 0.5 ug/kg/min) independent of sepsis subtype. Adherence to AI Clinician recommendations resulted in a significant decrease in expected 90-day mortality in the most seriously ill δ-subtype patients only (42.5% vs. 44.1%, $p < 0.0001$) (Figure), for which there was the largest discrepancy in IV fluid recommendations by the AI Clinician compared to the clinical team (12.0% vs. 38.7% recommended > 700 mL).
Conclusions: Reinforcement learning models differ in performance across clinical sepsis subtypes, with greater relative benefit among those delta-type patients in intensive care.

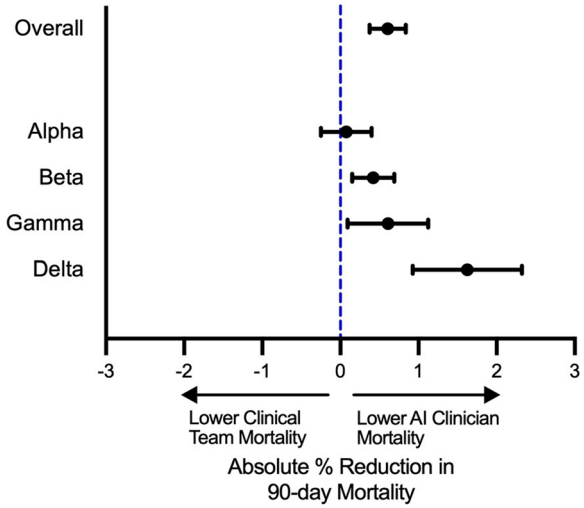

Figure (abstract P216) Absolute percentage reduction in expected 90-day mortality between AI clinician and human clinical team by sepsis subtype

P217

Concordance of Co_2 gaps measured using peripheral and central venous blood in patients diagnosed with septic shock

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Critical Care 2025, **29(S1)**:P217

Introduction: The venous-arterial CO_2 difference (Pv-aCO_2) is a key marker for tissue perfusion and cardiac output. While mixed venous Pv-aCO2 is the gold standard, central venous sampling is commonly used due to its correlation with mixed venous values. However, central venous access is invasive. This study aims to evaluate the correlation between peripheral venous Pv-aCO_2 (Pv-aCO_2p) and central venous Pv-aCO_2 and explore peripheral sampling as a less invasive alternative.
Methods: We conducted a prospective study with septic shock patients, all of whom had central venous catheters within 24 h of ICU admission. Blood samples were taken from central venous, peripheral venous, and arterial sites in 54 patients. We calculated Pv-aCO_2 by subtracting arterial PCO_2 from venous PCO_2 values from both sites.
Results: Among the participants, 51.9% were male, with an average age of 70 years. The mean PCO_2 difference between peripheral and arterial samples was 8 mmHg, and between central and arterial samples, it was 6 mmHg. A statistically significant, moderate positive correlation was found between PCO_2 differences from peripheral and central sites ($r = 0.593$, $p < 0.001$). Bland–Altman analysis also revealed a significant mean difference of 8.278 mmHg between arterial and peripheral PCO_2 values.
Conclusions: Pv-aCO_2p measurements from peripheral venous blood show a strong linear correlation with central venous values, offering a reliable alternative for assessing tissue perfusion when central venous access is not feasible. In patients with septic shock, where central venous catheterization may not be routinely performed, evaluating peripheral venous blood provides an effective way to monitor the venous-arterial CO_2 difference (Pv-aCO_2p). This approach allows for a timely assessment of circulatory efficiency, particularly in determining whether cardiac output meets the metabolic demands of tissues in septic shock, thus enhancing therapeutic decision-making.

P218

The international, prospective COSMOS (CytoSorb treatment of critically ill patients) registry: interim results from the first 230 patients

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Critical Care 2025, **29(S1)**:P218

Introduction: The International COSMOS Registry collects real-world data on the use of CytoSorb (CS) hemoadsorption in critically ill patients.
Methods: Since July 2022, the registry has enrolled critically ill patients treated with CS integrated with standard care. Data were collected: 24 h before, during, and 24 h after CS therapy, as well as at ICU discharge, hospital discharge, and day 90 follow-up. Results are presented as mean ± SD or median [Q1, Q3].
Results: A total of 230 patients (33% female, mean age 59 ± 16 years) from 21 sites in Germany, Italy, Spain, and Portugal were enrolled. Indications for CS included septic (56.6%), cardiogenic shock (13.1%), rhabdomyolysis (14.0%), liver failure (12.2%), and acute respiratory distress syndrome (ARDS; 5%). The mean number of adsorbers used per patient was 3.2 ± 3.4, with 26% requiring ≥ 4 adsorbers. CS platforms included renal replacement therapy (68.8%), standalone hemoperfusion (10.7%), and extracorporeal membrane oxygenation (ECMO; 5.1%). Baseline APACHE II and SOFA scores were 24 [17–30] and 12 [9–14], respectively, with a median ICU stay of 20 [11–37] days. After CS, lactate and creatinine levels decreased significantly ($p < 0.0001$), while albumin remained unchanged ($p = 0.12$). Fluid balance improved, from + 1372 [163–3095] pre-treatment to + 150 [− 850 to 1500] mL post-treatment, while norepinephrine requirements decreased from 0.22 [0.09–0.39] to 0.09 [0.02–0.23] µg/kg/min ($p < 0.0001$ for both). PaO_2/FiO_2 improved from 132 [72–208] to 174 [105–254] ($p < 0.0001$, Figure). Platelet counts decreased (from 127 [86–186] to 76 [44–125]*10^3/mL, $p < 0.0001$), primarily in the septic cohort. ICU mortality was 31.1% (33.3% in septic shock), lower than predicted by scores.
Conclusions: These real-world data with CS integrated into standard care for critically ill patients, showed significant improvements in key therapeutic targets, including norepinephrine and fluid requirements, lactate levels, and oxygenation, with observed mortality lower than predicted by risk scores.

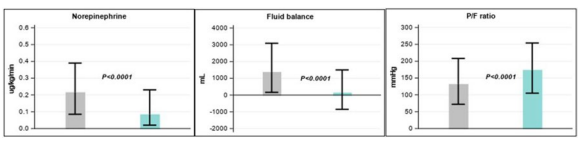

Figure (abstract P218) Changes in norepinephrine, fluid balance and P/F ratio in 24 h periods before (grey) versus after CytoSorb® treatment (blue), data are presented as median and interquartile range

P219

Hemoadsorption with CytoSorb® in patients with septic shock

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Critical Care 2025, **29(S1)**:P219

Introduction: Septic shock presents with multiorgan dysfunction caused by a dysregulated response to infection and is associated with high mortality. In an effort to reduce mortality, new adjuvants therapies have emerged, such as adsorption with filters like CytoSorb®. Hemoadsorption removes inflammatory cytokines and bacteria toxins, to try to reduce inflammation and vasoplegia, characteristic of septic shock.
Methods: The data was collected between 2022 and 2024 from an ICU in Hospital Curry Cabral, Portugal. The patients were in septic shock and requiring norepinephrine doses above 0.5 mcg/kg/min. All had invasive hemodynamic monitoring and started therapy with hydrocortisone according to the Guidelines of the Surviving Sepsis Campaign of 2021. When patients needed, they initiated renal replacement therapy, adding an adsorption filter, Cytosorb®. The variables calculated and presented are frequency, median and interquartile range.
Results: We identified 14 patients in septic shock, with main source being abdominal (45%), followed by respiratory (27%). The age median was 53 (33–66.5). In admission to ICU, the median of number of organs dysfunction was 3, the median of calculated APACHE score was 26 (15–32), SAPS II score was 55 (32–74) and SOFA score was 11 (6–11). Before treatment, 54% patients had severe hepatic dysfunction. Comparing parameters before and after treatment: the median of Interleucine-6 pre-treatment was 14,168 pg/dL (462–50,000) and after was 576 pg/dL (89.1–2478), with a reduction of 88.8% (66.7–97.4). The reduction observed in serum lactate levels was 51.2%. The dose of norepinephrine before treatment was 0.83 mcg/kg/min (0.67–1.02), and after treatment was 0.17 mcg/kg/min (0.02–0.42), with a reduction of 75.2% (51.8–96.8).
Conclusions: Maybe hemoadsorption with Cytosorb® is an option to reduce inflammation and gain hemodynamic stability in patients with septic shock. There is need for more trials to define the patients who will benefit most from this adjuvant therapy.

P220

Potential savings associated with faster septic shock resolution in the ICU: An exploratory analysis of extracorporeal hemoperfusion using the Efferon LPS device

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Critical Care 2025, **29(S1)**:P220

Introduction: Extracorporeal hemoperfusion (EHP) using the Efferon LPS adsorber was recently shown to result in faster resolution of septic shock compared with a conventional protocol in patients with intra-abdominal sepsis (ClinicalTrials.gov NCT04827407) [1]. We present an exploratory analysis of the potential healthcare resource utilisation (HCRU) savings from such faster septic shock resolution.
Methods: We designed a decision-analytic model to compare HCRU associated with Efferon LPS and the conventional approach. The models used a daily cycle over 6-day and 28-day time horizons to project HCRU. HCRU consisted of intensive care unit (ICU) and hospital lengths of stay, as well as requirements and durations of mechanical ventilation (MV). The analysis was scoped on 50 septic shock patients. All parameters were informed and interpolated from the trial results. Threshold and sensitivity analyses were performed to determine the robustness of the results to parameter uncertainties.
Results: For 50 patients whose septic shock is treated with Efferon LPS instead of the conventional approach, Efferon LPS could save up to 105 days of MV in total, a reduction of -20.7% (2.1 MV days per patient). Total ICU and hospital length of stay would be reduced by 200 days (− 24.6%; 4.0 ICU days per patient) and 248 days (− 20.8%; 5.0 hospital days per patient), respectively. These results were robust to sensitivity analysis.
Conclusions: Faster resolution of septic shock with the Efferon LPS treatment could lead to significant savings in the ICU. This is

particularly noteworthy in our increasingly cost-constrained healthcare systems, of which ICUs are no exception. Further observational research is warranted to confirm the results of this RCT-based modelling analysis.

Reference

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P221

Deterioration of the circadian rhythm in sepsis

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Critical Care 2025, **29(S1)**:P221

Introduction: It is considered that the normal circadian cycle is disturbed in sepsis. However, proof coming from over-hour measurements is missing. In this prospective cohort study over-time circadian levels of melatonin and cortisol were measured and associated with the severity of sepsis.
Methods: 43 individuals in total participated in the study; 25 with sepsis according to the Sepsis-3 definitions hospitalized in an ICU; 15 critically-ill comparators for causes other than sepsis hospitalized in the same ICU; and 3 fully healthy individuals. Blood was sampled every 4 h for 3 consecutive days and on day 7 at specific timepoints (08:00, 12:00, 16:00, 20:00, 00:00, 04:00). Cortisol and melatonin were measured by an enzyme immunosorbent assay. All the patients and healthy controls were asked to complete the Munich ChronoType Questionnaire and Pittsburgh Sleep Quality Index (PSQI) on the first and second months following discharge to assess their adaptation back to normal environment and phone-call follow up was done on day 90.
Results: Complete dysregulation of melatonin was found (Figure). The median area under the curve of melatonin was 1424 (405.0–2761) for non-sepsis patients, 2600 (1615–4078) for sepsis patients and 586 pg/mL/h (581–933) for healthy controls. Similar dysregulation was found for cortisol and median AUCs were 381.3 (244.6–898.2), 692.4 (441.3–980.0) and 210.4 µg/mL/h (179.6–231.2) respectively ($p < 0.05$). 65% of patients recovering from sepsis presented with difficulty returning to their usual environment again following discharge from the hospital, as assessed by the dispensed questionnaires.
Conclusions: The huge discrepancies between cortisol and melatonin levels from normal values indicate severe malfunction of the central pacemaker in sepsis, introducing direct impact not on the main clock of the central nervous system.

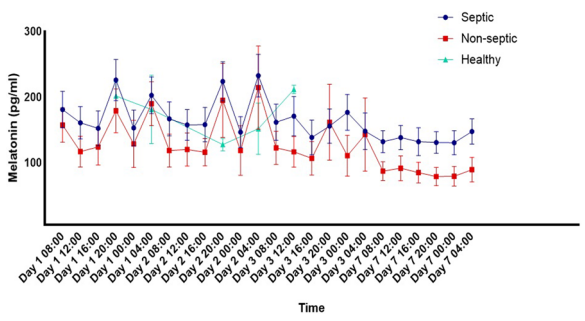

Figure (abstract P221) Plasma melatonin levels for in sepsis patients, critically-ill comparators and healthy individuals

P222

Artificial intelligence (AI) to predict sepsis early in patients admitted to intensive care unit (ICU)

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Critical Care 2025, **29(S1)**:P222

Introduction: Sepsis is a complex, life-threatening syndrome with a reported overall mortality rate of up to 40%. The intensive care unit (ICU) patients developing sepsis require timely medical intervention. Hence, early detection and prediction of sepsis is crucial to improve patient outcomes. Advances in artificial intelligence (AI), machine learning (ML) algorithms are being utilized to predict sepsis and help physicians in clinical decision on appropriate management approach. The objective of the current study was to test the predictive performance of ML strategy in early sepsis prediction in ICU and to develop ML model(s) to predict sepsis early in patients in ICU.
Methods: This is a non-interventional, single center, retrospective and descriptive study. Patients were included in the study if they were ≥ 18 years and were diagnosed with sepsis after admission to the ICU were included in cohort 1. Adult patients without sepsis, who were being treated in the ICU, were included in cohort 2. AI-based models were used to predict sepsis (based on Sepsis-3 criteria) using real time series real intensive care patient data (recorded on Metavision-iMDsoft) fed in a Long short-term memory (LSTM) and eXtreme Gradient Boosting (XGBoost) model.
Results: In the LSTM model at 24 h, 56% accuracy was achieved. The XGBoost model was able to predict sepsis positive patients at 24 h with 73% accuracy. Furthermore, the model was able to predict qSOFA positive patients at 4-, 8-, and 12- hours, t with 92%, 93%, and 93% accuracy, respectively.
Conclusions: Using the XGBoost model and qSOFA may be useful in sepsis prediction. For the future, integration of biomarkers like IL-6, the utilization of standardized criteria such as Sepsis-3 and qSOFA and leveraging robust datasets can collectively contribute to enhancing sepsis prediction accuracy and facilitating improved patient outcomes.

P223

Study of microcirculation and NIRS in sepsis-induced coagulopathy

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Introduction: In this prospective observational study we aimed to evaluate the relationship between sepsis-induced coagulopathy (SIC) and alterations in microcirculation and tissue oxygenation [1–3].
Methods: We included adult patients with sepsis (< 24 h). Exclusion criteria: age < 18, coagulopathy unrelated to sepsis, conditions affecting sublingual microcirculation, and lack of informed consent. Sublingual microcirculation and thenar tissue oxygenation (with vascular occlusion test) were assessed with incident dark field imaging and near infrared spectroscopy (NIRS) at recruitment (T0) and at day 4 (T4). Coagulopathy was defined by a SIC score ≥ 4.
Results: N = 23 (M 12, F 11). Mean age: 55 ± 16 years, all mechanically ventilated and sedated. Mean SOFA at T0 9 ± 2. Thirteen patients had SIC, and 3 had DIC. Patients with SIC tended to show lower microvascular flow index and percentage of perfused vessels at T0 (not significant). Total vessel density decreased in SIC patients over time, while it increased in non-SIC patients. StO2 Downslope was higher in SIC patients at T0, indicating reduced tissue oxygen extraction. StO2

Upslope (a measure of microcirculatory reactivity) was lower in SIC patients (Figure).
Conclusions: Patients with SIC may have more severe alterations in microvascular flow, reduced tissue oxygen extraction capacity and lower microvascular reactivity as compared to those without SIC.

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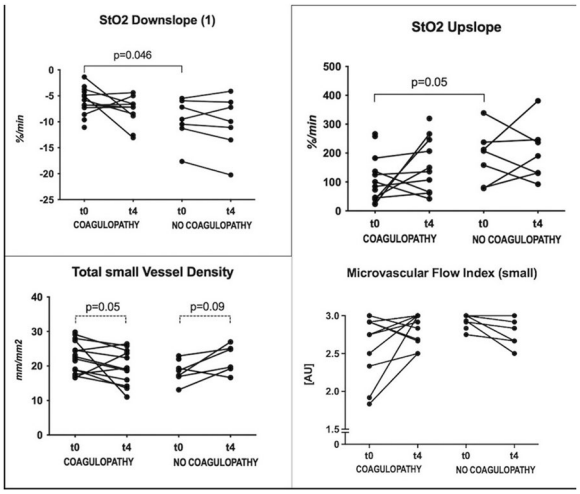

Figure (abstract P223) Results for StO_2-TVD-MFI

P224
Relationship between TEG (thromboelastography) and SIC (sepsis-induced coagulopathy)
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Critical Care 2025, **29(S1)**:P224

Introduction: The aim of this prospective observational study was to evaluate the relationship between sepsis-induced coagulopathy (SIC) [1] and alterations of viscoelastic tests (TEG).
Methods: We included adult patients with sepsis (< 24 h). Exclusion criteria: age < 18, coagulopathy unrelated to sepsis, and lack of informed consent. For the first 5 days, the coagulation profile was evaluated with standard laboratory tests and TEG. Patients were divided into two groups based on a SIC score ≥ 4 (SIC +) or < 4 (SIC-). We compared the coagulation time (CT), clot formation time (CFT), alpha angle, maximum clot firmness (MCF) and clot lysis index at 30 (CLI30) between the two groups.
Results: N = 23 (M 12, F 11). Mean age: 55 ± 16 years, all mechanically ventilated and sedated. MeanSOFA at T0: 9 ± 2. Thirteen patients were SIC+ (3 had DIC). All patients showed MA-CFF values above the normal range. MA-CK and MA-CFF were higher in SIC− patients at all time points (Figure). The alpha angle was lower in SIC+ patients at T0. The CLI30 was higher in SIC+ patients at T0.
Conclusions: Even in SIC− patients, TEG revealed clotting abnormalities characterized by a hypercoagulative state. SIC+ patients showed an MA-CK in the normal range and lower MA-CFF, likely depending on higher fibrinogen consumption. SIC+ patients also showed higher activation of fibrinolysis.

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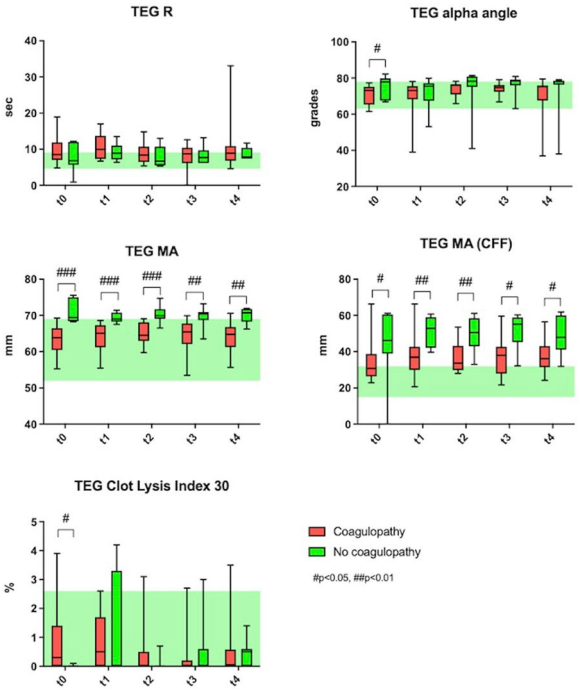

Figure (abstract P224) Teg-SIC

P225
Thrombomodulin in sepsis-associated coagulopathy: a systematic review and meta-analysis
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Critical Care 2025, **29(S1)**:P225

Introduction: Sepsis-associated coagulopathy (SAC), a critical complication of sepsis, significantly increases mortality [1]. Recombinant human thrombomodulin (rhTM), with anti-inflammatory, anticoagulant, and anti-fibrinolytic properties, is a promising therapy for SAC [2,3]. This study evaluates the efficacy of rhTM in resolving coagulopathy, mitigating organ dysfunction, improving survival, and assessing bleeding risk.
Methods: A systematic review and meta-analysis were conducted per Cochrane and PRISMA guidelines (PROSPERO: CRD42023479916). A comprehensive search across Medline, Embase, CENTRAL, Scopus, and Web of Science was performed on November 12, 2023. Studies involving SAC patients treated with rhTM compared to standard care were included, assessing mortality, coagulopathy resolution, organ dysfunction, and bleeding events. Random-effects models calculated odds ratios (OR) and mean differences (MD) with 95% confidence intervals (CI).

Results: Of the 2403 articles screened, 28 studies met the inclusion criteria. In the rhTM group compared to the standard of care, there was a significant reduction in 28-day mortality in the full cohort (OR 0.66, 95% CI 0.53–0.82, $p < 0.001$; Fig. 1/A). rhTM also improved DIC resolution (OR 3.58, 95% CI 2.46–5.20, $p < 0.001$; Fig. 1/B), increased ventilator-free days (MD 1.64, 95% CI 0.21–3.07, $p < 0.001$), and did not increase bleeding risk (OR 1.08, 95% CI 0.89–1.32, $p = 0.392$).
Conclusions: rhTM shows potential in treating SAC by improving DIC resolution, reducing mortality, and increasing ventilator-free days without elevating bleeding risk. Future research should focus on identifying high-risk populations, refining clinical criteria, and optimizing therapeutic applications to maximize the benefits of rhTM.

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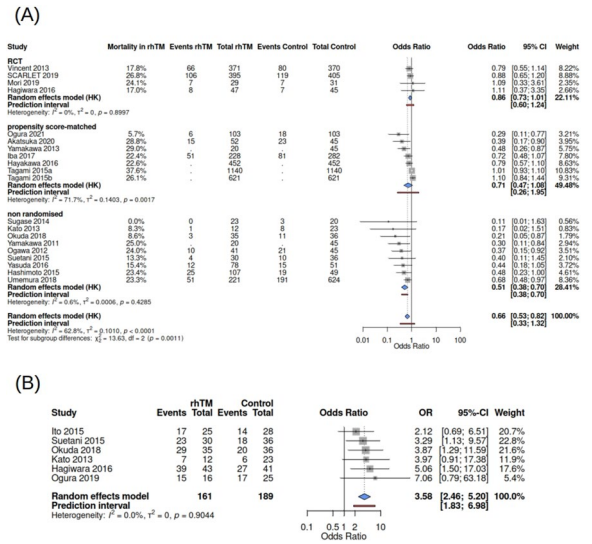

Figure (abstract P225) Forest plots illustrating 28-day mortality across study designs (A) and the resolution of coagulopathy (B)

P226

Impact of heparin on neutrophil extracellular trap formation in a sepsis model

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Critical Care 2025, **29(S1)**:P226

Introduction: Anticoagulants like heparin and citrate are widely used in acute blood purification therapies. During the COVID-19 pandemic, heparin's role was reaffirmed, renewing interest in its application for sepsis. However, the impact of these anticoagulants on leukocyte behavior remains unclear. This study investigates the effects of heparin and citrate on leukocytes and neutrophil extracellular traps (NETs).
Methods: We conducted basic experiments using a murine sepsis model induced by cecal ligation and puncture (CLP). Blood samples were treated with either heparin or citrate as anticoagulants and subsequently stained with Hoechst and Sytox Green for fluorescent microscopy analysis. Additionally, the release of damage-associated molecular patterns (DAMPs), such as histones, was quantified at 0, 3, and 6 h post-sampling in anticoagulant-exposed blood.
Results: Heparin-treated blood samples showed more Hoechst-stained cells and higher extracellular DNA release than citrate-treated samples. Histone levels varied between sham and sepsis conditions. In heparin-treated samples, histone levels were undetectable at 0 h in the sham condition but significantly increased at 3 and 6 h (6.3 ± 3.46 ng/mL and 16.9 ± 10.37 ng/mL, respectively). In the sepsis condition, histone levels were elevated at all time points, starting at 8.8 ± 1.22 ng/mL at 0 h and increasing to 15.1 ± 17.41 ng/mL at 3 h and 22.6 ± 6.64 ng/mL at 6 h. In citrate-treated samples, histone levels were generally lower than those in heparin-treated samples. In the sham condition, histone levels were 2.1 ± 2.09 ng/mL at 3 h and 6.9 ± 0.92 ng/mL at 6 h. In the sepsis condition, histone levels were 5.9 ± 2.82 ng/mL at 0 h, 4.7 ± 2.32 ng/mL at 3 h, and 5.0 ± 1.16 ng/mL at 6 h.
Conclusions: Heparin may promote the formation of NETs, suggesting it has both anti-inflammatory and pro-inflammatory effects. The use of heparin in sepsis treatment should be considered carefully due to these dual effects.

P227

Complex modulation of monocyte function in severe community-acquired pneumonia by clarithromycin: results from the ACCESS trial

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Critical Care 2025, **29(S1)**:P227

Introduction: In the ACCESS randomized controlled trial, overwhelming clinical efficacy was achieved by the addition of clarithromycin to the standard-of-care antibiotics in hospitalized patients with community-acquired pneumonia (CAP). Benefit was evaluated the first 72 h as a composite of decrease of the intensity of symptoms and of the SOFA score; progression to organ dysfunction was also decreased [1]. In this subgroup analysis we investigated the impact of treatment on lymphocyte and monocyte function.
Methods: Peripheral blood mononuclear cells were isolated before start of treatment and after 72 h and stimulated by purified ligands and inactivated Candida albicans targeting for the production of pro- and anti-inflammatory cytokines. The difference in cytokine production at 72 h was analyzed in order to define pathways associated with clinical outcomes by logistic regression analysis with severity scores and comorbidities as independent variables; and pathway modulation under clarithromycin treatment.
Results: Greater production of interleukin (IL)-1 family cytokines (IL-1beta, IL-1ra, IL-18, IL-36alpha, IL-36beta and IL-36 gamma) was a risk factor for progression into organ dysfunction (OR 1.84; *p*: 0.018). Production of more than 4 IL-1 family cytokines was pronounced in the placebo group (Figure). Monocyte production of chemokines (CXCL9, CXCL10, IL-8, S100A8/A9) and IFNγ, TNFα, IL-23, GM-CSF was associated with attainment of the early composite clinical benefit (OR 1.15; *p*: 0.041). Production of more than 5 of these cytokines was pronounced in the clarithromycin group (Figure). The production of anti-inflammatory cytokines (IL-10, sTNFRI and sTNFRII) was decreased in the clarithromycin group; no effect on Th1/Th2/T17 functions was observed.
Conclusions: Clarithromycin in severe CAP exerts distinctive effects on monocyte function, characterized by down-regulation of the IL-1 pathway and up-regulation of other chemokines.

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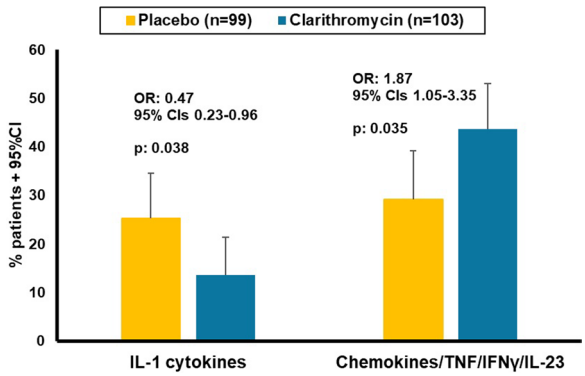

Figure (abstract P227) Cytokine modulation under clarithromycin treatment

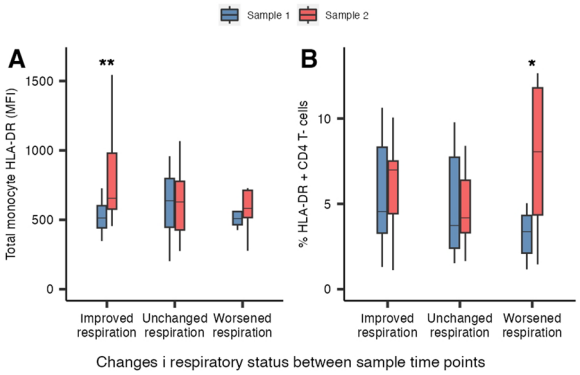

Figure (abstract P228) HLA-DR expression on monocytes (A) and frequency of HLA-DR+CD4+T cells (B) between sample 1 and 2 in patients with improved, unchanged and worsened respiratory status between samples

P228

HLA-DR expression on immune cells during SARS-CoV-2 infection

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Introduction: We aimed to examine human leukocyte antigen-DR (HLA-DR) expression on immune cells in COVID-19 patients with varying disease severity at different time points.
Methods: Blood samples were collected from 141 patients admitted to Karolinska University Hospital, Stockholm, Sweden. A second sample was taken 6–11 days from the first one, and a third sample during convalescence. Fifty-six patients were categorized as severe COVID-19 cases, and 21 healthy controls were included. Flow cytometry was used to measure HLA-DR expression on different immune cells.
Results: Compared to healthy individuals, HLA-DR expression on plasmablasts, dendritic cells, neutrophils, and eosinophils was decreased during acute COVID-19 but rose during convalescence. During the acute phase, HLA-DR+CD4+T cells, HLA-DR+CD8+T cells, and HLA-DR+ NK cells were increased compared to healthy controls and almost returned to the level of healthy controls by convalescence. HLA-DR expression on monocytes, plasmablasts, and dendritic cells was lower in severe cases than in moderate cases. Severe cases showed significantly higher HLA-DR expression on CD8+T cells compared to moderate cases. Between the first and the second sample, patients with improved respiratory status showed a significant increase in monocyte and neutrophil HLA-DR expression, with no change in HLA-DR+CD4+T cells. In contrast, patients with worsened respiratory status showed no change in monocyte or neutrophil HLA-DR expression, but the frequency of HLA-DR+CD4+T cells increased significantly. No changes were observed in patients with unchanged respiratory status (Figure).
Conclusions: There are substantial changes in HLA-DR levels during the course of COVID-19, with differences between severely and moderately ill patients. HLA-DR levels on monocytes and CD4+T cells can reflect changes in the respiratory status of COVID-19 patients.

