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50 - APPLICAZIONE DI UN ALGORITMO DI INTELLIGENZA ARTIFICIALE A PAZIENTI CON ACCESSO PRESSO IL DIPARTIMENTO DI EMERGENZA DELL'AZIENDA OSPEDALIERA UNIVERSITARIA PISANA PER DOLORE TORACICO: VALUTAZIONE RETRO

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Titolo:

APPLICAZIONE DI UN ALGORITMO DI INTELLIGENZA ARTIFICIALE A PAZIENTI CON ACCESSO PRESSO IL DIPARTIMENTO DI EMERGENZA DELL'AZIENDA OSPEDALIERA UNIVERSITARIA PISANA PER DOLORE TORACICO: VALUTAZIONE RETROSPETTIVA DELL'ACCURATEZZA DIAGNOSTICA

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Affiliazione:

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Abstract

Introduzione

Il dolore toracico è un sintomo frequente all'interno del Dipartimento di Emergenza Accettazione (DEA), con mortalità del 2-4%. Può essere espressione di entità cliniche variabili, da condizioni benigne a patologie cardiovascolari (CV) pericolose per la vita. Accanto ai convenzionali strumenti clinici e a vari scores validati, emergono strumenti di intelligenza artificiale (IA), come possibile supporto per una adeguata stratificazione del rischio.

Metodi

E' stato analizzato un campione di 154 pazienti giunti presso il DEA dell'AOUP tra maggio 2024 e giugno 2025 per dolore toracico, allo scopo di valutare l'accuratezza diagnostica dell'algoritmo ChatGPT 4.0. Di ciascun paziente è stata verificata gestione, diagnosi conclusiva, outcomes. Sono state selezionate un numero limitato di variabili da sottoporre all'algoritmo, suddivise in due interrogazioni successive: una prima comprendente dati di triage (anagrafici, genere, parametri, anamnesi e caratteristiche del dolore) e una seconda comprendente esame obiettivo, test di laboratorio e strumentali.

Risultati

La popolazione presenta un'età media di 60,7 anni. Le patologie pericolose per la vita rappresentano una netta minoranza (17,45%). La maggioranza della popolazione (74,5%) è stata dimessa a domicilio, in considerazione di accertamenti negativi. I risultati emersi riguardo l'accuratezza diagnostica fra le diagnosi conclusive e la diagnosi suggerita dall'algoritmo di IA

mostrano nella prima interrogazione (dati di triage) una concordanza nel 32,9% dei casi se si considera la prima proposta fornita e del 67,8% se si considera tutte e tre le proposte fornite. Nella seconda interrogazione (in cui i dati si arricchiscono di dati laboratoristici e strumentali) l'accuratezza sale fino al 90,6%. Analogamente, i dati relativi al potere diagnostico di questo strumento nell'identificare esclusivamente patologie CV acute (embolia polmonare, sindrome coronarica acuta e dissecazione aortica) mostrano una concordanza che raggiunge il 100%.

Conclusioni

L'IA ha dimostrato di saper riconoscere i pattern diagnostici rilevanti, soprattutto quando vengono fornite indicazioni ben strutturate. I risultati raggiunti sono promettenti e aprono concretamente la prospettiva di utilizzare i sistemi di AI nel triage e nella valutazione precoce del dolore toracico, creando algoritmi creati appositamente, che sappiano interagire direttamente con i sistemi informatici dell'ospedale.

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Titolo:

UTILIZZO DELL'ECOGRAFIA POLMONARE NEI PAZIENTI RICOVERATI AL DIPARTIMENTO DI EMERGENZA PER POLMONITE: MONITORAGGIO A DISTANZA TRAMITE LUS SCORE E VALUTAZIONE PROGNOSTICA

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Affiliazione:

2. UO Medicina di Urgenza Universitaria, Azienda Ospedaliera Universitaria Pisana

Abstract

Introduzione

La polmonite è un processo flogistico acuto che si associa a un elevato tasso di morbilità e mortalità, rappresentando la principale causa di morte per causa infettiva in tutto il mondo. L'ecografia polmonare è una metodica di ampio utilizzo in tutti i setting vista la sua maneggevolezza, la rapida curva di apprendimento, l'accuratezza diagnostica, nonché la possibilità di predire outcomes negativi e monitorare il processo patologico a distanza.

Metodi

Sono stati valutati prospetticamente 27 pazienti ricoverati per polmonite presso l'UO di Medicina di Urgenza Universitaria dell'AOUP tra giugno 2024 e gennaio 2025. Durante la degenza, i pazienti sono stati sottoposti a ecografia toracica, con schema di refertazione a 16 campi. È stato assegnato un punteggio di LUS score basato sul grado di areazione polmonare. I pazienti sono stati sottoposti a visita ambulatoriale di FU a 5 settimane, con rivalutazione comprendente esame obiettivo, analisi ematochimiche e nuova ecografia toracica.

Risultati

I pazienti valutati presentavano età media di 69, 7 anni. La totalità ha svolto, come indagine diagnostica, l'ecografia polmonare, 25 (92,6%) hanno svolto l'RX del torace, mentre a 12 (44,4%) è stata eseguita una TC del torace. La concordanza topografica tra ecografia e altre metodiche è risultata del 88,5%. I risultati relativi all'ecografia polmonare eseguita in due tempistiche, mostrano una completa scomparsa dei fenomeni consolidativi al FU, nonché una riduzione statisticamente significativa del LUS score nella totalità dei pazienti analizzati (20,7 ± 6,2 vs 6,1 ± 3, p value <

0,001). Grazie a questa metodologia, nessun paziente è stato sottoposto a diagnostica radiologica con radiazioni ionizzanti di controllo. Il punteggio di LUS score ha consentito di predire alcuni outcomes negativi (durata degenza, necessità di ventilazione).

Conclusioni

L'ecografia polmonare è una metodica utile nel processo diagnostico e gestionale del paziente affetto da polmonite, riducendo l'utilizzo di esami di radiologia pesante. Il punteggio LUS si è rivelato uno strumento promettente per la capacità di documentare il processo di guarigione e predire informazioni prognostiche significative. I risultati suggeriscono che il LUS score potrebbe essere adottato come indicatore precoce per monitorare l'evoluzione della polmonite e per prevedere l'outcome a lungo termine.

4 - LE CURE PALLIATIVE POSSONO AVERE UN RUOLO IN AREA CRITICA?

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LE CURE PALLIATIVE POSSONO AVERE UN RUOLO IN AREA CRITICA?

Barchetti Marco, Rosi Stefania, Angela Ciuffreda

MEDICINA D'URGENZA E PRONTO SOCCORSO- NUOVO OSPEDALE DI SASSUOLO

Introduzione: l'area critica, intesa come terapie subintensive ed intensive, rappresenta un luogo ad alta intensità assistenziale in cui vengono ricoverati pazienti con gravi alterazioni delle funzioni vitali. A volte però le condizioni generali, la patologia di base o l'aggravarsi del quadro possono rendere la scelta di un trattamento palliativo come la risposta più adeguata. Sulla base di questa riflessione abbiamo attuato un progetto di miglioramento della gestione del pz. in area critica tentando di implementare una valutazione e, quando possibile, una gestione dei bisogni palliativi.

Materiali e Metodi: dopo una formazione specifica attraverso il corso VaPU (Valutazione Palliativa in Urgenza) i pazienti internistici affetti da patologie croniche afferenti alla terapia semiintensiva del reparto di Medicina d'Urgenza sono stati valutati al fine di individuarne bisogni il cui trattamento poteva essere di tipo palliativo. Dal gennaio 2023 al dicembre 2024 tutti i pazienti ricoverati nella terapia semintensiva della Medicina d'Urgenza sono stati valutati attraverso la scheda di Valutazione Palliativa in Urgenza (VaPU), i pazienti risultati positivi alla valutazione venivano candidati ad un trattamento di tipo palliativo previo confronto con il curante, con il paziente e con i familiari. La casistica si compone di 72 pz. (43 uomini e 29 donne, età media 77 anni); in 51 casi il trattamento è stato solamente palliativo, in 21 è stato modulato con inizio comunque di terapie palliative.

Risultati: tutti i pz. sottoposti al solo trattamento palliativo sono deceduti durante il ricovero, in 46 casi si è proceduto a sedazione palliativa; dei 21 pz. in terapia rimodulata 12 sono deceduti, 9 sono stati dimessi con presa in carico da parte del servizio di cure palliative domiciliari (al follow-up a 30 gg dalla dimissione risultavano tutti deceduti).

Conclusioni: individuare pazienti in fase terminale in area critica può consentire una migliore gestione del caso singolo e contribuire alla ottimizzazione della gestione delle risorse.

42 - RENIN-GUIDED, PERSONALIZED HEMODYNAMIC MANAGEMENT AND ACUTE KIDNEY INJURY IN SHOCK: RATIONALE AND DESIGN OF A RANDOMIZED TRIAL

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Renin-guided, personalized hemodynamic management and acute kidney injury in shock: rationale and design of a randomized trial

Introduction: Shock is a major risk factor for mortality among patients admitted to intensive care units (ICUs). Since various hemodynamic strategies uniformly delivered to patients with shock have failed to improve clinically relevant outcomes, individualized approaches for shock supported by robust evidence are required. Recently, renin has been suggested as a potential marker to assess kidney perfusion in shock. Accordingly, we hypothesized that a personalized hemodynamic management based on renin values could be superior to standard care. Therefore, we designed the *Randomized Evaluation of persoNalized hemodynamIc maNagement based on serum renin concentration (RENIN)* trial (Figure 1) to evaluate the effect of renin-guided hemodynamic management on mortality and acute kidney injury (AKI) in patients with shock.

Methods: This will be a multicenter, multinational, randomized, patient- and assessor-blinded trial. We will include 800 patients aged ≥18 year, requiring vasopressor administration to maintain mean arterial pressure (MAP) >65 mmHg, admitted to an ICU and expected to remain in ICU for ≥24 h. Main exclusion criteria will be receipt of vasopressors >24 h before enrolment, chronic kidney disease stage IV or greater, AKI stage 2 or greater at time of enrolment, or any condition explicitly requiring a specific MAP target. Patients will be randomized in 1:1 ratio to renin-guided resuscitation or standard care. In patients in the renin-guided group, we will measure serum renin values every 6-8h, and adjust MAP target according to changes in renin levels (Figure 2). Patients in the standard care group will be managed according to clinician discretion. The primary outcome will be a composite of 30-days AKI progression or mortality. Main secondary outcomes will be 90-days mortality, need for renal-replacement therapy, day-90 major adverse kidney events, and day-90 quality of life.

Results: As of September 25th, 2025, a total of 16 patients in two centers have been randomized in the study. Preliminary data suggest feasibility with correct renin sampling and timely results obtained in >95% of patients and good adherence to study protocol.

Conclusions: Our study will investigate whether renin-guided resuscitation can improve outcome in patients with shock.

41 - THE EFFECT OF PHOSPHOCREATINE ON MEDICAL EMERGENCY TEAM (MET) TREATED PATIENTS: A RANDOMIZED CLINICAL TRIAL PROTOCOL - SPHERE.

Benedetta Chiodi *[1] - Giada Russo [1] - Erica Ronca [1] - Cristina Nakhnoukh [1] - Rosalba Lembo [1] - Filippo Consolo [1] - Giuseppe Giardina [1] - Elena Moizo [1] - Giacomo Monti [1] - Giovanni Landoni [1]*

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The effect of phoSPHocreatine on mEdical emergency team (met) tREated patients: a randomized clinical trial protocol - SPHERE.

Introduction

Clinical deterioration in hospitalized patients often leads to unplanned ICU admission and high short-term mortality. Medical Emergency Teams (METs) aim to recognize and treat instability before irreversible organ failure, yet outcomes remain suboptimal, with prolonged stays and morbidity. Mitochondrial energy failure is pivotal—particularly in patients with impending or ongoing cardiac dysfunction. Phosphocreatine (PCr), a high-energy phosphate, regenerates ATP without lactate production, sustaining myocardial and cerebral metabolism. Experimental and clinical studies suggest that PCr improves cardiac performance, reduces arrhythmias, and decreases mortality in acute cardiac conditions. The SPHERE trial evaluates whether intravenous PCr given during MET intervention improves outcomes in deteriorating ward patients.

Materials & Methods

SPHERE is a phase III, multicenter, randomized, double-blind, placebo-controlled trial enrolling 400 adults reviewed and treated by METs in general wards across Italian hospitals. Eligible patients (≥18 years, serum creatinine ≤2 mg/dL, MET activation for respiratory distress, shock, altered consciousness, or severe vital-sign abnormalities) are randomized 1:1 to receive intravenous PCr or saline. The PCr arm receives a 4 g bolus in 200 mL saline, followed by 2–4 g twice daily for two days according to renal function. The primary endpoint is Days Alive and Out of Hospital at 30 days (DAOH30). Secondary endpoints include 30-day cognition by the Cognitive Telephone Screening test (COGTEL), incidence of arrhythmias requiring treatment, ICU admission, and 30-day mortality. Data are collected by blinded assessors in an electronic case report form. This study is supported by Ricerca Finalizzata 2021 grant from the Italian Ministry of Health (GR-2021-12375001).

Results

The study is powered to detect a 2-day increase in DAOH30 in the PCr group (α=0.05, power 90%). PCr is expected to improve organ function, reduce arrhythmias and ICU admissions, and enhance short-term survival. Interim analyses are planned at 25%, 50%, and 75% enrollment.

Conclusions

SPHERE is the first large multicenter randomized trial testing an energy-based metabolic strategy in acutely deteriorating ward patients. By enhancing cellular bioenergetics, PCr may improve recovery, shorten hospitalization, and reduce mortality in this high-risk population. The trial is currently ongoing in 4 centers, and we are actively seeking additional centers interested in joining this important study.

40 - THE IMPACT OF MULTIMODAL PREHABILITATION TO IMPROVE HEART RATE VARIABILITY IN SURGICAL CANCER PATIENTS: THE PRIME TRIAL

Marta Veneziano *(1)* ***- Noemi De Piccoli*** *(1)* ***- Fabio Guarracino*** *(1)* ***- Palina Kozhan*** *(1)* ***- Laura Fossati*** *(1)* ***- Lisa Notarianni*** *(1)* ***- Matteo Ghezzi*** *(1)* ***- Filippo Sanfilippo*** *(1)* ***- Luigi Beretta*** *(1)* ***- Giovanni Landoni*** *(1)*

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The impact of multimodal prehabilitation to improve Heart Rate Variability in surgical cancer patients: the PRIME TRIAL

Introduction

The standard management of solid tumors involves surgery combined with medical therapies that, while improving survival, impose substantial physiological stress and can compromise both short- and long-term health. Patients' physical condition, nutritional status, and psychological resilience are key determinants of postoperative recovery. The preoperative phase represents a critical window to address comorbidities and modifiable risk factors, especially since neoadjuvant therapies may contribute to muscle loss and functional decline. In this context, multimodal prehabilitation has emerged as a proactive strategy to enhance patients' functional reserve before surgery. However, its overall impact on postoperative outcomes has not yet been conclusively determined. This trial evaluates the effect of multimodal prehabilitation on heart rate variability (HRV).

Methods

We will conduct a multicenter, randomized controlled trial enrolling adult patients scheduled for elective major cancer surgery. Participants will be randomly allocated in a 1:1 ratio to either a prehabilitation group or a standard care group. The prehabilitation intervention will be administered for a minimum of three weeks prior to surgery and will comprise a multimodal program including structured exercise training, individualized nutritional support, and anxiety-reduction strategies. The primary endpoints are the change in the HRV and the number of days spent at home during the first 30 postoperative days. Secondary endpoints include postoperative complications within 30 days and patient-reported quality of life. Funded by the European Union - Next Generation EU - NRRP M6C2 - Investment 2.1 Enhancement and strengthening of biomedical research in the NHS" Codice progetto: PNRR- MCNT2-2023-12377934; CUP master: C43C23000820006.

Results

To date, 90 of 600 planned patients have been randomized across four participating centers, and the trial remains ongoing. The study is projected to conclude in August 2026, with additional sites expected to join the enrollment.

Conclusions

It is anticipated that patients enrolled in the prehabilitation program will exhibit improved HRV, more days spent at home within the first 30 postoperative days, a lower incidence of postoperative complications, shorter hospital stays, and enhanced quality of life compared with those receiving standard care.

11 - EVALUATION OF OUTCOMES IN SYNCOPE PATIENTS DISCHARGED FROM THE EMERGENCY DEPARTMENT OF PIACENZA: A RETROSPECTIVE MONOCENTRIC STUDY

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VALUTAZIONE DELL'OUTCOME DEI PAZIENTI DIMESSI DAL PRONTO SOCCORSO DI PIACENZA PER SINCOPE: UNO STUDIO RETROSPETTIVO MONOCENTRICO.

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Introduzione. La sincope rappresenta circa l'1-3% degli accessi in Pronto Soccorso (PS). Nella maggior parte dei casi è dovuta ad una causa benigna; in rari casi, però, è espressione di una patologia grave potenzialmente fatale. Per tale motivo è importante una corretta valutazione dei pazienti che si presentano in PS per una sincope. La gestione della sincope nel nostro PS è standardizzata secondo una istruzione operativa (I.O.) basata sulle linee guida della European Society of Cardiology del 2018. L'obiettivo è seguire un percorso standardizzato per poter dimettere in sicurezza i pazienti.

Metodi. Studio retrospettivo osservazionale monocentrico approvato dal Comitato Etico AVEN dell'Area Vasta Emilia Nord" (numero di protocollo 2025/0051160) che ha coinvolto tutti i pazienti di età ≥ 18 anni giunti in PS per sincope dal 1 gennaio 2022 al 31 dicembre 2024 e dimessi a domicilio, con/senza un periodo di osservazione. Lo scopo è verificare la corretta gestione secondo l'I.O. in auge. Criteri di inclusione: decesso o ricovero nei 30 giorni successivi alla dimissione per una causa riconducibile alla sincope.

Risultati. Sono stati arruolati 45 pazienti - 22 donne, 23 uomini - di età media 77 anni (69 ± 29). Nel triennio 2022-2024 gli accessi totali in PS sono stati 184121, di questi 6209 (3.3%) per sincope. La maggior parte dei pazienti (4546, 73%) è stata dimessa dal PS; il 25% dei quali dopo un periodo di osservazione in PS/OBI. Nei 30 giorni successivi alla dimissione, sono stati registrati 14 decessi e 31 ricoveri per un totale di 45 casi su 4546 (0.98%). Le patologie cardiache sono state le più frequenti tra i pazienti ricoverati (19/31), seguite da emorragia digestiva (3/31) ed embolia polmonare (2/31); nei restanti casi (7/31) durante il ricovero non vi sono stati riscontri patologici (diagnosi finale "sincope vasovagale" o "da ipotensione ortostatica"). Nei 14 pazienti deceduti, solo in 3 casi la causa è potenzialmente riconducibile alla sincope.

Conclusioni. L'I.O. in uso nel PS di Piacenza permette una corretta gestione del paziente con sincope minimizzando il rischio di conseguenze gravi / fatali.

EVALUATION OF OUTCOMES IN SYNCOPE PATIENTS DISCHARGED FROM THE EMERGENCY DEPARTMENT OF PIACENZA: A RETROSPECTIVE MONOCENTRIC STUDY.

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Introduction. Syncope accounts for approximately 1-3% of visits to the emergency department (ED). In most instances, it stems from a benign cause; however, in rare cases, it may indicate a serious and potentially fatal condition. Therefore, it is crucial to accurately assess patients who present to the ED with syncope. In our ED, the management of syncope follows a standardized approach based on the 2018 guidelines from the European Society of Cardiology. The goal is to adhere to a consistent procedure to ensure the safe discharge of patients.

Methods. This is a single-center, retrospective observational study approved by the AVEN Ethics Committee of the Emilia Nord Area (protocol number 2025/0051160). It includes all patients aged ≥ 18 years who presented to the ED for syncope between January 1, 2022, and December 31, 2024, and were discharged home, either after a period of observation or without it. The study aims to verify whether the management of these cases aligns with current guidelines. The inclusion criteria are death or hospitalization within 30 days of discharge due to a cause related to syncope.

Results. A total of 45 patients were enrolled in the study (22 women and 23 men) with an average age of 77 years (69 ± 29). During the three-year period from 2022 to 2024, there were 184,121 visits to the ED, of which 6,209 (3.3%) were due to syncope. Most patients, 4,546 (73%), were discharged from the ED; 25% of these discharges occurring after a period of observation in the ED/Observation Unit. In the 30 days following their discharge, there were 14 deaths and 31 hospitalizations, resulting in a total of 45 adverse events out of the 4,546 patients discharged (0.98%). Among the hospitalized patients, cardiac conditions were the most common diagnosis (19 out of 31), followed by gastrointestinal haemorrhage (3 out of 31) and pulmonary embolism (2 out of 31). In the remaining cases (7 out of 31), no pathological findings were identified during hospitalization, with the final diagnoses being "vasovagal syncope" or "orthostatic hypotension." Of the 14 patients who died, only 3 cases were potentially attributable to syncope.

Conclusions. Our operational guidelines facilitate the effective management of patients experiencing syncope, minimizing the risk of serious or fatal consequences.

12 - EMATOMA SUBDURALE CRONICO SENZA TRAUMA RECENTE EVIDENTE: IMPORTANZA DELL'ANAMNESI NELLA DIAGNOSI TEMPESTIVA

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Titolo:
Ematoma subdurale cronico senza trauma recente evidente: importanza dell'anamnesi nella diagnosi tempestiva.

Introduzione
La cefalea persistente e resistente alla terapia analgesica domiciliare può rappresentare il sintomo iniziale di patologie intracraniche potenzialmente gravi, tra cui l'ematoma subdurale cronico. La diagnosi può essere complicata in assenza di un trauma cranico recente o segni neurologici focali. Presentiamo un caso clinico di ematoma subdurale cronico in un paziente con cefalea insorta in seguito a trauma cranico pregresso, non riferito inizialmente.

Metodi
Paziente maschio, 62 anni, con anamnesi di ipertensione arteriosa e diabete mellito tipo 2, si presenta in pronto soccorso per cefalea fronto-temporale persistente da circa una settimana, refrattaria a terapia antalgica domiciliare. All'ingresso, i parametri vitali risultano stabili: frequenza cardiaca 77 bpm, pressione arteriosa 150/95 mmHg, SpO2 98% in aria ambiente, Glasgow Coma Scale (GCS) 15, senza deficit neurologici evidenti. ECG evidenzia ritmo sinusale con singola extrasistole ventricolare. Viene eseguito tampone antigenico per SARS-CoV-2, risultato negativo. Gli esami ematochimici mostrano lieve aumento del D-dimero (454 ng/ml). A causa della persistenza della sintomatologia, viene eseguita TC cranio senza mezzo di contrasto che evidenzia un ematoma subdurale cronico fronto-parieto-temporale sinistro, con spessore massimo di circa 20 mm, marcato shift della linea mediana di 13 mm e compressione ventricolare omolaterale. Viene attivata consulenza neurochirurgica e organizzato trasferimento urgente presso centro di riferimento per intervento neurochirurgico.

Risultati
Durante la permanenza in pronto soccorso, il paziente rimane vigile, collaborante, con parametri emodinamici stabili e senza deficit neurologici focali. L'intervento neurochirurgico di evacuazione dell'ematoma subdurale cronico viene eseguito in urgenza il giorno stesso del ricovero. Il decorso postoperatorio è regolare, con mobilizzazione autonoma precoce e assenza di complicanze neurologiche. Il paziente viene dimesso con terapia corticosteroidea a scalare, profilassi anticoagulante, e indicazione a TC encefalica di controllo a 20 giorni.

Conclusioni
Questo caso sottolinea l'importanza di un alto indice di sospetto diagnostico in pazienti con cefalea persistente refrattaria alla terapia, anche in assenza di trauma cranico recente o segni neurologici evidenti. La raccolta anamnestica accurata, l'utilizzo tempestivo di imaging neuro-radiologico e il coordinamento multidisciplinare sono fondamentali per una diagnosi precoce e un trattamento efficace, migliorando gli esiti clinici.

52 - THE PEECS STUDY: PICCO-ECHOCARDIOGRAPHIC EVALUATION OF CARDIOMYOPATHY IN SEPTIC SHOCK

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ABSTRACT

Title: The PEECS Study: PiCCO-Echocardiographic Evaluation of Cardiomyopathy in Septic Shock

Background and aim: We coducted a prospective observational study conducted in two tertiary hospital ICUs to evaluate heart hemodynamics in septic shock. The primary objective is to evaluate the relationship between arterial compliance pressure (ACP) measured by the PiCCO system and ventricular-arterial (VA) coupling obtained by echocardiography to predict septic cardiomyopathy (SCM) within the first 48 hours of septic shock diagnosis.

Methods: The study enrolled 13 adult patients diagnosed with septic shock, undergoing semi-invasive hemodynamic monitoring (PiCCO, MostCare) within the first 48 hours. Patients were evaluated at baseline (<12h from diagnosis), 72 hours, and 7 days. Data collected included demographic information, clinical parameters, and echocardiographic measurements. ACP was calculated as a percentage value of the ratio between cardiac index (CI) measured with the PiCCO system and predicted CI. Echocardiographic evaluation focused on systolic and diastolic function of the cardiac sections and VA coupling.

Results: At baseline, 30.77% of patients met the criteria for SCM, which increased to 38.6% at three days. By the seventh day, an improvement in hemodynamic parameters was observed in 62% of patients. The study found a significant association between ACP and VA coupling at baseline ($R^2 = 0.34$; $p = 0.003$). Both ACP and VA coupling metrics were valid in predicting SCM, with ACP showing a slightly higher area under the ROC curve. The study also noted a trend of improvement in both PiCCO and echocardiographic parameters over the seven days.

Conclusion: The preliminary findings suggest that both ACP and VA coupling are effective in predicting SCM in septic shock patients. The improvement in hemodynamic parameters over seven days indicates potential for better patient outcomes with early and accurate monitoring. Further research with a larger sample size is needed to validate these results.

36 - A META-ANALYSIS OF AMINO ACIDS INFUSION FOR RENAL PROTECTION

Simone Bruno *(1)* ***- Matteo Carraro*** *(1)* ***- Giusi Capuano*** *(1)* ***- Marco Baccalaro*** *(1)* ***- Elisa Micucci*** *(1)* ***- Fabiana Crocco*** *(1)* ***- Chiara Mariotti*** *(1)* ***- Stefano Santoro*** *(1)* ***- Rosario Losiggio*** *(1)* ***- Giovanni Landoni*** *(1)*

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A meta-analysis of amino acids infusion for renal protection

Introduction: Acute kidney injury (AKI) frequently occurs in critically ill and surgical patients, affecting more than 13 million people per year. Recent evidence shows that amino acids (AA) infusion reduces AKI in cardiac surgery, by recruiting renal functional reserve. We performed a meta-analysis to assess the renal-protective effects of AA infusion in broader clinical settings.

Methods: We performed a random-effects meta-analysis of randomized controlled trials, involving both perioperative and critically ill patients (P) and comparing intravenous AA infusion (I) with any controls (C). The primary outcome was the incidence of in-hospital AKI (O). We also evaluated our patients population in terms of renal replacement therapy, serum creatinine, and estimated glomerular filtration rate (eGFR). (PROSPERO: CRD42024527561)

Results: After the full-text screening, 19 studies met the inclusion and exclusion criteria, totaling 5,145 patients. Eight studies (4,609 patients) reported the primary outcome. The incidence of AKI was significantly lower in AA group compared to controls (569/2,308 [24.7%] vs 681/2,301 [29.6%]; relative risk, 0.72; 95% confidence interval, 0.55 to 0.95; P=0.02; I^2=55%). AA infusion also reduced serum creatinine levels and increased eGFR, with no difference in other outcomes.

Conclusions: Low dose, short term, prophylactic AA infusion reduces AKI incidence in critically ill and perioperative patients. Their routinely use in clinical practice should be encouraged.

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Effect of high dose protein supplementation on mortality in intensive care unit: a meta-analysis

Introduction: Nutrition in critically ill patients is an important aspect of intensive care medicine. Choosing the correct amount of macronutrients is of major importance to decrease malnutrition, muscle wasting and increase post-illness quality of life. Proteins have been identified as possible target with several major trials testing high dose protein supplementation on patient-centered and clinical outcomes. While high dose protein supplementation not only showed no benefits, certain subgroups like patients with acute kidney injury even suffered from an increased mortality. These findings urgent an updated meta-analysis including the most recent trials.

Methods: We conducted a meta-analysis of large, randomized controlled trials (RCT), using random-effects model with Hartung-Knapp-Sidik-Jonkman adjustment and inverse-variance weighting. Eligible studies involved at least 500 adult critically ill patients (P) randomized to receive either a high dose protein supplementation (I) or usual care (C). The primary outcome was the incidence of mortality at the longest follow-up available (O).

Results: A total of 4 RTCs met our inclusion and exclusion criteria and were involved in this meta-analysis, totaling 6133 patients (3040 in the high dose protein group vs. 3093 in the control group). Two studies were published in 2025, one in 2024, and one in 2023. Mortality at the longest follow-up available was significantly increased in higher protein dose group (895/3040 [29.4%] vs. 851/3093 [27.5%], risk ratio [RR], 1.07; 95% confidence interval [CI], 1.04 to 1.10, I^2=0%, p=0.007). Magnitude and direction of these findings were confirmed in a sensitivity analysis which excluded

the only single center RCT (859/2796 [30.7%] vs. 817/2837 [28.8%], RR, 1.07; 95% CI, 1.02 to 1.12, I^2=0%, p=0.03).

Conclusions: Augmented protein administration should not be used in clinical practice.

38 - EFFECT OF MULTIMODAL PREHABILITATION IN SURGICAL CANCER PATIENTS: THE PROPOSE RANDOMIZED CONTROLLED TRIAL

Noemi De Piccoli *(1)* ***- Marta Veneziano*** *(1)* ***- Laura Fossati*** *(1)* ***- Federico Mattia Oliva*** *(1)* ***- Giorgia Pagliai*** *(1)* ***- Maria Sofia Foss*** *(1)* ***- Simone Bruno*** *(1)* ***- Greta Zoni*** *(1)* ***- Marina Pieri*** *(1)* ***- Stefano Turi*** *(1)*

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Effect of multimodal prehabilitation in surgical cancer patients: the PROPOSE randomized controlled trial

Introduction

Cancer patients require continuous medical management due to the chronic and progressive nature of the disease. Major surgical interventions are frequently associated with a reduction in physiological reserves and functional capacity. Although postoperative rehabilitation has traditionally represented the primary strategy to restore function, increasing evidence supports the potential benefits of prehabilitation, a proactive, multimodal intervention designed to optimize functional status and stress tolerance prior to surgery. Despite growing scientific interest, high-quality evidence confirming its clinical efficacy remains limited. This study aims to evaluate whether prehabilitation can reduce the incidence of severe postoperative complications in cancer patients.

Methods

The PROPOSE trial is a multicenter, randomized controlled trial on 400 adult patients scheduled for elective major abdominal, thoracic or gynecological cancer surgery. Patients are randomly assigned to either the prehabilitation group or the standard care group with a 1:1 allocation ratio. Both groups receive standard perioperative management in accordance with ERAS guidelines; however, the prehabilitation group participates in an additional home-based program comprising structured exercise, individualized nutritional support, and psychological interventions. The primary outcome will focus on the proportion of patients experiencing severe postoperative complications within 30 days after surgery. Funded by the European Union - Next Generation EU - NRRP M6C2 - Investment 2.1 Enhancement and strengthening of biomedical research in the NHS" Codice progetto: PNRR-MCNT2-2023-12378183; CUP master: C43C24000390007.

Results

We anticipate that patients participating in the multimodal prehabilitation program will demonstrate a lower incidence of postoperative complications compared with those receiving standard care. Additional expected benefits include a reduced length of hospital stay, an increased number of days spent at home within the first 30 postoperative days, more rapid recovery of functional capacity, and improvements in patient-reported quality of life.

Conclusions

With an increasing number of patients undergoing major cancer surgery each year, strategies that optimize preoperative fitness are of growing importance. Prehabilitation has the potential to enhance surgical outcomes, accelerate recovery, and meaningfully improve the overall patient experience.

39 - THE PROPOSE 1 STUDY: IDENTIFYING PREDICTORS OF POSTOPERATIVE RECOVERY AFTER ELECTIVE CANCER SURGERY

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The PROPOSE 1 Study: Identifying Predictors of Postoperative Recovery After Elective Cancer Surgery

Introduction

Cancer surgery presents significant challenges due to its invasiveness and complexity. It disrupts metabolic functions and triggers ongoing immune system activation, resulting in muscle protein breakdown, elevated energy expenditure, glucose imbalances, and chronic inflammation. These alterations can increase the risk of postoperative complications and prolong patient recovery. Understanding the effect of preoperative nutritional and functional status on these outcomes is crucial, representing a modifiable risk factor that can be addressed before surgery to optimize patient health and potentially reduce the risk of complications.

Methods

The PROPOSE 1 study is a multicenter, observational study enrolling adult patients scheduled for elective cancer surgery. In addition to standard preoperative assessments, eligible participants undergo a comprehensive nutritional evaluation conducted by a nutritionist and perform a set of simple functional tests under the supervision of a physiotherapist to assess both their nutritional and physical status. Participants also complete a series of questionnaires covering medical history, lifestyle habits, overall health, and psychological well-being. The primary objective of the study is to identify patient-specific characteristics that may influence postoperative recovery and the risk of complications. By identifying these factors, the study aims to delineate subgroups of patients who could benefit most from personalized prehabilitation strategies prior to surgery. Funded by the European Union - Next Generation EU - NRRP M6C2 - Investment 2.1 Enhancement and strengthening of biomedical research in the NHS" Codice progetto: PNRR-MCNT2-2023-12378183; CUP master: C43C24000390007.