P229

FTO deficiency protects sepsis induced acute lung injury by suppressing endothelial cell pyroptosis

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Introduction: This study aims to explore the role and mechanism of m6A demethylase FTO in sepsis induced acute lung injury.
Methods: C57BL/6 mice were subjected to the cecal ligation and puncture sepsis model, and human umbilical vein endothelial cells (HUVECs) were stimulated by LPS+Nigericin. Pulmonary endothelial Fto-knockout mice and FTO-knockdown/overexpression HUVECs were constructed to evaluate the effects of FTO on sepsis induced acute lung injury. Bioinformatics analysis and a series of in vivo and in vitro assays were used to investigate the mechanism of FTO regulation.
Results: In SI-ALI, RNA m6A modification amounts were upregulated, and FTO expression was downregulated. In vivo, pulmonary endothelial Fto knockout alleviated alveolar structure disorder, tissue edema, and pulmonary inflammation and improved the survival of CLP mice. In vitro, FTO knockdown reduced cell pyroptosis of HUVECs induced by LPS+Nigericin, whereas FTO overexpression exacerbated cell pyroptosis.
Conclusions: Target inhibition of FTO could protect sepsis induced acute lung injury by suppressing endothelial cell pyroptosis, which might be a novel therapeutic strategy.

P230

Development and validation of clinical diagnostic criteria (Suzhou criteria) for critical illness-associated immune dysfunction

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Introduction: Critical illness-associated immune dysfunction (CIID) is prevalent in the ICU and frequently resulted in uncontrollably immune responses. Critical immunological dysfunction is understood to be important, although there are currently no clinically accepted diagnostic criteria for it. Given this, we examined the literature and

developed an initial diagnostic criterion that we validated using the MIMIC-IV database.
Methods: We reviewed literature from the past 32 years and selected first-time ICU patients from the MIMIC-IV database. Patients were categorized into immune dysfunction (ID) and non-immune dysfunction (NID) groups using various criteria. The ID group was further divided into hyperinflammatory (HI), immunosuppression (IS), and HI + IS subgroups. APACHE II scores were used to measure severity, and the relationship between immune dysfunction and 30/180-day mortality was assessed using KM curves and COX regression analysis.
Results: By summarizing relevant literature, we proposed the initial diagnostic criteria of CIID (Suzhou Criteria). The analysis included 43,965 patients, with approximately 77% meeting the diagnostic criteria for CIID. We observed that patients with immune dysfunction possessed higher APACHE II scores and there were differences in peak APACHE II among the three subgroups. When comparing patients' 30-day mortality in the COX model, it is evident that patients in the IS subgroup had the lowest risk and patients in the HI subgroup the greatest risk after accounting for all covariates. In contrast, patients in the IS subgroup had the highest risk of death, those in the HI subgroup had the lowest risk when comparing long-term mortality. In summary, we propose and validate diagnostic criteria related to CIID. Subgroup analyses were carried out, which also revealed variations between the three groups.
Conclusions: The diagnostic criteria were confirmed by the MIMIC-IV database, demonstrating the diagnostic criteria were scientifically valid and reliable.

P231

Identification of immune cell infiltration and biomarkers in Alzheimer´s disease and COVID-19 by integrated bioinformatics analysis and machine learning

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Critical Care 2025, **29(S1)**: P231

Introduction: Since 2019, COVID-19 has been a global epidemic, and studies hint at a connection between Alzheimer's disease (AD) and COVID-19. A Mendelian randomization study suggests a causal link between AD and COVID-19. Despite this, few studies have explored the common pathogenic genes and immune responses in both diseases. Our study aims to identify key COVID-19 genes associated with AD, assess their relationship with immune cells and metabolic pathways, and discover potential new biomarkers.
Methods: Transcriptome analyses were conducted to identify common biomolecular markers of AD and COVID-19. We performed differential expression analysis and weighted gene co-expression network analysis (WGCNA) on gene chip datasets (GSE213313, GSE5281, and GSE63060) from AD and COVID-19 patients to find genes linked to both conditions. Common pathogenic mechanisms were revealed through gene ontology (GO) enrichment analyses, and core genes were identified using machine learning methods. We then assessed the relationship between these core genes, common immune cells, and metabolic pathways, with findings validated through single-cell analysis.
Results: The study identified 484 DEGs by taking the intersection of genes between AD and COVID-19. The black module, containing 132 genes, showed the highest association between the two diseases according to WGCNA. GO enrichment analysis revealed that these genes mainly affect inflammation, cytokines, immune-related functions, and signaling pathways related to metal ions and cellular response to viruses. A machine learning approach identified eight core genes. We identified links between these genes and immune cells and also found a strong association between EIF3H and oxidative phosphorylation. In addition, these results were further validated by single-cell analysis.
Conclusions: This study identifies potential shared genes, signaling pathways, immune-related alterations, and changes in metabolic pathways that may collectively contribute to the pathogenesis of COVID-19 and AD.

P232

CD52hi cardiac macrophages promote cardiomyocyte injury during sepsis

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Introduction: Sepsis-induced cardiomyopathy (SICM) is a prevalent organ dysfunction associated with sepsis, often resulting in poor clinical outcomes. Due to the incomplete understanding of its pathogenesis, the development of targeted therapeutic strategies remains challenging.
Methods: We combined 10×genomics single-cell RNA sequencing with fate-mapping in a murine sepsis model to identify damage-associated immune cell subpopulations in SICM (Figure). In vivo and ex vivo experiments in mice were conducted to investigate the underlying mechanisms. Additionally, we evaluated the role of CD52 in sepsis using macrophage-specific CD52 knockout mice and by administering anti-CD52 antibodies locally or intravenously.
Results: A unique subpopulation of CD52hi Mac4 macrophages was identified in the hearts of SICM mice. The abundance of these cells positively correlated with SICM severity, primarily derived from circulating monocytes during disease progression. Mechanistically, CD52 mediated mitochondrial fragmentation, dysfunction, and enhanced glycolysis, leading to increased inflammatory factor release and worsened prognosis in SICM. Targeted CD52 knockdown in myeloid-derived macrophages or local anti-CD52 antibody administration significantly reduced cardiac inflammation, myocardial injury, and dysfunction in SICM mice.
Conclusions: This study identifies CD52hi macrophages as a key driver of injury in septic cardiomyopathy. Targeting CD52 alleviates SICM in mice, offering a potential therapeutic strategy for clinical management.

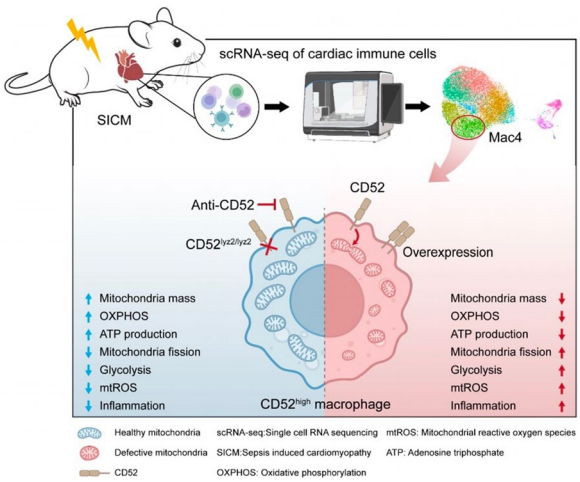

Figure (abstract P232) Mechanism of CD52hi cardiac macrophages in sepsis induced cardiomyopathy

P233
WITHDRAWN

P234
Comparison of immunomodulation strategies and associated outcomes in critically ill COVID-19 patients: a multicenter cohort study
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Critical Care 2025, **29(S1)**:P234

Introduction: Current evidence on immunomodulatory treatments other than corticosteroids for patients with severe COVID-19, such as JAK inhibitors, and anti-IL6 antibodies remains inconclusive. There is limited data on head-to-head comparison and in conjunction with corticosteroids use in critically ill patients. We aimed to compare different immunomodulatory agents with outcomes in this population.
Methods: This multi-center, target trial emulation with inverse probability treatment weighing (IPTW) included hospitalized adult patients with COVID-19 who met NIH criteria for the administration immunomodulatory drugs. We used the CURE ID dataset that enrolled patients from 11 centers. Demographic data, lab values, treatments, and clinical outcomes were collected. We compared dexamethasone (Dexa), dexamethasone + baricitinib (DB), and dexamethasone + tocilizumab (DT) groups. The primary outcome was all-cause hospital mortality. Secondary outcomes included survival without life support at 28 days, time to death (truncated at 28 days), organ support-free days, and hospital length of stay (LOS).
Results: A total of 14,343 met the eligibility criteria. Of these, 57% received Dexa, 40% received DB, and 3% received DT. The mean age was 64 years (SD 16.2) and 44% were women. The entire cohort was included in IPTW analysis. All groups had a comparable median of 4 organ support-free days, and 24.7% of them required non-invasive and invasive mechanical ventilation support. The hospital LOS was 9 days in the Dexa group, 13 days in the DB, and 14 days in the DT group. The weighted analysis showed a higher mortality for the DB group (OR, 1.52; 95% CI, 1.42–1.63, $p < 0.001$), and for the DT group (OR, 3.23; 95% CI, 3.0–3.48, $p < 0.001$) compared to patients in the Dexa group.
Conclusions: Patients receiving only dexamethasone had shorter hospital LOS and lower mortality. The combination of DT and DB immunomodulators did not show synergistic effects on all-cause hospital mortality.

P235
Functional immunophenotyping for ex-vivo efficacy of immune adjuvants in severe infections at low-resource settings
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Critical Care 2025, **29(S1)**:P235

Introduction: Critical illness-induced immune dysfunction is an underlying cause of the multi-inflammatory syndromes of sepsis associated with bacterial and fungal infections. We used a functional immunophenotyping platform to quantify the ex vivo efficacy of immune stimulants in understudied populations to identify sepsis patients likely to respond in vivo to these types of therapeutic interventions.
Methods: Ex vivo production of IFN-γ by T-cells and TNF-α by monocytes was quantified in sepsis whole blood using the Enzyme-Linked Immune absorbent Spot (ELISpot) immunoassay [1]. Samples were obtained under an international, observational sepsis protocol from study sites in Ghana (n = 26) and Uganda (n = 24). Following stimulation, samples were treated with interleukin-7 (IL-7) and Baricitinib, respectively, to quantify the responses induced by these immune modulatory agents.
Results: All ELISpot analyses were performed at clinical sites in Ghana and Uganda, with the long-term aim of bringing this clinically relevant assay closer to the point of care. IL-7 treatment induced a significant increase in T-cell IFN-γ production, as measured by ELISpot counts and spot sizes. In contrast, the JAK-inhibitor Baricitinib did not induce additional TNF-α production by monocytes in sepsis whole blood samples.
Conclusions: The ELISpot functional immunophenotyping platform was successfully implemented near the point-of-care in a low-resource setting to quantify the ex vivo effects of IL-7 and Baricitinib treatments on IFN-γ and TNF-α production in whole blood samples of hospitalized sepsis patients. These results show that IL-7 promotes immune function ex vivo in sepsis subjects with diverse backgrounds and etiologies.

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P236
Pentraxin-3, MyD88, and PD-L1: emerging biomarkers for early sepsis detection in the emergency department
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Critical Care 2025, **29(S1)**:P236

Introduction: Sepsis remains a critical diagnostic challenge in emergency care, demanding biomarkers that can distinguish sepsis from less severe infections at the earliest stages. This study investigates the utility of three emerging biomarkers, including Pentraxin-3 (PTX3), MyD88, and PD-L1, for sepsis detection and risk stratification in a real-life emergency department (ED) cohort.
Methods: Serum samples were collected from 587 patients with suspected acute infection and 201 control patients presenting to the ED between 2019 and 2022. Biomarker levels were measured using electrochemiluminescence. Diagnostic performance for bacterial infections and sepsis was assessed using AUROCs.
Results: Among the 390 patients analyzed 59.5% (n = 232) had a bacterial infection and 35.1% (n = 137) met sepsis criteria. PTX3, MyD88, and PD-L1 demonstrated high diagnostic accuracy for bacterial infections (AUROCs: 0.89, 0.88, and 0.87, respectively) and sepsis (AUROCs: 0.82, 0.84, and 0.80, respectively).
Conclusions: PTX3, MyD88, and PD-L1 are promising biomarkers for sepsis diagnosis in the ED, offering significant potential to enhance early recognition and improve patient outcomes. Combining these three powerful biomarkers using machine learning techniques could further enhance diagnostic performance.

P237
Pancreatic stone protein (PSP) role in urinary tract infections (UTI), lower respiratory tract infections (LRTI) and intrabdominal infections (IAI) prognosis: a validation single-center prospective cohort study protocol. An interim analysis
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Critical Care 2025, **29(S1)**:P237

Introduction: Infections are frequent reason of hospital admission leading to serious morbidity and increasing workload for healthcare system. Biomarker based practices tend to divide patients in low or high risk groups. PSP has been proven effective in predicting unfavorable outcomes in patients with VAP and peritonitis. In our previous study PSP was found to predict unfavorable outcomes, including sepsis development, hospital readmission and treatment escalation in patients with IAI [1]. We aim to validate those promising results, in a more wide and disparate population, to establish its position in point-of-care settings.
Methods: In this prospective observational cohort study, adult patients admitted to the Emergency Department of the University Hospital of Patras Greece, with signs and symptoms of LRTI, UTI or IAI, who meet inclusion criteria, are consequently sampled and enrolled in this study. A consequent peripheral whole blood sample is taken within the first hour since admission and PSP is measured using a diagnostic capsule for quantitative measurement with a desktop spectrophotometer diagnostic device.
Results: We have enrolled 46 patients in our study. 50% of the patients were male and had a mean age of 65.6 years. 23 patients experienced sepsis or septic shock, and 4 patients died during hospitalization. PSP on admission was significantly higher in patients that developed sepsis or septic shock (40 ± 34 vs 157 ± 122, $p < 0.001$). PSP had an AUC of 0.927 (95% CI: 0.844–1.0) for predicting sepsis/septic shock and was superior to other commonly used inflammatory biomarkers (CRP, WBCs, LDH) (Figure).
Conclusions: PSP is an early sepsis predictor which could help clinicians in point-of-care setting to take decisions based on possible complications superiorly to other common used biomarkers.

Reference

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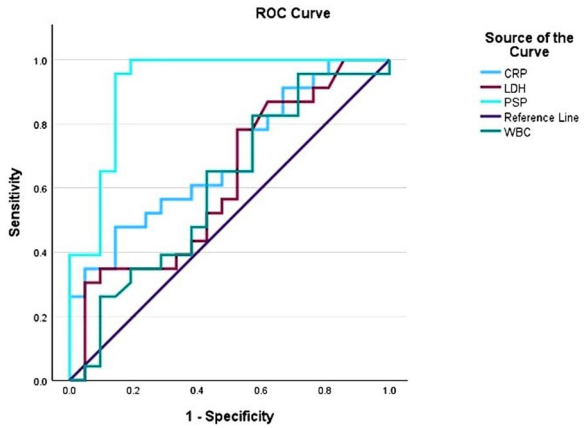

Figure (abstract P237) ROC analysis of predicting ability of PSP for sepsis compared to other common biomarkers

P238

Comparison of pancreatic stone protein, C-reactive protein and procalcitonin for the diagnosis of infection and sepsis in critically ill patients: a multicenter prospective study

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Critical Care 2025, **29(S1)**:P238

Introduction: Biomarkers can assist in detecting early sub-clinical signs of infection and sepsis. In this study, we compared pancreatic stone protein (PSP), C-reactive protein (CRP), and procalcitonin (PCT) for their effectiveness in the recognition of infection and sepsis in patients admitted to the intensive care unit (ICU).
Methods: A total of 274 ICU patients with suspected infection and sepsis were recruited in three hospitals across UAE after informed consent. Plasma levels of PSP, CRP and PCT levels were measured on admission and 48 h following admission. Patients were further categorized as culture negative and positive infection or sepsis.
Results: The final analysis included 272 patients, with 45% and 38.16% having culture confirmed infection and sepsis, respectively. The median [interquartile range(IQR)] plasma concentration of PSP in culture negative and culture positive infected patients was 142 (0.84–600) ng/mL and 229 (12.7–600) ng/mL ($p = 0.045$),while for CRP, it was 164.78 (4–492) mg/L and 191 (4–464) mg/L ($p = 0.11$) and for PCT, 2.16 (0.01–205.91) ng/mL and 2.19 (0.04–329) ng/mL ($p = 0.30$), respectively. In sepsis patients, the median PSP concentration in culture negative versus culture positive patients was 181.5 (20–600) ng/mL and 229 (12.7–600) ng/mL ($p = 0.45$); 132.03 (10–492) mg/L and 208 (4–464) mg/L ($p = 0.037$) for CRP; 2.58 (0.06–205.91) ng/mL and 2.8 (0.04–329) ng/mL ($p = 0.42$) for PCT, respectively. The area under the ROC curve (AUROC) at admission for identifying culture negative and culture positive infections and sepsis was 0.58 and 0.53 for PSP, 0.56 and 0.59 for CRP, and 0.54 and 0.53 for PCT, respectively (Figure). The mean duration of antibiotics was 9 days and 5 days in infected and non-infected patients respectively.
Conclusions: Higher levels of PSP were observed in culture positive infections and CRP in culture positive sepsis. However, the overall performance of all three biomarkers was inadequate for the diagnosis of infection and sepsis in critically ill patients.

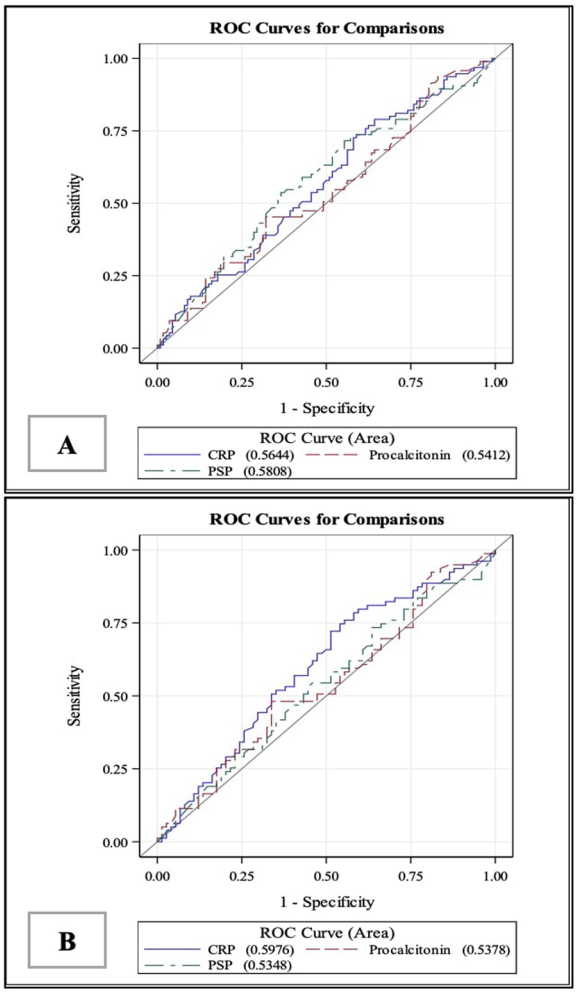

Figure (abstract P238) Receiving operating curve (ROC) analysis of pancreatic stone protein (PSP), C-reactive protein (CRP) and procalcitonin (PCT) for diagnosis of infection and sepsis. A. ROC of PSP, CRP and PCT in culture negative and culture positive infection. B. ROC of PSP, CRP and PCT in culture negative and culture positive sepsis

P239

Does PCT improve diagnosis of early infection in clinically suspected cardiac surgery patients? A two-center, prospective diagnostic study

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Critical Care 2025, **29(S1)**:P239

Introduction: We studied the diagnostic performance of procalcitonin (PCT) in patients clinically suspected of infection after cardiac surgery. We hypothesized that PCT rules out infection. Secondarily, we analyzed diagnostic performance of C-reactive protein (CRP), interleukin-6 (IL-6), and leukocytes.

Methods: A prospective, cross-sectional study in elective cardiac surgery patients. Patients were clinically suspected of infection if their body temperature was < 36.0 or > 38.0 °C, blood cultures were drawn or antibiotic treatment was initiated, in the first three postoperative days (POD). Infection diagnosis was adjudicated by chart review, according to center for disease control criteria. Daily blood samples were collected up to POD 3. The sample collected on the day of clinical suspicion was used for analysis. Cut-off values and corresponding diagnostic performance measures were deemed clinically relevant if a negative likelihood ratio (−LR) ≤ 0.2 was achieved or a positive likelihood ratio (+LR) ≥ 5 to respectively rule-out or rule-in infection.
Results: In 15/310 (5%) suspected patients infection diagnosis was confirmed. PCT concentrations were similar in infected and non-infected patients (0.39 µg/L, IQR 0.19–0.72 vs. 0.30 µg/L, 0.17–0.63, $p = 0.58$) (Figure). The area under the curve (AUC) was 0.54 (95% CI 0.39–0.69). The minimal −LR and the maximal + LR were 0.39 and 1.57 at a cut-off of 0.15 and 0.83 µg/L respectively. IL-6 concentrations were higher in infected patients (196 pg/mL (IQR 126–259) vs. 106 pg/mL (69–188), $p = 0.03$). The AUC was 0.67 (95% CI 0.53–0.80). The minimal −LR and the optimal +LR were 0.23 and 6.56 at a cut-off of 73 and 815 pg/mL respectively. The corresponding negative- and positive predictive value were 99% and 25%. CRP and leukocytes did not differentiate infected from non-infected patients.
Conclusions: PCT has no added value diagnosing early infection in clinically suspected cardiac surgery patients. IL-6 could be useful, mainly to rule-out infection.

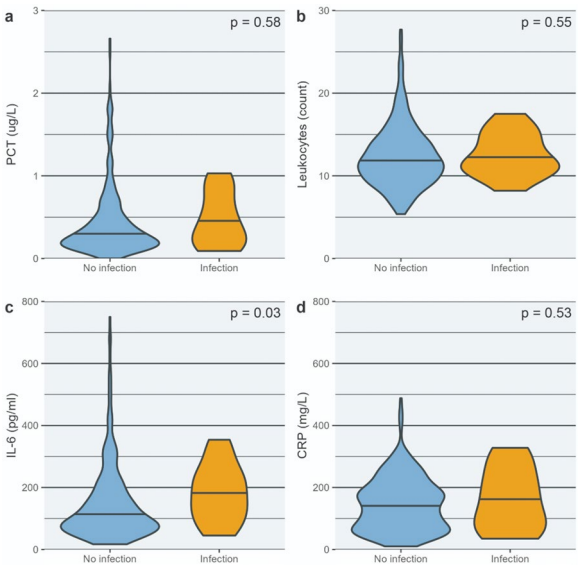

Figure (abstract P239) Violin plots of biomarker concentrations in patients with or without early infection after cardiac surgery. The violin plots reflect the density of concentrations for each biomarker. The black lines within the violin plots show the median. The p-value for the Wilcoxon Rank Sum test is displayed. PCT = procalcitonin, IL-6 = interleukin-6, CRP = C-reactive protein

P240

Assessment of diagnostic performance of mid-regional proadrenomedullin (MR-proADM) in patients with positive hemoculture—pilot project

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Critical Care 2025, **29(S1)**:P240

Introduction: MR-proADM is a biomarker of microcirculatory and endothelial damage. Our study aimed to evaluate and compare plasmatic levels of MR-proADM in patients with positive hemoculture, negative hemoculture and hemoculture contamination and to compare it to selected biomarkers (the ability of MR-proADM to distinguish between positive hemoculture, negative hemoculture and hemoculture contamination).
Methods: Patient cohort (n = 99; 99 samples) with collected hemoculture was enrolled. The cohort was divided into four groups. Group A (13) patients with Gram positive bacteria in hemoculture, group B (14) patients with Gram negative bacteria, group C (29) patients with negative hemoculture and group D (43) patients with hemoculture contamination. Biomarkers mid-regional proadrenomedullin (MR-proADM nmol/L), C-reactive protein (CRP mg/L), procalcitonin (PCT ug/L) and leukocytes (LEU 109/L) were assessed.
Results: The medians (1st and 3rd quartile) in group A were as follows: MR-proADM 2.28 (1.44–7.08), CRP 222.60 (178.50–269.80), PCT 2.22 (0.52–8.48) and LEU 13.03 (9.90–16.16); in group B: MR-pro ADM 1.96 (1.19–2.50), CRP 150.15 (93.63–227.60), PCT 4.79 (1.56–11.58) and LEU 11.46 (8.07–13.00); in group C: MR-proADM 0.89 (0.55–1.59), CRP 105.50 (39.60–145.95), PCT 0.35 (0.15–0.75) and LEU 8.22 (4.99–13.00); in group D: MR-proADM 0.95 (0.39–1.51), CRP 69.80 (17.90–140.45), PCT 0.29 (0.14–0.99) and LEU 7.19 (2.54–12.66). Medians of MR-proADM are not significantly different between group A and B and between C and D. Medians of MR-proADM in groups with positive hemocultures are slightly higher than those in groups with negative hemocultures or hemoculture contamination.
Conclusions: MR-proADM does not differentiate between Gram positive and Gram negative sepsis. In case of possible contaminations and negative hemocultures, a more difficult interpretation must be considered (possible non-infectious elevation in response to the severity of the patient's condition).

P241

Prospective multi-omic analysis of clinical sepsis subtypes

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Critical Care 2025, **29(S1)**:P241

Introduction: Recent work identified distinct sepsis subtypes using clinical characteristics and bedside biomarkers [1]. Although prospectively validated in multiple cohorts, less is known about how subtypes capture biologic mechanisms in multi-omic profiles.
Methods: We performed a prospective cohort study of 48 adults with sepsis, identified with Sepsis-3 criteria within 24 h of emergency care arrival using electronic health record data and clinical adjudication. The SENECA subtyping approach applied 28 clinical variables within 6 h of presentation to identify α, β, γ, δ–subtypes [1]. Using prospective plasma samples, we compared Interleukin-6 (IL-6), pentraxin-3, E-selectin, P-selectin, angiopoietin-1, angiopoietin-2, and heme oxygenase-1 (HO-1) across subtypes (Kruskal–Wallis, $p < 0.05$). Liquid chromatography mass spectrometry was used for untargeted metabolomics and lipidomics data to identify distinct multi-omic patterns (2-sided t-test, $p < 0.01$).
Results: Among 48 patients, the mean age was 53 ± 16 years, 67% were men, and mean SOFA score was 3.5 ± 1.9. There were 14 α-type (29%), 16 β-type (24%), 5 γ-type (27%) and 13 δ-type (10%) patients. Among 7 biomarkers qualitatively different, only IL-6 was significantly elevated in δ-type ($p < 0.05$) (Figure). There were no differences in other markers of endothelial dysfunction, such as E-selectin and P-selectin, across subtypes ($p = 0.05$). Among 4739 metabolites, distinct patterns were observed by type; β-type had the most unique metabolites (2%) compared to α-type. The pathways most enriched in δ-type were methionine/cysteine and selenoamino acid metabolism. Among 7687 lipids, distinct patterns were also noted by type; γ-type had the most unique lipids (0.2%) compared to α-type. The pathways enriched in δ-type were membrane component and lipid storage.
Conclusions: In a prospective cohort study, multi-omic profiles vary across different clinical sepsis subtypes, suggesting potential mechanistic pathways for further study.

Reference

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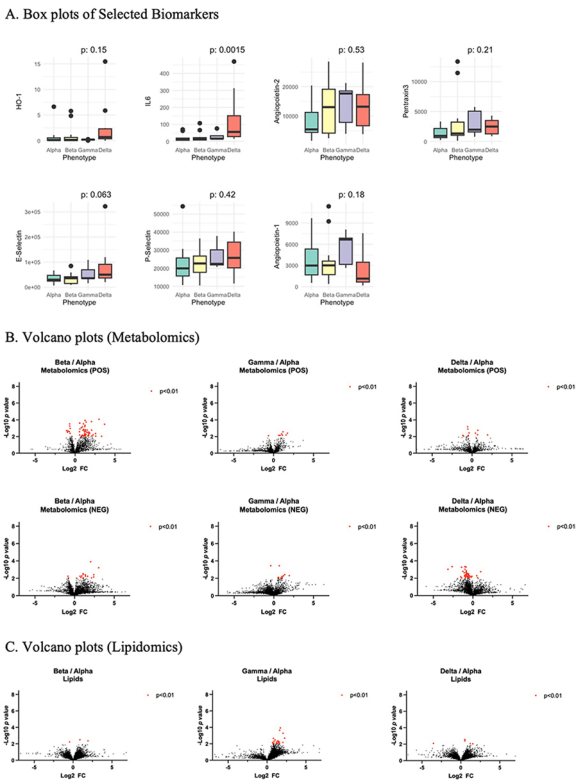

Figure (abstract P241) (A) Boxplots showing the distribution of seven biomarkers (HO-1, IL-6, angiopoietin-2, pentraxin-3, E-selectin, P-selectin, and angiopoietin-1) across sepsis phenotypes (α, β, γ, δ). (B-C) Volcano plots of metabolomic (B) and lipidomic data (C) comparing β, γ, δ phenotypes to α. Red points denote significant changes ($p < 0.01$), and black points represent non-significant differences.

P242

Elevated FAM19A4 expression in sepsis correlates with poor prognosis and modulates inflammatory response

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Critical Care 2025, **29(S1)**:P242

Introduction: This study aimed to investigate the expression levels and prognostic significance of a novel cytokine FAM19A4 in sepsis, hypothesizing that FAM19A4 plays a pivotal role in the pathogenesis of sepsis and its associated inflammatory responses.
Methods: The research involved the detection of FAM19A4 expression levels in sepsis patients' serum using flow cytometry microsphere assay and ELISA. A total of 40 sepsis patients within 7 days of onset and 10 healthy volunteers were enrolled. The study also involved in vivo experiments using CRISPR/Cas9 to construct Fam19a4-EGFP

knock-in (KI) mice and cecal ligation and puncture (CLP) to construct sepsis model.
Results: FAM19A4 expression was significantly elevated in sepsis patients and CLP mice, correlating with the severity of inflammation and 28-day mortality rates (Figure A-C). The absence of FAM19A4 in Fam19a4-/- mice ameliorated sepsis symptoms, as evidenced by improved survival rates compared to wild-type (WT) mice (Figure D). Histopathological analysis revealed less severe organ damage in Fam19a4-/- mice post-CLP, with lower damage scores in lung, liver, and kidney tissues (Figure E). In vivo ROS levels were decreased in FAM19A4-null mice, indicating a role for FAM19A4 in modulating the inflammatory response in sepsis (Figure F).
Conclusions: The study concludes that FAM19A4 is a novel cytokine that is upregulated in sepsis and is associated with poor patient outcomes. It plays a role in modulating the inflammatory response, as evidenced by the amelioration of sepsis symptoms in FAM19A4-null mice. These findings provide insights into the pathophysiological mechanisms of sepsis and suggest that FAM19A4 could serve as a therapeutic target.

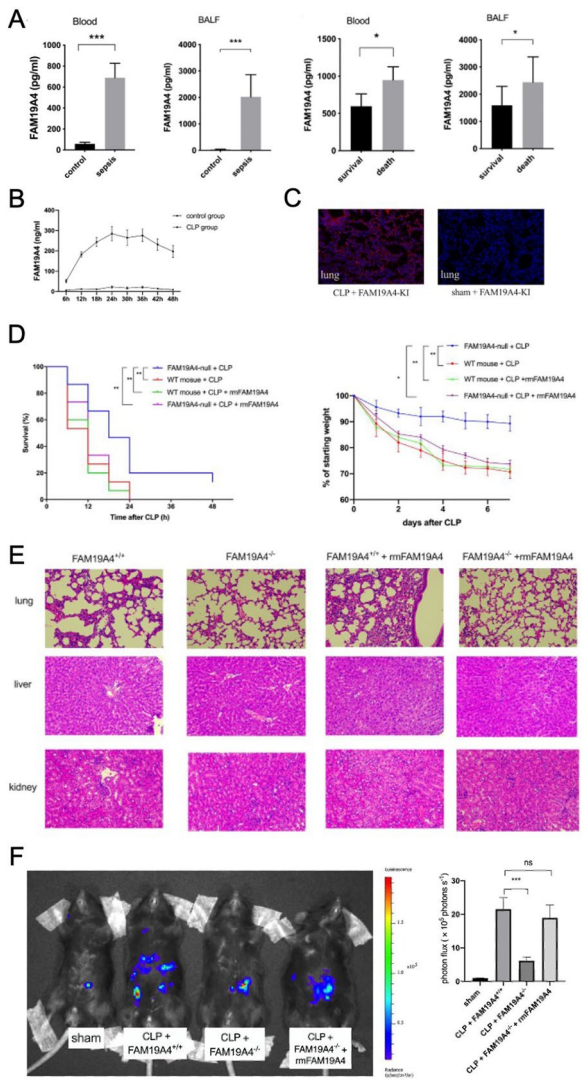

Figure (abstract P242) Expression and function of FAM19A4 in sepsis

P243

Identification of sepsis subphenotypes using clustering analysis of ICU data: a step toward personalized diagnosis and treatment

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Critical Care 2025, **29(S1)**: P243

Introduction: The high variability in patient responses to sepsis presents a significant challenge to early diagnosis and increases the risk of mortality. The current international consensus sepsis-3, based on the SOFA score, applies a uniform classification to septic patients, overlooking their inherent heterogeneity. This study aims to address this limitation by identifying sepsis subphenotypes through the clustering of ICU data, enabling a more personalized approach to diagnosis and treatment.
Methods: This study utilized data from the publicly available MIMIC-IV database, identifying a total of 36,581 septic patients. These included individuals diagnosed with sepsis at admission (14,753) and those who developed the condition during hospitalization (21,828). Laboratory test results, vital signs, and demographic data were collected, with the most abnormal values recorded within the first 24 h of ICU stay. Missing data were imputed using the MissForest technique, and dimensionality was reduced through Uniform Manifold Approximation and Projection (UMAP). Clustering was performed using the Gaussian Mixture Model (GMM) to identify sepsis subphenotypes. To evaluate the quality of the clustering, we applied the silhouette score, a metric that measures cluster cohesion and separability.
Results: Our clustering analysis identified five distinct sepsis subphenotypes, achieving a silhouette score of 0.29 (Figure).
Conclusions: The identification of five distinct sepsis subphenotypes in this study supports the hypothesis of the condition's inherent heterogeneity. These findings underscore the need for further research to develop new metrics that effectively capture this variability, enabling more tailored diagnostic and therapeutic approaches.

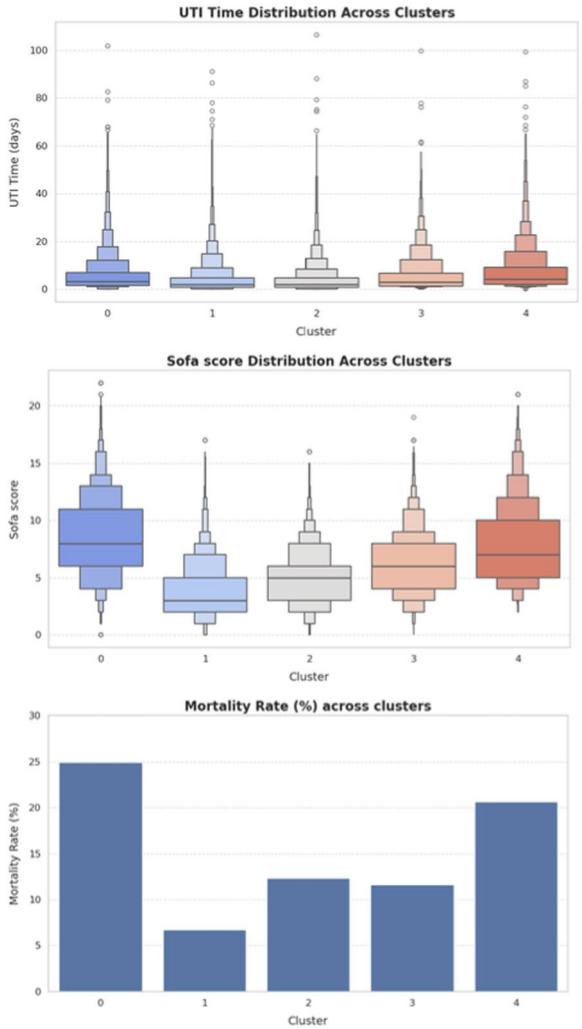

Figure (abstract P243) 1. ICU time distribution across clusters. 2.SOFA score distribution across clusters. 3. Mortality rate across clusters

P244

Evaluation of year-long implementation results of a cellular host-response test in an emergency department setting

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Critical Care 2025, **29(S1)**:P244.

Introduction: Sepsis is a life-threatening emergency requiring urgent intervention to achieve optimal outcomes [1–3]. In the ED, there is a need for diagnostics to aid in timely sepsis risk stratification (RS) of patients. In this study, we evaluated performance of a cellular host-response (HR) test to RS and change resource utilization for patients with suspicion of infection (SI) 1 year after implementation in an ED setting.

Methods: The HR test, which generates an Index based on the state of immune activation stratified into 3 interpretation bands (Band 1-Band 3) of increasing sepsis likelihood [4], was integrated into an existing ED workflow for patients presenting to the ED of a large academic medical center in Louisiana, USA, with SI on 8/1/23. Following a 1 month learning period, outcomes and HR test results of patients were analyzed for 11 months after implementation (9/1/23–7/31/24). Prior to test implementation, an observational baseline cohort of adult patients presenting to the same ED following the SI ED workflow were prospectively enrolled (05–07/23). For all patients, EDTA blood was assayed within 5 h of draw, and patients were followed by chart review.

Results: From 9/1/23–7/31/24, 5970 patients had been assayed with the test, with 2880 (49.7%) in Band 1, 1459 (25.2%) in Band 2, and 1451 (25.1%) in Band 3. Patients with tests ordered (avg. 17 tests/d) comprised 8.6% of the ED census and 65% of patients with the site's sepsis alert. Pre/Post, in Band 1 and Band 2, a 36.5% overall reduction of patients with blood cultures ordered (79.5% Pre, 43.0% Post, $p < 10^{-4}$, Figure A) was observed, with a 2.5-fold decrease in Band 1, 19% decrease in Band 2, and 11.4% increase in Band 3 (Figure B). Additionally, a 12.4% decrease in ED discharge in Band 3 was observed (Figure D).

Conclusions: These findings suggest this HR test may improve risk stratification and resource utilization for those presenting to the ED with SI.

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3. Paoli CJ et al. Crit C Med. 2018;46:1889–1897
4. US FDA 510(k) Clearance Letter for Intellisep Test. 2022.

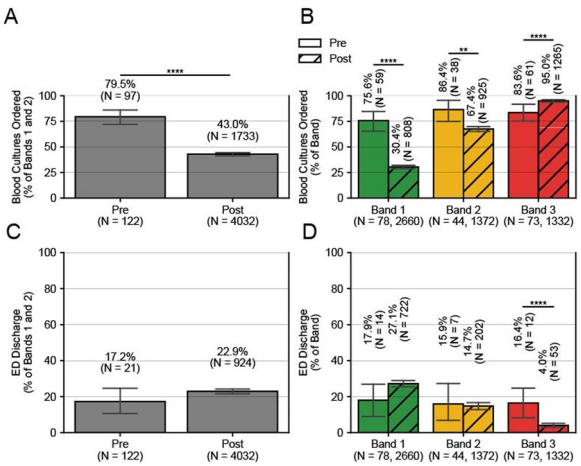

Figure (abstract P244) Pre/post implementation change in blood cultures ordered for aggregation of Bands 1 and 2 (A) and across interpretation bands (B). Pre/Post implementation change ED discharge for aggregation of Bands 1 and 2 (C) and across interpretation bands (D). Variance in counts in post data from total counts described in abstract arise from limitations in culture and discharge data availability

P245

Cardiac troponin I and N-terminal pro-B-type natriuretic peptide as a predictive marker of mortality in septic shock

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Critical Care 2025, **29(S1)**:P245

Introduction: Myocardial dysfunction, is typical of sepsis and septic shock. However, bedside assessment of cardiac function may be

complicated. Some researches have been conducted on the efficacy of cardiac troponin I (cTNI) and N-terminal pro-B-type natriuretic peptide (NT-proBNP) in the prognosis of sepsis [1]. There are currently insufficient data on clinical features of patients with septic shock. The aim of our study was to evaluate significance of cTNI and NT-proBNP levels for outcome prediction in this subgroup.
Methods: A cohort of 32 patients with septic shock (Sepsis-3 definition) admitted to medical-surgical ICU in 2024 was included in our study. Most patients (n = 28) had a surgical infection. Patients were examined with NT-proBNP, cTNI and were categorized as the survivors and non-survivors. Cutoff values, sensitivity and specificity of cTNI and NT-proBNP were determined by receiver-operating characteristic (ROC) curve analysis.
Results: Baseline characteristics of patients: Me (IQR) of age – 69.5 (58.0, 77.0) years, Me (IQR) of SOFA—8.5 (7.8, 10.0), Me (IQR) of vasopressor dose—0.65 (0.32; 1.00) of norepinephrine equivalent (eqNA). Refractory shock criteria were met in 78.1% of patients (eqNA > 0.5 μg/kg/min). Hospital mortality was 65,6%. The median rate of cTNI among survivors was 29.0 (9.0, 38.5) ng/L, and for non-survivors—92.0 (28.0, 218.0) ng/L, $p = 0.023$. The median rate of NT-proBNP among survivors was 1931.0 (820.0, 3961.0) pmol/L, and for non-survivors—6708.0 (2568.0, 13,266.0) pmol/L, $p = 0.006$. AUROC for NT-proBNP (0.80; 95% CI 0.62–0.98) and cTNI (0.75; 95% CI 0.57–0.93) showed no significant difference. The prognostic significance of NT-pro BNP vs cTNI levels is presented in the Table.
Conclusions: cTNI and NT-pro BNP levels measured on admission to ICU can be used to predict poor outcome in patients with septic shock.

Reference
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Table (abstract P245) Prognostic significance comparison of NT-pro BNP vs cTNI

Biomarker	Cut-off	Sensitivity, 95% CI	Specificity, 95% CI
NT-proBNP, pmol/L	4940	61.9 (38.4–81.9)	90.9 (58.7–99.8)
cTNI, ng/L	32	75.0 (50.9–91.3)	72.7 (39.0–94.0)

P246
Combination of high-dose corticosteroides and tocilizumab in critical COVID-19 significantly reduces mortality
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Critical Care 2025, **29(S1)**:P246

Introduction: Addition of tocilizumab (TOCI) to corticosteroids (CS) in rapid worsening of COVID-19 was shown to improve survival and shorten the time to clinical improvement [1]. Recommended CS dose in international guidelines is dexamethasone 6 mg. In Slovenia, high-dose methylprednisolone (1 mg/kg) was routinely used as a standard of care (SoC) in COVID-19 pneumonia with rapid worsening despite using dexamethasone. Aim of the present study was to evaluate use of combination of high-dose methylprednisolone (1 mg/kg) and TOCI 8 mg/kg in patients with critical COVID-19.
Methods: 174 patients with critical COVID-19, who were treated in intensive care unit, Department of Infectious Diseases, University Medical Center Ljubljana, Slovenia, between 21.4 and 13.12.2021 were included in the retrospective study. TOCI receivers and non-receivers were matched on demographic data, APACHE score and local indications for TOCI use. Data were extracted from medical documentation and statistical evaluation was performed. *P*-values < 0.05 were considered statistically significant.
Results: Among 174 included patients, mean age was 58.2 + 13.0 years and 70.7% were males. 104 patients received SoC and 70 patients received SoC + TOCI. Patients receiving SoC had statistically significantly higher APACHE score ($p < 0.001$) and required mechanically ventilation (MV) significantly more frequently ($p = 0.002$). Hazard ratio for mortality (95% CI: 1.802–20.477; $p = 0.004$) compared to SoC + TOCI group was 6-times higher. All non-survivors in TOCI group were males. Post-hoc analysis of female patients showed significant difference in mortality regarding gender ($p = 0.013$). The Table presents comparison of MV length and mortality in both groups.
Conclusions: Our results suggest that a combination of high-dose CS and TOCI in critical COVID-19 significantly reduces the need and time of MV, as well as mortality, but certain phenotypes are at greater risk for unfavorable outcome with such combination therapy.

Reference
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Table (abstract P247) Comparison of time of mechanical ventilation and mortality between methylprednisolone 1 mg/kg group and methylprednisolone 1 mg/kg + tocilizumab group

	All patients (N = 174)	Controls (n = 104)	Cases (n = 70)	*p* value
Number of mechanically ventilated patients	139 (79.9%)	91 (87.5%)	48 (68.6%)	0.002
Time of mechanical ventilation (hours)	382.8 ± 378.6	407.3 ± 290.0	346.4 ± 481.3	0.006
Non-survivors	29 (16.7%)	23 (22.1%)	6 (8.6%)	0.019
14-day mortality	12 (6.9%)	10 (9.6%)	2 (2.9%)	0.085
28-day mortality	20 (11.5%)	17 (16.3%)	3 (4.3%)	0.014

P247
Impact of immunosuppression on the incidence and outcomes of ventilator-associated events: an observational study
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Critical Care 2025, **29(S1)**:P247

Introduction: The aim of this research was to determine whether there is an association between immunosuppression and the incidence of ventilator-associated events (VAE). Additionally, we evaluated the impact of immunosuppression on outcomes for patients with VAE.
Methods: This observational study included consecutive patients who received mechanical ventilation (MV) for more than 96 h between June 1, 2022, and December 1, 2023. Patients were categorized as immunocompromised if they had neoplasia, hematological malignancies, AIDS, underwent organ transplantation, or were receiving immunosuppressive drugs. VAE were identified based on the criteria established by the Centers for Disease Control and Prevention (CDC). The primary outcome was the incidence of VAE among immunocompromised patients compared to those who were not, using regression analysis. Secondary outcomes included ICU mortality and the number of days on the ventilator by day 30 from the initiation of MV.
Results: Among 277 included patients, 118 were classified as immunocompromised. Within this group, 19 developed VAE, compared to 14 cases in the non-immunocompromised group (16.1% vs. 8.9%, respectively; incidence rate ratio, 2.26; 95% confidence interval [CI], 1.10–4.78, $p = 0.03$). Immunocompromised patients with VAE exhibited

a higher mortality than their non-immunocompromised counterparts, although this difference did not reach statistical significance (74% vs. 43%; odds ratio, 3.58; 95% CI 0.69–20.95, $p = 0.15$). The median duration of MV by day 30 was longer in the immunocompromised group; however, this finding was also inconclusive (15 vs.13 days, $p = 0.6$).
Conclusions: In our study population, we found an association between immunosuppression and an increased incidence of VAE in patients requiring MV. While the primary outcome suggests a clear relationship, the small sample size may limit the statistical significance of secondary outcomes. Studies with larger cohorts are necessary to validate these findings.

P248

Temporary suspension of immunosuppressive treatments reduces ICU-acquired infections in solid organ transplant patients

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Critical Care 2025, **29(S1)**:P248

Introduction: There is no consensus on the management of immunosuppressive treatments in solid organ transplant (SOT) patients admitted to the ICU due to two potential threats: graft rejection if interrupted and secondary infections if maintained. Accordingly, this study evaluates the impact of a suspensive strategy of immunosuppressive therapy on D90 mortality and ICU-acquired infections in patients with SOT.
Methods: This is a retrospective multicenter study (9 ICUs) over 5 years. The "maintenance" strategy was defined as the continuation of immunosuppressive treatments and "suspensive" strategy as the discontinuation of all immunosuppressive treatments upon ICU admission. We conducted a Bayesian analysis to evaluate the impact of the two strategies on D90 mortality and ICU-acquired infections.
Results: Overall, 591 patients were enrolled (men: 64%; median age: 65 years [57–70]; mechanical ventilation: 54%; vasopressors: 48%; renal replacement therapy: 36%) with a median ICU stay of 7 days (IQR: 4–14). The "suspensive" strategy was used in 34% of them with a median duration of 5 days (IQR: 3–10), more frequently among liver (42%) and kidney (37%) transplant recipients, compared to heart (18%) and lung (21%), and more commonly in patients admitted for sepsis (38%) or SARS-CoV-2 infection (49%) compared to those admitted for non-infectious reasons (24%). Bayesian analysis showed that the "suspensive" strategy had no significant effect on D90 mortality, except in septic patients, but suggested a high probability of reducing ICU-acquired secondary infections (Figure).
Conclusions: In this observational study, the "suspensive" strategy of immunosuppressive treatment in SOT patients hospitalized in the ICU appears to reduce the risk of secondary infections without increasing D90 mortality. These findings highlight the need for prospective studies to confirm these preliminary results.

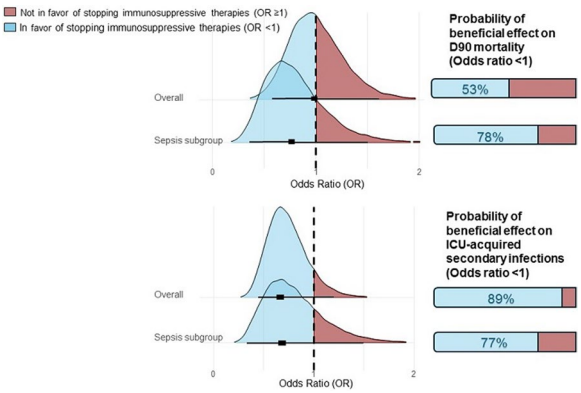

Figure (abstract P248) Posterior density of odds ratios (OR) with mean OR and credibility interval for the effect of suspending temporarily immunosuppressive treatment on D90 mortality and ICU secondary infections in the overall population and the sepsis subgroup

P249

Emapalumab treatment for anticipated clinical benefit in sepsis driven by the interferon-gamma endotype (the EMBRACE trial)

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Critical Care 2025, **29(S1)**:P249

Introduction: Recently a unique sepsis endotype was described with overall prevalence of 20% and 28-mortality 40 to 43% [1]. This endotype is called interferon-gamma (IFNγ)-driven sepsis (IDS) and shows excess production of IFNγ driving elevated biosynthesis of the chemokine CXCL9 by tissue macrophages. The EMBRACE trial will investigate if treatment with emapalumab (EMPB), an IgG1 monoclonal antibody which neutralizes IFNγ activity, in addition to standard of care (SoC), may improve the outcome of IDS patients.
Methods: This is a three-arm parallel, multicenter, phase IIa, double-blind, randomized controlled trial at 25 sites in Greece. Study participants have lung, intrabdominal or acute pyelonephritis or primary bacteremia; meet the Sepsis-3 definitions; and have a serological diagnosis of IDS (in blood detectable IFNγ, CXCL9 ≥ 2200 pg/mL and ≥ 8000 HLA-DR receptors on monocytes). 75 patients will be randomly assigned to: SoC with placebo; SoC with 6 mg/kg followed by 3 mg/kg EMPB, or SoC with 10 mg/kg followed by 6 mg/kg and 3 mg/kg EMPB. Repeat doses will be administered on days 3, 6, 9, 12, 15, 19, 23 and 27. HLA-DR and CXCL9 are monitored and a stopping rule applies based on prespecified threshold levels for safety and efficacy (EU CT Number: 2024-515255-38-00; ClinicalTrials.gov NCT06694701).
Results: The primary endpoint is a ≥ 1.4-point decrease of mean SOFA score from baseline to end-of-treatment (EOT) or ≥ 2-point decrease of SOFA score from day 0 to the EOT visit. Secondary endpoints include 28-day mortality, safety, pharmacokinetics and changes of CRP, IL-6, ferritin, IFNγ and CXCL9 over time.
Conclusions: EMBRACE aims to precision treatment with EMPB in sepsis driven by the IDS endotype.

Acknowledgement: Study group: S. Anisoglou, E. Antoniadou, G. Dimopoulos, E. Gkeka, A. Ioakeimidou, V. Karamouzos, E. Kondili, Z. Mastora, E.Mouloudi, P. Myrianthefs, M. Ntaganou, E. Paramythiotou, V. Papaioannou, M. Patrani, N. Rovina, G. Vlachogianni.

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P250

Investigating the extent of dysbiosis in the critically ill—where are we now?

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Critical Care 2025, **29(S1)**:P250

Introduction: The human microbiome is a complex, dynamic ecosystem essential for immune regulation, nutrition and pathogen defense. In critical illness, homeostasis disruptions lead to dysbiosis, characterized by reduced microbial diversity and pathogen dominance, potentially driving secondary infections and poor outcomes in sepsis. 16S rRNA gene sequencing methods offer insights into these transitions, revealing possible modifiable risk factors.
Methods: We conducted a meta-analysis of microbiome studies in critically ill patients using 16S rRNA gene sequencing, adhering to PRISMA 2020 guidelines and the Cochrane Handbook. Data on gut and lung microbiome were screened and pooled using random-effects models. Standardized mean differences (SMD) were calculated and pooled for improved comparability in studies with control groups. Possible risk factors were collected. Risk of bias and evidence quality were systematically evaluated.
Results: The systematic search identified 18,547 studies, with 104 included in the meta-analysis. Of these, 25 studies included healthy control groups to calculate SMDs for standardized comparison. The pooled Shannon diversity index was 3.27 (95% CI: 3.01–3.54; n = 2,245) in the gut and 2.32 (95% CI: 2.05–2.59; n = 2,562) in the lungs. The pooled Chao1 index for gut samples was 320 (95% CI: 221–419; n = 1063). Gut microbial richness (Chao1: − 1.54 SMD, 95% CI: − 2.32 to − 0.77; n = 648) and alpha diversity (Shannon: − 0.91 SMD, 95% CI: − 1.25 to − 0.58; n = 1,189) were significantly reduced in critically ill patients.
Conclusions: We demonstrated significant dysbiosis in critically ill patients but highlighted challenges in pooling raw diversity results. Methodological differences in sampling, sequencing, and data analysis still make microbiome research hard to interpret. Variations in reference databases, similarity thresholds and alignment strategies highly affect results. We recommend an individual participant data meta-analysis approach to identify modifiable risk factors and possible interventions.

P251

Comparing machine learning and traditional scoring systems for early sepsis detection: a network meta-analysis

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Critical Care 2025, **29(S1)**:P251

Introduction: Early identification of sepsis is essential for improving patient outcomes, but traditional scoring systems such as the Sequential Organ Failure Assessment (SOFA) and National Early Warning Score (NEWS) often lack sufficient accuracy. Machine learning (ML) algorithms offer a promising alternative for more reliable sepsis prediction. This network meta-analysis compared the efficacy of various ML models with traditional scoring systems for early sepsis detection.
Methods: A systematic review and network meta-analysis were conducted using studies identified through Medline, PubMed, Google Scholar, and Cochrane Library. A frequentist meta-analysis approach was employed to compare the area under the receiver operating characteristic curve (AUROC) of ML models and traditional scoring systems. The ML methods analyzed included neural networks, decision trees, logistic regression, and Bayesian methods. The CINeMA (Confidence in Network Meta-Analysis) approach was applied to assess the certainty of the evidence, and risk of bias was evaluated using the QUADAS-2 tool.
Results: Seventy-three studies encompassing 457,932 patients were included in the analysis. Machine learning models demonstrated a pooled AUROC of 0.825, significantly outperforming the SOFA and NEWS score (AUROC = 0.667 and 0.719, respectively). The mean difference (MD) in AUROCs between ML models and traditional scoring systems ranged from 0.06 to 0.17. Among ML models, Neural Networks and Decision Trees achieved the highest AUROC values. Despite the superior performance of ML models, the certainty of evidence supporting their advantage over traditional scoring systems was rated as 'low' due to heterogeneity across studies.
Conclusions: Machine learning models outperform traditional scoring systems in early sepsis detection. While the results are promising, the low certainty of evidence highlights the need for further research and validation of ML models before they are widely implemented in clinical practice.

P252

A superior tool for predicting sepsis in SAH patients: the nomogram outperforms SOFA score

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Critical Care 2025, **29(S1)**:P252

Introduction: Sepsis, a life-threatening organ dysfunction caused by dysregulated host responses to infection, remains a global challenge with high mortality rates [1,2]. Early intervention is critical, but nonspecific symptoms and rapid progression hinder timely diagnosis. Subarachnoid hemorrhage (SAH), a severe stroke subtype, also poses significant challenges due to high mortality and long-term disability rates [3]. In China, SAH significantly contributes to the stroke burden [4]. This study developed a nomogram to predict sepsis risk in SAH patients, improving clinical decision-making and outcomes [5,6].
Methods: A total of 803 SAH patients were divided into a training set (563 cases) and a validation set (240 cases). Independent prognostic factors were identified using forward stepwise logistic regression, and a nomogram was developed. Its discriminative ability, assessed by AUC, outperformed the SOFA score. Model consistency (C-index) and performance improvements (IDI, NRI) further demonstrated the nomogram's superior predictive accuracy.
Results: Five predictive factors were identified via LASSO regression: mechanical ventilation, hyperlipidemia, temperature, white blood cell count, and red blood cell count. The nomogram's AUC in the training and validation sets were 0.854 and 0.824, outperforming the SOFA score (Figure). NRI, IDI, calibration curves, and the Hosmer–Lemeshow test confirmed its accuracy, while decision curve analysis showed higher clinical net benefit.
Conclusions: The nomogram developed in this study performed excellently in predicting the risk of sepsis in SAH patients, surpassing the traditional SOFA scoring system, and has significant clinical application value.