Results

To date, enrollment is ongoing, with 832 patients enrolled out of 1000 planned. The IRCCS San Raffaele Hospital has recruited 626 patients, including 502 who underwent pancreatic resections, 83 gastrointestinal surgeries, and 41 thoracic procedures.

The study will generate comprehensive data on patient characteristics, functional status, and postoperative recovery, including complication rates, thereby enabling the identification of potential predictors of surgical outcomes.

Conclusions

The PROPOSE 1 study will provide critical observational data to characterize factors influencing postoperative recovery in cancer patients. This knowledge is expected to inform the design of future prehabilitation programs tailored to specific patient subgroups, ultimately aiming to optimize surgical outcomes and enhance quality of life.

Eva Epifani *(1) - Luca Gregorio Giaccari (1) - Gianfranco Paiano (1) - Antonella Merico (1) - Sonia De Giorgi (1) - Gaetano Tammaro (1) - Giuseppe Pulito (1) - Alessandro Sannino (2) - Luisa Siculella (2) - Luciana Mascia (3)*

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SIMULATION LEARNING PROCESS FOR MEDICAL STUDENTS: QUALITY EVALUATION STUDY

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Background

Simulation-based learning is an effective strategy for developing technical, decision-making, and communication skills in clinical contexts [1,2]. A simulation course was recently introduced at the University of Salento for medical and nursing students. It aimed to foster both soft and hard skills through low-fidelity mannequin scenarios. At the end of the course, a questionnaire was administered to assess perceived educational effectiveness, professional relevance, and course organization.

Materials

The overall sample includes 260 students (80 medical, 180 nursing). This report presents preliminary findings from 180 nursing students. The questionnaire, comprising closed and open-ended questions, explored perceived usefulness, learning ease, clarity of objectives, instructor preparation, professional applicability, and personal impact. Data were collected anonymously and analyzed using percentage frequencies.

Results

As shown in Figure1, 88% of students considered the course “extremely useful” for improving clinical skills; 12% rated it as “very useful.” Additionally, 72% found mannequin-based sessions “extremely useful.” For learning purposes, 88% judged the simulation course “very useful,” and 13% “useful.”

Fig.1

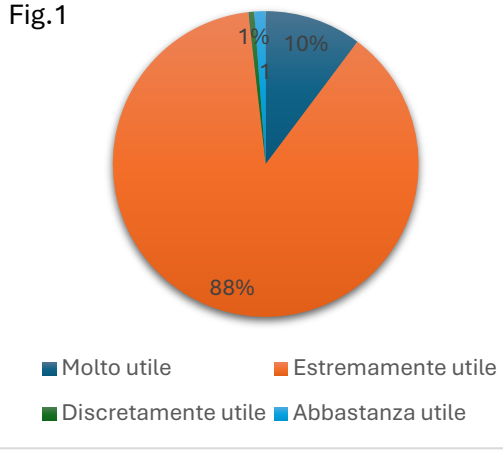
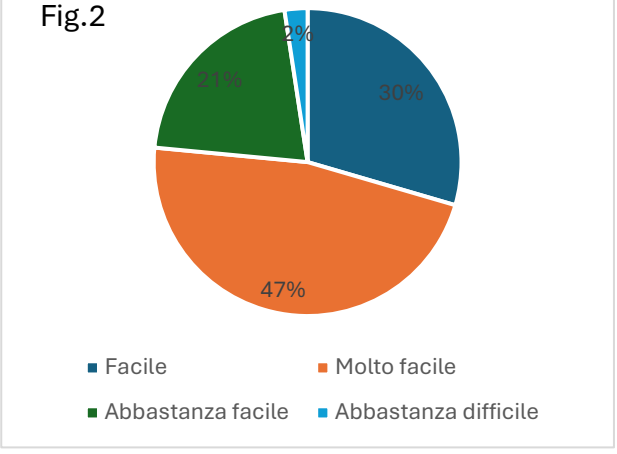


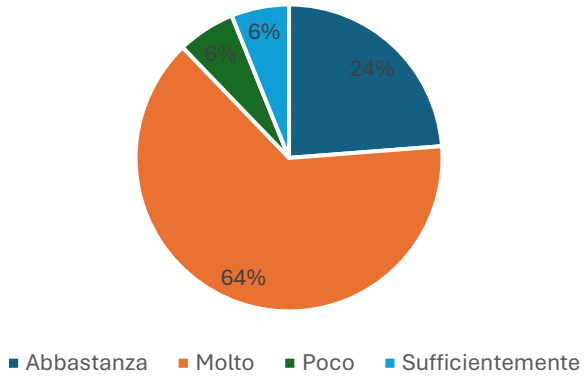
Fig.2



Regarding ease of learning (Fig.2) 47% found the topics "very easy," 30% "easy," and 21% "fairly easy" with the adopted methodology. Educational objectives were considered "very clear" by 96% of participants, and 100% acknowledged a high level of instructor preparation. Overall, 62% reported that the course exceeded their expectations.

For life-saving technique acquisition, 47% rated it "very easy," 30% "easy," and 21% "fairly easy," indicating the effectiveness of active learning methods. Regarding clinical relevance, 95% rated the course as "very important." In terms of personal development, 64% reported a "very" positive impact, while 30% rated it "quite positive."

Fig.3



Open-ended responses revealed strong interest in further training on pediatric/neonatal resuscitation and Elettrocardiogram interpretation. Students also suggested increasing simulation sessions and adopting peer learning methodologies.

Conclusion

The questionnaire confirmed high student satisfaction and perceived instructional effectiveness. These findings support the integration of simulation-based learning as a core component of healthcare education, emphasizing its practical, realistic approach as essential for meaningful, hands-on learning.

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46 - MONOCYTE DISTRIBUTION WIDTH (MDW) IN EARLY DIAGNOSIS OF SEPSIS

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Monocyte distribution width (MDW) in early diagnosis of sepsis

Introduction MDW measures the volumetric distribution width of monocytes, reflecting monocytic anisocytosis, and is detected using advanced hematological analyzers. Different studies have shown that an increased MDW value is associated with a higher risk of sepsis and that its combination with clinical parameters (such as qSOFA) and other biomarkers (CRP, PCT) can enhance diagnostic sensitivity and risk stratification capacity. Other advantages are its ease of measurement, its high negative predictive value (NPV) and the absence of correlations with demographic factors such as age, sex, or surgical conditions.

Rationale Sepsis is a complex and potentially life-threatening syndrome which can lead to death. Early diagnosis is crucial to improving prognosis and reducing hospital management costs.

We will set up a prospective study in ED of Policlinico Universitario A. Gemelli on the role of monocyte distribution width (MDW) as a diagnostic biomarker for sepsis, highlighting its advantages, limitations, and potential clinical applications.

Methods We will enroll patients over 18 years who are able to give informed consent. Patients with a suspected clinical condition will be asked for CBC (containing MDW). A cutoff value of 20 will be used to indicate sepsis positivity, as supported by most studies.

Expected Results The primary endpoint is based on evaluating the diagnostic performance of MDW, while the secondary endpoints involve comparison with other markers such as PCT and PSP. Finally, we may repeat MDW measurements to assess its utility in guiding antibiotic therapy management.

45 - ROLE OF PRESEPSIN IN MULTIMARKERS APPROACH FOR EARLY DIAGNOSIS OF SEPSIS

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Role of Presepsin in multimarkers approach for early diagnosis of sepsis

Introduction: Sepsis is an exaggerated inflammatory response to infection, requiring early and accurate treatment. However, its diagnosis is challenging due to varied clinical presentations. A prospective study on Presepsin was conducted in the ED of Policlinico Agostino Gemelli. Presepsin (sCD14-ST) is a fragment of soluble CD14 released into the bloodstream by monocytes in response to infection.

Methods : Patients over 18 years who were able to sign the informed consent were enrolled thanks to a venous blood sample in EDTA. The study pool included 216 patients from the emergency room, who were suspected of having sepsis.

Results: We classified patients basing on blood cultures results. There were 86 patients with positive blood cultures and, among them , 89.5% had Presepsin levels >165 pg/mL and 65.1% had PCT> 0.5 ng/mL. On the other hand, 130 patients had negative blood cultures, including 36 who were clinically diagnosed with sepsis. In this group 94.4% had Presepsin>165 and 86.1% PCT>0.5. Regardless of blood cultures, biomarkers appear to be effective in identifying sepsis. Additionally, In the remaining 94 patients: 14 were true negatives with PSP < 165 and PCT < 0.5; 36 had PSP > 165 and PCT > 0.5 with sepsis diagnosis in ward; 45 patients had one of the two markers below the negative cutoff but the other one above. This is due to the different kinetics of the markers. These 45 patients had an evolving infectious condition.

Conclusions : Our study demonstrated higher sensitivity of Presepsin. Finally, our evidence also suggests the complementarity of the two markers in the diagnosis of sepsis due to their high negative predictive value.

14 - POLITRAUMA PEDIATRICO MULTIPLO: STRATEGIE DI GESTIONE IN EMERGNEZA E URGENZA

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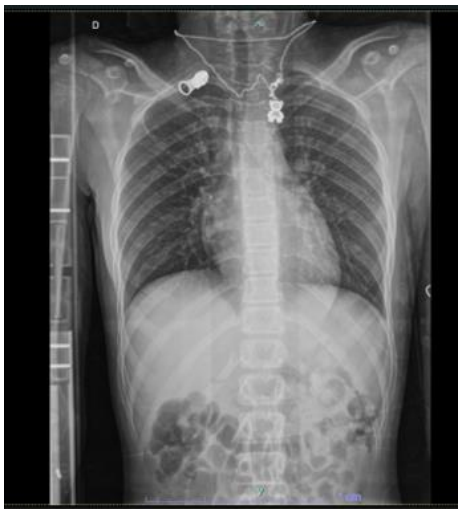
Introduzione



Un team working rapido ed efficace nelle emergenze è cruciale per ottimizzare l'outcome dei pazienti. Il caso presentato illustra come collaborazione e organizzazione siano state determinanti in un contesto complesso e raro: una maxiemergenza pediatrica.

Caso clinico

In seguito a un grave incidente stradale ad alta velocità, sei passeggeri – tra cui quattro bambini di età compresa tra 2 e 12 anni – venivano eiettati dal veicolo riportando traumi multipli. La Centrale Operativa 118 (CO118), responsabile del coordinamento, indirizzava i quattro bambini al Policlinico di Modena, Hub Traumatologico Pediatrico provinciale. L'allerta giungeva durante il cambio turno serale; il personale uscente si rendeva disponibile a rimanere, consentendo una pronta attivazione del protocollo di maxi-emergenza. Venivano coinvolti l'anestesista di guardia con il relativo specialista pediatrico, il pediatra di Pronto Soccorso e il medico radiologo.

All'arrivo, i pazienti venivano rapidamente triagiati e accolti in Shock Room, ciascuno affidato a un team dedicato composto da uno o due anestesisti-rianimatori, un medico di PS e un infermiere esperto; dopo handover con gli equipaggi del 118 e riesame secondo il Primary Survey, il radiologo eseguiva un E-FAST su tutti i pazienti. Gli esami TC venivano pianificati in base alla priorità clinica, con decisioni condivise tra i team e refertazione urgente.

Il bilancio lesionale comprendeva quattro traumi cranici maggiori, tre dei quali cranio-cervicali; due associati a emorragia cerebrale (ESA e subdurale) e frattura composta di teca cranica. Un paziente presentava danno assonale diffuso, un altro frattura di C3. Due bambini riportavano inoltre trauma toracico (uno con frattura sternale e estesa contusione polmonare) e fratture minori di ossa lunghe.

Il tempo medio di permanenza in PS per stabilizzazione e accertamenti primari è stato di 1 ora e 35 minuti, seguito da rapido ricovero in Terapia Intensiva per tre di loro. La tempestività dell'intervento ha consentito, dopo un lungo ricovero, un esito favorevole per tutti e quattro i pazienti.

Conclusioni

Un efficace lavoro di équipe multidisciplinare, un'adeguata leadership e una chiara suddivisione dei ruoli rappresentano la base di un Trauma Team addestrato ed efficiente, chiave di volta nell'ottimizzare l'outcome in termini di sopravvivenza, esiti e lunghezza della degenza.

16 - EFFECT OF ACUTE NORMOVOLEMIC HEMODILUTION ON ALLOGENEIC TRANSFUSION IN SHORT-BYPASS CARDIAC SURGERY: SECONDARY ANALYSIS OF THE ANH TRIAL

Matteo Aldo Bonizzoni *(1)* ***- Federica Picco*** *(1)* ***- Alkan Begüm*** *(1)* ***- Simone Vietri*** *(1)* ***- Luciano Nobile*** *(1)* ***- Edoardo Mongardini*** *(1)* ***- Rosa Labanca*** *(1)* ***- Gabriele Burato*** *(1)* ***- Domenico Pontillo*** *(1)* ***- Giovann Landoni*** *(1)*

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Effect of acute normovolemic hemodilution on allogeneic transfusion in short-bypass cardiac surgery: secondary analysis of the ANH trial

Introduction

In the ANH trial, acute normovolemic hemodilution did not reduce the number of patients receiving at least one red-blood cell transfusion during hospital stay after cardiac surgery with cardiopulmonary bypass (CPB), when compared to usual care. However, a possible beneficial role of acute normovolemic hemodilution was observed in patients with a brief duration of cardiopulmonary bypass. Thus, a separate investigation of such patients is warranted.

Methods

In a secondary analysis of the ANH multicenter randomized single-blind controlled trial, we divided patients into those who underwent a brief (≤102 minutes) and prolonged CPB duration (> 102 minutes) according to the median value. The primary outcome was the transfusion of at least one unit of allogeneic red cells from randomization until hospital discharge. Secondary outcomes included 30-day mortality, bleeding complications, ischemic complications, and acute kidney injury.

Results

A total of 1995/2010 patients of the ANH trial with available data on cardiopulmonary bypass duration were included in this analysis. Acute normovolemic hemodilution reduced the number of patients reaching the primary endpoint in patients with brief CPB duration (16.0% vs 22.1% patients, RR 0.72, 95% CI 0.56 to 0.94, p=0.013) but not in patients with prolonged CPB duration (38.6% vs 37.2% patients, RR 1.04, 95% CI 0.88 to 1.22, p=0.66). The median volume of blood loss at 12 hours was reduced by ANH in the brief CPB population (ANH: 250 [170 – 390]; usual care: 290 [200 – 410]; p=0.012), while surgical revision for bleeding occurred more frequently in patients with prolonged CPB duration who received ANH (ANH: 5.8%; usual care: 3.2%; p=0.049). The other secondary and safety outcomes did not differ in the analyzed subgroups.

Conclusions

Acute normovolemic hemodilution may be effective in reducing the number of patients receiving at least one unit of allogenic red cells during the hospital stay in patients undergoing cardiac surgery with brief CPB duration.

19 - FEASIBILITY OF REMIMAZOLAM USE FOR SEDATION IN CRITICALLY ILL PATIENTS WITH RESPIRATORY FAILURE: A CASE SERIES

Enrique Jesus Cadenas Pérez *(1)* ***- Silvia Tomba*** *(1)* ***- Aurora Campugiani*** *(1)* ***- Andrea Indino*** *(1)* ***- Giulia Settili*** *(1)* ***- Giulio Filippozzi*** *(1)* ***- Mery Ann Belli*** *(1)* ***- Matteo Morelli*** *(1)* ***- Alessio Romito*** *(1)* ***- Stefano Turi*** *(1)*

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Feasibility of remimazolam use for sedation in critically ill patients with respiratory failure: a case series

Introduction

Remimazolam is a short-acting benzodiazepine characterized by fast onset/offset and esterase-mediated metabolism that is largely independent of hepatic and renal function. Several studies evaluated the efficacy of remimazolam for procedural sedation and general anesthesia; however, there are limited data on its use for sedation in intensive care unit (ICU). During coronavirus disease 2019 (COVID-19) pandemic, the high demand for mechanical ventilation led to significant and dramatic drug shortages. We therefore decided to use remimazolam for sedation in critically ill patients.

Methods

We report on the use of remimazolam as a sedative agent in five critically ill patients with COVID-19 induced acute respiratory distress syndrome (ARDS) admitted to an ICU in a large Italian hospital. The initial infusion rate was 0.05 mg/kg/h, titrated up to 2 mg/kg/h according to clinical condition and processed electroencephalogram [quantium counsciousness index (qCON) on CONOX]. Feasibility was defined as maintenance of target sedation level without additional hypnotics.

Discussion

We tried to maintain a moderate sedation in patients with spontaneous breathing [−3 target score according to Richmond Agitation-Sedation Scale (RASS)] and a qCON value on CONOX between 40 and 60 in intubated patients. Of the five patients, three received noninvasive respiratory support, and two were on invasive mechanical ventilation with norepinephrine. The median duration of remimazolam administration was 8 hours. In all patients, target sedation was reached without rescue sedatives. Vital signs and gas exchange remained stable, and no abnormalities in blood tests or episodes of agitation were observed after sedation withdrawal. Notably, in one patient, the use of remimazolam allowed progressive reduction in the dosage of norepinephrine.