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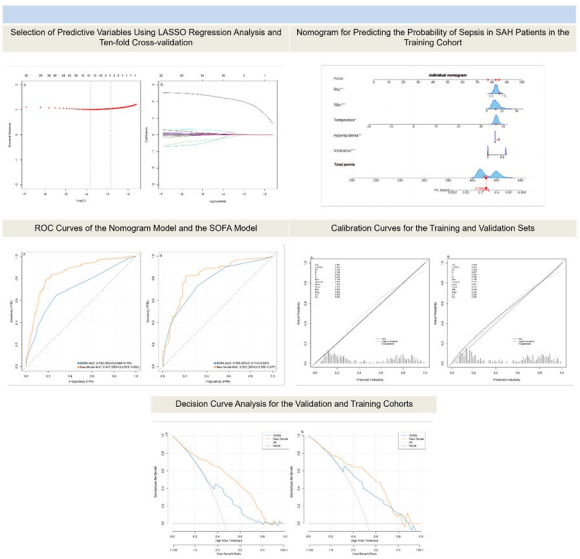

Figure (abstract P252) The nomogram developed in this study performed excellently in predicting the risk of sepsis in SAH patients, surpassing the traditional SOFA scoring system, and has significant clinical application value

P253

Assessment of risk factors for the development of surgical site infection after major orthopedic surgery—a retrospective analysis

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Critical Care 2025, **29(S1)**:P253

Introduction: Despite advances and improvements in infection prevention techniques, surgical site infection is a serious complication after total joint replacement. Prevention of Surgical site infection is the most important strategy to combat this disabling complication, and should begin with identifying patient-related risk factors.
Methods: A retrospective review of the medical records of 71 patients who underwent orthopedic surgery from September 2022 to August 2023 was performed. Taking into account the development of purulent-septic complications, the patients were divided into 2 groups. Group I included patients with infectious complications after surgery, such as periprosthetic infection (n = 9), suppuration of the surgical wound (n = 8), respiratory infection (n = 2), urinary tract infection (n = 9), skin infections (n = 8), in group II there were patients without complications.
Results: A retrospective analysis showed that in the selected group of patients, 3.1% had purulent-septic complications. The average age of patients in group I was 61.4 ± 11.5 years, in group II—61.6 ± 13.2 years ($p > 0.05$). 47.3% of patients in group I had preoperative anemia, while in group II—only 5% ($\chi^2 < 0.02$). At the same time, the hemoglobin level before surgery in the first group was 117.3 ± 3.4 g/L, and in the second—136.3 ± 8.6 g/L, $p < 0.001$. It was also revealed that concomitant diabetes mellitus was observed in 52.6% of patients with purulent-septic complications, which was 5 times higher than in patients of group II (10.5%, $\chi^2 < 0.04$).
Conclusions: Thus, a retrospective analysis showed that risk factors for the development of Surgical site infection after total joint replacement were preoperative anemia, concomitant diabetes mellitus, and hyperglycemia above 7.5 mmol/L at the end of the operation.

P254

Impact of COVID vaccines on COVID mortality rate in ICU

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Critical Care 2025, **29(S1)**:P254

Introduction: COVID vaccines were phased out for use among general population as early as March 2021. Vaccine hesitancy however remains the hurdle which India as a nation struggles to overcome. Although data from the World Health Organization supports COVID vaccines for preventing severe COVID, data from India is limited and almost negligible.
Methods: This retrospective cross sectional study was conducted at a tertiary care COVID center in Chennai, South India for years. Patients` demographic details, category of COVID-19, vaccination details, comorbidities were collected. Deceased were further categorized based on vaccination status and dose of vaccine administered. A comparative analysis among was done between vaccinated and unvaccinated deceased individuals. Among vaccinated deceased individuals, details about type of vaccine, doses of vaccine received, time to positivity after receiving vaccination were analyzed.
Results: A total of 4512 RT-PCR confirmed COVID-19 positive cases were admitted to our hospital since the beginning of the COVID pandemic; of which 4167 recovered and 345 COVID-19 positive deaths were reported. Therefore the overall mortality rate was 7.6% in our study. Mean age of all individuals who succumbed to the infection was 63.3 years. Out of 2387 patients in post vaccine era, 197 patients (8.2%) who had severe COVID-19 pneumonia and respiratory distress succumbed to the infection. Among these 197 patients, 146 (74.1%) were not vaccinated, 51 (25.8%) were vaccinated (Figure). Major comorbidities among vaccinated individuals were systemic hypertension, diabetes mellitus, heart disease, chronic kidney disease and lung diseases.
Conclusions: This study showed that in spite of vaccine availability and eligibility, many COVID deaths in India could not be prevented during the second wave. This catastrophic effect was contributed by the huge pool of unvaccinated population. Although available, hesitancy and reluctance are major stumbling blocks for vaccine coverage among Indian population.

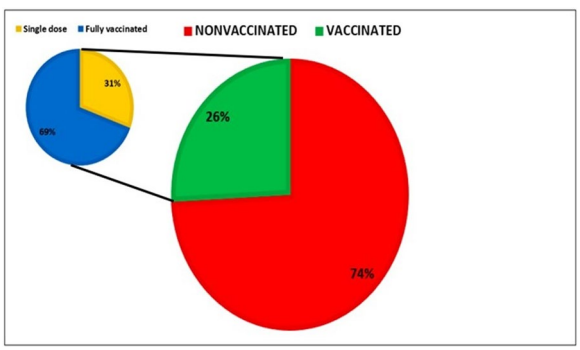

Figure (abstract P254) Distribution of vaccine status of deceased COVID patients

P255

Changing attitudes toward glove use and improving cross contamination risk at a tertiary intensive care unit

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Critical Care 2025, **29(S1)**:P255

Introduction: Climate change has been described as the greatest global health opportunity of the twenty-first century [1]. The UK NHS has committed to carbon neutrality by 2040, but the intensive care unit (ICU) has a significant carbon footprint [2]. This Quality Improvement Project aimed to reduce the environmental impact of non-sterile glove use at a teaching hospital in Brighton, UK.
Methods: Short, ward-based teaching using resources from the Intensive Care Society (UK), regional campaigns, and trust infection control policies were used to deliver teaching in one week to 40 staff in all roles. Teaching was supported with posters. Staff understanding, confidence, and intention to practice the "Gloves Off" policy before and after the teaching was surveyed, using a 10-point Likert scale. Glove use and cross-contamination risk was audited one week before and after teaching. Cross-contamination was defined as a hand/glove touching a surface/patient in contradiction of the WHO Five Moments of Hand Hygiene. Results were analyzed in DATAtab using Wilcoxon and Chi2 tests as appropriate.
Results: Teaching significantly improved self-reported attitudes toward "Gloves Off ICU" policy in all staff surveyed (N = 40). Comparing pre- and post-teaching responses, the median difference showed a large effect size ($r > 0.5$) in all three domains of self-assessment (Table). There was no significant change in overall glove use, but the intervention decreased observed moments of cross-contamination risk ($p < 0.001$).
Conclusions: A simple teaching intervention was effective at changing staff attitudes toward sustainable glove use in the ICU. The campaign reduced moments attributable to cross-contamination in the short term. A follow-up project is underway to reinforce this behavior in the long-term and effect glove use change.

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Table (abstract P256) Self-reported attitudes to "Gloves Off" policy on a 10-point Likert scale

Median (IQR)	Before teaching	After teaching	*p*	r
Understanding of the policy	5 (4–8)	9 (9–10)	< 0.001	0.82
Confidence practicing the policy	5 (5–7)	10 (8–10)	< 0.001	0.83
Intention to practice the policy	8 (6–10)	10 (9–10)	< 0.001	0.68

P256

Optimizing cost-effectiveness of microbiological surveillance during selective digestive decontamination in the intensive care unit—an in silico simulation study

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Critical Care 2025, **29(S1)**:P256

Introduction: Selective digestive decontamination (SDD) is used to prevent infections and reduce mortality in the intensive care unit (ICU). Microbiological surveillance of rectum, throat and sputum is essential for ensuring effective decontamination and detecting antibiotic resistant microorganisms. However, its optimal frequency has not been determined. We explored the cost-effectiveness of various microbiological surveillance intervals during SDD.
Methods: In an in silico simulation study, using data from patients admitted for > 48 h to the ICU of a tertiary care hospital in the Netherlands between 2011 and 2022, three surveillance scenarios were compared: (A) twice-weekly surveillance, (B) once-weekly surveillance, and (C) no surveillance. The primary outcome was the number of isolates with potential clinical relevance identified in each scenario. Secondary outcomes included detection of colonization persistence (prompting intensification of SDD administration) and costs associated with SDD culturing.
Results: We included 8,499 ICU admissions (76,964 treatment days) and analyzed 52,553 clinical and 75,567 SDD cultures. Scenario A yielded 911 (95% CI 905–917) isolates per 1,000 days, of which 90 (88–94) were adjudicated clinically relevant: 9 (9–10) multidrug-resistant microorganisms, 68 (66–71) microorganisms resistant to standard therapy, and 13 (12–14) infection-related microorganisms. Scenarios B and C yielded 85 (82–88) and 77 (75–80) relevant isolates, corresponding to 94% and 86% of all relevant isolates in scenario A, respectively (Figure). Scenario A identified 56 (55–58) cases of colonization persistence per 1,000 days, while scenario B detected 43 (42–45) and scenario C detected 12 (11–12). The total expenditure of SDD surveillance was €78,774, €55,208 and €31,522 per 1,000 days for scenarios A, B and C.
Conclusions: Once-weekly microbiological surveillance is associated with a 30% cost reduction against only 6% loss of potentially relevant information compared to twice-weekly surveillance.

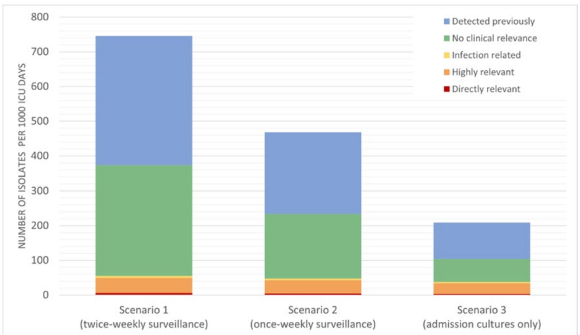

Figure (abstract P256) The number of detected isolates per 1,000 ICU days by relevance category

P257

Impact of a sepsis alert system on mortality in an emergency department: a retrospective propensity score analysis

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Critical Care 2025, **29(S1)**:P257

Introduction: This study aimed to evaluate the impact of a sepsis alert system on mortality at an emergency department (ED), as evidence for mortality benefit from sepsis alert systems is scarce.
Methods: A sepsis alert system was implemented at the ED of Karolinska Hospital Huddinge, Sweden, in October 2017. To evaluate the sepsis alert, we extracted electronic data of 18,312 adult patients who visited the ED, underwent blood cultures, and were admitted, from October 2015 to January 2020. A total of 3,389 patients met the criteria for the sepsis alert, defined as suspected infection (antibiotic treatment for at least 4 days, or until death or discharge) combined with triage criteria (priority 1, or priority 2/3 + lactate > 3.2 mmol/L). We performed propensity score matching between the subgroup that triggered the sepsis alert from October 2017 to January 2020, and a subgroup fulfilling the sepsis alert criteria before the implementation of the sepsis alert, using psmatch in STATA, with the following variables: sex, age, initial triage priority, admission SOFA score, Charlson Comorbidity Index, do-not-resuscitate-orders, discharge diagnosis (pneumonia, urinary tract infection (UTI), or other), and blood culture positivity. The primary outcome was 28-day mortality.
Results: The analysis consisted of 615 sepsis alert patients and 1405 propensity score matched patients presenting before the implementation of the sepsis alert. The groups were similar regarding the propensity score variables, although the sepsis alert patients included a higher proportion with UTI (17% vs 10%). The 28-day mortality was 13.2% in the sepsis alert group and 17.6% in the propensity score matched group ($p = 0.012$), see the Figure. Sensitivity analysis excluding patients with UTI did not alter the significantly lower mortality for sepsis alert patients.
Conclusions: In this evaluation a sepsis alert was associated with lower mortality for patients with sepsis.

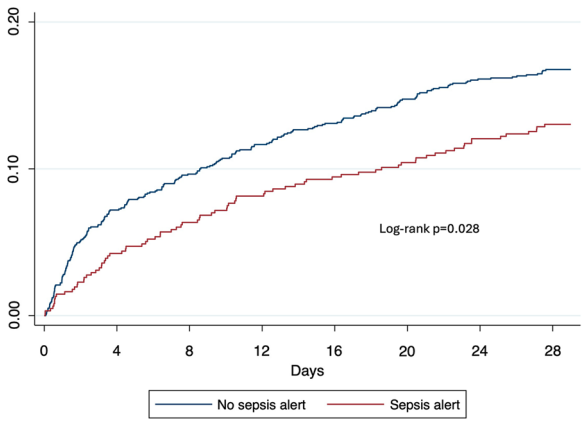

Figure (abstract P257) 28-day mortality among propensity score matched patients, 2015–2017 (no sepsis alert) and patients within sepsis alert

P258

Evaluating ICU response times and outcomes in necrotizing fasciitis management: a retrospective analysis

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Critical Care 2025, **29(S1)**:P258

Introduction: Necrotizing fasciitis is a life-threatening condition that demands urgent surgical and intensive care management. Timely admission to the ICU is paramount. National guidelines emphasize a 4-h benchmark for sepsis admissions[1]. This study evaluates the impact of ICU admission times on mortality and ICU stay length, contextualized against initial illness severity in patients treated for necrotizing fasciitis between 2015 and 2024.
Methods: This retrospective observational study analyzed 25 patients admitted to the ICU with necrotizing fasciitis. Patients were categorized into two groups based on ICU admission time: < 4 h (Group 1) and > 4 h (Group 2). Outcomes assessed included mortality and length of ICU stay. Statistical analysis compared trends between the two groups to evaluate adherence to and implications of admission timelines.
Results: Group 1 (14 patients) presented with a higher initial mean NEWS scores (8.1) compared to Group 2 (6.2), indicating greater initial severity among those admitted within 4 h. Despite guideline-adherent admission times, Group 1 had a longer mean ICU stay (24.6 days) compared to Group 2 (11.2 days) and higher mortality rates (33.3% in group 1 compared to 20% in group 2) (Figure). These findings reveal a paradox, where earlier admission was associated with worse outcomes and prolonged care, likely driven by the greater clinical severity of patients prioritized for expedited admission.
Conclusions: Timely ICU admission plays a critical role in managing necrotizing fasciitis, yet earlier admissions in this cohort were associated with higher mortality and longer stays. The findings underscore the need for tailored management strategies that address patient acuity while striving for optimal admission timelines. These findings highlight opportunities for quality improvement and reinforce the value of early recognition and intervention.

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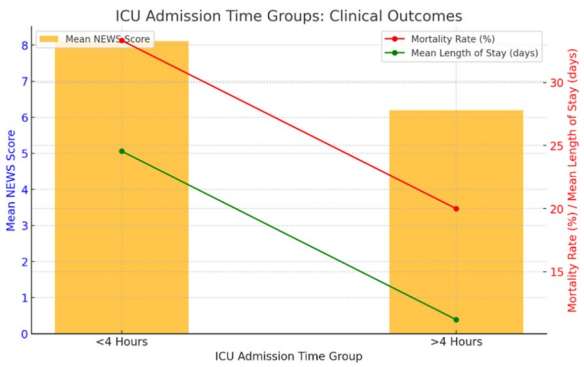

Figure (abstract P258) Comparison of clinical outcomes by ICU admission time groups (< 4 h vs. > 4 h): mean initial NEWS score, mortality rate, and mean length of stay

P259

Comorbidities and complexity: modern challenges in necrotizing fasciitis management

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Critical Care 2025, **29(S1)**:P259

Introduction: Necrotizing fasciitis (NF) is a rare but aggressive soft tissue infection with a global incidence of 0.3 to 15 cases per 100,000 annually [1]. It requires immediate surgical and critical care intervention to mitigate its high morbidity and mortality rates. The prevalence of NF is anticipated to rise, driven by an aging population and the increasing prevalence of complex comorbidities such as diabetes mellitus and immunosuppression.
Methods: A retrospective cohort audit conducted on 28 patients with confirmed NF admitted to a district general hospital in North Central London between 2015 and 2024. Data included patient demographics, presenting symptoms, comorbidities, microbiological findings, organ support needs and outcomes.
Results: 50% of patients had diabetes mellitus (DM) or immunosuppression, while 25% reported chronic vascular disease. The median time for surgical debridement was 6 h, with all patients (100%) meeting the UK (NHS/Leicester Guidelines) and international (IDSA/WSES) benchmarks of intervention within 12 h. Antibiotics were initiated within 1 h in 75% of cases, demonstrating weaker adherence to international benchmarks (IDSA: 90%). Mortality was 28.6% (8/28), with survivors more likely to have earlier recognition and treatment. Polymicrobial infections had a higher mortality rate (42%) compared to single-organism cases (18%) with the most common organism identified being streptococcus pyogenes.
Conclusions: This study underscores the critical role of surgical debridement and rapid intervention in improving outcomes for NF. Timely treatment significantly reduced morbidity and mortality, while patients with polymicrobial infections and greater clinical severity faced poorer outcomes. Our data provides a snapshot of a diverse population subset with complex comorbidities and risk factors and reflective of the future challenges we may face in the management of NF globally.

Reference

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P260

Severe pneumococcal infections, risk factors and outcomes

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Critical Care 2025, **29(S1)**:P260

Introduction: Invasive pneumococcal disease (IPD) is a significant global public health issue, posing higher risks to children, the elderly, and immunocompromised individuals. Pneumococcal pneumonia accounts for many ICU admissions, and IPD diagnosis requires isolating pneumococcus from sterile sites, such as blood or CSF cultures.
Methods: This retrospective observational study analyzes the clinical characteristics of invasive pneumococcal disease (IPD) patients admitted to a district hospital ICU in Portugal between 2017 and 2023, using data from the ICU patientcare platform and the Clinical Pathology Service.
Results: Between 2017 and 2023, 36 IPD patients were admitted to our ICU (13 females, 23 males, aged 31–89, average 66). Pneumonia was the primary cause in 27 cases, while 9 had meningitis, with most showing positive blood cultures. Nearly 30% had comorbidities or immunosuppression, and 78% required organ support, including invasive ventilation (58%). Mortality was 44%, predominantly males over 65 years old. Common comorbidities in fatalities included chronic corticosteroid use, alcoholic liver disease, cancer, and SARS-CoV-2. None were vaccinated post-65.
Conclusions: Pneumococcal diseases remain a significant global health burden, with IPD causing high mortality and morbidity, particularly in older adults and immunocompromised individuals. Vaccines and herd immunity have reduced IPD rates, yet challenges remain. In 2018, Europe reported 6.2 IPD cases per 100,000, with Portugal at 3.5. Despite including at-risk adults in vaccination programs since 2015, compliance among those over 65 remains low at 17%. Prompt treatment is crucial to prevent complications, but prevention must start with healthcare centers and public health initiatives, such as prioritize vaccination access, especially for children and high-risk groups, enhanced surveillance, identifying susceptible patients, and addressing underlying health conditions, in our opinion, are essential to further reduce IPD rates.

P261

Understanding *S. pyogenes* infections in ICU patients

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Critical Care 2025, **29(S1)**:P261

Introduction: *S. pyogenes* (Group A streptococcus, GAS) is a significant cause of invasive infections, leading to severe complications (shock, renal failure, and coagulopathy). In recent years, there has been a noticeable increase in the incidence of GAS infections. Despite advances in antimicrobial therapy and critical care management, mortality remains substantial.
Methods: A retrospective cohort of 29 patients with microbiologically confirmed GAS infections in the ICU (2010–2024).
Results: The cohort's median age was 45.7 years (IQR 37.3–59.5), with 62.1% male. Infection sources were skin and soft tissue 58.6%, respiratory 24.1%, and puerperal 17.2% (Table). Most patients developed shock 82.8%, acute renal failure 72.4%, coagulopathy 72.4% and respiratory failure 62.1%. Empirical therapy included clindamycin, linezolid, and a carbapenem in 51.7%. Immunoglobulin therapy was used in 44.8% of cases, and infection source control was achieved in 72.4%. Antimicrobial susceptibility was 100% for penicillin and clindamycin, while resistance was noted in 19.2% for macrolides and 3.4% for quinolones. The median ICU length of stay was 12.9 ± 6.5 days, and hospital was 38.6 days. Mortality was 13.8%.
Conclusions: Patients with GAS infections requiring ICU admission present with high severity, where complications such as septic shock and multi-organ failure are predominant. Mortality in this cohort was lower than previously reported rates in similar populations, potentially reflecting effective source control and early immunoglobulin therapies. Nevertheless, the persistence of antibiotic resistance, particularly to macrolides, emphasizes the need for judicious antibiotic use.

Table (abstract P261) Clinical and treatment characteristics

Variable	Result
Median age (years)	45.7 (IQR 37.3–59.5)
Male	62.1%
Infection source	Soft tissue 59%, respiratory 24%, puerperal 17%
Organ failure	Respiratory 62%, renal/coagulopathy 72%, shock 82%
Antibiotic resistance	Macrolides 19.2%, quinolones 3.4%

Variable	Result
Mortality rate	13.8%
Median ICU stay (days)	12.9
Median hospital stay (days)	38.6

P262

Characterization of central nervous system infections in an intensive care unit

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Critical Care 2025, **29(S1)**:P262

Introduction: This study aimed to characterize central nervous system (CNS) infections in critically ill patients admitted to the intensive care unit (ICU) and determine the factors most strongly associated with mortality.
Methods: This retrospective study analyzed adult patients diagnosed with CNS infections requiring ICU admission between January 2023 and October 2024. Data collected included clinical presentation, laboratory and microbiological findings, diagnoses, therapeutic interventions, ICU complications, and clinical outcomes.
Results: The incidence of CNS infections in the ICU was 1.7% (12 cases identified among 717 patients). The median age was 66.5 years. Predisposing factors included age ≥ 65 years, diabetes mellitus, alcohol abuse, pregnancy, immunosuppressive therapy, and drug abuse. Secondary infections were associated with brain hemorrhage, prior viral respiratory infections, and sinusitis. Diagnoses comprised meningoencephalitis (50%), encephalitis (16.7%), meningitis (8.3%), empyema (16.7%), and brain abscess with ventriculitis (8.3%). Common symptoms were altered mental status, fever, and nausea or vomiting. A microbiological agent was identified in 83.3% of cases, with 80% of these being bacterial infections, predominantly caused by gram-positive agents. Eight patients were discharged with a Glasgow Coma Scale ≤ 14, while two achieved full recovery. Complications occurred in 58.3% of cases. The overall mortality rate was 50%, with two deaths during ICU admission and four post-discharge within 30 days of diagnosis.
Conclusions: CNS infections in critically ill patients are rare but associated with substantial morbidity and mortality. In this cohort, age ≥ 65 years and the presence of complications were significant predictors of mortality. Early recognition, maintaining a high index of suspicion, and prompt treatment are essential to improving outcomes.

P263

Ventriculitis diagnosis in neurocritical care patients: a single-center ICU retrospective cohort study over a 5-year period

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Critical Care 2025, **29(S1)**:P263

Introduction: We aimed to determine the incidence of ventriculitis in neurocritical patients admitted to our multidisciplinary ICU, evaluating clinical, biochemical, and microbiological diagnostic criteria based on the broad framework proposed by ECDC.
Methods: We retrospectively analyzed data from 124 adult ICU patients (2017–2021) who had external ventricular drains (EVD) inserted during their stay. Clinical, biochemical, and microbiological parameters were collected and compared with ECDC diagnostic criteria. Data were extracted from electronic medical records; statistical analysis was performed using SPSS.
Results: Of the 124 patients (53,1% male, median age 61 years), the median SAPS II and APACHE II scores were 42 (29–52) and 20 (13–24), respectively. Median ICU and hospital LoS were 14 and 39 days, with in-hospital, 6-month, and 12-month mortality rates of 37.5%, 45.3% and 48.2%. Of 156 EVD insertions, 82% (n = 128) occurred in the operating room, and 15.4% (n = 24) in the ICU. Periprocedural antibiotics were administered in 61.4% (n = 67) of 109 cases with adequate records, primarily cefazolin (97%). Ventriculitis was documented in 29% (n = 36) of discharge notes, with ECDC-compliant incidence at 24.2% (n = 30) or 17.1 infections per 1000 EVD days. Microbiological confirmation was achieved in 36.7% (n = 11) or 6.3 infections per 1000 EVD days, predominantly gram-negative bacteria (64%), while 63.3% (n = 19) of reported ventriculitis only met secondary criteria. EVD insertion-to-infection suspicion median time was 6 days.
Conclusions: Microbiological diagnosis of ventriculitis is challenging due to the low sensitivity of conventional cultures. Biochemical and cytological criteria may be confounded by underlying brain injury or device-related inflammatory changes. Incidence rates must be interpreted in the context of the diagnostic definitions used. Our findings align with other studies employing liberal vs. restrictive infection definitions, highlighting the inherent diagnostic challenges in this field.

P264

HIV-infected patients admitted to the ICU: the impact of a newly diagnosed HIV infection

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Critical Care 2025, **29(S1)**:P264

Introduction: We aim to characterize the epidemiology and outcomes of HIV-infected patients admitted to the ICU, and explore the possible impact of a newly diagnosed HIV infecton on the ICU course. The widespread use of antiretroviral therapy in the treatment of HIV-infected patients lead to a significant reduction of their morbidity and mortality, although ICU admission remains frequent.
Methods: A single-center, retrospective, observational study of critically ill HIV-infected patients was performed between 1 March 2019 and 31 December 2023. Statistical analysis was performed by IBM SPSS Statistics.
Results: During the study period, a total of 78 HIV-infected patients were admitted in the ICU, with a mean age of 55 years, 64.1% were male and 65.4% caucasian. HIV infection was newly diagnosed in 15.4% of the patients. The majority of ICU admissions were for non-HIV-related conditions (89.7%), mainly respiratory illness (33.3%), sepsis and septic shock (26.9%) and neurological disorders (16.7%). During ICU stay, 60.3% of the patients needed vasopressors, 65.4% mechanical ventilation and 25.6% renal replacement therapy. Patients with newly diagnosed HIV infection (n = 12) had higher hospital length of stay (49 vs 18 days, p value = 0.007), more AIDS-defining conditions (58.3% vs 22.7%, p value = 0.033), more immunosuppression (median CD4 count 126 vs 432 cell/μL, p value = 0.005) and higher viral load (median log 5.9 vs 0, p value < 0.01). Despite this, patients with previously diagnosed HIV infection (n = 66) had higher SAPS II score (52 vs 47, p value = 0.027) and higher ICU and hospital mortality (25.7% vs 16.6% and 36.4% vs 33.3%, respectively), but it did not reach statistical significance.
Conclusions: HIV infection is often diagnosed late, with patients presenting with life-threatening diseases, leading to high ICU mortality of HIV patients. Respiratory illness remains the main indication for ICU admission in HIV-positive patients.

P265

Limited treatment options for infections caused by carbapenem resistant enterobacterales. Is it necessary to also know the carbapenemase type?

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Critical Care 2025, **29(S1)**:P265

Introduction: Infections caused by carbapenem resistant *Enterobacterales* belong to the biggest problems in hospitals nowadays. Treatment and epidemiological measures in cases of these infections can be very complicated if the pathogens are a carbapenemase producer (CPE), especially metallo-beta-lactamase (MBL) producer. According to ESCMID guidelines, one of the best treatment options is cefiderocol.
Methods: Susceptibility to antibiotics was tested routinely by disc diffusion method. If the strain was resistant to carbapenems, carbapenemase production was determined using rapid immunochromatographic test and then MIC of aztreonam/avibactam, cefiderocol and fosfomycin was tested. Carbapenemase production detection of 95 unique *Enterobacterales* isolates obtained from patients hospitalized in General University Hospital in Prague (GUH) or long-term acute care hospital in Prague (LTACH) during the last 365 days was performed.
Results: In the last year, 95 unique isolates of *Enterobacterales* resistant to carbapenems were detected. 63 isolates were from patients hospitalized in GUH and 32 from LTACH. 82 strains were CPE. Most detected type was the New-Delhi metallo-beta-lactamase (NDM)—in 72%. In isolates with NDM type in this study, resistance to cefiderocol was very high (76%), resistance to fosfomycin was 61% and one case of resistance to aztreonam/avibactam was also detected. In other carbapenemase types, resistance to cefiderocol or aztreonam/avibactam was not detected. The lowest resistance to fosfomycin were in strains with OXA-48–17%.
Conclusions: Last year, the most detected carbapenemase type was NDM. NDM producing strains showed the highest antibiotic resistance, so for the right antibiotic treatment, it is very important to know the type of carbapenemase before the susceptibility result is available.

P266

Impact of *Pseudomonas aeruginosa* antibiotic resistance on ICU and hospital length of stay: an observational study

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Critical Care 2025, **29(S1)**:P266

Introduction: We hypothesize that infections caused by extremely resistant strains of *Pseudomonas aeruginosa* result in prolonged intensive care unit (ICU) and hospital stays.
Methods: In this observational study, we included adults with nosocomial infections caused by *Pseudomonas aeruginosa* who were admitted to ICU at Kommunarka Medical Center between 2022 and 2024. The *Pseudomonas aeruginosa* strains were classified into three groups based on their sensitivity to antimicrobial agents. Group 1 included strains resistant to all beta-lactams (ABLR); Group 2 comprised strains sensitive only to ceftazidime-avibactam (CAOS); and Group 3 consisted of strains sensitive to both meropenem and ceftazidime-avibactam (MCAS). Notably, the majority of strains in Group 3 were determined to be difficult-to-treat resistant (DTR). We compared the time from infection detection to hospital discharge, as well as the length of stay (LOS) in the ICU and at the hospital among groups.
Results: This study included 130 patients, of whom 44.6% had severe infections from ABLR strains, 16.9% were infected with CAOS strains, and 38.5% had infections caused by MCAS strains. The results of the Kruskal–Wallis test indicated significant differences in the time from infection to discharge ($p = 0.046$) and the hospital LOS ($p = 0.01$), with ABLR demonstrating the highest times for both outcomes, with a median of 21 days and 34 days, respectively. There was no difference in ICU LOS among groups.
Conclusions: In the presented population of ICU patients with nosocomial infections caused by *Pseudomonas aeruginosa*, we noted a concerning frequency of resistance to carbapenems and ceftazidime-avibactam. Specifically, 44.6% of the infections were caused by ABLR strains, which are associated with prolonged hospital stays. The emergence of these resistant strains highlights the urgent need for improved antimicrobial stewardship and targeted treatment strategies to reduce the risk of treatment failure and optimize healthcare resource use.

P267

A framework for outcome determination of nosocomial pneumonia treatment in critically ill patients

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Critical Care 2025, **29(S1)**:P267

Introduction: Treatment failure of HAP and VAP is often used as an endpoint in both epidemiological studies and clinical trials. Yet, the lack of a universally accepted definition introduces bias and results in variability between studies. This study aimed to develop a standardized definition of treatment outcomes in critically ill patients with HAP or VAP and to evaluate its applicability and predictive validity.
Methods: We analyzed data from two ICU cohorts in the Netherlands and France. An expert panel defined therapeutic response using a combination of clinical, radiological, and microbiological criteria. This was assessed daily up to day 10 after diagnosis. Clinical cure required ICU discharge, extubation, or improved oxygenation ($PaO2/FiO2 > 300$ or a > 100-point increase) plus ≥ 2 of: fever resolution (< 38.3 °C), absence of leukocytosis, or CRP decline (> 20%). Radiological cure required improvement of baseline consolidations and microbiological cure required eradication of the causative pathogen. Treatment success was achieved by either meeting criteria for clinical cure or both radiological and microbiological cure. Patients not meeting criteria for cure by day 10 were classified as treatment failure, with the exception of death or transfer before day 10, which was scored as indeterminate.
Results: A total of 1,941 patients (HAP: 42%, VAP: 58%) were analyzed. The incidence of treatment failure at day 10 was 19.9% (n = 254/1603) in the Dutch and 38.8% (n = 131/338) in the French cohort. Treatment failure was significantly associated with increased 90-day mortality (34.0% vs. 23.7%), 1-year mortality (51.0% vs. 35.8%), duration of mechanical ventilation (16 vs. 6 days) and increased use of empirical antibiotics among admitted patients at day 10 (60.0% vs. 39.3%).
Conclusions: This definition of treatment success and failure for HAP and VAP in critically ill patients is reproducible and valid. It offers a standardized approach that can be adopted in clinical settings, observational studies and clinical trials.

P268

Burden and costs of 30-day hospital readmissions among survivors of hospitalization with severe community-acquired bacterial pneumonia in the United States, 2018–2022

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Critical Care 2025, **29(S1)**:P268

Introduction: Survivors of hospitalization with community-acquired bacterial pneumonia (CABP) are subject to a high risk of

rehospitalization. As such, it represents a focus of the US Centers for Medicare and Medicaid Services quality initiatives, wherein hospitals are financially penalized for 30-day CABP readmissions. While 10–25% of patients admitted with CABP meet criteria for severe CABP (sCABP) and face increased short-term mortality, little is known about the risk for rehospitalization among survivors of sCABP.
Methods: We conducted a retrospective single-group cohort study using IQVIA's hospital charge data master database (2018–2022) including adults hospitalized with sCABP, defined as an episode of CABP requiring ICU admission. We quantified the incidence of, and costs related to, 30-day readmissions among survivors of sCABP and developed predictive models to identify associated risk factors.
Results: Among 24,422 sCABP patients (20,541 survivors, 84.1%) with an index sCABP admission, the majority were > 65 years old (58.4%), male (55.2%), and hospitalized in large (300 + beds, 50.9%) urban (91.9%) teaching (62.7%) institutions in the US Southern census region (52.3%). The mean (SD) Charlson Comorbidity Index was 1.35 (2.33). Nearly 1 in 5 survivors (19.9%) required readmission within 30 days after discharge from the initial hospital stay (4.2% for treatment of pneumonia). The mean (SD) cost per readmission was $61,072.28 ($102,603.99). The strongest predictors of readmission were older age and the presence of select comorbidities (diabetes mellitus, CHF, and COPD), each with an odds ratio > 1.4 and 95% confidence intervals excluding 1.0.
Conclusions: Those surviving an ICU admission for sCABP are frequently readmitted within 30 days. Given the 1 million pneumonia admissions annually in the United States, sCABP rehospitalizations may exceed 30,000 per annum, leading to an aggregate national annual bill for 30-day rehospitalizations of up to $1.9 billion.

P269

Characteristics and outcomes of ICU patients with severe acute respiratory infections (SARI): a comparison of respiratory syncytial virus, human metapneumovirus, influenza, and parainfluenza

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Critical Care 2025, **29(S1)**:P269

Introduction: Viral severe acute respiratory infections (SARI) are a major cause of intensive care unit (ICU) admission, with a significant burden on both patients and healthcare systems [1]. Comparative clinical data of patients admitted to the ICU is lacking. Therefore, this study aims to investigate patient characteristics, clinical outcomes, and ventilation parameters in ICU patients with SARI caused by RSV, HMPV, influenza, and parainfluenza.
Methods: A retrospective case series analysis was conducted of patients with SARI admitted to the ICU of the Spaarne Gasthuis, a Dutch secondary hospital, between 2017 and 2023. Data on demographics, comorbidities, ventilation support, and clinical outcomes were collected. Statistical analyses included chi-square tests and ANOVA/Kruskal–Wallis tests.
Results: A total of 277 patients were analyzed: RSV (n = 51), HMPV (n = 40), influenza (n = 142), and parainfluenza (n = 44). In 5 patients co-detections were found: RSV/HMPV, RSV/Influenza, HMPV/Influenza, influenza/HPIV. Hematological malignancies were significantly more common in RSV patients. Antiviral use was highest in influenza cases. There were no significant differences in mortality between the groups: RSV showed a mortality rate of 25.5%, HMPV 15%, influenza 24.7%, and parainfluenza 20.5%. Additionally, No significant differences were found in hospital stay of ventilation parameters across the virus groups. Co-infections were more common in patients with non-invasive ventilation (NIV) failure.
Conclusions: The study provides valuable insights into ICU outcomes for patients with viral SARI, highlighting the need for individualized care in high-risk groups like those with hematological malignancies. Further research is necessary to optimize treatment strategies for these patients.

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P270

Increasing incidence of anaerobic bacteria detected in samples from intra-abdominal infections in a surgical intensive care unit

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Critical Care 2025, **29(S1)**:P270

Introduction: Intra-abdominal infections (IAIs) are typically polymicrobial (incl. aerobic and anaerobic bacteria). The detection and identification of anaerobes is challenging because of their slow growth. Despite interpretation criteria for disc diffusion method being newly available, there are still difficulties with antibiotic susceptibility testing. Anti-anaerobic antimicrobial therapy is usually empiric, which considering global increase in resistance (especially in *Bacteroides fragilis* group, BFG) can lead to treatment failure and higher mortality.
Methods: Data concerning clinical samples taken in General University Hospital in Prague in cases of IAIs were extracted from laboratory information system and evaluated. Only valid samples from years 2014 to 2023 were included: intra-abdominal fluid, abscess fluid, wound exudate, tissue; swabs were excluded.
Results: From 2014 to 2023, 2850 intra-abdominal samples were taken in this hospital's surgical ICU or during surgery. Throughout the years, significant increase of samples was observed (199 vs. 322, resp., in 2014 and 2023, increase by 62%). The number of anaerobes increased by 100% (61 vs. 120 in 2014 and 2023, resp.). The distribution of pathogens also shifted: percentage of only aerobes decreased (58.8% and 39.4%, resp., in 2014 and 2023), and percentage of aerobic and anaerobic mixed culture, and purely anaerobes, had a rising trend. The distribution of anaerobes was similar during the observed period with some differences: the percentage of Clostridium spp. slightly decreased, and the percentages of *Veillonella* spp. and Gram-positive anaerobic cocci increased. The most prevalent anaerobes were members of BFG.
Conclusions: Because the incidence of anaerobes in severe infections (e.g., IAIs) is rising, it is necessary to routinely perform anaerobic culture from intra-abdominal samples and determine susceptibility for a proper treatment. Antimicrobial resistance is also increasing, so it is inappropriate to use empiric therapy for anaerobic infections.

P271

The impact of carbapenem-resistant Gram-negative catheter infections on mortality

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Critical Care 2025, **29(S1)**:P271

Introduction: Multidrug-resistant bacteria are known to have a higher impact on mortality compared to other types of infections [1]. This study aims to evaluate the diversity of pathogens isolated in catheter-related infections in ICU patients, their antibiotic resistance patterns and their impact on mortality.
Methods: This retrospective study was conducted by analyzing the medical records of patients monitored over the past year in a tertiary-level intensive care unit of a university hospital. A total of 215 patients with indwelling catheters were included in the study. Blood culture growth status, timing of growth, isolated pathogens and antibiotic resistance patterns were analyzed. Variables such as age, gender, type

of catheter used and surveillance data were also assessed. Statistical analyses were performed using IBM SPSS(v15.0).
Results: The mean age of the patients was 70.7 years (range:25–96), with 135 being male. Among the patients, 161 (74.9%) had hemodialysis catheters, while 54 (25.1%) had central venous pressure catheters. No significant association was found between demographic characteristics, catheter type, timing of pathogen growth and CRBSI. Blood culture growth was detected in 20 patient. Among the identified pathogens, Acinetobacter was isolated in 9 patients, Candida species in 10 and *Klebsiella pneumoniae* in 6. Antibiogram results showed that all *Acinetobacter* isolates and 50% of *Klebsiella* isolates were R-carbapenems. No significant correlation was observed between blood culture positivity and mortality.
Conclusions: These findings suggest no significant relationship between CR-GNB catheter infections and mortality. However, the increasing prevalence of multidrug-resistant gram-negative catheter infections is recognized as a therapeutic challenge. Considering the limitations of this study, further research with larger patient cohorts is warranted to validate these findings.

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P272

Impact of 2024 seasonal influenza surge on Dutch intensive care units: a descriptive cohort study of 32 Dutch hospitals

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Introduction: Severe acute respiratory infections (SARI) pose a considerable public health challenge [1]. During the COVID-19 pandemic, there was a rapid decline in the seasonality and prevalence of typical SARI pathogens [2]. While most patients with SARIs present with mild symptoms, certain demographic groups and individuals with underlying health conditions, are at an elevated risk of developing severe complications [3,4]. The re-establishment of SARI seasonality post-pandemic is of most importance to prepare for peak ICU capacity and identify those groups at risk.
Methods: A retrospective observational cohort study was conducted on 31 national intensive cares coordinated by the Spaarne Gasthuis, to assess the clinical course and burden of disease associated with influenza between November 2023 and April 2024.
Results: A total of 500 patients were included in the study. The median age was 65 years (range 56–73). The median duration of hospital admission was 11 days, with a median ICU stay of 4 days. The overall mortality rate was 22.9%. Co-infections were identified in 34% of patients. Mechanical ventilation was eventually required in 34% of patients with a median duration of 8.5 days.
Conclusions: The post pandemic landscape of SARI-pathogens is of interest with upsurges of other respiratory pathogens as influenza. This study described a cohort of complicated influenza with a high burden of disease in the first serious influenza season post pandemic. Contributing factors for complicated disease include waning immunity and variations in vaccination coverage rates. Prolonged surveillance is essential to accurately monitor disease trends and optimizing diagnostic accuracy in acute care. Furthermore, this study suggest potential factors associated with failure in non-invasive ventilation in viral pneumonia.

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P273

Comprehensive antibody (binding) profiles in two commercial IVIg preparations targeting diverse pathogens

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Introduction: IVIgs are human plasma-derived polyvalent immunoglobulin G preparations that are used in a variety of medical conditions, particularly those associated with immune dysfunction. In this study, the antibody binding profiles of two IVIg preparations against various viral and bacterial antigens are investigated to characterize the diversity of the antibodies. The antigen specificities of IVIgs reflect the donor antibody repertoires, likely maintaining stable antibody titers in IVIgs against common pathogens via natural exposure and vaccination. Understanding this spectrum could be valuable for optimizing the therapeutic benefit of IVIgs.
Methods: Antibody titers in different batches of IVIg A (Intratect®) and IVIg B (Yimmugo®) were evaluated using various immunoassay techniques including enzyme-linked immunosorbent assay, enzyme immunoassay, chemiluminescent immunoassay, and indirect immunofluorescence testing. The sample is considered positive against the antigen if an assay-specific value has been reached (no value available for RSV).
Results: Our analyses showed that the IVIg preparations A and B contain high antibody titers against several viral agents (Figure), including some herpes and influenza virus strains, RSV, EBV, and adenovirus strains tested, indicating a potent viral binding profile. In addition, antibodies against bacterial pathogens such as *Chlamydia pneumoniae* and pneumococci were also detected, underlining the ability of IVIg to target both viral and bacterial pathogens. These results indicate that both IVIgs have a similar and broad spectrum of activity against various infectious agents.
Conclusions: The observed antibody binding activities suggest the potential utility of both IVIgs in providing passive immunity against a range of infections, particularly those caused by common viral and bacterial pathogens. These results support the role of IVIg as a valuable therapeutic agent in immunocompromised patients and warrant further research to refine its antigen-specific efficacy.

Pathogen	Positive value*	IVIg A	IVIg B
RSV	**	807 U/mL	1180 U/mL
Adenovirus	>13 U/mL	74.7 U/mL	83.0 U/mL
EBV	≥1.0 Index	2840 Index	2260 Index
FSME	≥165 vieu/mL	4715 vieu/mL	5299 vieu/mL
Human Herpes-Virus			
Type 6	≥1:20 titer	1:1067 titer	1:1067 titer
Type 7	≥1:20 titer	1:1280 titer	1:1280 titer
Type 8	*≥1:100 titer*	*<1:100 titer*	*<1:100 titer*
HSV-Type 1/2	>12 U/mL	3020 U/mL	3443 U/mL
Influenza-Virus			
H1N1	*≥1:320 titer*	*1:229 titer*	*1:218 titer*
H3N2	≥1:320 titer	1:427 titer	1:593 titer
Yamagata	≥1:320 titer	1:577 titer	1:666 titer
Austria Victoria	*≥1:320 titer*	*1:80 titer*	*1:77 titer*
Bacteria			
C. pneumoniae	>24 U/mL	56 U/mL	54 U/mL
M. pneumoniae	>30 U/mL	397 U/mL	363 U/mL
Pneumococci	>10 mg/L	1180 mg/L	850.7 mg/L

Figure (abstract P273) Selection of measured antibody titers against several pathogens from the two IVIgs. * The sample is considered positive against the antigen if an assay-specific value has been reached. ** No assay-specific positive value available.

P274

Empiric antimicrobials in acute liver failure: a retrospective cohort study

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Introduction: Patients with acute liver failure (ALF) are especially susceptible to infections. The diagnosis is difficult due to the low specificity of inflammatory markers and similarities with septic shock. The threshold for antimicrobial initiation is low when there is clinical deterioration [1]. However, observational data shows that prophylactic use of antibiotics does not reduce the incidence of bacteriemia or 21-days mortality [2], so its routine use is not recommended in current guidelines [1]. We performed an observational study to evaluate the impact of antimicrobial use in our ICU.
Methods: We included adult patients diagnosed with ALF (encephalopathy and INR ≥ 1.5 [1]), admitted to the ICU of a hepatic transplant center, between 2016 and 2024. We compared patients based on use of empirical antimicrobials, before transplant or until discharge from the ICU.
Results: We included 48 patients, 37 (77%) received empiric antibiotics and 11 (23%) did not. 13 patients (27%) had an infection confirmed by a positive culture (10 with bacteriemia, 8 with positive urine culture). 32.4% of patients in the antibiotics group and 9% of patients in the control group had a culture positive infection ($p = 0.25$). In a multivariate logistical regression adjusting for confounding factors, we found that higher CRP levels at day 3 increased the odds of receiving antibiotics (OR 1.07, 95% CI [1.02–1.17]). ICU mortality (OR 0.22, 95% CI [0.003–8.05]) and transplant free survival (OR 0.01, 95% CI [< 0.001–1.76]) were not associated with antibiotic use. 7 patients (15%) were treated with empiric antifungals before transplant, and a similar multivariate analysis did not show a significant association with ICU mortality (OR 0.33, 95% CI [0.01–4.3]).
Conclusions: In this small observational study, empiric antibiotic use was not associated with a significant change in the odds of infection, ICU mortality or transplant free survival.

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P275

Treatment with metronidazole is associated with *Clostridioides difficile* infectious disease-related adverse outcomes

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Introduction: Both leucocytosis and elevated serum creatinine levels are severity criteria of *Clostridioides difficile* (*C. difficile*) infectious disease (CDID) [1]. The aim of this study was to analyze the association of the presence of both severity criteria on CDID-related adverse outcomes in case of treatment with metronidazole [2].
Methods: A single-center, retrospective cohort study was conducted in the largest university-affiliated hospital in Lithuania from 2011 to 2020. Cases with primary CDID (diarrhea and positive stool test for *C. difficile* toxin A/B) were enrolled. Leukocytes $\geq 15 \times 10^9$/L and/or serum creatinine level > 133 µmol/L were used as CDID severity criteria. The association of the presence of two vs. one severity criteria with the rate of CDID-related Intensive Care Unit (ICU) admission and CDID-related mortality has been estimated in cases of treatment with metronidazole. IBM SPSS 23.0, Fisher's exact test were used for statistics, level of significance—$p < 0.05$.
Results: N = 65 pt were included from a total of study n = 370 pt. CDID-related ICU admission rate was n = 3/16 (18.8%) in pt with two severity criteria compared to n = 0/49 (0.0%) in pt with one severity criterion, $p < 0.05$. CDID-related mortality rate was n = 4/16 (25.0%) in pt with two criteria in comparison with n = 1/49 (2.0%) in pt with one severity criterion, $p = 0.01$.
Conclusions: Severe CDID treatment with metronidazole in presence of both severity criteria is associated with CDID-related adverse outcomes.

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P276

Microbial profile and antibiotic resistance patterns in ventilator-associated pneumonia

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Introduction: This study aimed to evaluate and compare the microbiological profiles and antimicrobial resistance patterns of early-onset VAP (EOVAP) and late-onset VAP (LOVAP) in an intensive care unit (ICU) setting, with the goal of optimizing antibiotic stewardship strategies.
Methods: We conducted a retrospective cohort study of adult patients who developed VAP in an ICU of a tertiary university hospital between May 2020 and November 2021. Data collected included demographics, length of stay (LoS), SAPS II and SOFA scores, time from ventilation to diagnosis, SARS-CoV-2 status, microorganisms and

antimicrobial susceptibility test data. Comparative analyses were performed between EOVAP and LOVAP groups.
Results: Among 183 patients (74% male, median age 61), 30 had EOVAP and 153 had LOVAP. Mean LoS was 17 days for EOVAP and 28 for LOVAP. Median SAPS II scores were 34 and 37, respectively. Diagnosis occurred at a median of 5 days post-ventilation for EOVAP and 11 days for LOVAP. SARS-CoV-2 infection was present in 50% of EOVAP cases. The predominant EOVAP pathogens were *Haemophilus influenzae* (25%), Methicillin-sensitive *Staphylococcus aureus* (MSSA) (14%), and *Pseudomonas aeruginosa* (15%). LOVAP pathogens included *Klebsiella pneumoniae* (25%), MSSA (14%), *Serratia marcescens* (11%), and *Pseudomonas aeruginosa* (10%). In EOVAP, resistance to amoxicillin clavulanic acid (AAC) and piperacillin-tazobactam was 10% and 3%, respectively. LOVAP demonstrated higher resistance: 52% to AAC, 21% to piperacillin-tazobactam and 16% to meropenem. ESBL-producing pathogens in LOVAP exhibited 38% resistance to piperacillin-tazobactam and 8% resistance to meropenem.
Conclusions: Antibiotic stewardship is a keystone to prevent antimicrobial resistances. Our study demonstrates that the prevalence of AAC-resistant microorganisms in EOVAP is low suggesting that dual broad-spectrum antibiotic therapy may be unnecessary for this group. Conversely, LOVAP showed significantly higher resistance patterns.

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SAVE protocol and surgery: implications for MDR colonization in surgical patients admitted to the ICU

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Introduction: The emergence and proliferation of antibiotic-resistant microorganisms present a critical challenge, especially in intensive care and surgical settings, where the risks of infectious complications are elevated. This retrospective study evaluates the impact of the SAVE (Stewardship Antibiotica VErona) protocol [1] on surgical prophylaxis for patients admitted to our ICU at the AOUI of Verona. This protocol, introduced since 2018, aims at optimizing antibiotic prescriptions and reducing MDRO infections.
Methods: Over a 30-month period (June 2017-December 2019), surgical patients admitted to our ICU (REINSURE-ARDS Registry-Prog 1946CESC) were analyzed, according to their belonging to the pre-SAVE and post-SAVE cohorts.
Results: 805 patients were analyzed. Significant differences in preoperative conditions were noted between the two groups. Post-SAVE patients exhibited higher frailty, with more severe ASA scores (63.3% vs. 57.1% classified as ASA III/IV, $p=0.04$) and increased rates of preoperative chemotherapy (27.0% vs. 20.8%, $p=0.03$). Additionally, these patients experienced higher intraoperative blood loss (>400 mL, 65.0% vs. 47.0%, $p<0.01$) and required more vasoactive support (32.7% vs. 26.4%, $p=0.04$) during surgery. While post-SAVE patients had a higher overall rate of postoperative complications (median: 2 vs. 1, $p<0.01$), the rate of infective complications remained stable (41.1% vs. 41.8%, $p=0.85$). There was no significative difference in ICU (2.7% vs. 3.5% $p=0.51$) and in hospital mortality (5.3% vs 6.0%, $p=0.64$). SAVE was associated with improved preoperative rectal swab compliance (8.7% increase). In the post-SAVE cohort, guideline-compliance was related with shorter ICU stays and fewer complications compared to non-compliant regimens.
Conclusions: SAVE surgical prophylaxis guideline adherence increased screening procedures and prevented post-operative infections, emphasizing the importance of targeted antibiotic stewardship.

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P278

Comparison of linezolid elimination in albumin-based ADVOS dialysis versus conventional CVVHD in critically ill patients

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Introduction: Effective antibiotic treatment is crucial in critically ill patients with extracorporeal treatment (e.g. dialysis) which potentially alter drug pharmacokinetics. Linezolid, an antibiotic with 31% plasma protein binding, may exhibit different clearance rates in albumin-based ADVOS (Advanced Organ Support) compared to conventional (non-albumin-based) continuous venovenous hemodialysis (CVVHD). This could possibly affect therapeutic serum concentrations with the necessity to exceed the minimum inhibitory concentration (MIC) of 4 µg/mL for gram-positive bacteria. No in vivo data currently exists for linezolid elimination in patients treated with albumin-based dialysis systems.
Methods: Seventeen dialysis cycles of ICU-patients were analyzed (6 CVVHD, 11 ADVOS) with 600 mg linezolid doses given every 12 h. Clearance was assessed by measuring pre- and post-filter concentrations. Serum levels were measured at 1-, 2-, 3-, 4-, 7-, and 11-h post-administration to assess MIC adherence. Statistical analysis was conducted using Student's t-test to compare clearance differences between CVVHD and ADVOS.
Results: The ADVOS system demonstrated significantly ($p<0.001$) higher clearance of linezolid with 52.8 ± 2.9 mL/min compared to CVVHD with 28.9 ± 3.8 mL/min (Figure). Instances of sub-MIC serum concentrations were observed in both dialysis Methods: CVVHD patients experienced sub-MIC levels at hour 11 in one case and hour 7 in another, while ADVOS patients exhibited sub-MIC levels as early as hour 7 in three cases.
Conclusions: ADVOS yields higher linezolid clearance than conventional CVVHD, though both systems frequently result in sub-MIC levels, especially with ADVOS. These findings suggest that tailored dosing may be required to maintain therapeutic antibiotic levels in patients undergoing dialysis. Further studies are essential to refine pharmacokinetic models for albumin-based dialysis systems and to develop optimized dosing regimens for critically ill patients treated with extracorporeal therapies.

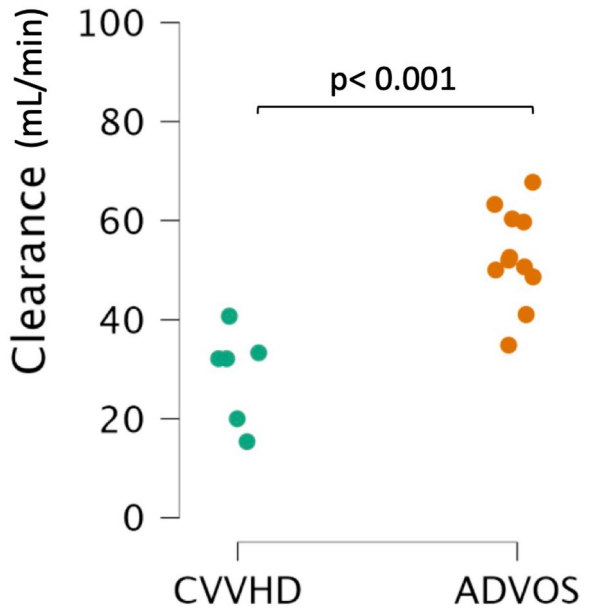

Figure (abstract P278) Comparison of linezolid clearance between dialysis modalities

P279

Antimicrobial stewardship in tracheoventilated home patients: the impact of intervention in our center

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Introduction: The purpose of our retrospective analysis is to observe the impact of our intervention to minimize microbial colonization in the period 2015–2024 on tracheoventilated home patients [1].
Methods: We analyzed 38 adult tracheostomized patient (M 25, W 13) home ventilated 24 h/day, subjected to tracheostomic cannula change at home every 60 days and to tracheobronchial sample in absence of VAP once a year enrolled in our center (St. Boniface Hospital, Verona). We planned a bundle of interventions to promote the prevention of new colonization by training nurses and caregivers and by creating an antimicrobial stewardship in coordination with general practitioners to prevent antibiotic overuse.
Results: *Pseudomonas aeruginosa* is the most frequently isolated bacteria (55.5%) followed by *Enterobacteriaceae* (34.3%: *E. coli, Serratia, Proteus, Providencia, Citrobacter*), *Klebsiella pneumoniae* (16.3%) and *Staphylococcus aureus* (15.9%). 38.9% of patients have polymicrobial colonization; prevalence of samples with 2 or more bacterial species decreases over time. Colonized patient's rate and incidence of new antimicrobial resistance decrease; moreover, MDR rate has a negative trend. Incidence of XDR (extensively drug-resistant) bacteria is negligible, pandrug-resistant(PDR) bacteria were not found.
Conclusions: The impact of our intervention within an antimicrobial stewardship is giving effective results on rate of new colonization and new antibiotic resistance, mostly on MDR bacteria incidence. An adequate training of our patients and their caregivers in daily tracheostomy care drives us to observe an admirable level of autonomy and as consequence a very low hospitalization rate: our goal is to maintain this trend and to observe an eventual further decrease of bacteria colonization and incidence of VAP due to multiresistant microorganisms.

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P280

The effectiveness and safety of combination of colistimethate sodium aerosol and injection in the treatment of pulmonary infection caused by resistant carbapenem-resistant Gram-negative bacterial: a multicenter retrospective study

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Introduction: Due to the relatively low drug concentration in the epithelial lung fluid after intravenous administration of colistin, it is suggested using aerosolized colistin in addition to intravenous colistin in patients with suspected or confirmed MDR-GNB pulmonary infections and colistimethate sodium (CMS) is preferred for inhalation therapy. This study aims to evaluate the effectiveness and safety of intravenous CMS compared to other drug treatments in patients with pulmonary infections who have received nebulization of CMS.
Methods: This study is a multicenter, retrospective study. Patients with suspected or confirmed CRO-induced pulmonary infection who received CMS therapy at 25 centers across our country between January 2022 and February 2024 were enrolled. Based on whether intravenous CMS was combined with nebulized CMS, patients were divided into CMS Nebulized + Intravenous CMS (Observation Group) and CMS Nebulized + Intravenous Non-CMS (Control Group).The primary endpoint was clinical efficacy, and the secondary endpoints included bacterial clearance rate at the end of treatment, 14-day mortality, and incidence of acute kidney injury and bronchospasm.
Results: The observation group included 215 patients and the control group included 212 patients. After PSM at a 1:1 ratio to remove confounding factors, each group retained 130 patients. The results showed that clinical efficacy rate (82.31% vs 70.77%, $p = 0.028$) and microbiological efficacy rate (80.62% vs 68.46%, $p = 0.025$) in the observation group was significantly higher than that in the control group. There was no significant difference in the 14-day mortality (21.54% vs 22.31%, $p = 0.881$) and nephrotoxicity (27.69% vs 28.46%, $p = 0.890$) between the two groups. The incidence rate of bronchospasm was 0% in both groups.
Conclusions: Our results confirmed that the combination of intravenous CMS with nebulized CMS significantly improves clinical efficacy and microbiological eradication rates compared to combination of intravenous other antimicrobial regimens.