Conclusions: The use of remimazolam was found to be safe and effective in five ICU patients. Future randomized trials are needed to confirm these preliminary data and to better clarify the role of remimazolam for long-term ICU sedation.

20 - MEGA-DOSE ESOMEPRAZOLE AS AN ANTI-INFLAMMATORY AGENT IN SEPSIS: A MULTINATIONAL RANDOMIZED TRIAL

Matteo Borello *(1) - Giorgia Re (1) - Dimitri De Dalt (1) - Margherita Vianello (1) - Bruna Ramos Valladão (1) - Filippo D'amico (1) - Marilena Marmiere (1) - Guido Torraco (1) - Giovanni Landoni (1) - Giacomo Monti (1)*

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Mega-Dose Esomeprazole as an Anti-inflammatory Agent in Sepsis: A Multinational Randomized Trial

Introduction

Proton pump inhibitors have dose-dependent immunomodulatory effects. We tested the hypothesis that mega-dose esomeprazole therapy would reduce organ dysfunction in patients with sepsis or septic shock.

Methods

We conducted a multinational, randomized, double-blind, placebo-controlled clinical trial at seventeen intensive care units or emergency departments across three countries. Adult patients with sepsis or septic shock were enrolled and assigned to receive either a mega-dose of esomeprazole (1,024 mg) or placebo, administered over a 72-hour period.

Discussion

The primary outcome was mean daily Sequential Organ Failure Assessment (SOFA) score to day 10. Secondary outcomes included antibiotics-free days, ICU-free days at day 28, and all-cause mortality. We also conducted a mechanistic study of the in vitro effects of esomeprazole in sepsis. We randomized 307 patients and assigned 148 to esomeprazole and 159 to placebo. Mean age was 71 years; 166 patients (54%) had septic shock and median SOFA score at randomization was 7. The median mean daily SOFA score in the first 10 days post-randomization was 5 (interquartile range [IQR], 3–9) in the esomeprazole group and 5 (IQR, 3–8) in the placebo group (risk difference, 0.1; 95% CI, –0.8 to 1.0; $p > 0.99$). No differences were observed in secondary outcomes. Monocytes isolated from patients' peripheral blood and activated with a toll-like receptor agonist exhibited a pro-inflammatory phenotype, which was not affected by esomeprazole therapy.

Conclusion

CONCLUSIONS: Among patients with sepsis or septic shock, mega-dose esomeprazole did not reduce organ dysfunction or other patient-related or biolog ical secondary outcomes.

18 - PIRFENIDONE TO PREVENT FIBROSIS IN ACUTE RESPIRATORY DISTRESS SYNDROME: THE PIONEER STUDY PROTOCOL

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Pirfenidone to prevent fibrosis in acute respiratory distress syndrome: The PIONEER study protocol

Background

Pulmonary fibrosis represents a major complication of ARDS. Pirfenidone is an approved treatment for idiopathic pulmonary fibrosis. It may attenuate ARDS-related fibrosis and decrease the need for prolonged ventilation. Accordingly, we aimed to evaluate the effect of pirfenidone on ventilator-free days in patients with ARDS.

Methods

In a multi-center, randomized, double-blind, placebo-controlled trial, we plan to randomly assign 130 adults invasively ventilated for ARDS to receive pirfenidone or placebo for up to 28 days. The primary outcome is days alive and ventilator free at 28 days. Secondary outcomes include ICU-free days, hospital free days all at 28 day, ICU mortality and hospital mortality. We will also assess fibroproliferative changes on high-resolution CT scans at ICU discharge and quality of life. Data analysis will be on an intention-to-treat basis.

Discussion

The trial is ongoing and currently recruiting. It will be the first randomized controlled study to investigate whether, compared to placebo, pirfenidone increases the number of days alive and ventilator-free in patients with ARDS. Its double-blind multicenter design will provide internal validity, minimal bias, and a degree of external validity.

Conclusion

If our hypothesis is confirmed, this treatment would justify larger trials of this intervention.

Trial registration: This trial was registered on ClinicalTrials.gov with the trial identification NCT05075161

17 - REMOTE ISCHEMIC PRECONDITIONING AND MYOCARDIAL INJURY AFTER NONCARDIAC SURGERY: THE PRINCE RANDOMIZED CLINICAL TRIAL

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Remote Ischemic Preconditioning and Myocardial Injury After Noncardiac Surgery: The PRINCE Randomized Clinical Trial

Introduction

Major noncardiac surgery is associated with a high incidence of postoperative myocardial injury and other complications. Remote ischemic preconditioning (RIPC) was reported to decrease these complications. However, such supportive evidence lacks robustness.

Methods

In a multinational, double-blind trial, we randomly assigned adult high-risk patients undergoing noncardiac surgical procedures to receive RIPC or sham-RIPC after the induction of general anesthesia and before surgery. RIPC involved three 5-minute ischemic cycles, each followed by 5 minutes of reperfusion, using a blood-pressure cuff inflated to 200 mmHg. The primary endpoint was the rate of myocardial injury defined by an increase in postoperative troponin levels above the highest 99th percentile of reference values. Secondary outcomes included myocardial infarction, stroke, acute kidney injury, need for intensive care unit, length of hospital stay and 30-day all-cause mortality.

Results

We recruited 1213 patients in 25 hospitals and 8 countries. We randomly assigned 599 to RIPC and 614 to sham-RIPC. The most frequent surgical procedures were abdominal and intrathoracic surgeries (406 patients, 33.6%). RIPC was applied to the upper limb in 1,014 patients (84.8%) and to the lower limb in 182 patients (15.2%). Postoperative myocardial injury occurred in 215/566 patients (38.0%) in the RIPC group and in 223/596 patients (37.4%) in the sham-RIPC group (relative risk, 1.02; 95% confidence interval, 0.88 to 1.18; P=0.84). There were no significant differences in the rate of any secondary outcomes. We observed eleven episodes of limb petechiae (10 [1.7%] in the RIPC group vs 1 [0.2%] in the sham-RIPC group) and 34 (6.0%) hospital readmissions in the RIPC group vs 20 (3.5%) in the sham-RIPC group.

Conclusions

Among adult patients undergoing noncardiac surgery, RIPC did not reduce myocardial injury or other postoperative complications.

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A Meta-analysis of Long-Term Outcomes After Acute Kidney Injury

Introductiom

The impact of AKI on long-term outcomes is controversial. We aim to conduct a systematic review and metanalysis of all studies reporting such outcomes in patients with AKI and including a control population.

Methods

We conducted a combined systematic review and meta-analysis. We included original studies published in peer-reviewed journals which compared long-term outcomes (survival, need for dialysis, chronic kidney disease [CKD]) among hospitalized patients with vs. without AKI. Only articles with at least one-year of follow-up for patients who experienced a defined episode of AKI and that included a control group were considered.

Results

We identified 21 studies for a total of 1,061,745 overall matched patients with a median duration of follow-up of 3 years. AKI patients had a significant increase in long-term mortality, measured at the longest follow-up available per each study, compared to controls (137,734/520,961 [26.4%] vs. 93,853/532,201 [17.6%]; RR, 1.56; 95% CI, 1.29–1.88; $p<0.001$). They also had a greater risk of receiving dialysis (1,928/42,529 [4.5%] vs. 854/42,529 [2.0%]; RR, 2.48; 95% CI, 1.79 to 3.43;

p<0.001), and of developing CKD rate (3,056/6,132 [49.8%] vs. 3,002/8,189 [36.7%]; RR, 1.58; 95% CI, 1.26 to 1.97; p<0.001).

Conclusions

Compared with controls, AKI patients appear to have a greater risk of death, dialysis, and CKD.

22 - REMOTE ISCHAEMIC PRECONDITIONING AND SURVIVAL IN NONCARDIAC SURGERY: AN UPDATED META-ANALYSIS OF RANDOMIZED TRIALS

Rosa Labanca *(1)* ***- Gaetano Lombardi*** *(1)* ***- Sara Bacilieri*** *(1)* ***- Ludovica La Rusca*** *(1)* ***- Elisa Bartocletti*** *(1)* ***- Anna Laura Masciopinto*** *(1)* ***- Gaia Ferrari*** *(1)* ***- Federico Bollati*** *(1)* ***- Maria Rosa Calvi*** *(1)* ***- Stefano Turi*** *(1)*

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Remote ischaemic preconditioning and survival in noncardiac surgery: an updated meta-analysis of randomized trials

Introduction

Remote ischaemic preconditioning (RIPC) demonstrated potential beneficial effects on organ protection in laboratory experiments and in several clinical settings. This systematic review of randomised controlled trials (RCTs) evaluates the association of RIPC with mortality and other relevant clinical outcomes in patients undergoing noncardiac surgery.

Methods

We conducted a systematic review with meta-analysis of randomized controlled trials. We searched PubMed, Embase, the Cochrane Central Register of Controlled Trials, and ClinicalTrials.gov, and also screened proceedings from major scientific congresses, up to June 2025. Eligible studies enrolled adult patients undergoing elective non-cardiac surgery and compared remote ischaemic preconditioning with either standard care or a sham intervention; only randomized trials were included.

Results

79 RCTs with 9,340 patients were included. RIPC was not associated with a statistically significant reduction in overall mortality compared to control [n=5,395; Relative Risk (RR)=0.82; 95% Confidence Interval (CI), 0.60–1.12; p=0.15; I^2=13%]. In RIPC patients, we observed a reduction in stroke rate (n=2,935; RR=0.46; 95% CI, 0.24–0.85; p=0.01), in the length of hospital stay (n=5,045, Mean Difference=-0.79 days; 95% CI, -1.16 to -0.42; p<0.0001) and in the peak of postoperative serum creatinine (n=2,505, Mean Difference=-5.32; 95% CI, -10.07 to -0.57; p=0.03). A significant

reduction in mortality was detected in the subgroup of patients receiving RIPC before anaesthesia induction (RR=0.42; 95% CI, 0.20–0.89; p=0.02).

Conclusions

In patients undergoing noncardiac surgery, RIPC was not associated with a significant reduction in mortality. RIPC showed beneficial effects on biomarkers of renal damage, stroke rate and length of hospital stay. Future studies could focus on the application of RIPC before anaesthesia induction, given the protective effects on mortality observed in this subgroup of patients.

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Benessere organizzativo e qualità del lavoro negli operatori sanitari del 118: un'indagine sulle percezioni del personale sanitario

Elisa Lo Sciuto, Federica Chiodo, Silvia Scelsi, Stefano Innocenzi

Introduzione: Nel sistema sanitario di emergenza-urgenza, il benessere organizzativo degli operatori del 118 è cruciale per garantire un servizio efficace e sostenibile. Tuttavia, questo aspetto viene spesso trascurato, nonostante il personale sia quotidianamente esposto a situazioni ad alta intensità emotiva, turni irregolari, elevati carichi di lavoro e pressioni decisionali.
L'indagine mira a esplorare la percezione del benessere organizzativo tra il personale sanitario impiegato nel servizio di emergenza territoriale 118, analizzando il legame tra contesto lavorativo e setting assistenziale, al fine di individuare eventuali criticità organizzative, relazionali o professionali.
Metodi: Lo studio, di tipo osservazionale, descrittivo e trasversale, ha indagato le percezioni soggettive degli operatori del servizio 118 attraverso il *Questionario sul Benessere Organizzativo – Allegato A*, validato a livello nazionale. Il questionario, anonimo e strutturato, era composto da 82 domande a risposta chiusa su scala Likert a sei punti, oltre a cinque quesiti sociodemografici. La somministrazione, effettuata in formato digitale tra maggio e settembre 2025, ha coinvolto un campione di 245 operatori, includendo infermieri, medici, autisti-soccorritori e dirigenti provenienti da diversi enti impegnati nel soccorso extraospedaliero
Risultati: Il campione era composto prevalentemente da uomini (65%), con età tra 51 e 60 anni e contratto a tempo indeterminato (89,8%). I risultati mostrano condizioni lavorative generalmente positive, con bassi livelli di mobbing e stress percepito (10,2%). Non emergono percezioni rilevanti di discriminazione. La distribuzione di carichi e responsabilità è considerata equa, ma si segnala insoddisfazione per la retribuzione (63,3%) e scarsa fiducia nella meritocrazia e nei percorsi di carriera (67,3%). Il clima lavorativo è collaborativo, con buona autonomia operativa e competenze riconosciute.
Conclusioni Lo studio ha evidenziato criticità come lo squilibrio tra impegno e retribuzione, percorsi di crescita poco trasparenti e scarso coinvolgimento decisionale, elementi che possono compromettere la motivazione e la salute psicofisica degli operatori. Interventi mirati, come il riconoscimento del merito, un miglioramento della comunicazione interna e il supporto psicologico, sono fondamentali per promuovere il benessere del personale. Investire su questi aspetti è non solo un dovere etico, ma una condizione necessaria per l'efficienza del sistema di emergenza-urgenza.

Elisa Lo Sciuto *(1)*

(1) ARES 118, ARES 118, VITERBO, Italia

Benessere organizzativo e qualità del lavoro negli operatori sanitari del 118: un'indagine sulle percezioni del personale sanitario

Elisa Lo Sciuto, Federica Chiodo, Silvia Scelsi, Stefano Innocenzi

Introduzione: Nel sistema sanitario di emergenza-urgenza, il benessere organizzativo degli operatori del 118 è cruciale per garantire un servizio efficace e sostenibile. Tuttavia, questo aspetto viene spesso trascurato, nonostante il personale sia quotidianamente esposto a situazioni ad alta intensità emotiva, turni irregolari, elevati carichi di lavoro e pressioni decisionali.
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28 - A NOVEL APPROACH TO MYOGLOBIN CLEARANCE AND ORGAN PRESERVATION IN SEVERE RHABDOMYOLYSIS: PARALLEL CYTOSORB HEMOADSORPTION THERAPY

Leonardo Tedesi [1] - Tommaso Scquizzato [1] - Veronica Peri [1] - Matilda Colombo [1] - Giulia Biscari [1] - Rebecca Bendinelli [1] - Giorgia Volonterio [1] - Emanuele Pievani [1] - Marina Pieri [1] - Anna Mara Scandroglio [1]

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A Novel Approach to Myoglobin Clearance and Organ Preservation in Severe Rhabdomyolysis: parallel CytoSorb Hemoadsorption Therapy

Introduction

Severe rhabdomyolysis, characterized by extensive muscle breakdown and release of myoglobin and creatine kinase (CK), is a life-threatening condition often complicated by acute kidney injury (AKI) and multi-organ failure (MOF). Even when conventional treatments such as fluid resuscitation and renal replacement therapy (RRT) are timely applied, severe cases remain challenging to manage. Among therapies available in this setting, hemadsorption with CytoSorb has the potential not only to treat rhabdomyolysis through removal of circulating molecules but also to limit or even prevent rhabdomyolysis-related renal failure and MOF. We present preliminary data of a novel use CytoSorb hemoadsorption therapy, which encompassed the use of two CytoSorb cartridges running in parallel, to enhance myoglobin and cytokine clearance.

preliminary

Methods

Retrospective case series of adult patients with massive rhabdomyolysis of heterogeneous origin treated with dual concomitant cytosorb circuits running in parallel at our institution.

Results

Clinical data from three patients with severe rhabdomyolysis were reviewed: a 26-y woman with acute ischemia and to compartment syndrome of the left leg, necessitating fasciotomy, in the context of multiple emobolization from intracardiac myxoma (fig 1A); a 54-y woman with cardio-septic shock requiring intraaortic balloon pump support and with diffuse muscular injury (fig 1B); a 41-y male with massive rhabdomyolysis due to prolonged leg ischemia in the context of type A aortic dissection who underwent emergent cardiac surgery (fig 1C). In all patients, dual concomitant CytoSorb treatments was associated with marked improvements in CK, renal, hepatic, and inflammatory marker. Potential impact on CRRT reduction could not be assessed due to the very limited sample size.

Conclusions

Dual CytoSorb therapy offers a transformative approach to severe rhabdomyolysis, with potential for organ preservation and recovery in critically ill patients. Future studies are warranted to further evaluate its efficacy and refine its application in acute multi-organ failure contexts.

25 - CLEVIDIPINE VERSUS NITROGLYCERIN FOR BLOOD PRESSURE CONTROL DURING CAROTID ENDARTERECTOMY: A COHORT STUDY

Edoardo Mongardini *(1)* ***- Viviana Teresa Agosta*** *(1)* ***- Chiara Pepe*** *(1)* ***- Emanuele Peviani*** *(1)* ***- Gabriele Bettinelli*** *(1)* ***- Giorgia Emma Desideri*** *(1)* ***- Domenico Pontillo*** *(1)* ***- Alice Bottussi*** *(1)* ***- Jacopo D'andria Ursoleo*** *(1)* ***- Fabrizio Monaco*** *(1)*

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Clevidipine versus nitroglycerin for blood pressure control during carotid endarterectomy: a cohort study

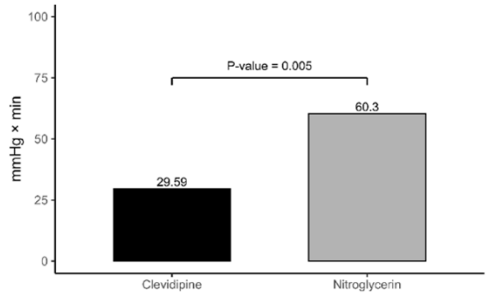
Introduction: Clevidipine is an ultrafast-acting dihydropyridine calcium channel antagonist with selective arteriolar-dilating effects that may be suitable for afterload reduction during surgeries requiring tight blood pressure control. The objective of this study was to evaluate the role of clevidipine to control blood pressure during carotid endarterectomy.