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Ceftazidime/avibactam therapy in the ICU: focus on patients´ immune status

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Introduction: The aim of this study was to characterize critically ill patients receiving ceftazidime/avibactam (CAZ/AVI) therapy, with a specific focus on their immune status.

Methods: A retrospective analysis of a prospective database from our center was conducted, identifying critically ill patients treated with CAZ/AVI between August 30, 2020, and November 10, 2023. Patients were further categorized based on their immune status. Demographic data, comorbidities, indications for CAZ/AVI use, microbiological findings, and treatment duration were collected and analyzed. The study was approved by the local ethics committee (IRB#2012–53) with a waiver for informed consent.
Results: A total of 100 patients were identified, of whom 65 were male, with a median age of 65 [51–74] years. Of these, 79 patients were immunocompromised. Among the immunocompromised group, 17 had hematological malignancies, 18 had solid tumors, and 2 were HIV-positive, while the remaining were immunosuppressed due to medications (9 with solid organ transplants, 11 with autoimmune diseases, and 22 on high-dose steroid therapy). Additional characterization and mortality rates are detailed in the Table.
Conclusions: The majority of patients treated with CAZ/AVI were immunocompromised. KPC-type carbapenemases were the most frequently identified resistance mechanism.

Table (abstract P281) Description of non-immunocompromised (N-IC) and immunocompromised (IC) patients treated with CAZ/AVI

Variables	All (N = 100)	IC (N = 79)	N-IC (N = 21)	*p* value
Age, years	65 [51–74]	65 [53–74]	64 [45–75]	0.970
APACHE II, points	13 [9–19]	13 [9–19]	13 [9–17]	0.611
SOFA, points	7 [5–9]	7 [5–9]	7 [7–11]	0.664
Invasive mechanical ventilation, %	74	79.7	52.4	0.022
KPC, %	31	26.6	47.6	0.109
Metallo beta lactamase, %	22	20.3	28.6	0.393
Hospital mortality, %	35	36.7	28.6	0.610

P282

Genetic characterization of linezolid-resistant *Enterocccus spp*. in clinical isolates from 2014 to 2022 in Colombia

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Introduction: *Enterococcus spp*. develop resistance to linezolid through specific genes such as cfr, optrA and poxtA [1]. Linezolid is an antibiotic reserved as an option for the treatment of infections caused by multidrug-resistant (MDR) Gram-positive organisms, including vancomycin-resistant *Enterococcus spp* [2].
Methods: Retrospective, descriptive, was conducted; using the technical reports of antimicrobial resistance from the national surveillance program of antimicrobial resistance of the National Institute of Health (INS) of Colombia during the period 2014 to 2022.
Results: During 2014 to 2022, 479 isolates of *Enterococcus spp* were sent for confirmation of linezolid resistance to the national reference laboratory. Of the samples tested 97.5% (n = 467) were resistant to linezolid and 2.5 (n = 12) were sensitive. The mechanisms of resistance were Transferable 424 (90.8%) and Non-transferable 43 (9.2%). There were 424 enterococci samples with a transferable gene and 3 transferable genes cfr, poxtA, optrA were identified. The percentage and number of the different genes are described in the Table.
Conclusions: Our results differ from the findings reported in temporality with other countries in North America, Europe and Oceania, however there are no studies in Latin America to compare our results, we have limitations in our work because the reports are voluntary and may not reflect the real problem of bacterial resistance.

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Table (abstract P282) Enterococcus spp. with a transferable gene

Gen	n	%
Cfr	1	0.2
poxtA	1	0.2
optrA	442	99.6

P283

Herpes simplex virus-1 pneumonia in immunocompetent critically ill patients: a single-center retrospective study

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Introduction: Herpes simplex virus-1 (HSV-1) reactivation is frequent in intensive care unit (ICU) patients, especially those with immunosuppression; however, it can also occur in immunocompetent patients, whose characteristics remain poorly defined [1]. This study investigates HSV-1 pneumonia in immunocompetent ICU patients.
Methods: The single-center retrospective study included patients admitted to the ICUs of the Policlinico Tor Vergata in Rome (January 2023-August 2024) tested for HSV-1 DNA on respiratory samples. HSV-1 pneumonia was diagnosed based on worsening respiratory function or new radiological findings, and HSV-1 DNA detection (> 2033 copies/mL). Patients with known immunosuppression were excluded. Demographic, clinical, laboratory and radiological data were collected. The incidence rate of pneumonia was calculated as the number of cases per 1000 patient-days. Differences between groups were analyzed using Fisher's exact test and Mann–Whitney test.
Results: Of 1513 ICU patients admitted during the study period, 54 immunocompetent were included, 21(38.1%) of these received diagnosis of HSV-pneumonia (median age 66, IQR [55–75] vs 67 IQR [59–72], $p = 0.79$[ls1]. A comparison between the two subpopulations (21 HSV+ and 33 HSV−) revealed no differences in demographic data. Patients undergoing cardiac surgery and admitted to the cardiothoracic-ICU had a higher incidence rate of HSV-pneumonia (4.2/1000 patient-days). The use of extracorporeal circulation (ECC) was more common in the HSV-pneumonia group, although not statistically significant ($p = 0.08$). No significant differences were observed in comorbidities, although COPD was less frequent in the HSV-pneumonia group (0% vs. 30.3%, $p = 0.004$). Bacterial co-infections were more frequent in HSV- (69.7% vs. 57.1%, $p = 0.39$).
Conclusions: We observed a higher incidence rate of HSV-1 pneumonia among critically ill cardiac surgical patients; the underlying cause of this increased susceptibility remains unclear.

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P284

MICy: a new method for rapid determination of antibiotic resistance: results of clinical bacteria

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Introduction: Early initiation of personalized antibiotic (AB) therapy can save lives in septic patients [1]. Rapid and appropriate drug selection shortens hospital stays, reduces the spread of AB resistance, decreases hospital mortality, and lowers ICU costs [2]. Therefore, early transition from empirical to targeted therapy is of critical importance.
Methods: At the Central ICU of Semmelweis University's Department of Intensive Therapy, bacteria isolated from bronchoalveolar lavage samples were inoculated into 96-well microplates containing Müller-Hinton broth with serial dilutions of tested antibiotics, similar to the microdilution method. After 5 h of incubation, samples were stained with acridine orange fluorescent dye, and bacterial counts at each AB concentration were quantified using flow cytometry based on previous experience [3]. The bacterial counts were used to determine the minimal inhibitory concentration (MIC) of the antibiotics, revealing the resistance profiles of the bacteria. The results were compared to those obtained from the gold standard microdilution technique after 24 h of incubation.
Results: Despite the significant difference in incubation times, MIC values determined by MICy and the reference method showed 78.8% agreement within ± 1 dilution step. Resistance/susceptibility results were identical to the reference method in 87.9% of cases. Minor errors occurred in 10.1% of cases, while major errors were observed in only 2.0% (Figure).
Conclusions: Our research demonstrates that the MICy method we developed enables the initiation of personalized antibiotic therapy for critically ill patients at least one day earlier than the currently used microdilution method. This approach likely improves treatment efficacy, enhances cost-effectiveness, and helps slow the spread of AB resistance through the application of targeted therapy.

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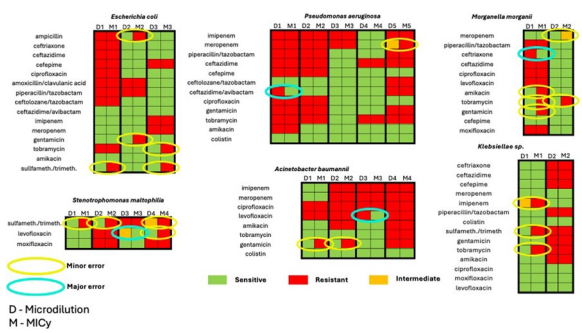

Figure (P284) Results of the measurements of clinical bacteria

P285

Introducing a daily medical emergency team (MET) huddle to improve patient safety

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Critical Care 2025, **29(S1)**:P285

Introduction: 1–1.5 per 1000 hospital admissions in the UK results in-hospital cardiac arrests with most (85%) occurring on the wards in patients admitted under medical specialties [1]. The Resuscitation Council UK quality standards guidelines recommend that an emergency response team meeting at the beginning of each shift should occur [2]. Communication failure leading to difficulties working as a team has been reported by several doctors during debriefs. Miscommunication, absence of task allocation and lack of leadership can lead to failure of providing time critical Advanced Life Support (ALS) and is known to cause patient harm [3,4].
Methods: The Royal Hampshire County Hospital is a 450 bedded hospital in Hampshire, UK which did not have any meetings to establish members of the emergency team. A daily MET huddle with those holding the emergency bleeps was introduced in June 2024 at the beginning of each day shift. This was to introduce members of the MET, identify everyone's skills and experience as well as allocating responsibilities, and identifying 'at-risk' patients. Data collection started after six months in November 2024, evaluating doctors' confidence when attending and managing emergency calls.
Results: 35 responses to an anonymous feedback questionnaire were obtained (see Table).
Conclusions: A daily MET huddle at the start of each shift can help doctors feel more confident when attending and managing emergency calls. This can lead to more effective communication within the emergency response team resulting in reduction of human factors and improvement in patient safety.

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Table (abstract P285) Results

Doctors' confidence in managing arrest scenarios	Before introducing daily MET huddle	After introducing daily MET huddle
By knowing team members' names	1/35 (2.86%)	30/35 (85.71%)
By knowing team members' roles	7/35 (20%)	31/35 (88.57%)
By knowing team members´ ALS training status	3/35 (8.57%)	24/35 (68.57%)

P286

Introducing the Russian Intensive Care Dataset: a new resource for critical care research

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Critical Care 2025, **29(S1)**:P286

Introduction: Large, structured datasets are becoming increasingly important for improving research and clinical decision-making in intensive care [1, 2]. The Russian Intensive Care Dataset (RICD) was developed to provide a comprehensive repository of ICU data for analysis and AI applications, aligning with international standards.
Methods: RICD was constructed using anonymized data from patients treated at the Federal Research and Clinical Center of Intensive Care Medicine and Rehabilitology between December 2017 and July 2023. SQL queries were used to extract the data. All patient data were fully anonymized.
Results: The dataset contains over 14 million records from 7,730 hospitalizations and 5,115 patients, organized into 16 tables [3]. Approximately 85% of the dataset consists of continuous ICU monitoring data, capturing vital signs such as heart rate, blood pressure, oxygen saturation, respiratory rate, body temperature, and central venous pressure, recorded up to 10 times per hour. The RICD dataset encompasses a wide array of information, including medical-anthropometric data, diagnoses, details of the therapy provided, results of laboratory tests, clinical scale assessments, microbiological findings, antibiotic resistance profiles, and hospitalization outcomes.
Conclusions: RICD enables in-depth analysis and research of clinical practices in intensive care, enabling the development of clinical decision support tools and the application of machine learning methods to enhance diagnostic tools and patient outcomes. RICD can serve as a valuable tool for both scientific research and practical applications in intensive care.

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P287

Three-year experience of a pilot multidisciplinary critical care simulation programme for ICU novice

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Critical *Care* 2025, **29(S1)**:P287

Introduction: Transition from new graduates to frontline ICU doctors and nurses is challenging as they are expected to handle complex critically ill patients in a multidisciplinary team approach [1]. Simulation-based training program integrates both clinical practice and Crew Resource Management elements, which enhance ICU novice's readiness to face clinical crisis as a team. We aim to evaluate a three-year multidisciplinary simulation programme for ICU novices joining a tertiary ICU in Hong Kong.
Methods: The programme involved a half-day simulation of two common ICU emergency scenarios using high-fidelity mannikins. Pre- and post-course questionnaires on a scale of 1–6 (1: strongly disagree and 6: strongly agree) were obtained and analyzed. Results were expressed as median ± interquartile ranges. Questions were evaluated by Wilcoxon signed rank test and $p < 0.05$ were considered statistically significant.
Results: From November 2021 to September 2024, 45 participants (36 nurses and 9 doctors) joined the simulation. All participants agreed that the scenarios improved their ability to manage clinical situations and expressed overall satisfaction with the training. Pre- and post-course evaluation showed statistically significant improvement in awareness of major elements in handling critical care crisis ($p = 0.011$), ability to handle immediate risks during transfer of critically ill patients ($p = 0.001$), management of clinical emergencies in stepwise approach ($p = 0.001$) and team coordination during emergencies ($p = 0.001$) (Figure).
Conclusions: Our three-year pilot experience in the multidisciplinary simulation course demonstrates the cruciality to incorporate simulation in ICU orientation programme. It enhanced self-perceived readiness, awareness, and team coordination when facing critical care emergencies.

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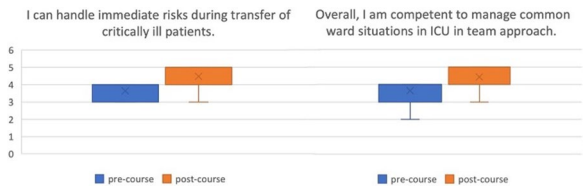

Figure (abstract P287) Pre and post course evaluation of simulation training

P288

Implementation of an extended intensive care medicine service in a tertiary care hospital: impact on ICU admission timing and mortality

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Critical Care 2025, **29(S1)**:P288

Introduction: The traditional limitation of intensive care medicine to ICU-only activities is outdated. Extended intensive care medicine services (EICMS) aim to detect patients at risk for ICU admission early and facilitate timely interventions. This study evaluates the impact of EICMS on ICU admission timing.
Methods: A retrospective, descriptive, quasi-experimental "before-and-after" cohort study was conducted in a tertiary care hospital with 630 inpatient boxes and a polyvalent ICU with 37 boxes. The hospital employs electronic medical records (Selene®), and a color-coded alert system (Selene Discern®) was developed to identify at-risk patients. Patients admitted urgently between Monday and Friday during two periods (1 February–30 June 2022 and 2023) were included, excluding scheduled admissions, hemodynamic unit cases (e.g., acute myocardial infarction codes), and direct transfers from other hospitals. The EICMS reviewed alerts daily, contacting attending physicians in cases of significant clinical deterioration. Admissions were classified into regular hours (08:00–15:00) and out-of-hours shifts (15:00–08:00). Mortality differences between periods were also assessed. Statistical analyses were performed using Pearson's chi-square test and Fisher's exact test.
Results: In the first period, 239 patients were admitted, with 29.29% during regular hours. In the second period, 211 patients were admitted, with 43.13% during regular hours—a significant increase

($p = 0.0031$). Mortality decreased from 13.80% to 9.95%, but the difference was not statistically significant.
Conclusions: EICMS implementation significantly increased ICU admissions during regular hours without impacting overall mortality.

P289

Educational impact of a structured one-week intensive care unit clerkship: a prospective questionnaire-based study

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Critical Care 2025, **29(S1)**:P289

Introduction: Time constraints often limit intensive care unit (ICU) rotation length in medical education. This study evaluated the effectiveness of a structured one-week ICU clerkship on medical students' learning outcomes and perceptions of critical care medicine.
Methods: We conducted a prospective questionnaire study of fifth-year medical students who completed a one-week ICU rotation during 2023. Pre-rotation surveys (n = 95) assessed initial perceptions and learning objectives, while post-rotation surveys (n = 109) evaluated satisfaction levels using a 10-point scale, achievement of objectives, and effectiveness of educational components. Changes in perceptions and attitudes were analyzed through qualitative content analysis, while quantitative data were assessed using descriptive statistics.
Results: Among respondents, 78% (74/95) reported significant changes in their perceptions of ICU care, shifting from viewing it as a "tense/busy environment" to understanding "systematic patient management." Overall satisfaction was high (mean 8.5 ± 1.2), with 94% achieving their self-defined learning objectives. Post-rotation surveys (n = 109) identified rapid response training (60%), infection control/antibiotics education (48%), and central venous catheterization practice (46%) as most impactful components. Qualitative analysis revealed improved understanding of multidisciplinary care (82%) and critical care principles (76%). Hands-on experiences combined with physiology-based lectures were particularly valued.
Conclusions: A well-structured one-week ICU clerkship can effectively transform medical students' understanding of critical care while achieving high satisfaction and learning outcomes. The integration of hands-on training with systematic lectures appears particularly effective. These findings suggest the educational value of brief but structured ICU rotations in the undergraduate medical education and provide a framework for optimizing short-term critical care clinical experiences.

P290

Evaluating GPT-4´s capabilities in scientific communication: insights from a prospective study on poster creation and perception

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Critical Care 2025, **29(S1)**:P290

Introduction: The launch of OpenAI's fourth-generation Generative Pre-trained Transformer model, GPT-4, in March 2023 marks a significant step in the development of large language models, promising that artificial intelligence (AI) applications will be used across diverse fields all over the world, including medicine. Usage includes but is not limited to generation of scientific texts. This raises the question whether individuals can still distinguish between human-generated and AI-generated output. This study aims to investigate whether people can differentiate between posters written by humans and those generated by GPT, as well as to evaluate the quality, clarity, and overall impression of conference posters created by GPT-4 compared to their human-made counterparts.
Methods: A prospective, blinded study was conducted using six posters based on existing, published studies: three created by GPT-4 and three by a researcher. All posters were designed using a standardized template from the Medical University of Vienna. These posters were displayed at two Austrian conferences, where attendees were invited to evaluate them.
Results: Participants correctly identified whether a poster was created by a human or generated by GPT in 69% of cases, with 31% being incorrect (Figure). This ability to distinguish was statistically significant ($p < 0.001$). Human-created posters received higher average ratings for clarity (3.61 vs. 3.43), language quality (3.78 vs. 3.64), and overall impression (3.48 vs. 3.24) compared to GPT-generated posters. However, these differences were not statistically significant.
Conclusions: The study demonstrates that while participants can distinguish between AI- and human-generated posters, their quality is comparable, offering potential time and resource savings for scientists. As AI technology advances, ongoing research into its applications and limitations in medicine remains essential.

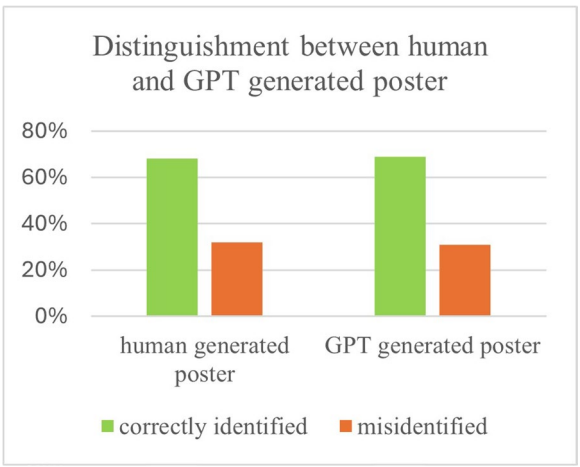

Figure (abstract P290) Distinguishment between human and GPT generated poster

P291

Unplanned admission to critical care from enhanced peri-operative care: a retrospective 3-year study

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Critical Care 2025, **29(S1)**:P291

Introduction: The post-anesthetic care unit (PACU) opened April 2021 as a weekday overnight service to provide short-term Level 1 and 2 post-operative care (e.g. HFNO and peripheral vasopressors [1,2]). As an enhanced peri-operative care (EPC) area, its aims are to separate elective and emergency pathways and to reduce surgical cancellation due to lack of ICU capacity for intermediate risk patients. Unplanned ICU admission from EPCs may reflect inappropriate triage decision-making and is a recommended performance metric [2]. However, data regarding such admission rates and reasons for ICU admission are lacking. This study aimed to evaluate local rate of unplanned admission from PACU to ICU, to identify associated peri-operative factors and to describe impact on outcomes.

Methods: This was a retrospective service evaluation of PACU admissions April 1st 2021 to 31st March 2024. Patient episodes were identified from ICU and PACU databases (MedICUs and WardWatcher).
Results: During the study period, there were 675 PACU admission episodes of whom 18 (2.7%) were transferred to ICU. Characteristics and outcomes are summarized in the Table below. Most PACU admissions (98%) were elective cases. No emergency surgical PACU admissions were admitted to ICU. There was a significantly higher proportion of vascular cases (33%) among ICU admissions than among the wider PACU cohort (16%, $p=0.043$). Unplanned ICU admission were associated with significantly higher heart rate and lower systolic blood pressure. Unplanned ICU admission was associated with significantly prolonged hospitalisation but not with increased mortality.
Conclusions: Although unplanned admission rate from PACU to ICU is described as a key metric by FICM, bench-marking processes do not yet exist in Wales or the wider UK. A standardized dataset and national data collection system would facilitate EPC performance evaluation.

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Table (abstract P291) Patient characteristics and outcomes

	Discharged to ward from PACU (n = 657)	Admitted to ICU (n = 18)	All (n = 675)	
Age (years, mean)	68.1	68.3	68.1	$p=0.940$
Sex (male, %)	353 (54%)	11 (61%)	366 (54%)	$p=0.544$
PaO2:FiO2 ratio (kPa, mean)	43.7	45.4	43.8	$p=0.304$
High heart rate (per min, mean)	85.7	93.9	86.0	$p=0.012$
Low systolic pressure (mmHg, mean)	110.1	90.1	109.5	$p<0.001$
Post-PACU hospital LoS (days, median)	4.0	7.0	6.3	p = 0.001
Hospital mortality (number, %)	6 (0.9%)	0	6 (0.9%)	–

P292

A prospective modelling exercise of the demands for intensive care input across a busy UK district general hospital

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Critical Care 2025, **29(S1)**:P292

Introduction: Increasing global demands for critical care is an inevitable consequence of expanding medical workload and complexity of modern care [1]. We surveyed ICU demand within our hospital to better inform discussions about further consultant recruitment and working pattern modifications.
Methods: We conducted a survey across a five-day period, aiming to capture the demand for advice, intervention or referrals received. Our hospital has a single point of contact number to make these referrals. This is now covered by one of the two on-duty consultant Intensivists. The survey contained specific questions relating to the time, origin and nature of the referral.
Results: 51 referral points were recorded. The most frequent referral location was the Emergency Department (21 requests), followed by General Medicine (11), surgery (5), and pediatrics (4). The commonest requests were for a decision regarding suitability for ICU (12). Six patients who required escorted transfer for imaging and five requiring emergency intubation (Table). The majority of referrals (38, 74.5%) occurred during the day. The median time spent attending was 45 min. This forecasts ~ 5 h 45 min activity per day to manage the 38 daytime referrals.
Conclusions: Consultant provision in our hospital no longer allows the demands of the hospital to be effectively balanced against the responsibilities for patients already being cared for on ICU. Changes to UK anesthesia registrar training mean these doctors, who previously were able to undertake a significant proportion of the demand captured in our survey, are no longer available. Consequently, the duty ICU consultant now covers these tasks and those of caring for ICU patients. This has the potential to delay decision-making and response to emergencies. This survey provides the first steps toward understanding current service demand and allow an informed approach to workforce planning.

Reference

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Table (abstract 292) Table showing referral indication

Referral indication	Frequency (n)
Intubation	5
Escalation discussion	12
Senior medical review	7
Support for medical imaging	3
Transfer	3
Review and transfer	3
Other	15

P293

Relationship between intraoperative bleeding, postoperative complications (POC) and hospital stay in lumbar spinal stenosis surgery (LSSS)

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Critical Care 2025, **29(S1)**:P293

Introduction: LSSS is a widely performed procedure for treating this pathology. However, POC are common and affects outcomes by increasing morbidity and mortality, hospital stay and overall satisfaction [1]. This study analyzed the incidence of POC and its relationship with intraoperative variables in LSSS.
Methods: This study included 165 patients from a retrospective cohort between 2022 and 2024 at the Hospital Universitario Fundación Santa Fe de Bogotá, Colombia. We analyzed the POC incidence in relation to intraoperative variables, such as type of anesthesia, surgical time, intraoperative bleeding (IOB), and decompression levels. ICU admission and length of hospital stay were also analyzed. IOB was grouped into < 500 mL and ≥ 500 mL. Descriptive statistics and bivariate analyses were performed. Chi-square or Fisher's exact test was used for qualitative associations, and Mann–Whitney or Kruskal–Wallis test was used for quantitative variables.

Results: 165 patients were analyzed. 57% women, mean age 71 years. 80% received total intravenous anesthesia and 12% required postoperative ICU admission. Twenty-five major POC events were observed in 19 (12%) patients during hospitalization. The most common complications were anemia (5), acute myocardial infarction (2) and pulmonary thromboembolism (2). 32.7% of patients presented IOB ≥ 500 mL, this was associated with more POC ($p = 0.02$) and a longer in-hospital stay (8 vs. 4 days, $p = 0.00$) (Table). No significant correlations were found between POC and other intraoperative variables such as type of anesthesia, surgical time, or decompression levels.
Conclusions: Significant IOB was associated with a higher POC rate and longer hospital stay in patients with LSSS. Our findings highlight the importance of optimizing surgical and anesthetic strategies focused on minimizing bleeding to improve clinical outcomes and reduce prolonged hospital stay. Teamwork is key to the reduction of POC.

Reference

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Table (abstract P293) Distribution of complications according to bleeding and hospital stay

	Postoperative complication	Postoperative complication	*p* value
	Yes	No	
Intraoperative bleeding	Mean: 500 mL	Mean: 300 mL	0.002
In-hospital stay (days)	Mean: 8 days	Mean: 4 days	< 0.001

P294

Multidisciplinary full team high-fidelity in-situ intensive care unit simulation: an education and quality improvement initiative

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Critical Care 2025, **29(S1)**:P294

Introduction: Simulation has emerged as a vital component to intensive care unit (ICU) medical education and quality improvement. Recent simulation literature has focused on team objectives, however the multidisciplinary environment of ICUs necessitates optimizing learning for all participants including physicians, nurses, and respiratory therapists (RTs). Our multidisciplinary author group sought to establish a new high-fidelity, team-based, in-situ simulation (ISS) program.
Methods: The ISS program began July 2024 and operates monthly in the University of Alberta Hospital adult ICU. Physician, nurse, and RT educators are collaboratively involved with all stages of ISS implementation including case design, learning objective creation, survey creation, and quality review. Simulation is delivered using the Laerdal Medical SimMan® 3G Plus mannequin. Simulation cases focus on common scenarios requiring ICU consultation. Surveys utilize a 7-point Likert scale (1 = unfavorable, 7 = favorable) to assess ISS case quality, team skills educational yield, and task training self-assessment.
Results: We achieved 96% (n = 23) survey completion rate. Mean ISS case quality score was favorable at 6.35 for all participants (n = 141, σ = 0.95); 6.24 for physicians (n = 79, σ = 0.84), 6.62 for RTs (n = 26, σ = 0.96), and 6.38 for nurses (n = 36, σ = 1.08) (Figure panel a). Team skills educational yield was similar with mean of 6.33 for all (n = 33, σ = 0.80); 5.94 for physicians (n = 18, σ = 0.84), 7 for RTs (n = 6, σ = 0), and 6.67 for nurses (n = 9, σ = 0.47) (Figure panel b). Task training self-assessment identified a general discomfort towards managing common ICU scenarios and no significant change after ISS (mean 3.71 (n = 77, 95% CI = 0.32) pre-ISS vs. 3.90 (n = 70, 95% CI = 0.38) post-ISS). Secondary gains from ISS has led to quality improvement initiatives including the creation of pre-intubation checklists and ISS video recording review.
Conclusions: This single-center experience showcases how full team high-fidelity ISS can be successfully implemented by multidisciplinary leadership.

Figure 1a. Case quality and team skills mean survey scores with standard deviation.

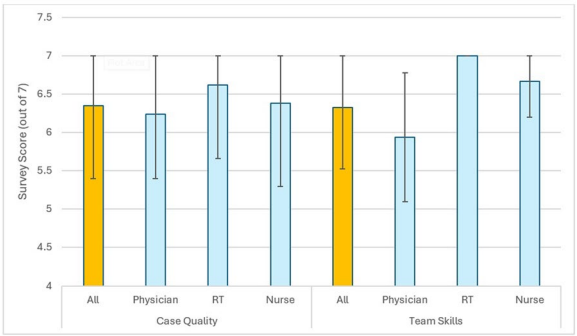

Figure 1b. Task training self-assessment mean survey scores before and after ISS implementation with 95% confidence interval.

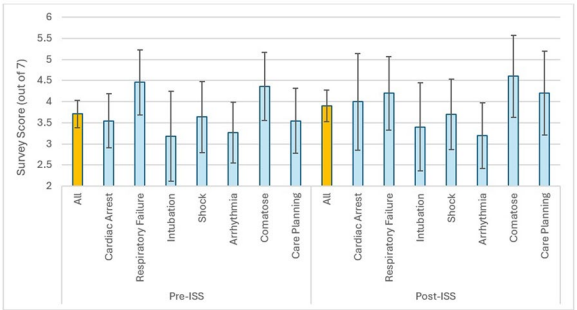

Figure (abstract P294) a. Case quality and team skills mean survey scores with standard deviation. b. Task training self-assessment mean survey scores before and after ISS implementation with 95% confidence interval

P295

What is the best training strategy to teach management of low-volume and high-risk critical care events in an intensive care setting?

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Critical Care 2025, **29(S1)**:P295

Introduction: Doctors in the intensive care unit (ICU) face low-volume and high-risk critical care events, such as severe tracheostomy-related complications. The ability to properly manage these situations may affect patient outcomes. Doctors need to learn how to manage these clinical situations to provide optimal care and ensure patient safety. This study aimed to compare three different approaches for teaching medical residents how to manage tracheostomy-related emergencies in the ICU.
Methods: In this prospective pilot study, twenty-four participants were randomly assigned to the following groups to manage tracheostomy emergency: 1) group A: Control group with the basic teaching (use of cognitive aids); 2) group B: E-learning with open access to a

toolbox; 3) group C: Flipped classroom with a short simulation-based course. Participants' learning was assessed through a pre-post simulation session including each three tracheostomy-related scenarios. The performance of the scenarios was assessed with a scale specifically developed, using a modified Delphi technique with a panel of sixteen experts. The primary outcome was the Global Performance Score, calculated as the total score across all scenarios.
Results: There was no significant difference in the post-test performance score obtained by group B ($M = 157 \pm 14$, $p = 0.105$) compared to group A ($M = 141 \pm 22$). However, there was a significant difference in the post-test performance score obtained by group C ($M = 171.9 \pm 20.1$, $p = 0.021$) compared to group A ($M = 141 \pm 22$). The flipped classroom approach with a short simulation course was more effective than traditional learning in terms of global performance.
Conclusions: Using the flipped classroom approach with a short simulation course related to acute care may improve learners' performance in low-volume and high-risk critical care events such as severe tracheostomy-related complications. This study guides educators in using these design factors in their courses to address ICU educational challenges.

P296

Quantifying non-actionable alarms in the ICU: a retrospective study of critical ECG alerts

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Critical Care 2025, **29(S1)**:P296

Introduction: Alarms in intensive care units (ICUs) are major stressors for both clinicians and patients, contributing to physical complaints such as sleep disturbances and post-intensive care syndrome. Alarm fatigue, caused by frequent alarms, can desensitize clinicians to critical alerts and compromise patient safety [1]. Reducing false-positive alarms is crucial to mitigating these issues, requiring an understanding of alarm prevalence and false-positive rates. This study aimed to evaluate the prevalence and proportion of false-positive ECG-related critical alarms in ICU patients.
Methods: This retrospective, single-center study analyzed high-resolution ECG data (500 Hz) from 127 ICU patients via Data Warehouse Connect (Philips). A random sample of critical ECG alarms (incl. VF/VT, asystole, and severe brady-/tachycardia) underwent a thorough manual review using detailed analysis of vitals and electronic patient records. False positives were non-actionable alarms without documented clinical complications or related interventions.
Results: A total of 7362 critical alarms, including 1080 critical ECG alarms, were analyzed. Of these, 13.2% (143 alarms from 20 patients) were manually reviewed. The cohort (mean age 69.1 ± 9.2 years, 75.6% male) comprised 95% ICU admissions after elective surgeries, 0.8% non-surgical admissions, with a median ICU stay of 0.9 days (IQR 0.7–1.9). The prevalence of all critical alarms and critical ECG alarms was 0.7 and 0.2/hour/patient. Manual review showed 85.9% of the critical ECG alarms were false positives, 31.0% involving ventricular fibrillation/asystole.
Conclusions: The high prevalence of alarms, coupled with a significant proportion of false-positive ECG alarms, underscores the burden of non-actionable alarms in ICUs. These findings highlight the need for targeted alarm management strategies, such as multiparametric algorithms, to reduce alarm fatigue and enhance clinical efficiency without compromising patient safety.

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P297

Exploring granular pharmaceutical data, clinical activity and impact on evidence-implementation in the intensive care unit (ICU)

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Critical Care 2025, **29(S1)**:P297

Introduction: Research with high certainty should improve patient outcomes. Yet implementation is challenging. We proposed that longitudinal granular analysis of medication usage indexed against outcomes would give data to improve implementation. The project aim was to explore clinical utility of a 5-year analysis of pharmaceutical activity indexed against ICU practice.
Methods: This project was registered as a service evaluation without ethics approval and conducted in a UK ICU. A report template was developed and revised over 25 years by clinical pharmacists. Utilizing the pharmacy-based electronic finance system, cumulative totals for critical care were stratified by therapeutic group including pain, delirium and IV fluids and indexed against clinical activity with a review of benefit and harm, including opioid consumption, and antimicrobial stewardship (AMR) [1,2]. To deliver meaningful findings an annual report with highlighted areas for consideration was created.
Results: Core clinical activity, including ICU admissions and bed occupancy, increased over time. Mean length of stay remained static. Overall pharmaceutical expenditure decreased in 2023/24 from £2.3 to £2.2 million (Table). Over the 5 years there was a below inflation increase: £1.9 to £2.2 million. This was enhanced during the COVID-19 pandemic. IV fentanyl use increased from £10k to £41k (300% increase) during COVID-19. Since 2019/20, antimicrobial consumption has remained consistent, despite COVID-19 and introduction of newer agents.
Conclusions: Our 5-year analysis gave vital information for evidence implementation. Satisfyingly, expenditure reduced despite increase in clinical activity. Areas of concern include the rise in IV opioids during COVID-19. Future interventions will include targeting medication with limited benefit including parenteral olanzapine and Gelofusine.

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Table (abstract P297) 5 year pharmaceutical costs per occupied bed day (OBD) from a UK ICU

2019/20	2020/21	2021/22	2022/23	2023/24
Total pharmaceutical expenditure £1,873,925	£2,376,755	£2,282,199	£2,303,502	£2,180,961
Occupied bed days OBD 22566	22,568	22,449	23,697	23,779
Cost per OBD £83	£105	£102	£97	£92

P298

Pharmacist consults in a Canadian PICS clinic: a 5 year quantitative analysis

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Critical Care 2025, **29(S1)**:P298

Introduction: Intensive care unit (ICU) survivors face significant drug-related challenges and pharmacists can play a crucial role in addressing these issues in critical care recovery clinics. This study aims to describe the nature and number of pharmacy interventions per patient within the post-ICU clinic, while also exploring patient characteristics that predict those that would most likely benefit from a pharmacist's intervention.
Methods: A retrospective cohort study, including all patients with a post-ICU clinic pharmacist consult record between March 2019 and July 2024, was conducted at the McGill University Health Center. Pharmacist interventions were categorized as followed: medication cessation, initiation, dosage adjustment or substitution, adverse drug event review, drug interaction review, lab monitoring, patient education, coordination of care, vaccination, and others. The relationship between patient characteristics and benefits derived from a pharmacist intervention was analyzed using stepwise logistic regression. Benefits from a pharmacist intervention was defined by the presence of any the following interventions: either a drug cessation, initiation, substitution or dosage adjustment.
Results: Among the 129 patients, a mean of 3 interventions (range: 0–10) were recorded. The most frequent interventions included patient education (55.8%), coordination of care (52.7%), medication cessation, (32.6%), and dosage adjustment (16.3%). The stepwise logistic regression identified the number of medications taken at the time of the post-ICU clinic as a significant factor in determining the likelihood of benefiting from a pharmacist intervention, with an OR of 1.182; 95% CI 1.085–1.289 (p-value < 0.0001).
Conclusions: Pharmacists' involvement in multidisciplinary post-ICU clinics provide a range of patient-centered interventions, with the number of medications at the time of the post-ICU recovery clinic identified as the primary factor influencing which patients have the greatest benefits from pharmacist.

P299

Evaluation of patients' perception of pharmacist's role within a post-ICU recovery clinic: the critical illness recovery center (E-PICS-RX)

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Critical Care 2025, **29(S1)**:P299

Introduction: Post-intensive care syndrome clinics have well-established benefits for patients' physical, mental, and cognitive recovery following critical care hospitalization. Observational studies have shown that pharmacists' involvement improves patient's outcomes by solving drug-related problems. However, there is a research gap regarding patient's perception of the pharmacists' role. This study aimed to describe and understand patients' and caregivers' perceptions of the pharmacist's role within the multidisciplinary team of Quebec's first post-intensive care syndrome clinic: the Critical Illness Recovery Center.
Methods: Semi-structured interviews were conducted with patients (and their caregivers, when applicable) who participated in the clinic between November 1st 2023 and July 30th 2024. The themes explored in these interviews were (1) participants' perception of the Critical Illness Recovery Center and (2) perception of the care provided by the clinic's pharmacist. Qualitative iterative processes guided the interviews which were video-recorded and transcribed. Data was coded on Nvivo and analyzed by researchers using thematic analysis.
Results: Participants positively viewed the clinic's multidisciplinary team and telemedicine nature. They identified the pharmacist as an essential member of the clinic, highlighting their expertise in medication management and patient education. Patients' and caregivers' perceptions were influenced by several factors: their interpersonal interactions with the clinic's pharmacist, access to follow-up care, experiences in the intensive care unit, and others.
Conclusions: Patients and their caregivers positively view the clinic's multidisciplinary approach and value pharmacists' expertise in medication management and patient education. This qualitative study enriches and supports the existing literature on pharmacists' roles in post-intensive care clinics from the participants' perspectives.

P300

An audit of ICU to ward discharge processes: an assessment of communication between health professionals

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Critical Care 2025, **29(S1)**:P300

Introduction: Effective handover during ICU discharge is essential for patient safety, but it remains a high-risk event, especially when patients have complex ICU courses or are discharged after hours [1–3]. Despite guidelines, there is no standardized approach. Poor handovers can lead to adverse events, including preventable readmissions and increased mortality. At the authors' institution, the handover involves a printed discharge document and a verbal handover, particularly important for out-of-hours discharges. Differences in how surgical and medical patients are managed complicate this process, increasing the risk of missed information.
Methods: A retrospective audit was performed on ICU discharges from February to March 2023. Data collected included patient survival, age, length of stay, surgical/medical status, discharge time, documentation of verbal handovers, and time to first ward review.
Results: Of 78 discharges reviewed, 61 patients were included in the analysis. Ten had documented handovers, and 31 had the receiving consultant recorded. Forty-six discharges were out of hours, with review times ranging from 30 min to 11 h. Sixteen patients had no review. Most reviews were by on-call registrars, although two were initially done by interns.
Conclusions: The audit revealed significant gaps in both the handover process and its documentation, posing a risk to patient safety. Variability in practice suggests that essential information might be missed, affecting patient care. Although informal or undocumented handovers may occur, the lack of consistency is concerning. To address these issues, a new handover form has been developed to ensure verbal handovers are documented before discharge. Further audits will assess the impact of this form, with results expected at ISICEM 2025.

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P301

Association between critical care occupancy and code status decisions during periods of resource scarcity: a retrospective cohort study

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Critical Care 2025, **29(S1)**:P301

Introduction: Demand for critical care often exceeds availability. Access is typically determined using explicit criteria; however, some patients may be denied admission through the attribution of a code status that precludes intensive care unit (ICU) admission. Our study investigates the association between code status decisions and critical care occupancy during the COVID-19 pandemic.
Methods: We performed a retrospective cohort study of adult patients hospitalized at the Geneva University Hospital for acute COVID-related illness during two successive pandemic waves, in spring and autumn 2020. Multivariate logistic regression was used to analyze the association between code status attribution and critical care occupancy at admission, as well as clinical and demographic characteristics, including age, gender, ROX index (pulse oximetry/fraction of inspired oxygen/respiratory rate), comorbidities, malignancy, nationality and socio-economic status.
Results: A total of 2122 patients were included. Higher critical care occupancy was associated with an increased likelihood of being attributed an ICU-ineligible code status. Specifically, the odds ratios (OR) were 1.61 (95% CI 1.11–2.32), 1.59 (1.11–2.28) and 1.71 (1.06–2.76) for critical care occupancy levels, compared to usual capacity, of 100–119%, 120–139% and ≥ 140% respectively. Other factors significantly associated with the attribution of an ICU-ineligible code status included age 70–79 (OR 8.56; 95% CI 4.12–17.77), 80–89 (OR 32.78; 95% CI 16.16–66.50) and ≥ 90 (OR 49.04; 95% CI 23.05–104.31), a higher comorbidity index (OR 1.22; 95% CI 1.07–1.39) and having complementary hospitalization insurance (OR 0.52; 95% CI 0.29–0.92) (see Table).
Conclusions: Our study highlights a positive association between the attribution of an ICU-ineligible code status and critical care occupancy, indicating the presence of implicit triaging. This can pose ethical challenges, including moral distress for decision-making physicians and the use of non-consensual triage criteria.

Table (abstract P301) Association of critical care occupancy and age with an ICU-ineligible code

Variable	Category	Adjusted OR for ICU-ineligible code (95% CI)	*p* value
Critical care occupancy (reference: < 100%)	100–119%	1.61 (1.11– 2.32)	0.012
	120–139%	1.59 (1.11–2.28)	0.011
	≥ 140%	1.71 (1.06–2.76)	0.027
Age in years (reference: < 60)	60–69	1.09 (0.38–3.13)	0.868
	70–79	8.56 (4.12–17.77)	< 0.001
	80–89	32.78 (16.16–66.50)	< 0.001
	≥ 90	49.04 (23.05–104.31)	< 0.001

OR: odds ratio; ICU: intensive care unit; CI: confidence interval.

P302

Post-ICU follow-up protocol in a single-center university hospital in Portugal

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Critical Care 2025, **29(S1)**:P302

Introduction: Post-intensive care syndrome (PICS) affects up to 80% of survivors of intensive care units (ICUs), leading to a decline in quality of life and increased healthcare use. Addressing this condition requires multidisciplinary efforts extending beyond the ICU setting. The objective is to provide a detailed description of a follow-up protocol at a single-center university hospital in Portugal designed to identify patients at high risk for PICS, reduce post-ICU morbidity and improve their quality of life.
Methods: Eligible patients have an ICU stay > 5 days, a highest SOFA score > 5, and a life expectancy > 6 months. There are 5 key time points: 1) ICU admission, 2) ICU discharge, 3) 2 weeks post-discharge 4) 2 months post-discharge and 5) 4 to 6 months if necessary. Each evaluation follows a standardized protocol (Figure), employing validated tools to assess physical function, mental health, cognitive function, nutritional and overall health-related quality of life. Referrals to other specialties are made.
Results: Between October 2022 and October 2024, 156 patients were included. The average age was 50 years, with a median SAPS II score of 44 and median SOFA at admission of 7. Of these 83.3% required mechanical ventilation with an average duration of 10 days, 19.2% renal replacement therapy and 19.2% ECMO support. At discharge ICU-AW was identified in 28.8% and cognitive impairment in 57.1%. CAM-ICU was positive in 25.0%, during ICU stay. Evaluations were conducted for 111 patients at two 2 weeks post-ICU discharge, 93 at 2 months, and 65 at 4 to 6 months. Data suggests an improvement in physical function, cognitive deficits, post-traumatic stress symptoms, nutritional outcomes and quality of life during the follow up period. Positive anxiety and depression screenings increased in the first 2 evaluations, requiring psychiatry intervention.
Conclusions: This protocol enables a comprehensive evaluation, closer monitoring, and the possibility to develop tailored interventions for ICU survivors.

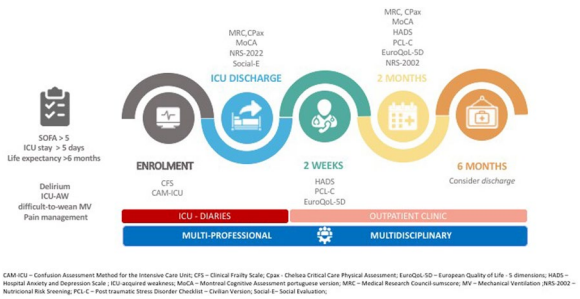

Figure (abstract P302) Workflow of the ICU follow-up consultation: a comprehensive approach to post-critical care patient management

P303

A scoping review and comparative analysis of psychometric scales for measurement of caregiver burden in the post-ICU family in the Chinese context

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Critical Care 2025, **29(S1)**:P303

Introduction: Family members of adult ICU survivors may experience significant degree of psychosocial distress due to caregiver burden, despite their important role in the long-term recovery of post-ICU patients. While the clinical implication of caregiver burden had often been discussed in the literature, there was a lack of clear guidance on how to measure it among post-ICU families. Linguistic and cultural differences would further complicate this issue. Therefore, we sought to review the relevant psychometric scales that could be useful in the Chinese-speaking communities.
Methods: A comprehensive systematic search was performed using the PubMed, CINAHL, PsycINFO and Google Scholar databases. Snowballing technique was employed to broaden the scope of the literature

search. Articles published during the period from 1 January 2005 to 31 October 2024 were screened. Only peer-reviewed and validated psychometric scales with Chinese version of the questionnaire available were included in our analysis.
Results: Out of 5126 articles screened, we identified 8 psychometric scales fulfilling our inclusion criteria. All of them were published as Chinese translation based on the original English version of the scale. In our analysis of the scales' thematic focus, we further classified them into "grief focused", "strain focused" and "self-efficacy focused" (see Figure). However, we found that none of these scales were specifically designed for ICU or post-ICU families.
Conclusions: There is a need to develop specific psychometric tools to assess caregiver burden that are adapted to and validated in the post-ICU context, which would allow researchers and clinicians to gauge the problem of post-ICU caregiver stress more reliably.

Grief Focused	Strain Focused	Self-Efficacy Focused
• Chinese version of Marwit-Meuser Caregiver Grief Inventory – Short Form (C-MM-CGI-SF) • Chinese version of Caregiver Grief Questionnaire (C-CGQ)	• Chinese version of Modified Caregiver Strain Index (C-M-CSI) • Chinese version of Caregiver Burden Inventory (C-CBI) • Chinese version of Family Burden Interview Schedule (C-FBIS-24) • Chinese version of Zarit Caregiver Burden Interview (C-ZBI-22) • Brief Assessment Scale for Caregivers – Chinese (BASC-C)	• Chinese version of Caregiver Self-Efficacy in Contributing to Patient Self-Care (C-CSE-CSC)

Figure (abstract P303) List of relevant psychometric scales.

P304

Family waiting rooms and visitation policies in Japanese intensive care units: a multicenter questionnaire survey

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Critical Care 2025, **29(S1)**:P304

Introduction: Previous studies have reported a correlation between family satisfaction and the development of post intensive care syndrome-family (PICS-F). Descriptive studies have indicated dissatisfaction with the environments of family waiting rooms in intensive care units (ICUs). This study investigated the current status of family waiting rooms and visitation policies in Japanese ICUs.
Methods: We conducted a nationwide survey across 292 emergency and critical care centers in Japan using a combination of postal and web-based questionnaires, comprising 12 questions about institutional characteristics, waiting room facilities, and family visitation policies.
Results: Of the 292 emergency and critical care centers contacted, 151 (51.7%) responded. Of these, 144 institutions (95.4%) had family waiting rooms for ICUs. The waiting rooms typically included tables (76.4%) and chairs (97.9%), but only a few had books and magazines (13.9%), napping areas (11.1%), cooking facilities like microwaves and kettles (3.5%), shower rooms (2.1%), or refrigerators (0.7%) (Figure). Only 47 centers (32.6%) offered waiting rooms that adequately protected family privacy. In addition, while 120 centers (79.5%) restricted visiting hours, typically limited to several hours in the afternoon, these restrictions were often relaxed in cases of sudden clinical deterioration or near the end of the patient's life.
Conclusions: Although most ICUs in Japan provide waiting rooms for the families of patients, they typically lack amenities for families and for the protection of privacy. Optimizing the design of these ICU family waiting rooms to better meet the needs of families and using them as providing information area about PICS-F may be useful in preventing the development of PICS-F.

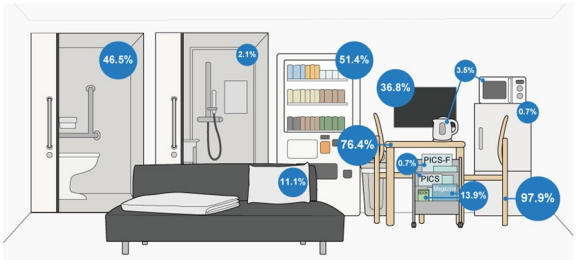

Figure (abstract P304) The proportions of the facilities in the family waiting room are shown in the graphical image

P305

Knowledge and attitudes towards adequacy of therapeutic effort of adult ICU workers in Clinica Alemana Santiago ICU. A pilot study

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Critical Care 2025, **29(S1)**:P305

Introduction: One of the most common and difficult decisions made in the ICU are related with the limitation of life support. Incidence have shown that up to 93% of ICU professionals suggested that bioethical knowledge would be beneficial in their daily work. The aim of these study was to describe the knowledge and attitudes from different adult ICU workers have towards the limitation of life support decisions in Clinica Alemana Santiago.
Methods: Descriptive study based on a survey send by email prior signed consent from participants between October and November 2024. All ICU workers were included (physician, nurse, physical therapist, speech therapist, nurse technician and occupational therapist), with at least one year of experience in ICU. The opinion poll included demographic data, UCI experience, religion and previous bioethical studies. The adequacy (limitation) of support variables were analyzed with a 5-point Likert scale.
Results: A total of 60 participant responded the survey. 75% females, 25% males. Mean age and years of experience were 38 and 13.1 years. 61.7% had a religion. 41.7% nurses, physicians 6.7%, nurse technicians 31.7%, physical therapists 15%, speech therapist 3.3% occupational therapists 1.7%. 8% had previous bioethical studies, 80% curses, 20% diploma. 100% had witness an end-of-life decision in the last two months. 57% agreed with end-of-life decisions taken in the ICU the last semester. 93% considered necessary to improve bioethical knowledge to enhance the decision making. It was considered part of support adequacy: withdraw or withhold mechanical ventilation 88%; Vasoactive drugs 88%; parenteral nutrition 33% and multitherapy attention 33%. 72% refers that a terminal patient could ask for invasive methods and ICU admission in an acute respiratory insufficiency.
Conclusions: Bioethical capacitation is currently low in the ICUs. There is interest in participating if the opportunity to have more bioethical training was given. Further analysis is needed.

P306

Dying with dignity on TV—an analysis of medical drama television programs

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Critical Care 2025, **29(S1)**:P306

Introduction: Death, a critical subject in society and medicine, is often depicted in medical TV series, potentially reflecting or distorting reality. When all treatment options fail, critical care clinicians focus their efforts on providing their patients with a 'dignified death'. This concept, shaped by societal norms, may influence patients' and families' expectations, often informed by media depictions. This study investigates how death and dying are represented in medical TV series and compares these portrayals to real-life scenarios.
Methods: A qualitative and quantitative content analysis of five popular medical TV series (Grey's Anatomy, House MD, Chicago Hope, The Good Doctor and Emergency Room), using a specially designed questionnaire. Across 1,198 episodes, researchers analyzed portrayals of dying patients, their environments, end-of-life decisions, and the emotional impact on clinical teams. Two researchers independently reviewed episodes via streaming platforms and DVDs.
Results: Preliminary analysis of 94 episodes shows: Most deaths (81.25%, 13 of 16) occurred in single ICU rooms with family present (81.25%, 13 of 16). Advance directives appeared in 1 of 16 cases, and religion/spirituality in 2 of 16. Sterile hospital settings dominated, with rare personal design (1 of 16, e.g., flowers). Physical signs of dying (e.g., sputum, death rattles) were not shown. COVID-19-related deaths accounted for 31.25% (5 of 16) and showed immediate passing after ventilator withdrawal. Full findings will be available in 2025.
Conclusions: Depictions of death in medical TV series follow a consistent, formulaic pattern, diverging significantly from real-life experiences. This study highlights the gap between media portrayals and reality, aiming to foster more accurate public understanding and enhance professional approaches to end-of-life care.

P307

Adherence to the ACERTO protocol and perioperative complications in oncology patients admitted to the intensive care unit

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Critical Care 2025, **29(S1)**:P307

Introduction: Patients undergoing oncological surgeries are exposed to specific risk factors that can influence both the outcome of the procedure and postoperative recovery. The study and implementation of measures to optimize recovery after elective surgeries has been an area of interest since the 1990s. In Brazil, the ACERTO project covers some of these protocols that are fundamental for the early identification of complications, evaluation of the effectiveness of the intervention and optimizing patients' quality of life.
Methods: Retrospective longitudinal study carried out at the Londrina Cancer Hospital, Paraná, Brazil. The study sample consisted of 229 immediate postoperative patients admitted to the intensive care unit from July to December 2021.
Results: There was good adherence to the recommendation of intraoperative (56.6%) and postoperative (90.4%) fluid restriction and prescription of intraoperative (93%) and postoperative (100%) nausea and vomiting prophylaxis. There was less adherence to the recommendation to shorten the fast (32%). An association was observed between adherence to recommendations and a reduction in the frequency of complications. The frequency of complications was 68.5%, with higher occurrences of infectious, respiratory, coagulation-related and renal complications. The mortality rate observed in this sample was 11.8%. In multivariate analysis, the independent risk factors for death were age (OR = 1.0388, 95% CI: 1.0034–1.0754; $p = 0.031$) and SOFA in the immediate postoperative period (OR = 1.2136, 95% CI: 1.0620–1.3867; $p = 0.004$).
Conclusions: This study identified a high frequency of complications in the postoperative period and a mortality rate of 11.8% during hospitalization. Complications associated with the risk of death were infectious, respiratory, renal and related to coagulation. Age and SOFA score were independent risk factors for death. Adherence to the ACERTO protocol was associated with a reduction in postoperative complications in oncology patients.

P308

Serum lactate/albumin ratio as a clinical prognosticator for predicting intensive care unit mortality in a regional hospital in Hong Kong

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Critical Care 2025, **29(S1)**:P308

Introduction: This study aims to evaluate the prognostic value of the Lactate-Albumin Ratio (LAR) in predicting intensive care unit (ICU) mortality. Elevated lactate levels indicate tissue hypoxia and organ dysfunction, while low albumin levels reflect inflammation and poor nutritional status. Both markers are crucial in risk stratification in ICU [1]. The combination of these two biomarkers may enhance prognostic accuracy in predicting adverse clinical outcomes.
Methods: We conducted a retrospective cohort analysis of patients admitted to our ICU from 1 January 2022 to 30 June 2024. Patients without lactate or albumin measurements taken within two hours of ICU admission were excluded. The primary endpoint was ICU mortality.
Results: A total of 427 patients were excluded. Among the 2,991 patients included in the study, there were 224 (7.5%) non-survivors. Non-survivors were older (69.5 vs 65.6 years old) and exhibited higher APACHE IV scores (126 vs 66), elevated serum lactate (6.2 vs 2.5), lower serum albumin (27.7 vs 32.3), and higher admission LARs (0.26 vs 0.085). Logistic regression analysis identified admission LAR (OR 3.897, 95% CI 1.53–9.93, $p = 0.004$), APACHE IV score (OR 1.047, 95% CI 1.04–1.05, $p < 0.001$), diabetes (OR 0.552, 95% CI 0.36–0.85, $p = 0.007$), hypertension (OR 0.419, 95% CI 0.29–0.61, $p < 0.001$), and hyperlipidemia (OR 0.588, 95% CI 0.39–0.89, $p = 0.012$) as independent predictors of ICU mortality. The area under the receiver operating characteristic curve (AUROC) for admission LAR was 0.769, outperforming admission lactate (AUROC 0.746) and admission albumin (AUROC 0.660) in predicting ICU mortality; however, it was less effective than the APACHE IV score (AUROC 0.890).
Conclusions: LAR at ICU admission is a good predictor of mortality among emergency admission. Although the APACHE IV score provides superior discriminative power, its complexity limits its immediate availability in clinical settings.

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P309

Muscle weakness persisting years after critical illness supported with intensive care: a transcriptomics quest for underlying mechanisms

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Critical Care 2025, **29(S1)**:P309

Introduction: Critically ill patients requiring intensive care unit (ICU) admission suffer from muscle weakness that persists for years, compromising quality of life. Long-term follow-up of former critically ill patients has shown reduced strength, worse functional capacity, and lower physical function 5 years after ICU admission compared to matched controls [1,2]. This study aims to investigate the mechanisms underlying this long-term weakness, which remain unclear.
Methods: The muscle transcriptomes of 115 former ICU patients 5-years after critical illness and 30 matched controls were compared with RNA sequencing, followed by pathway overrepresentation and differential co-expression analyses of the differentially expressed RNAs. Abnormal RNA expressions were associated with patients' long-term strength and risk factors were identified with multivariable linear regression analyses.
Results: In former patients, 234 down-regulated and 116 up-regulated RNAs were identified. Pathway analyses and molecular and histological analyses indicated impaired mitochondrial energy metabolism, disturbed lipid metabolism, and increased collagen formation/fibrosis in former patients. Abnormal RNA expression correlated with lower long-term muscle strength. Several treatments given in-ICU and at 5-year follow-up associated with abnormal RNA expression, most notably in-ICU early parenteral nutrition (early-PN) and glucocorticoid use.
Conclusions: Abnormal RNA expression profiles 5-years after critical illness suggest disrupted mitochondrial function, disturbed lipid metabolism and fibrosis, associated with lower long-term muscle strength and partly attributable to the possibly avoidable risk factors in-ICU early-PN and glucocorticoid treatment. These findings open perspectives for prevention and possibly treatment of long-term muscle weakness after critical illness.