Methods: We performed a single-center retrospective observational study. We enrolled all patients undergoing elective carotid endarterectomy from October 2024 to March 2025 who received clevidipine or nitroglycerin for intraoperative blood pressure management were included. The primary endpoint was the area under the curve of systolic blood pressure excursions beyond the predefined target range of 140-160 mmHg. Secondary outcomes included corresponding measurements for mean arterial pressure and heart rate, as well as the incidence of significant clinical complications.

Results: Of 40 included patients, 20 received clevidipine and 20 received nitroglycerin. Patients in the clevidipine group spent significantly less time outside the goal systolic blood pressure range than the nitroglycerin group (10 min vs. 37.5 min, $p < 0.001$). The median normalized area under the curve per five-minute intervals was 29.59 mmHg × min (interquartile range, 15.83 to 49.35) in the clevidipine group versus 60.30 mmHg × min (interquartile range 42.79 to 74.38) in the nitroglycerin group ($p = 0.005$). There were no significant differences in mean arterial pressure, heart rate, or clinical complications between the groups.

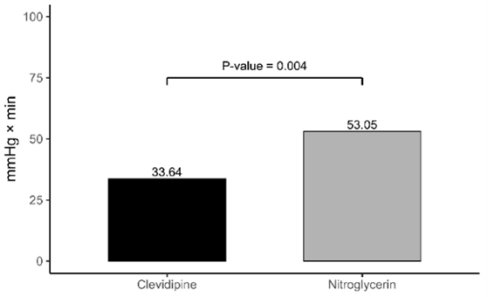
Conclusion: Clevidipine was associated with significantly fewer blood pressure excursions outside the target goal range compared to nitroglycerin during carotid endarterectomy.

Figure A



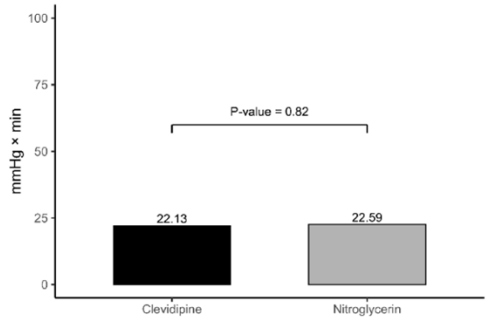
Intraoperative range: SBP 140–160 mmHg

Figure B



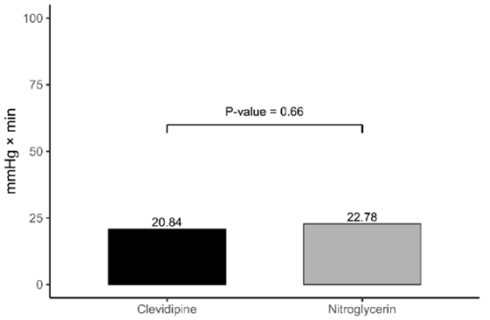
Intraoperative range: SBP 140–160 mmHg

Figure C



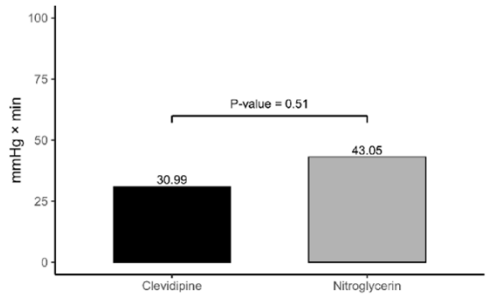
Intraoperative range: MAP 80–100 mmHg

Figure D



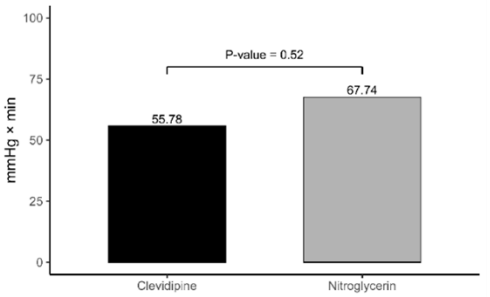
Intraoperative range: MAP 80–100 mmHg

Figure E



Intraoperative range: HR 60–80 bpm

Figure F



Intraoperative range: HR 60–80 bpm

30 - EVALUATION OF THE ROLE OF CYTOSORB IN THE REMOVAL OF FREE HEMOGLOBIN IN PATIENTS UNDERGOING MECHANICAL CIRCULATORY SUPPORT

Ludovica La Rusca [(1)] - Marco Puca [(1)] - Leonardo Tedesi [(1)] - Benedetta Chiodi [(1)] - Viola Casadei [(1)] - Riccardo Bof [(1)] - Martina Carmela Crusi [(1)] - Marilena Marmiere [(1)] - Can Ozcebe [(1)] - Alessandro Belletti [(1)]

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Evaluation of the role of CytoSorb in the removal of free hemoglobin in patients undergoing mechanical circulatory support

Introduction

Cardiogenic shock is a severe condition and is associated with a mortality higher than 50%.
A recent randomized study suggested that the use of mechanical circulatory support (MCS) devices, in particular Impella, may improve the survival of these patients. [1]
However, use of MCS is also associated with an increased incidence of acute kidney injury (AKI) [1] and the need for renal replacement therapy. A higher rate of hemolysis in patients receiving MCS could have contributed to the increased incidence of AKI in this group. A new device that could reduce this problem is CytoSorb, a hemoadsorption device designed to remove toxic molecules and inflammatory mediators from the circulation. CytoSorb could have a depurative role against plasma free hemoglobin (fHB), thus potentially preventing renal failure. However, to date, solid data are lacking.
The aim of this study is therefore to evaluate the effectiveness of CytoSorb in removing fHB in patients with cardiogenic shock undergoing MCS.

Methods

We conducted an observational study in a cardiac intensive care unit including adult patients with a diagnosis of cardiogenic shock and the need for MCS. In all patients, CytoSorb was integrated into the extracorporeal membrane oxygenation (ECMO) circuit.
We measured fHB values sampled upstream and downstream of the CytoSorb, directly from the circuit. Samples were collected between 15 and 30 minutes after the start of each purification cycle.

Results

We enrolled 14 patients undergoing MCS and obtained 25 valid fHb samples.
The device configurations were: ECMO + Impella (2 pts); ECMO + IABP (7 pts); and ECMO only (2 pts); three patients initially treated with ECMO + IABP underwent upgrade to ECMO + Impella.
The median fHB values upstream and downstream CytoSorb cartridge were 245 mg/L (interquartile range [IQR] 194-388 mg/L) and 279 mg/L (IQR 155-372 mg/L), respectively (p = 0.179; Figure 1).

Conclusions

CytoSorb, while proving to be safe, does not seem to be effective in removing fHB in patients undergoing MCS.

29 - MAPPING THE SCIENCE OF PALLIATIVE CARE: A BIBLIOMETRIC ANALYSIS OF THE TOP 100 CITED ARTICLES

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Mapping The Science Of Palliative Care: A Bibliometric Analysis of the Top 100 Cited Articles

Introduction: The palliative care evidence base has grown substantially in recent years with the benefits, barriers, and facilitators of care delivery well established across many settings and contexts. We aimed to rigorously and systematically delineate the trends, themes, and scope of the top 100 papers aided by bibliometrics to map the field of palliative care science and identify future directions for the field.

Methods: We conducted a bibliometric analysis in accordance with the BIBLIO checklist for reporting the bibliometric reviews. Employing a comprehensive search string we examined the Scopus online database from inception to December 14th, 2024, to identify and retrieve pertinent publications. Extracted data included year of publication, number of citations and other metrics, authorship, and study design, among others.

Results: Total citations for the 100 most cited articles ranged from 5803-419. Most articles originated from the US (43%), United Kingdom (16%), and Canada (15%). Overall, 83 different first authors and 87 senior authors contributed; about half first authors and 32% of senior authors were women. Forty-two different journals published the articles. Key themes were end-of-life care, palliative care integration within different medical sub-specialties (e.g., oncology, respiratory disease), clinical tool development and validation, and symptom management.

Conclusion: Our findings provide a comprehensive map of the palliative care scientific landscape with key implications for future research, clinical practice, and policy. These results can be used to mitigate scientific disparities in author representation, ensure appropriate evidence use across international contexts, and empower high-quality evidence-based palliative care advocacy.

Mapping the Science of Palliative Care: A Bibliometric Analysis of the Top 100 Cited Articles

BACKGROUND the palliative care (PC) evidence base has grown substantially in recent years with the benefits, barriers, and facilitators of care delivery well established.

AIM to systematically delineate the trends, themes, and scope of the top 100 papers aided by bibliometrics to map the field of PC science and identify future directions for research, practice, and policy.

METHODS

A bibliometric analysis of the 100 most cited articles in PC retrieved from Scopus database, from its inception to date.

RESULTS

- Total citations ranged from 419-5803.
- Most articles originated from the US (43%), United Kingdom (16%), and Canada (15%).
- Overall, 83 different first authors and 87 senior authors contributed; about half and 32% of the first and senior authors were women, respectively.
- The gender gap in PC research appears to be less apparent compared to that observed in other medical fields.
- Forty-two different journals published the top 100 articles.
- Key themes were end-of-life care, PC integration within different medical sub-specialties (e.g., oncology, respiratory disease), clinical tool development and validation, and symptom management.

IMPLICATIONS

Our findings provide a comprehensive map of the PC scientific landscape with key implications for future research, clinical practice, and policy. These results can be used to mitigate scientific disparities in authors, ensure appropriate evidence use across international contexts, and empower high-quality evidence-based PC advocacy

Chiara Mariotti *(1)* ***- Domenico Pontillo*** *(1)* ***- Giulia Pennisi*** *(1)* ***- Jee Changhwan*** *(1)* ***- Lina Belhassen*** *(1)* ***- Matteo Angelini*** *(1)* ***- Alessia Greco*** *(1)* ***- Matteo Aldo Bonizzoni*** *(1)* ***- Alessandra Bonaccorso*** *(1)* ***- Giovanni Landoni*** *(1)*

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Sex-related mortality differences in septic shock: a propensity score–matched study

Introduction

Septic shock is frequently observed and a major determinant cause of mortality among Intensive Care Unit (ICU) patients. Previous studies suggest that female sex, particularly during childbearing years, might be associated with reduced mortality risk. We analysed sex-related differences in mortality among age-matched male and female patients with septic shock.

Methods

We conducted a retrospective analysis using the TriNetX patient database. The study cohorts included adult patients aged ≤55 years, admitted to the ICU with a diagnosis of septic shock. Women were compared to a 1:1 propensity score–matched cohort of men. A Kaplan-Meier survival analysis was performed to estimate the probability of survival over the 28-day, 90-day and 180-day follow-up period. Two additional cohorts, including patients aged >55 years and divided by sex, were constructed to evaluate outcomes and compare with the young adult cohort.

Results

A total of 100,894 young adults (≥18 and ≤55 years) septic shock patients were analyzed. After 1:1 propensity score matching, 86,748 young adults septic shock patients (43,374 male, 43,374 female) were included in the analysis. Females had a lower risk of death compared with males (6,630/43,374 [15.3%] vs. 7,192/43,374 [16.6%], respectively; risk ratio (RR=0.92, 95% confidence interval (CI) 0.89–0.95, p<0.001). Survival analyses demonstrated that female sex was associated with a lower risk of death in patients with septic shock (hazard ratio (HR)=0.92, 95% CI 0.89–0.95; p<0.001). These findings were not confirmed when analyzing 28-day mortality in post-menopausal females and age-matched males (>55 years): 23,849/92,348 [25.8%] in females vs. 23,146/92,348 [25.1%] in

males (RR=1.03, 95% CI 1.01–1.04, p<0.001). Mortality analysis at 90- and 180-days showed similar magnitude and directions in both cohorts.

Conclusion

Young women of childbearing potential with septic shock showed lower mortality as compared with age-matched men. Our findings support the existence of sex-related difference in outcomes, potentially influenced by hormonal and immune factors. The limitations of the present study indicate that further prospective studies are necessary to assess the potential therapeutic impact of our results.

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HOW CAN SIMULATIONS IMPROVE DAILY CLINICAL PRACTICE IN ACUTE CARE SETTINGS? A CROSS SECTIONAL SURVEY ON CRITICAL CARE PRACTIOTIONERS

Vincenzo Federico Mimmo[1], Emanuele Rollo[1], Federica Gloria[1], Maria Teresa Giglio[2], Filomena Puntillo[2], Luigi Pisani[1], Salvatore Grasso[1] and Marco V. Ranieri[1]

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Backround:

Clinical simulation has become an essential educational strategy in critical care settings (1), promoting the development of technical and non-technical skills such as communication, leadership, and stress management (2). While its professional benefits are well documented (3), little is known about the impact that simulation-based training can have on education in critical care. This study aims to evaluate the perceived impact of simulation training on critical care healthcare professionals, focusing on professional competence and development of non-technical skills.

Methods:

An observational cross-sectional study was conducted using a structured questionnaire consisting of 22 multiple-choice items, administered with Google Forms to attending physicians, medical residents, and nurses, working in various critical care services (intensive care units, emergency departments, pre-hospital emergency services). The survey included questions on the following domains:

- The professional impact of technical and non-technical skills and the extent to which simulation can improve emergency/urgency management
- The personal and emotional impact of simulation: how it improves stress management in critical situations and highlights the need for continuous training

Results:

This observational cross-sectional study included **103 critical care healthcare professionals** (physicians, residents, and nurses). The vast majority of participants (81.6%) perceived the impact of simulation on their work as "High" to "Very High", with **53.4%** choosing the maximum rating ("Very High") [**Figure1**].

In line with the study's objective, the analysis confirmed a strongly perceived impact on skill improvement:

- **Technical Skills: 79.6%** of participants rated the improvement of technical skills with a score of 4 or 5 out of 5 (54.4% maximum rating) [**Figure2,PanelA**].
- **Non-Technical Skills:** The effectiveness in improving non-technical skills (communication and teamwork) was perceived as even higher, with **87.4%** assigning a score of 4 or 5 (61.2% maximum rating) [**Figure2,PanelB**].

Finally, the most useful element in the simulation experiences was found to be the **Debriefing**, indicated by **48.5%** of professionals, surpassing both technical skills alone (31.1%) and non-technical skills alone (18.4%) [**Figure3**].

Conclusions:

The findings underline how contemporary simulation activities have an extremely positive impact on critical care staff. This strongly perceived impact validates simulation as a central training strategy, essential for advancing professional competence and team effectiveness within the critical care environment.

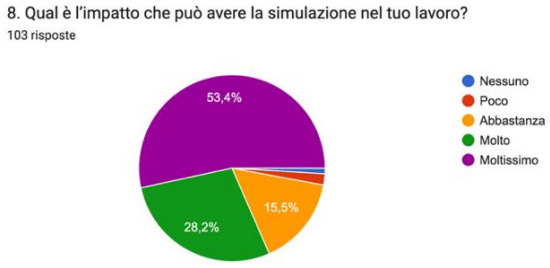

Figure 1 Question n° 8: "What impact can simulation have in your job?" - More than half of respondents (53.4%) answer "Extremely/Very Much".

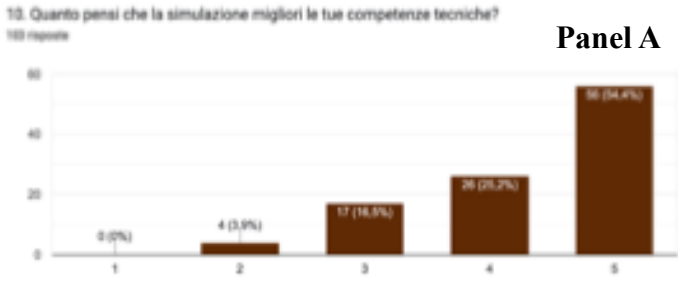

Figure 2: Panel A Question n° 10: "How much do you think simulation improves your technical skills?" - 54% of respondents answer with the maximum score (5). **Panel B** Question n° 11: "How much do you think simulation improves your non-technical skills (communication, teamwork)?" - 61% of respondents answer with the maximum score (5).

Figure 3 Question n° 19: "What did you find most useful in simulation experiences?" - Debriefing is the most useful element for 48.5% of respondents.

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48 - ALBUMIN VERSUS CRYSTALLOIDS: FLUID DISTRIBUTION AND ALBUMIN KINETICS IN PIGS VENTILATED AT DIFFERENT MECHANICAL POWER

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Albumin versus Crystalloids: Fluid Distribution and Albumin Kinetics in Pigs Ventilated at different Mechanical Power

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Introduction

The rationale for using albumin in fluid resuscitation lies in its ability to increase plasma oncotic pressure and optimize hemodynamics and tissue perfusion. However, randomized trials in sepsis have not demonstrated a survival benefit, and the effects of albumin infusion on fluid distribution remain unclear. This study investigates, in healthy pigs, whether albumin infusion modifies intravascular fluid volume (IFV) distribution, compared to crystalloids, and explores albumin kinetics.

Methods

Thirty-nine healthy female pigs ventilated for 48 hours were categorized into four groups based on mechanical power (MP) (High ~18 J/min vs. Low ~6 J/min) and fluid type (5% albumin vs. balanced crystalloid) to achieve a set fluid balance: MP_{LOW}-Crystalloid; MP_{LOW}-Albumin; MP_{HIGH}-Crystalloid; and MP_{HIGH}-Albumin. Measurements were taken at baseline and six-hourly thereafter. Outcome variables included IFV and albumin kinetics and other physiological variables.

Results

No significant differences in IFV were observed over time across groups (Figure 1), and at 48 hours: MP_{LOW}-Crystalloid 1.92 (±0.38) L; MP_{LOW}-Albumin 1.86 (±0.37) L; MP_{HIGH}-Crystalloid 1.72 (±0.40) L; MP_{HIGH}-Albumin 2.10 (±0.58) L; p=0.389.

As expected, the theoretical and the actual quantities of albumin in the IFV were higher in the albumin groups compared to the crystalloid groups. Wasted albumin, defined as the difference between theoretical and actual albumin is shown in Figure 2. At 48h, albumin-treated groups demonstrated significantly greater albumin waste, as high as: 62 (±13) % in the MP_{LOW}-Albumin group and 58 (±24) % in the MP_{HIGH}-Albumin group (p<0.001).

Groups receiving albumin had a higher volume of ascites: MP_{LOW}-Crystalloids= 261 (±380)mL, MP_{LOW}-Albumin = 710 (±664) mL, MP_{HIGH}-Crystalloids = 144 (±148) mL, and MP_{HIGH}-Albumin = 685 (±651) mL (p=0.034) (Figure 3, Panel A). Additionally, the amount of infused albumin was linearly related to the volume of ascites (p<0.001; R^2=0.750) (Figure 3, Panel B).

Conclusions

The 48h-long administration of albumin was associated with higher quantities of wasted albumin and greater volume of ascites.

Figure 1: Time course of intravascular fluid volume in the four experimental groups

Figure 2: Time course of the percentage of wasted albumin in the four experimental groups

Figure 3: Panel A – End-of-experiment ascites volume in the four experimental groups. **Panel B** – Association between the end-of-experiment infused albumin amount and ascites volume.

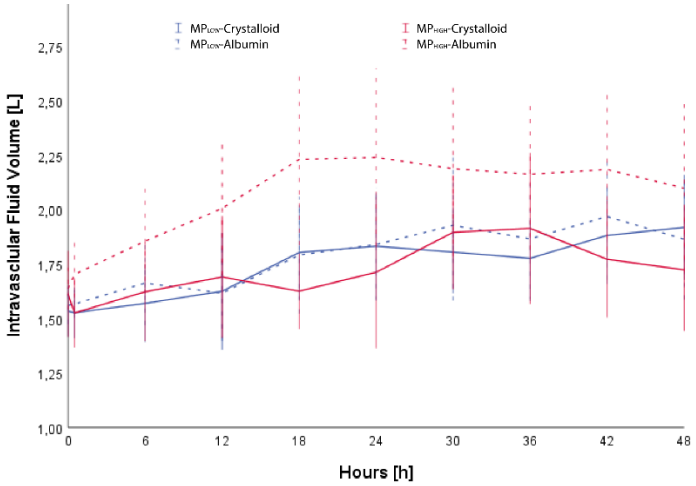

Figure 1: Time course of intravascular fluid volume in the four experimental groups

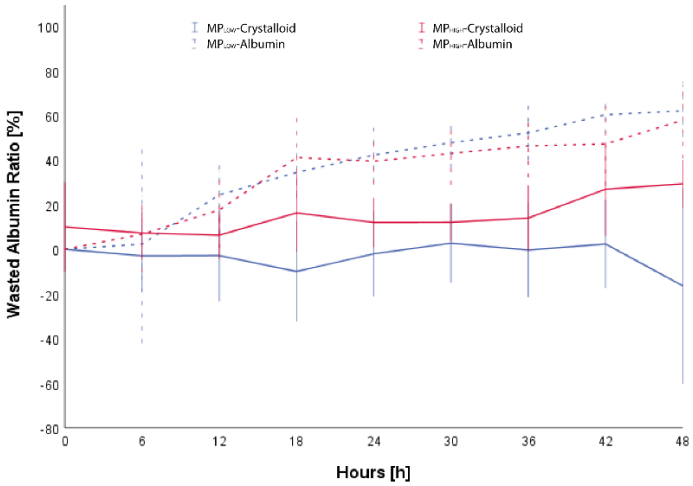

Figure 2: Time course of the percentage of wasted albumin in the four experimental groups

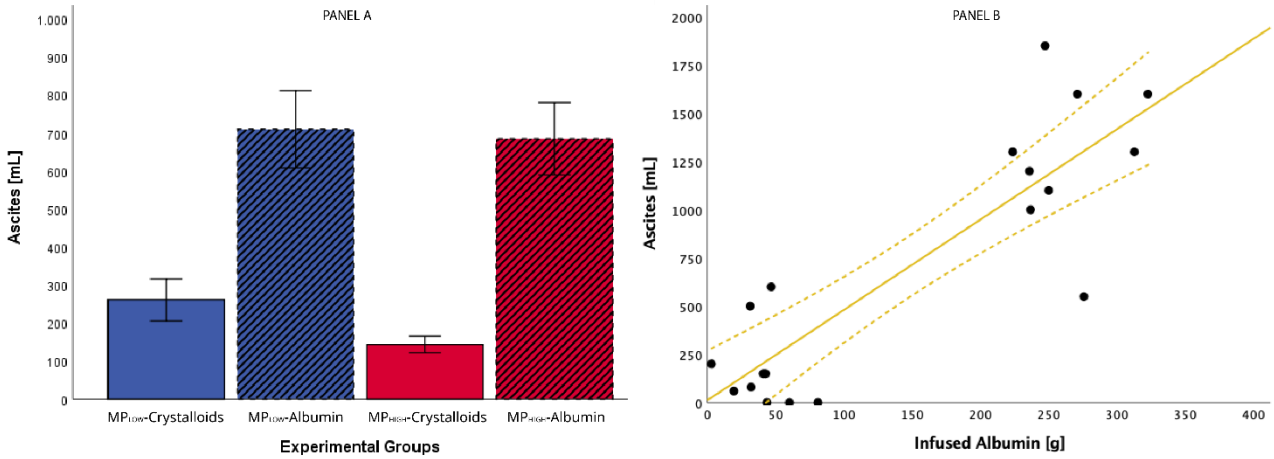

Figure 3: Panel A - End-experimental amount of ascites in the four experimental groups. Panel B - Association between the end-experimental amount of infused albumin and ascites

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Title:

Clinical Application of the New Global Definition of ARDS in a Case of Fat Embolism Syndrome

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Introduction

The new Global Definition of Acute Respiratory Distress Syndrome (ARDS) [1] allows diagnosis in patients receiving high-flow nasal cannula (HFNC) therapy at flow rates≥30 L/min and supports the SpO2/FiO2 (S/F) ratio as an alternative to the PaO_2/FiO_2 (P/F) ratio. It also recognizes Lung Ultrasound (LUS) as an imaging modality equivalent to CT or chest X-ray for identifying bilateral opacities [2], emphasizing its value for dynamic bedside monitoring of disease progression and recovery. We report a case of Fat Embolism Syndrome (FES) evolving into moderate ARDS, managed exclusively with HFNC and monitored through an integrated ultrasonographic approach.

Methods

A 16-year-old male was admitted to the intensive care unit for hypoxemia that developed after a post-traumatic diaphyseal femur fracture. On admission, on spontaneous ventilation before the initiation of HFNC, the S/F ratio was 224. Chest CT revealed bilateral alveolar infiltrates consistent with ARDS. HFNC was started (initial flow 55L/min, FiO_2 0.5), with serial monitoring of P/F and S/F ratios. A systematic 8-zone diagnostic lung ultrasound was also performed with a convex low frequency probe and the lung ultrasound computed for each zone.

Results

Following HFNC initiation, oxygenation progressively improved. The P/F ratio increased from 138 to 262 mmHg, while the S/F ratio rose from 186 to 306, with parallel trajectories accompanying the gradual reduction of support (**Figure1**) and the HFNC flow was decreased from 60 to 40 L/min in

accordance with clinical and gasometric improvement. Lung ultrasound demonstrated a distinct interstitial pattern with multiple B-lines with a global LUS score of 14**,** consistent with CT and chest X-ray findings (**Figure2**). The clinical course was favorable, with complete HFNC weaning by day 5 and discharge on day 6.

Conclusions

Implementation of the new Global Definition is especially useful in post-traumatic ARDS in young patients, for whom a tube-sparing strategy is encouraged – and in resource-limited settings with restricted access to blood gas analysis and imaging. Benefits are also envisaged in terms of limiting serial arterial blood gas sampling and iatrogenic anemia in the ICU. This case exemplifies its practical application, showing how integrating HFNC, S/F ratio, and lung ultrasound enables early diagnosis and effective non-invasive management.

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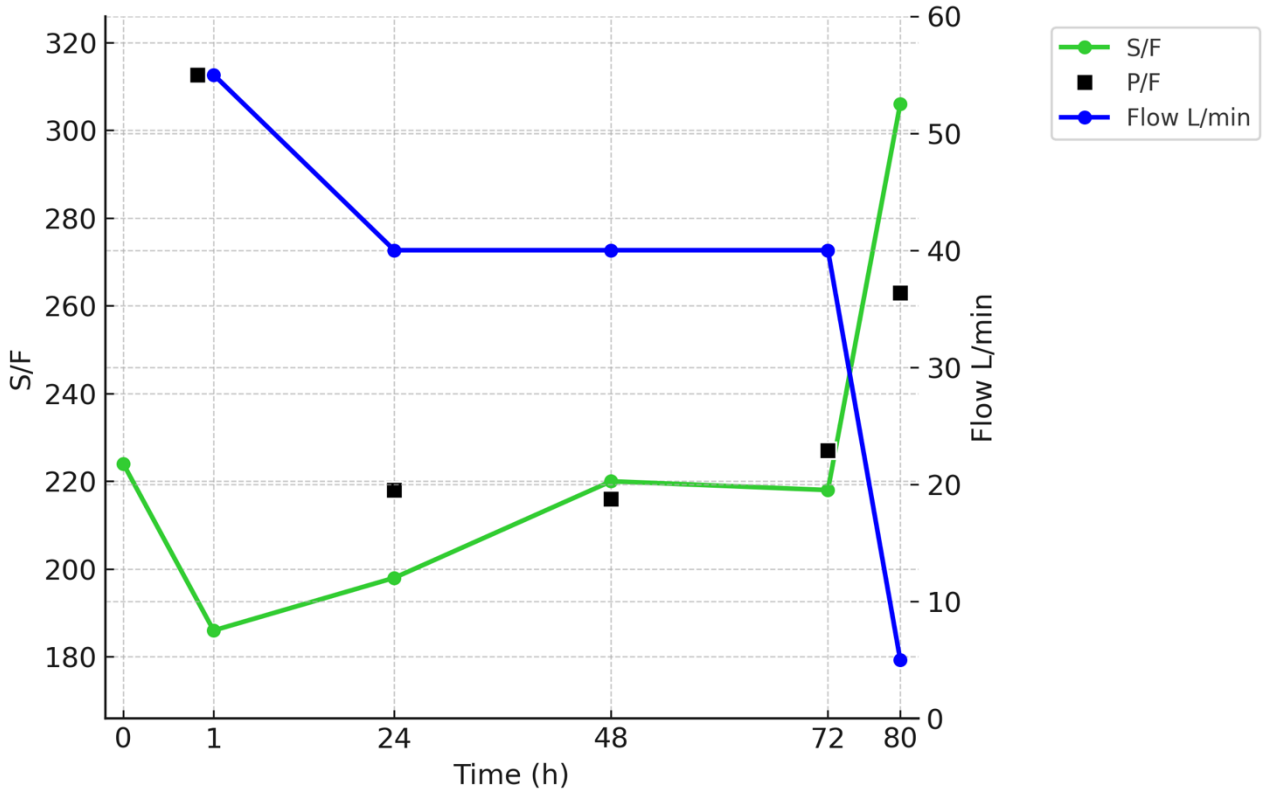

Figure 1. Trend of S/F ratio, P/F ratio, and HFNC flow over time in non-invasive ARDS

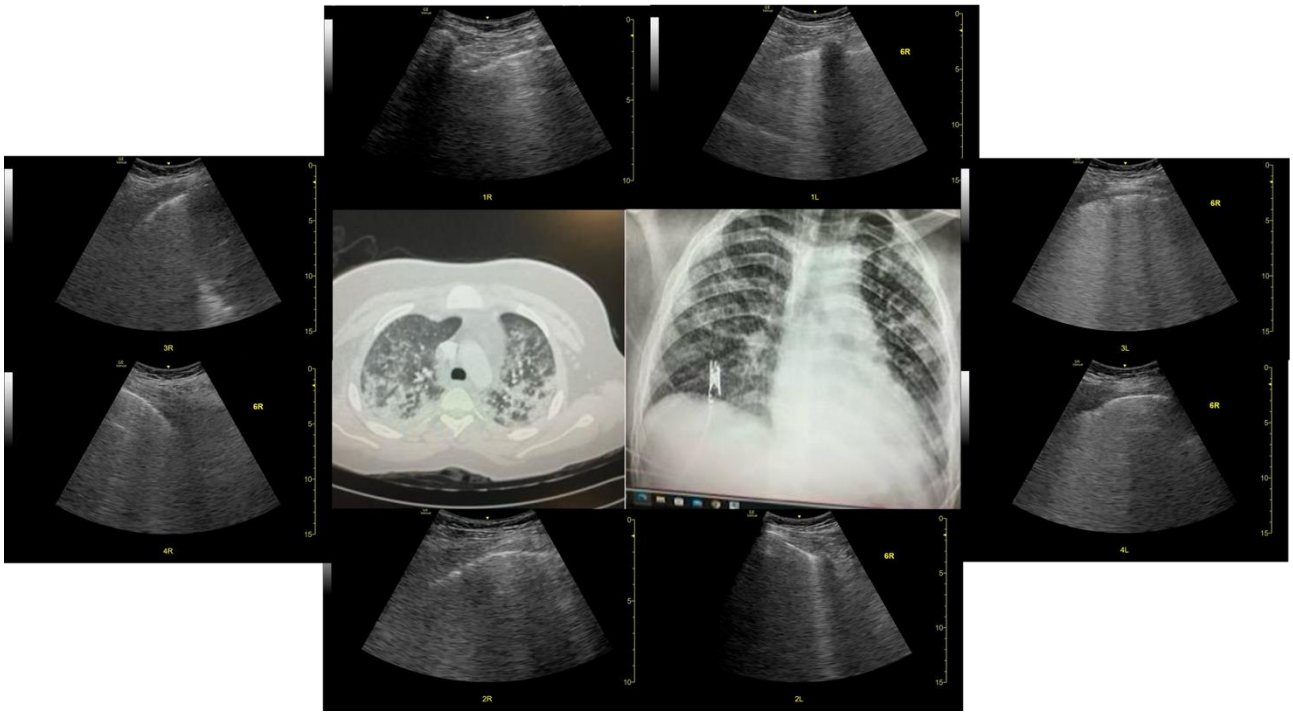

Figure 2. Lung ultrasound images acquired through an 8-regions protocol (posterior zones not shown), CT-scan and chest X-Ray in the first 24hours of ICU Stay

49 - DIFFERENTIAL LUNG VENTILATION AND EXTRACORPOREAL CO_2 REMOVAL AS RESCUE STRATEGY IN SEVERE POST-TRAUMATIC ARDS – A CASE REPORT

Emnauele Rollo *(1) - Monisa Xhihani (1) - Leonardo Nanna (1) - Francesco Grittani (1) - Claudio Laterza (1) - Manuela Fioriello (1) - Claudio Zimatore (1) - Antonio Sforza (1) - Mary J. Mura Ondok (1) - Vito Laguaragnella (1) - Dafne Pisani (1) - Mario Ribezzi (1) - Antonio Civita (1) - Luigi Pisani (1) - Salvatore Grasso (1) - Marco V. Ranieri (1)*

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Title:

Differential Lung Ventilation and Extracorporeal CO_2 Removal as Rescue Strategy in Severe post-traumatic ARDS – a case report

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Background

Major trauma is a recognized risk factor for Acute Respiratory Distress Syndrome (ARDS), resulting from direct lung injury (e.g. pulmonary contusions) or indirect mechanisms mediated by inflammation and endothelial dysfunction. Trauma-related risk factors include pulmonary injury, head trauma, hemorrhagic shock, massive transfusion, and long bone or pelvic fractures [1,2]. Initial management relies on lung-protective mechanical ventilation with a tidal volume<6 mL/kg PBW and moderate PEEP. In cases of severe ARDS with refractory hypoxemia or hypercapnia, extracorporeal CO_2 removal ($ECCO_2R$) may serve as a rescue strategy, enabling CO_2 clearance and allowing ultra-protective ventilation without substantially affecting oxygenation [3].