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P310

Comprehensive physiological monitoring of passive leg mobilization with a cycle ergometer in critically ill patients

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Critical Care 2025, **29(S1)**:P310

Introduction: The use of cycle ergometers (CE) can improve physical function, reduce intensive care unit (ICU) length of stay, and potentially shorten hospital stay [1]. Currently, ergospirometer monitoring in the ICU has been shown to be feasible in critically ill patients [2], serving as an evaluation tool. The aim of this study was to analyze the physiological changes associated with passive mobilization using a leg CE in critically ill patients.
Methods: Patients who had undergone more than 48 h of invasive mechanical ventilation (IMV) were prospectively enrolled. Passive mobilization was performed using a leg CE (Motomed Letto2, Germany) with real-time monitoring using a Quark RMR ergospirometer (Cosmed, Italy). The protocol included five stages, each lasting 5 min (rest, 10 rpm, 20 rpm, 30 rpm, and recovery). Physiological variables were recorded and analyzed. The study was approved by the local ethics committee with a waiver for informed consent (IRB#2012–53).
Results: A total of 12 patients were enrolled, 9 of whom were admitted to the ICU for acute respiratory failure. The median age was 70 [63–73] years, APACHE II were 12 [8–15] points, and SOFA were 6 [5–10] points. Evaluations were conducted on day 8 [4–13] of IMV. Significant differences ($p < 0.05$) were observed between the recovery phase and the stages of rest, 10 rpm, 20 rpm, and 30 rpm in the variables of heart rate, oxygen pulse, METs, VO2, ventilatory equivalent for O2 (VE/VO2), and VO2/kg (figure). No differences were observed in tidal volume, respiratory rate, minute ventilation, or ventilatory variables related to CO2 elimination.
Conclusions: During the recovery phase of passive mobilization in patients on IMV, an increase in heart rate and VE/VO2 was observed, along with a decrease in VO2, VO2/kg, oxygen pulse, and METs. This study provides insight into the changes in respiratory and circulatory physiology in critically ill patients during passive mobilization.

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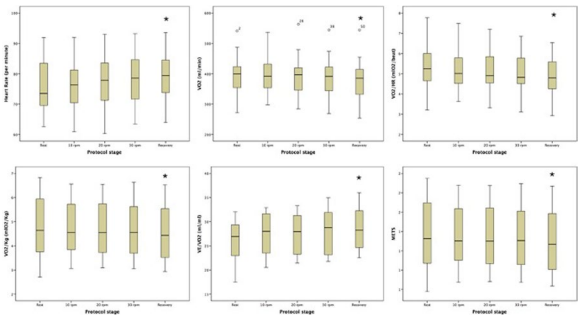

Figure (abstract P310) Heart rate (HR), oxygen expired volume (VO2), ventilatory equivalent of oxygen (VE/VO2), oxygen pulse (VO2/HR). *$p < 0.05$ compared with all other step of protocol

P311

ICU-acquired weakness in critically ill oncology patients: a pilot study

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Critical Care 2025, **29(S1)**:P311

Introduction: Up to one-third of patients admitted to critical care units are oncology patients (OP). ICU-acquired weakness (ICU-AW) has an incidence of up to 40% during critical care stays. Unlike other patients, OP with impaired functionality are no longer candidates for receiving antineoplastic treatment. The primary objective of this study was to determine the prevalence of ICU-AW in OP and to describe the characteristics of the study population.
Methods: A prospective database of OP admitted to an ICU between May 2020 and January 2023 was analyzed. Patients with complete data on oncological disease and muscle strength assessment using the Medical Research Council-Sum Score (MRC-SS) were included. Statistical analysis included the Mann–Whitney U test for continuous variables, Spearman's rho for correlation analysis, and the chi-square or Fisher's exact test for categorical variables. Statistical significance was defined as $p < 0.05$. The project was approved by the ethics committee with a waiver for informed consent.
Results: Thirty OP were identified with a median age of 65 years [56–72], APACHE II of 13 [10–17], SOFA of 6 [3–8], and an initial MRC-SS of 47 [40–52]. Most admissions were unplanned (N = 28), with 24 requiring invasive mechanical ventilation, 7 presenting with septic shock at admission, and 14 developing acute kidney injury. Hemato-oncology patients comprised 53% of the cohort. The first MRC-SS evaluation was 47 [40–52], while the final score before discharge was 50 [39–55], $p = 0.035$. A significant association was observed between

the initial MRC-SS and SOFA (rho = −0.438, $p = 0.015$), ICU length of stay (rho = −0.417, $p = 0.022$), and ICU discharge MRC-SS (rho = 0.522, $p = 0.009$). Patients who continued oncological treatment had higher ICU discharge MRC-SS (43 [33–50] vs. 52 [46–58], $p = 0.015$).
Conclusions: The assessment of ICU-AW using MRC-SS in OP was associated with organ dysfunction, ICU length of stay, and the likelihood of continuing oncological treatment upon ICU discharge.

P312

Effects of a combined lifestyle intervention on recovery of ICU-survivors: a randomized controlled trial

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Critical Care 2025, **29(S1)**:P312

Introduction: Many ICU survivors often do not meet protein intake requirements [1] and face long-term challenges associated with physical dysfunction [2]. Evidence supporting the benefits of combined nutrition and exercise programs in ICU survivors is limited [3]. Thus, we aimed to assess the impact of a combined lifestyle intervention on physical functioning and health related quality of life (HRQoL) post-ICU.
Methods: In this single-center RCT, adult long stay ICU survivors (≥ 48 h) with a Physical Functioning (PF) score of < 67% on the Dutch translation of the RAND-36 item Health Survey were included. Baseline and ICU characteristics were retrieved from patient records. The 12-week intervention included twice-weekly group exercise, dietary advice, and protein supplementation as needed. The control group received standard aftercare. Primary outcome (PF-score at 12 weeks) and secondary outcomes were assessed during a clinic visit at baseline and after a 12-week period.
Results: This preliminary analysis included 34 patients: 24% female, mean age 59 (13) years, median ICU stay 7 [5–13] days, and patients severely ill (APACHE III: 70 (29)). While there were imbalances in ICU stay and ventilation days between groups, baseline PF scores were similar. At 12 weeks, the intervention group showed a significant improvement ($p = 0.049$) (Figure). Daily protein intake in the intervention group increased from 0.99 (0.28) to 124.3 (29.1) g/kg ($p = 0.006$), with 67% meeting the minimal intake target of 1.2 g/kg/day.
Conclusions: This preliminary analysis showed improved PF in ICU survivors after a combined lifestyle intervention.

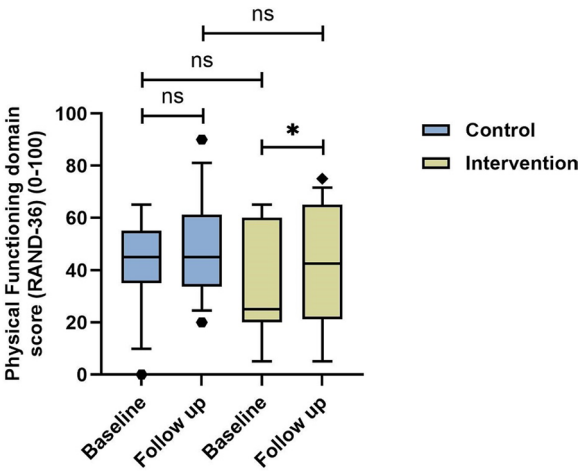

Figure (abstract P312) Physical functioning domain scores measured at baseline (t = 0) and at follow up (t = 12) presented in boxplot with 10-90th percentile whiskers. *$p \leq 0.05$

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P313

Postoperative disability improvement (PODI) in lumbar spinal stenosis surgery (LSSS): impact of age and presurgical frailty

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Critical Care 2025, **29(S1)**:P313

Introduction: LSSS is an intervention aimed at alleviating symptoms and improving quality of life, including important aspects such as disability, which have been related to outcomes in LSSS [1,2]. This study analyzed the impact of intraoperative and anesthetic factors on PODI in patients undergoing LSSS, providing valuable information for optimizing perioperative care and functional outcomes.
Methods: We included 165 patients who underwent LSSS in a historical cohort between 2022 and 2024 at the Hospital Universitario Fundación Santa Fe de Bogotá. Disability was assessed using the Oswestry Disability Index (ODI) preoperatively and 6 months postoperatively. Age was classified as ≤ 65 years, 65–80 years, and > 80 years, and frailty was defined as a modified 5-item frailty index score ≥ 2. Demographic, clinical, and perioperative variables were analyzed, and descriptive statistics and bivariate analyses were performed. Chi-square or Fisher was used for qualitative associations and Mann Whitney or Kruskall-Wallis for quantitative variables.
Results: The mean age was 71 years, 19% were frail, the mean operative time was 4 h, and 12% required postoperative ICU admission, with an average in-hospital stay of 4 days. ODI at six months was significantly improved over baseline in younger patients ($p = 0.03$), as well as in those without preoperative frailty ($p = 0.03$) (Table). No correlations were found between DCPOP and the type of anesthesia, duration of surgery, or transfusion.
Conclusions::The results of this study highlight that age and preoperative frailty are determining factors of PODI after LSSS, underscoring the importance of assessing these parameters in surgical planning.

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Table (abstract P313) Distribution of disability according to ODI scale by age

Age	Oswestry Disability Index preoperatively	Oswestry Disability Index 6 months postoperatively	*p* value
	Moderate to severe disability (> 22%)	Moderate to severe disability (> 22%)	0.03
< 65 years	39 (23.6%)	6 (4.7%)	
65–80 years	90 (54.5%)	18 (14.0%)	
> 80 years	23 (13.9%)	6 (4.7%)	

P314

Prognostic value of bioelectrical impedance analysis and phase angle in predicting ICU readmission in critically ill patients

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Critical Care 2025, **29(S1)**:P314

Introduction: Real-time body composition assessment is crucial in intensive care unit (ICU) settings for monitoring rapid physiological changes in critically ill patients. Bioelectrical impedance analysis (BIA) offers a convenient, non-invasive method for bedside evaluation. This study aimed to investigate BIA changes during ICU stay and assess differences between patients who were readmitted and those who were not.
Methods: This single-center, prospective study included surgical ICU patients admitted between April 2021 and February 2022. BIA was conducted at ICU admission, on day 3, after 1 week, and weekly thereafter until ICU discharge. Body composition parameters measured by BIA included phase angle (PhA), fat-free mass (FFM), body cell mass (BCM), skeletal muscle mass (SMM), and the ratio of extracellular water (ECW) to total body water (TBW).
Results: A total of 76 patients (55 males and 21 females, mean age 67.6 ± 10.1 years) were enrolled in the study. During the first week of ICU admission, there were notable changes in BIA variables: phase angle (PhA) decreased by 0.8 ± 0.8°, indicating a decline in cellular integrity and overall health status, while the ratio of ECW to TBW increased by 0.01, reflecting a trend towards fluid overload. Furthermore, FFM, BCM, and SMM decreased significantly by 4.0 ± 1.4 kg, 3.7 ± 1.2 kg, and 6.2 ± 1.6 kg, respectively, indicating significant muscle wasting and catabolic activity during the ICU stay. Multivariate analysis identified that higher APACHE II scores (odds ratio [OR]: 1.105, 95% confidence interval [CI]: 1.017–1.201, $p = 0.018$) and lower PhA (OR: 0.501, 95% CI: 0.254–0.986, $p = 0.045$) were both significantly associated with an increased risk of ICU readmission.
Conclusions: PhA, FFM, BCM, and SMM measured by BIA decreased during the ICU stay, indicating clinical deterioration. PhA specifically was a strong predictor of ICU readmission.

P315

Circulating muscle proteolysis metabolites and physical function in critical illness survivors: a metabolomics cohort study

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Critical Care 2025, **29(S1)**:P315

Introduction: N-terminal acetyl amino acids are general markers of protein turnover (Figure). In critical illness, a higher rate of muscle proteolysis occurs with higher illness severity. We hypothesized that an elevation of plasma muscle proteolysis metabolites during the first week of ICU admission is associated with physical function at 6 months in critical illness survivors.
Methods: We performed a post-hoc metabolomics study of the Correction of Vitamin D Deficiency in Critically Ill Patients (VITdAL-ICU) trial. The relative abundance of 983 metabolites in 758 plasma samples from 258 patients at randomization (day 0), day 3, and day 7 were analyzed. For longitudinal data, we used multivariable linear mixed-effects models to find the linear association between the individual metabolite abundance at day 0, 3, and 7 and SF-12 physical component score group 6 months following ICU admission adjusting for age, sex, baseline 25(OH)D, an absolute increase in 25(OH)D at day 3, SAPS II, plasma day, admission diagnosis and patient identification as the random-intercept. We utilized a conservative *p* value correction via false discovery rate adjustment.
Results: In the cohort, 37% were women and 58% were intubated, the mean (SD) age was 60.8 (15.6), and the mean (SD) SAPS II was 31.6 (15.4). The median [IQR] of SF-12 Physical Component at 6 months was 39.3 [22.1, 56.5]. In linear mixed-effects models for longitudinal data, 160 individual metabolites were significantly associated with decreased SF-12 physical component score. 87 metabolites had significant positive associations with decreased SF-12 physical component score. These included 7 N-terminal acetyl amino acids and 22 amino acid metabolites including creatine. Metabolite abundance patterns remained the same when analysis was limited to trial patients who received placebo.
Conclusions: Elevated plasma markers of muscle proteolysis in early critical illness is associated with functional impairment at 6 months in survivors.
Acknowledgement: National Institutes of Health R01 GM115774.

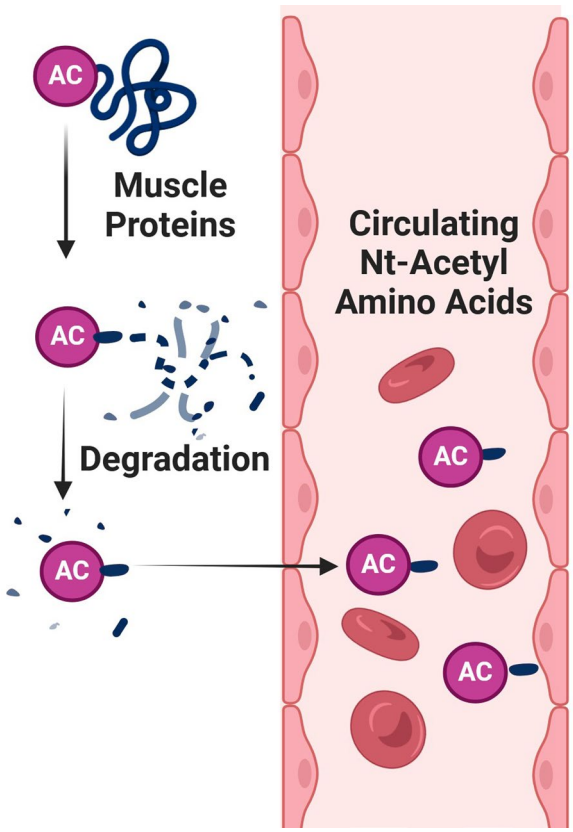

Figure (abstract P315) Circulating Nt-acetyl amino acids

P316

Health-related quality of life after ICU stay for sepsis

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Critical Care 2025, **29(S1)**:P316

Introduction: The health-related quality of life (HRQoL) is often affected in survivors of intensive care. The HRQoL after sepsis has not been described in large ICU cohorts previously. We aimed to describe HRQoL and identify factors associated decreased HRQoL after intensive care for sepsis in Swedish ICU patients.
Methods: We acquired a cohort of ICU patients with sepsis from the Swedish Intensive Care Registry. The cohort consisted of all patients over 18 years of age admitted to an ICU in Sweden and discharged alive between 01/01/2008 to 28/02/2020. ICD-10 codes for comorbidities prior ICU admission were retrieved from the Swedish National Patient Registry. The primary outcome was HRQoL assessed with RAND-36 at follow-ups during the first 15 month after ICU-discharge. A mixed-model analysis was used assess the adjusted effects of covariates on HRQoL.
Results: RAND-36 data was available for 11,741–11,893 individuals, with 23,262–23,449 observations (varying by dimension). HRQoL was lower than Swedish population reference levels but improved over the first 15 months post-ICU discharge for all RAND-36 dimensions (not shown). The mixed model (Figure) indicated that male sex was linked to higher RAND-36, while age and unplanned admission had varying impacts on different dimensions. Severity of illness (SAPS-3) had no impact on HRQoL, whereas invasive ventilation was associated with slightly better RAND-36. CRRT and length of stay (LOS) were primarily linked to worse RAND-36. Pre-ICU comorbidities negatively impacted RAND-36 post-ICU, with the largest effects seen in cerebrovascular, chronic pulmonary, neurologic, and psychiatric diagnoses. Time after ICU discharge was associated with improvement of RAND-36.
Conclusions: In conclusion, in a Swedish national cohort of ICU patients surviving sepsis, HRQoL was low but improved over time. Severity of illness had no impact on HRQoL, while LOS and comorbidities were negative factors.

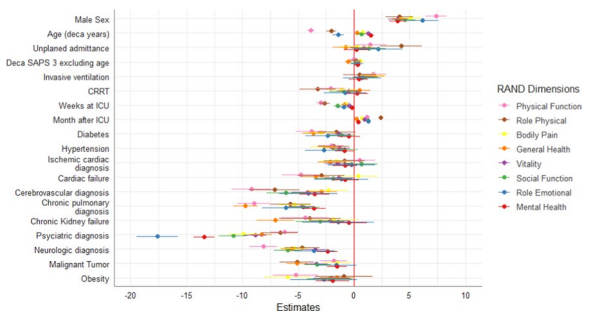

Figure (abstract P316) A mixed model of factors associated with the different RAND-36 dimensions the first 15 month after intensive care with sepsis

P317

Using data linkage to investigate the long-term impact of critical illness on healthcare resource use

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Critical Care 2025, **29(S1)**:P317

Introduction: Population-level estimates of the excess mortality and health care costs associated with surviving ICU are available for some countries (e.g. Canada and Scotland), however minimal data exists in Australia. This study aimed to quantify healthcare resource utilisation and its associated costs in the year prior to and the three years following ICU admission.
Methods: Retrospective observational longitudinal cohort study formed through data linkage of the PREDICT database and Victorian government administrative databases containing data on all ED and hospital admissions, as well as costs. The PREDICT database used in this study included ICU data and outcomes for 822 patients enrolled in the PREDICT Study in 6 Victorian ICUs between 2017 and 2018 who were ventilated for > 24 h.
Results: Data from 810 (98.5%) patients was able to be successfully linked. The mean age was 57.8 (16.3) years, 63% were male and 76% had pre-existing disability. A total of 560 (69%) patients had ≥ 1 hospital admission in the year prior to their ICU admission (Table). Among the 616 (76%) patients who survived the PREDICT study admission, 449 (73%) were readmitted to hospital within one year, and 85% had ≥ 1 admission in the 3 years post discharge. Mean (SD) hospital costs in the year post discharge were $46,796 ($88,055). Among patients with pre-existing disability, 80% had an admission in the year prior to their ICU admission. A total of 139 (81%) were readmitted to hospital within one year within a median number of admissions of 4 (IQR 1–9) and a mean (SD) total cost of $54,392 ($85,545).
Conclusions: Ventilated ICU patients have high rates of readmission and significant costs, however the resource burden was also high prior to the ICU admission. These patients place an ongoing burden on limited healthcare resources, and further research is needed to identify factors predictive of healthcare resource use.

Table (abstract P317) Results

Characteristic	The year before index hospitalization, N = 810	1 year after index hospitalization N = 616	3 years after index hospitalization N = 616
Number of patients admitted	560 / 810 (69)	449 / 616 (73)	523 / 616 (85)
Median (IQR) number of admissions	1.0 (0.0, 4.0)	2.0 (0.0, 5.3)	4.0 (1.0, 10.0)
Median (IQR) hospital LOS (days)	2.0 (0.0, 14.0)	5.0 (0.0, 25.0)	14.0 (2.0, 48.0)
Total hospital costs			
Mean (SD)	$35,149 ($79,287)	$46,796 ($88,055)	$76,657 ($124,603)
Median (IQR)	$7,955 ($0, $32,787)	$10,595 ($0, $49,638)	$28,285 ($2,987, $97,670)

IQR = interquartile range, SD = standard deviation, LOS = length of stay; All costs are presented in 2023 AUD.

P318

The familiarity of post-intensive care syndrome among general practitioners

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Critical Care 2025, **29(S1)**:P318

Introduction: Post-intensive care syndrome (PICS) comprises new or worsening long-lasting physical, cognitive, and mental impairments in patients after being treated in an intensive care unit (ICU). In Belgium,

a standardized ICU follow-up is currently lacking and many patients consult their general practitioner (GP) post-ICU with PICS-related sequelae. This study assessed GPs' familiarity of PICS and GPs' perspective on follow-up care in former ICU-patients.
Methods: A single center observational study was done (October–November 2024) in which a 14-item survey was emailed to GPs (East-Flanders region, Belgium) from the ICU department of the Ghent University Hospital. The survey encompassed multiple choice and open questions concerning the GP's demographics and practice, familiarity of PICS and preferred methods of information and follow-up care in ICU patients. Data were securely stored and managed using Research Electronic Data Capture (REDCAP). Informed consent was obtained prior to survey participation. Descriptive data were analyzed using Microsoft Excel.
Results: 118 out of 710 GPs responded but only 107 surveys were fully completed (15.1%). Mean age of the GPs was 36 years (SD 10.4 years), 57% were female. Among respondents, 77.6% were unfamiliar with the term PICS. The majority (93%) expressed interest in further education about PICS through e-learning (54%), symposia (26%) and printed (12%) or emailed guidelines (42%). 66% of GPs preferred a multidisciplinary approach for ICU follow-up care involving a psychologist, intensivist, GP and physiotherapist; while 43% favored follow-up led by the GP with support from an ICU team.
Conclusions: Despite a low response rate, this study highlights a significant gap in knowledge among Belgian GPs regarding PICS. GPs are however eager to increase their knowledge regarding long-term ICU-sequelae. ICU physicians should therefore enhance information and collaboration with GPs to improve follow-up care in former ICU-patients.

P319

Prognostic significance of selected electrocardiographic parameters in critically ill patients

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Critical Care 2025, **29(S1)**:P319

Introduction: Myocardial dysfunction is often seen among critically ill patients and different abnormalities in electrocardiogram (ECG) may indicate cardiac involvement [1]. SOFA score is a stratifying toll used for evaluating organ dysfunction [2], however its clinical value in the assessment of cardiac dysfunction is insufficient and it does not include none of ECG parameters.
Methods: Clinical data of 307 consecutive adult patients (47.6% medical, 38.4% surgical) hospitalized in the ICU and selected ECG parameters obtained from standard 12-lead ECG on admission including ST segment deviation (STD), prolonged QTc (prol-QTc) and prolonged QRS duration (prol-QRS) were analyzed.
Results: Analyzed abnormalities in ECG are frequent: prol-QTc (n = 32; 30.0%), prol-QRS (n = 41;13.4%) and STD (n = 126; 41.0%). In comparison to survivors, non-survivors had more often ST deviation (60 (47.6%) vs 66 (36.5%), $p = 0.033$), but there was no difference in the frequency of prol-QRS and prol-QTc. Only STD was associated with lower 30-day survival rate in the Kaplan–Meier estimates ($p < 0.018$) and in Cox regression analysis only ST-deviation (HR = 1.534 (95% CI: 1.081–2.177), $p = 0.017$) was independent risk factor for mortality even after adjustment for SOFA score.
Conclusions: ECG abnormalities are often seen in non-cardiac critically ill patients and ST-deviation is independent risk factor for increased mortality even after adjustment for SOFA score which may serve as an additional tool describing cardiac dysfunction.

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P320

Longitudinal D-dimer trends as a prognostic marker for mortality in critically ill patients

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Critical Care 2025, **29(S1)**:P320

Introduction: This study hypothesized that longitudinal trends of D-dimer levels in critically ill patients are associated with mortality. The objective was to analyze these trajectories and evaluate their potential to guide risk stratification and tailored interventions. D-dimer is a biomarker of fibrin degradation commonly used to diagnose venous thromboembolism (VTE), and elevated levels are linked to higher thrombotic risk and mortality in critically ill patients.
Methods: A retrospective study was conducted on 3674 ICU patients admitted for ≥ 72 h at Fondazione IRCCS Ca' Granda Ospedale Maggiore Policlinico (Milan, Italy) between 2018 and 2024. Exclusion criteria included pregnancy and age < 18 years. Longitudinal D-dimer levels were analyzed using mixed-effects regression models, accounting for inter-patient variability and repeated measures. Differences in trajectories between deceased and surviving patients were compared.
Results: Deceased patients exhibited significantly higher D-dimer levels compared to survivors (10013 [2742–28276] µg/mL vs. 3669 [1569–7168] µg/mL; $p < 0.0001$). Mixed-effects analysis showed that deceased patients began with elevated D-dimer levels that declined steeply over time, whereas survivors showed lower levels with a gradual decrease. Greater variability was observed among deceased patients. The interaction between outcome and trajectory was statistically significant ($\beta = 0.0199$; $p < 0.0001$).
Conclusions: Distinct D-dimer trajectories and elevated initial levels are associated with mortality in critically ill patients, suggesting its potential as a prognostic biomarker. Longitudinal D-dimer monitoring may enhance risk stratification, guiding targeted antithrombotic strategies for patients with persistently high levels while minimizing unnecessary interventions on low-risk patients.

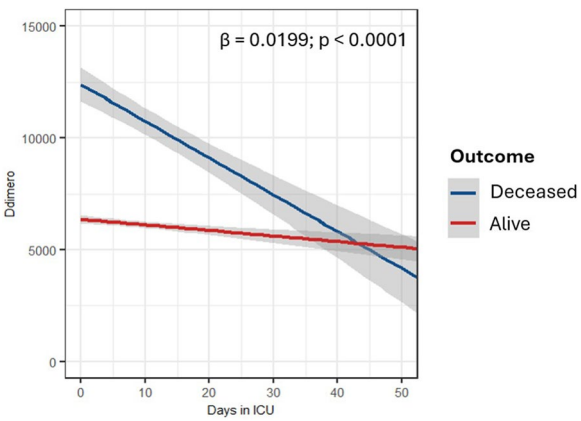

Figure (abstract P320) D-dimer trends in ICU patients by outcome. Deceased patients (blue) had higher initial levels with a steep decline, while survivors (red) had lower levels and a gradual decrease

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Decreased HLA-DR expression on monocyte membrane as a severity marker upon ICU admission in critical patients

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Introduction: Acquired immune dysfunction in critically ill patients, known as immunoparalysis, has been recently described. The most closely analytical variable related to is the decreased expression of human leukocyte antigen DR on the membrane of monocytes (mHLA-DR) in peripheral blood. The aim of this study is to determine whether altered mHLA-DR expression is related to severity upon ICU admission.
Methods: A prospective observational study was conducted in an ICU over 24 months. Inclusion criteria were patients over 18 years old without infection at admission. Patients with immunosuppression were excluded. Severity was assessed using APACHE II score. mHLA-DR expression was monitored on days 0, 3, 5, and 7 using flow cytometry, measured as percentage of monocytes expressing HLA-DR (mHLA-DR ratio) and mean fluorescence intensity of antibodies against mHLA-DR (MFI mHLA-DR). C-reactive protein (CRP) was also measured as marker of systemic inflammation. Statistical associations were evaluated using robust linear regression. A p-value < 0.05 was considered significant.
Results: Eighty-four patients were included, mean age was 58 years (20–82) and 55 were male (65.4%). Main reason for admission (73.8%) was neurocritical pathology. Median APACHE II score was 20 points (5–27). Significant association was observed between higher APACHE II score and lower mHLA-DR expression at admission, measured both by mHLA-DR ratio (R^2 0.0965; $p = 0.021$) (Figure) and MFI mHLA-DR (R^2 0.0679; $p = 0.023$). Correlation was also found between higher CRP levels at admission and decreased mHLA-DR expression on days 0 (R^2 0.285; $p = 0.035$) and 3 (R^2 0.438; $p < 0.001$).
Conclusions: Decreased expression of mHLA-DR in patients admitted to ICU is associated with greater clinical severity. It is also linked to a higher state of systemic inflammation. That could indicate dysfunction of the adaptive immune response. Immune dysregulation may be explained as part of immune system impairment in the multiorgan dysfunction syndrome produced in critically ill patients.

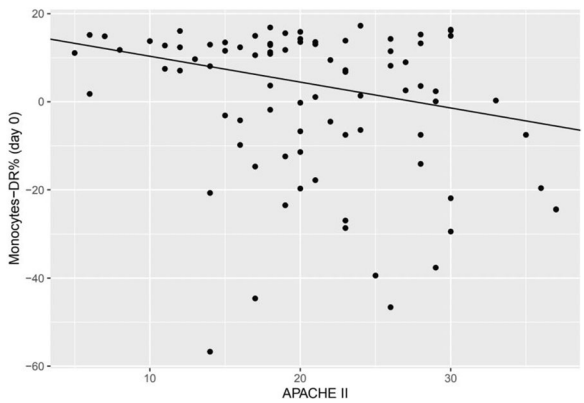

Figure (abstract P321) Robust linear regression test between mHLA-DR ratio and APACHE II. R^2 0.0965; $p = 0.021$

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