Methods

A 30-year-old patient with multiple traumatic injuries was admitted and showing thoracic asymmetry and absent breath sounds on the right side, consistent with an extensive right pneumothorax. Imaging revealed multiple pulmonary contusions in both lungs, with fractures of the ribs, and sternal manubrium. After 7 days under mechanical ventilation, the patient developed severe ARDS (P/F 83). A single prone positioning attempt failed to improve oxygenation. A double lumen tracheostomy cannula was positioned to allow separate ventilation of the two lungs. Ultra-protective ventilation was set on the most injured side and enabling extracorporeal CO_2 removal during concurrent renal replacement therapy (**Figure1** AI generated).

Results

Following surgical tracheostomy and insertion of a double-lumen cannula, differential lung ventilation was initiated, using ultra-protective settings (Vt≈3.5mL/kg PBW). This maintained expired minute volumes of 1.46L/min (right lung) and 5.28L/min (left lung). Simultaneously, $ECCO_2R$ was started via a dialysis-oxygenator circuit (blood flow ~300mL/min; sweep gas flow 10L/min). In the first 48h, $PaCO_2$ progressively decreased from 95 to 49mmHg, normalizing the pH (7.03→7.27) (**Figure2**). PaO_2 and the P/F ratio remained stable (155→120) despite ultra-protective ventilation and CO_2 reduction, confirming preserved oxygenation efficiency. Following improved gas exchange, the patient began a ventilator weaning protocol and was transferred to the Physical and Rehabilitative Medicine Unit on day 45°.

Conclusion

The combination of differential lung ventilation and $ECCO_2R$ during RRT allowed safe ventilation and effective CO_2 clearance in severe trauma-related ARDS refractory to conventional management. The treatment maintained stable oxygenation while improving ventilation–perfusion efficiency, suggesting feasibility and potential as a rescue strategy in selected patients.

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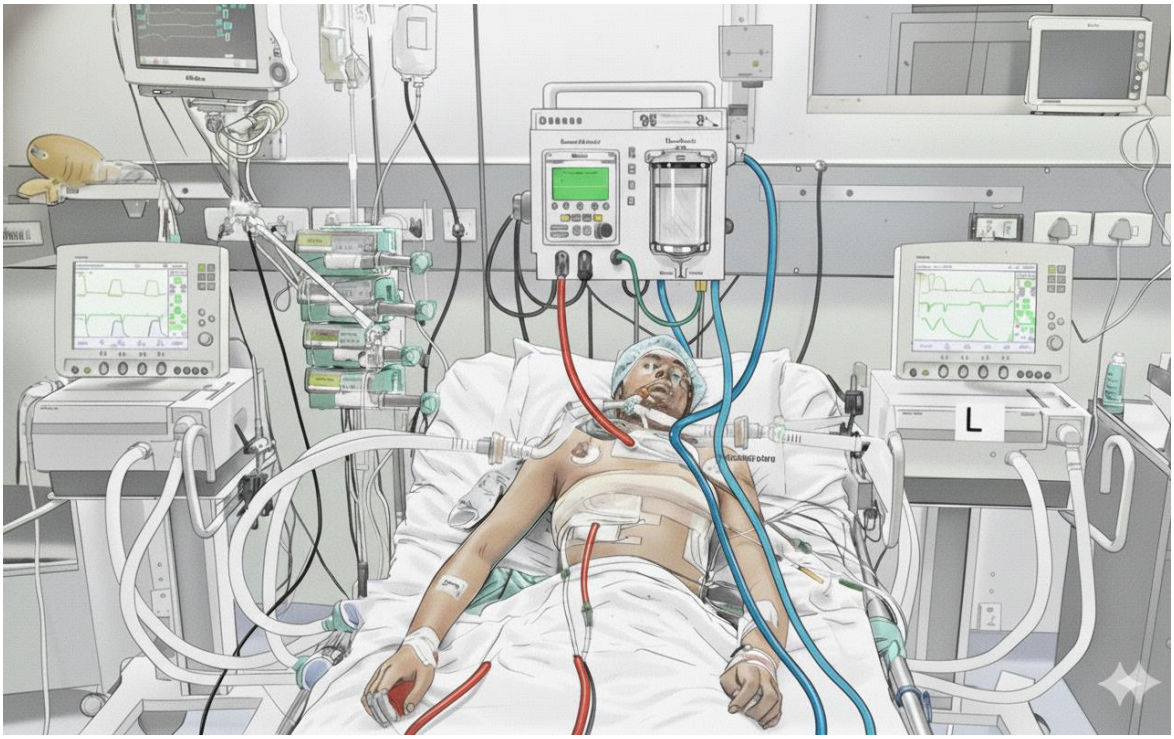

Figure 1. Complexity of the Intensive Care Unit setting, with a high level of support and monitoring: patient simultaneously undergoing differential mechanical ventilation and extracorporeal CO2 removal (ECCO2R).

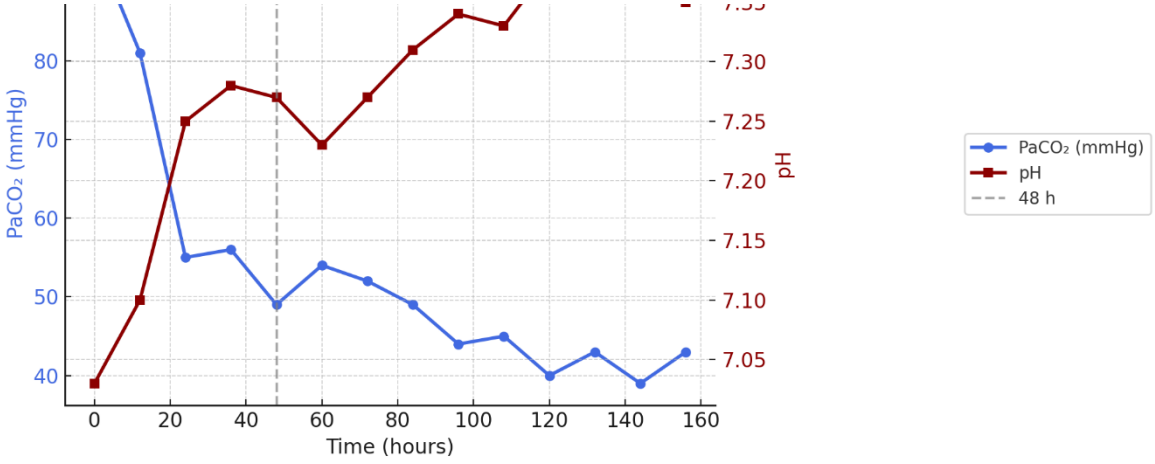

Figure 2. Trend of $PaCO_2$ and pH during the initial hours of ECCO2R and differential ventilation, showing a rapid decrease in $PaCO_2$ (from ~95 to 49 mmHg) and pH normalization (from ~7.03 to 7.27) within 48 hours (indicated by the dashed line).

Rossana Soloperto *(1)* ***- Francesco Murgolo*** *(1)* ***- Rossella Di Mussi*** *(1)* ***- Vito Marco Ranieri*** *(1)* ***- Salvatore Grasso*** *(1)*

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Recruitability-Dependent Right-Ventricular Response to PEEP in ARDS: Preliminary Results from the Echo-REVEAL Study

Rossana Soloperto, Francesco Murgolo, Rossella di Mussi, Vito Marco Ranieri, Salvatore Grasso

Introduction: Determining the optimal positive end-expiratory pressure (PEEP) in acute respiratory distress syndrome (ARDS) remains challenging, as the PEEP level that improves oxygenation may not coincide with the one that minimizes ventilator-induced injury and/or hemodynamic compromise. PEEP modulates right-ventricular (RV) afterload acting on pulmonary vascular resistance (PVR) and transpulmonary pressure. Depending on its impact on alveolar recruiting, PEEP may increase or decrease PVR and thus influence global RV performance and RV–pulmonary artery (PA) coupling [1]. By reflecting the potential for lung recruitment, the recruitment-to-inflation (R/I) ratio is a non-invasive, bedside index to predict the PEEP-induced alveolar recruitment [2] [3]. The aim of *Echo-REVEAL study ("Echocardiographic Right Ventricular Evaluation in Assessment of ARDS Lung Recruitment")* was to test the R/I ability to predict the impact of PEEP on RV function and RV–PA coupling.

Methods: Adults with ARDS [4] receiving controlled MV were prospectively enrolled. Each patient underwent standardized R/I calculation followed by full echocardiographic, hemodynamic, and ventilatory assessments at low (5 cmH_2O) and high (15 cmH_2O) PEEP.

The primary endpoint was the within-patient change in global right-ventricular strain ($\Delta GRVS = GRVS_{PEEP15} - GRVS_{PEEP5}$) stratified by dicothomized lung recruitability (R/I). Secondary endpoints included the concomitant variations in tricuspid systolic velocity (S′), tricuspid annular plane systolic excursion to pulmonary-artery systolic pressure ratio (TAPSE/PAPs), right-to-left ventricular end-diastolic diameter ratio (RVEDD/LVEDD), and stroke-volume index (SVI) - as well as the degree of association between the venous excess ultrasound (VExUS) score and right-ventricular performance.

Results: we report the preliminary analysis results of fifteen patients (8 high-R/I, 7 low-R/I). In low-recruitable patients, at high PEEP, GRVS deteriorated ($p < 0.001$) (Figure 1), S′ ($p=0.002$), SVI ($P=0.042$) and TAPSE/PAPs ($p < 0.001$) declined, while RVEDD/LVEDD ($p=0.002$) and VExUS ($p<0.001$) increased; conversely, in high-recruitable patients, at high PEEP strain and coupling indices remained stable or improved.

Conclusions: These preliminary *Echo-REVEAL* findings show that the RV response to PEEP is recruitability-dependent and may be predicted by the R/I. In poorly recruitable lungs, higher PEEP worsened the RV–PA coupling and systemic venous congestion, whereas in patients with greater recruitability higher PEEP did not worsen the assessed RV function parameters. These results

emphasize the bidirectional interplay between lung mechanics and right-heart function in ARDS management.

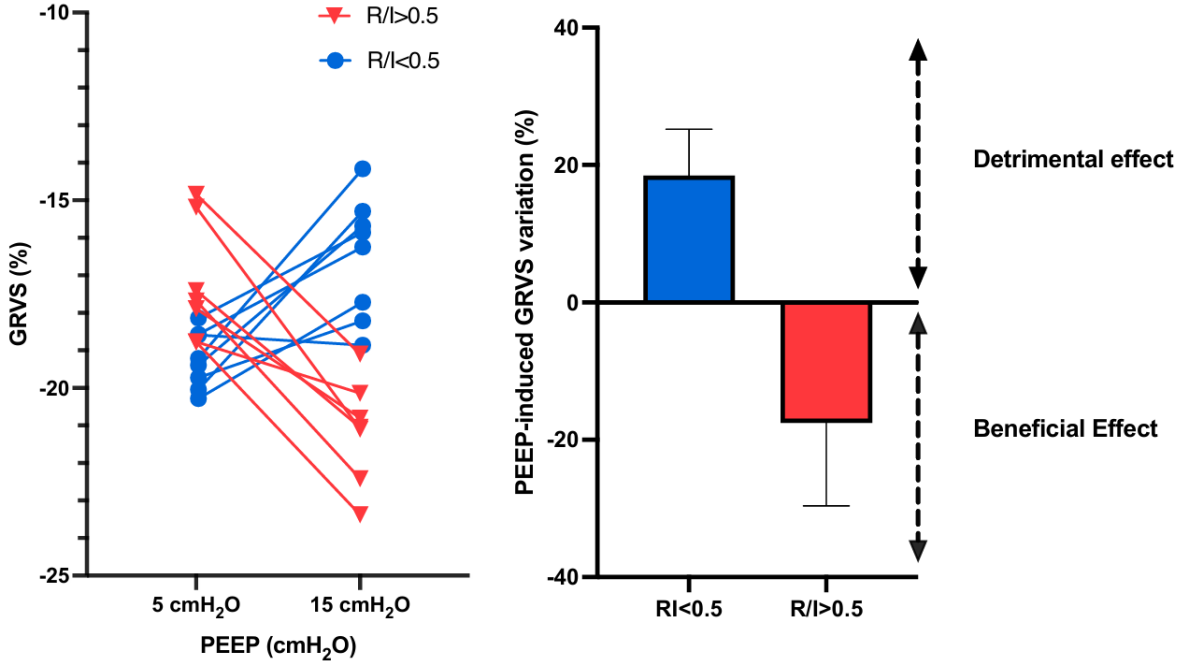

Figure 1. PEEP-Induced Changes in Right Ventricular Strain by Lung Recruitability Profile. The effect of positive end-expiratory pressure (PEEP) on global right ventricular strain (GRVS) is shown according to the recruitment-to-inflation ratio (R/I). Left: individual GRVS values measured at PEEP 5 and 15 cmH_2O, stratified by low recruitability (R/I < 0.5, blue) and high recruitability (R/I > 0.5, red). Right: percentage variation in GRVS induced by PEEP, highlighting an overall detrimental effect in low-recruiters and a beneficial effect in high-recruiters.

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LA VERTIGINE CHE SPAVENTA IL MEDICO DI PS

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Introduzione

L'aneurisma dell'aorta addominale (AAA) è una delle patologie che più spaventano i medici di Pronto Soccorso, la cui diagnosi è spesso tardiva. La rottura dell'aneurisma dell'aorta addominale (RAAA) è ancora associata ad un elevato rischio di mortalità. Spesso è una patologia così fulminea da non lasciar scampo al paziente che non riesce nemmeno a raggiungere l'ospedale più vicino, rendendola difatti la patologia con il più alto tasso di mortalità intorno al 90%. Sino a metà degli anni Ottanta, il diametro AAA era il principale indicatore del rischio di rottura. L'insorgenza è spesso fulminea ma in alcune circostanze la rottura di parete è minima presentando il paziente con dolore addominale mal riferito o con dolore lombare, massa palpabile addominale o stato di shock con cute sudata, pallido e tachicardico.

Metodi

Paziente di sesso maschile,74 anni, iperteso, ex fumatore, cardiopatico ischemico portatore di PM, diabetico, distiroideo. Accede in shock room del PS di Barletta per "episodio vertiginoso con rilascio sfinterico con dolore emitorace e fianco sinistro da due giorni".

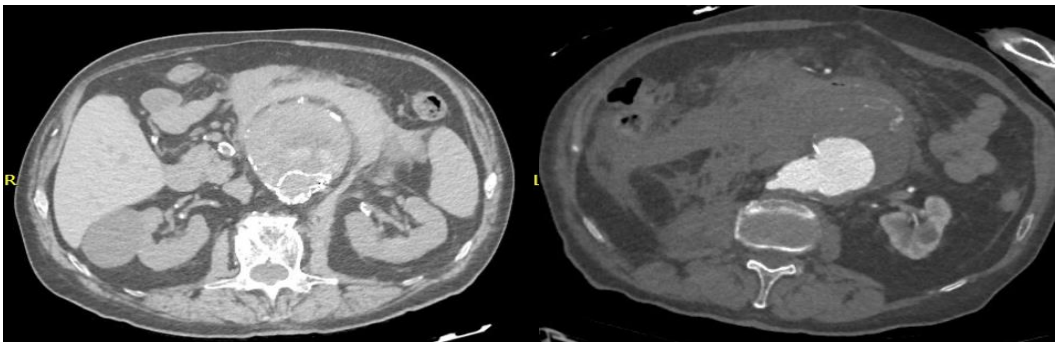
Discussione

Arrivo autonomo in PS, entra in sala dopo pochi minuti. Parametri nella norma, GCS 15, troponina 6.5 ng/l, EGA lieve ipossia con saturazione 94%, lattati 1.15, Hb 12.7 g/dl, si presenta pallido tachicardico e sudato. Viene eseguita una pocus addome dove è subito evidente una voluminosa massa tondeggiante in sede dell'ipocondrio sinistro e mesogastrio. Nel sospetto di una dissecazione, confermato poi dalla TC, si reperisce doppio accesso venoso periferico con immediata infusione di liquidi ev, acido tranexamico 1gr in bolo e due fiale a lenta infusione, Andexanet e fattori della coagulazione oltre alla analgesia con morfina. Per riduzione di circa tre punti di emoglobina si avvia infusione di due unità di emazie concentrate.

Il paziente stabile e con trasporto rianimatorio viene trasferito in Chirurgia Vascolare dove viene operato e poi dimesso cinque giorni dopo.

Conclusione

Vertigini in PS se ne vedono tante ma, importante per il buon esito, è stato in primis il triage nel capire di come fosse un paziente con alto rischio evolutivo facendolo subito accedere. L'esecuzione della eco fast addominale e la non sottostima delle condizioni hanno permesso velocizzare il processo diagnostico e conseguente out come del paziente.



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Estubazione precoce dopo trapianto di fegato: è sempre possibile? Dati preliminari del Petalo Trapianti di Fegato in un centro di riferimento in Puglia.

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Abstract

Introduzione

L'estubazione precoce è una strategia di fast-track surgery volta a favorire il recupero dopo trapianto ortotopico di fegato (TOF). [1,2] Scopo dello studio è stato confrontare estubazione precoce (EP) in sala operatoria (SO) ed estubazione differita (ED) in Terapia Intensiva (TI) in termini di caratteristiche cliniche ed outcome dei pazienti.

Metodi

Analisi retrospettiva monocentrica su pazienti adulti sottoposti a TOF da donatore cadavere da aprile 2024 a dicembre 2024, escludendo quelli affetti da sindrome porto-polmonare ed epato-polmonare. [3]

Pazienti estubati in SO (gruppo EP) e pazienti estubati in TI (gruppo ED) sono stati confrontati in merito a: indicazione al trapianto, dosaggio di noradrenalina e lattacidemia a fine intervento, complicanze d'organo e funzione epatorenale (AST/ALT, bilirubina totale, INR, creatinina) in settima giornata, durata della degenza in TI e in ospedale, mortalità.

I dati sono stati estratti dal registro multicentrico PROSAFE, Petalo Trapianti di Fegato (GiViTI) [4] e sono stati analizzati utilizzando il test di Kruskal-Wallis per le variabili continue e il test del Chi-quadrato per quelle categoriche ($\alpha = 0.05$).

Risultati

Dei 43 pazienti sottoposti a TOF, 37 sono stati arruolati, il 59% nel gruppo EP, il 41% nel gruppo ED. I due gruppi sono risultati omogenei per indicazione al trapianto.

A fine intervento, il gruppo ED presentava un dosaggio più elevato di noradrenalina (0.16 vs 0.04 mcg/kg/min; $p < 0.001$) e di lattacidemia (6.6 vs 3.9 mmol/L; $p = 0.016$). Il weaning dalla VM è stato completato nelle prime 24 ore in TI.

Non sono emerse differenze significative in merito a disfunzione del graft, funzione epatorenale e complicanze in TI, sebbene il gruppo EP abbia presentato un tasso di re-intubazione maggiore (13.3% vs 0%; $p = 0.078$).

La durata della degenza in TI è risultata superiore nel gruppo ED (4.4 vs 2.4 giorni; $p = 0.05$) mentre quella ospedaliera e la mortalità in TI sono risultate simili in entrambi i gruppi.

Conclusioni

L'estubazione differita dopo TOF è riservata a pazienti che presentino instabilità emodinamica al termine dell'intervento e non sembra associarsi a complicanze precoci. Ulteriori studi su un campione più ampio potranno meglio definire criteri di estubazione precoce e l'impatto sulle risorse ospedaliere di questa strategia. [5]

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23 - FEASIBILITY AND CLINICAL IMPACT OF OUT-OF-ICU NON-INVASIVE RESPIRATORY SUPPORT IN HEMATOLOGIC PATIENTS WITH ACUTE HYPOXEMIC RESPIRATORY FAILURE

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TITLE

Feasibility and clinical impact of out-of-ICU Non-Invasive Respiratory Support in hematologic patients with Acute Hypoxemic Respiratory Failure

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KEY WORDS

Hematologic Malignancies, Acute Hypoxemic Respiratory Failure (AHRF), Non-Invasive Ventilation (NIV), Continuous Positive Airway Pressure (CPAP), High Flow Nasal Cannula (HFNC), Critical Care Outreach Team (CCOT).

ABSTRACT

BACKGROUND

Acute Hypoxemic Respiratory Failure (AHRF) is a frequent and life-threatening condition in patients with hematologic malignancies (HMs). The need for invasive mechanical ventilation in this population is associated with mortality rates exceeding 70%. Non-invasive respiratory supports (NIRS) - including Non-Invasive Ventilation (NIV), High-Flow Nasal Cannula (HFNC) and Continuous Positive Airway Pressure (CPAP) - have therefore been increasingly used to avoid intubation. However, evidence on NIRS use in non-ICU settings remains limited.
This study aimed to describe the feasibility and clinical impact of ward-based NIRS in hematologic patients with AHRF.

METHODS
Data from adult hematologic patients with mild-to-severe AHRF ($PaO_2/FiO_2 < 300$ or $SpO_2 < 90\%$), who were treated with NIRS in the hematology wards of Niguarda Hospital, were retrospectively collected.
Both Do-Not-Intubate ("DNI" group) and ICU-eligible ("UPGRADE" group) patients were included. Exclusion criteria were: Glasgow Coma Scale < 8, hemodynamic instability or ongoing palliative care.
The primary outcome was the NIRS failure rate (need for endotracheal intubation or death within 30 days). Secondary outcomes included were intubation rate, ICU admission rate and 30-day mortality.
Data on hematologic diagnosis, AHRF etiologies, NIRS mode, interface, therapy duration, positional therapy, need for Airway Clearance Techniques (ACTs), intolerance and adverse events were also collected and analyzed descriptively.

RESULTS
Among 51 patients, 43 (84.4%) were treated for a first episode of AHRF and 8 (15.6%) after ICU discharge. Patients' characteristics are shown in table 1, while hematologic diagnosis and AHRF etiologies are reported in figure 1 and 2.
NIRS failure occurred in 6 patients (11.8%): 3 (8.3%) in the UPGRADE group and 3 (20%) in the DNI group. Within the UPGRADE group, ICU admission rate was 25%, intubation rate 8.3% and 30-day mortality 0%.
Tolerance was high (92.2%) with no adverse events. NIRS modalities and adjuvant therapies are shown in table 2 and 3.

CONCLUSION
Out-of-ICU NIRS for AHRF management in selected hematologic patients appears safe, feasible and effective. Appropriate patient selection, close monitoring and an expert multidisciplinary critical care outreach team (physician, nurse, physiotherapist) are essential.
Larger observational studies are warranted to confirm these findings, identify NIRS failure predictors and refine out-of-ICU management strategies.

Table 1. *Patient's Characteristics.*
Data are presented as "Number (%)" or "Median (IQR)".

Patients' Characteristics	Overall (N=51)	UPGRADE (N= 36; 70,6%)	DNI (N=15; 29,4%)
Age	67 (62-75)	66 (61-73)	71 (65-78)
Sex (F/M)	25/26 (49%/51%)	18/18 (50%/50%)	7/8 (46,7%/53,3%)
NEWS2 score	5 (4-8)	6 (5-8)	5 (4-8)
PaO2/FiO2 (first eval.)	172 (137-248)	153 (136-215)	200 (166-257)
SpO2%/FiO2 (first eval.)	235 (165-268)	215 (167-262)	250 (185-270)

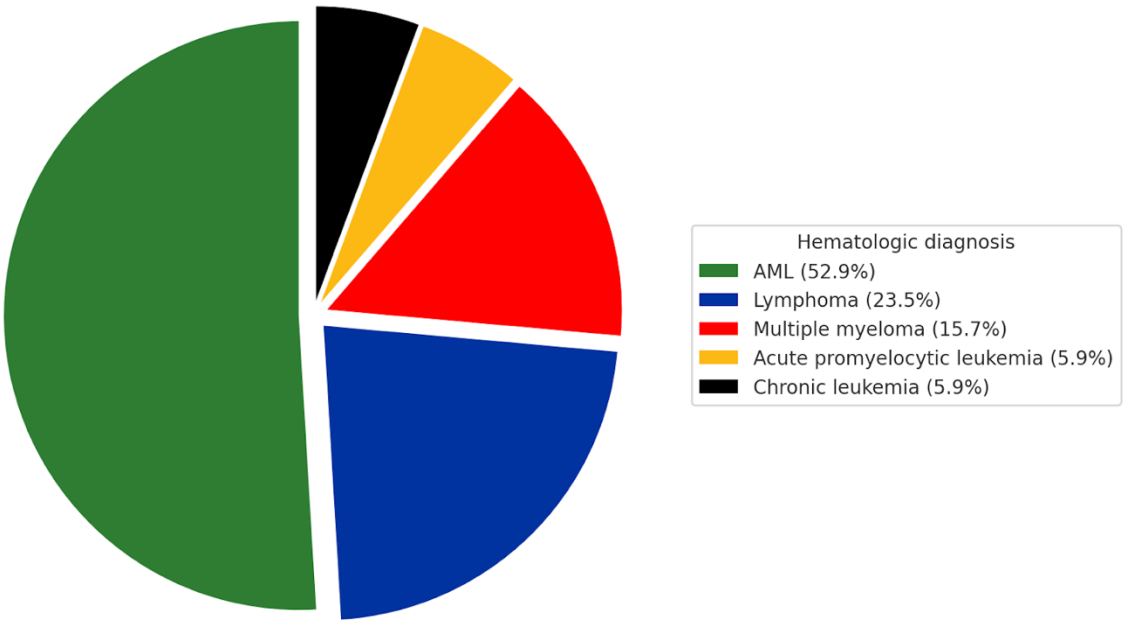

Figure 1. *Hematologic diagnosis.*
3 patients (5,9%) were hospitalized following bone marrow transplantation.

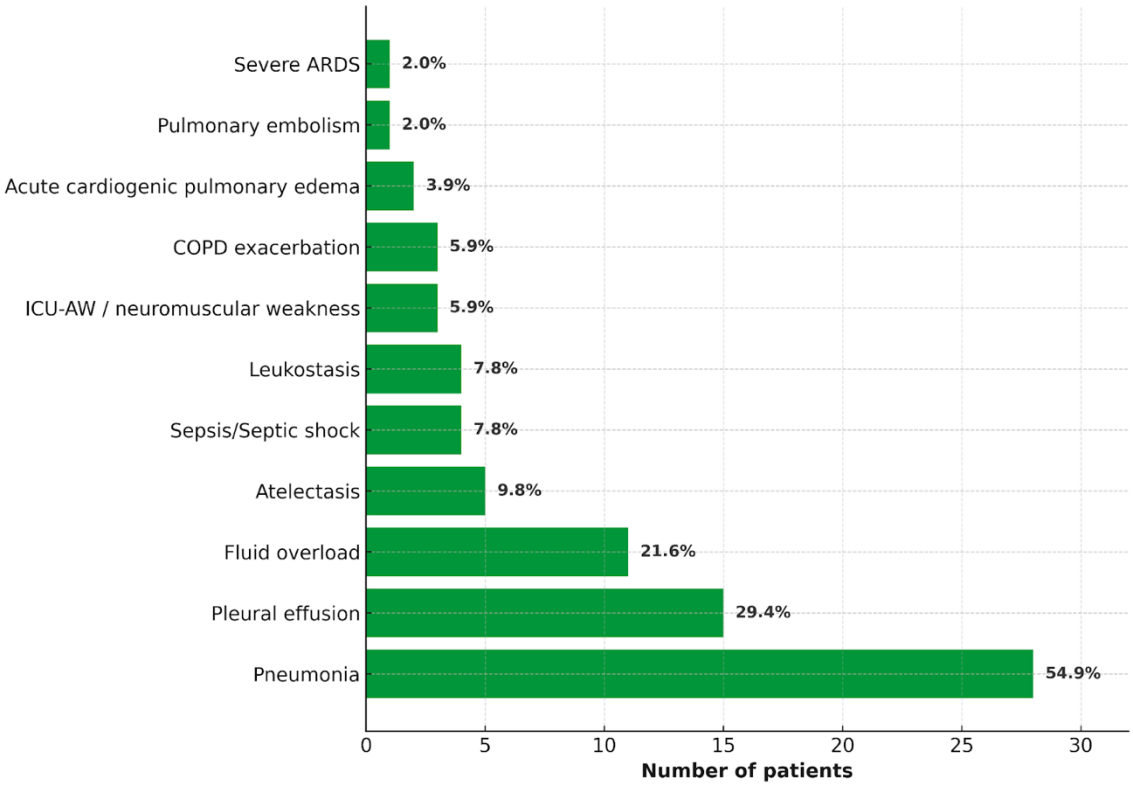

Figure 2. *AHRF etiologies.*
In 52% of patients, two concomitant etiological factors for acute respiratory failure were identified. The chart shows the cumulative prevalence (primary + secondary) of AHRF etiologies.

Table 2. *NIRS modalities.*
Data are presented as "% (number of patients)", "Median (IQR)" or "Median (IQR; min–max)". Abbreviations: COT = Conventional Oxygen Therapy, PEEP = Positive End-Expiratory Pressure, PS = Presure Support, FiO2 = Fraction of inspired oxygen.

NIRS mode	
HFNC only	11,8% (6)
NIV (+COT)	13,7% (7)
CPAP (+COT)	7,8% (4)
NIV + HFNC	49% (25)
CPAP + HFNC	17,6% (9)
Ventilatory parameters	
FiO2 (%)	45 (40-50; 30-90)
PEEP (cmH_2O)	8 (8-10; 7-12)
PS (cmH_2O)	8 (7-10; 5-12)
Flow (L/min)	50 (45-60; 30-60)
Hours/day (*only for NIV and CPAP, N=45*)	
Night use only (6 hs/day)	4,4% (2)
2-3h every shift (6-9 hs/day)	17,8% (8)
2-3h every shift + night (12 hs/day)	64,4% (29)
Small brakes (16-20 hs/day)	8,9% (4)
In continuous (20-24 hs/day)	4,4% (2)
Days of treatment	
NIV/CPAP	8 (5-12)
HFNC	7 (4-12)
Device	
Domiciliary HFNC	66,7% (34)
Domiciliary BiPAP/CPAP *(single-limb circuit, vented mask)*	78,4% (40)
Critical care hospital ventilator *(double-limb circuit, non-vented mask)*	9,8% (5)
Flow generator or blender	0% (0)
Interface (*only for NIV and CPAP, N=45*)	
Helmet	0% (0)
Total-face	4,4% (2)
Full-face (oronasal)	88,9% (40)
Hybrid Oronasal	20% (9)
Nasal	2,2% (1)
Nasal Pillows	2,2% (1)
Rotation of 2 different masks	17,7% (8)

Table 3. *Adjuvant Therapies.*
Data on patient positioning and need for sedation during NIV or CPAP are shown. The number of patients

who required ACTs is also reported. Data are presented as "% (number of patients)" or "Median (IQR; min–max)".

Patient Positioning	
Overall	64,7% (33)
Number of positions	1 (0-1; 0-3)
Lateral decubitus	64,7% (33)
Prone position	5,9% (3)
Sitting (chair/bed's edge)	64,7% (33)
Need for Airway Clearance Techniques	
Overall	27,5% (14)
Need for sedation	
Overall	29,4% (15)

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Critical Care Echocardiography to Guide Haemodynamic Management in Dilated Cardiomyopathy with Pneumonia-Associated ARDS: The Role of Dynamic Indices Beyond Ejection Fraction

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Background

Acute pulmonary injury profoundly alters heart–lung interaction by increasing right-ventricular afterload, impairing venous return, and limiting left-ventricular filling and forward flow. In patients with dilated cardiomyopathy (DCM), such load-dependent fluctuations are often underestimated by static echocardiographic parameters. The integration of advanced, physiologically responsive indices - including global longitudinal strain (GLS), stroke volume, TAPSE/PAPs (a surrogate of RV–PA coupling), and venous excess ultrasound (VExUS) scoring - provides a dynamic evaluation of biventricular performance, supporting individualized management, especially in non-ICU settings where invasive monitoring is unavailable.

Case presentation

A 68-year-old man with advanced DCM (baseline LVEF 28%, GLS −12%) and chronic heart failure was discharged after 40 days in the coronary care unit, where he had been treated for acute decompensation. Four days later, he was readmitted to the Emergency Department with dyspnea, fever, hypotension and dizziness. Laboratory tests revealed elevated inflammatory markers and severe hypoxemia (PaO_2/FiO_2 120 on HFNC 60 L/min, FiO_2 0.60). Chest CT showed bilateral interstitial infiltrates.

Empiric antibiotic therapy and low-dose dobutamine were initiated. On transfer to the step-down unit, advanced transthoracic echocardiography demonstrated stable left-ventricular systolic function (GLS −12%) and a cardiac index of 2.8 L/min/m², excluding acute-on-chronic systolic dysfunction. However, TAPSE/PAPs (0.30) was markedly reduced compared with baseline, and VExUS (3) indicated severe venous congestion, findings consistent with transient RV–PA uncoupling secondary to pulmonary vascular load rather than primitive left-ventricular failure.

Continuous diuretic therapy with furosemide and ethacrynic acid was started to maintain a negative fluid balance, titrated by serial dynamic echocardiographic indices. Dobutamine was progressively tapered as RV–PA coupling improved. During recovery, GLS improved (−12%→−14%), TAPSE/PAPs normalized (0.30→0.45), and VExUS decreased (3→1). The patient received targeted antibiotic therapy after microbiological identification and continuous hydrocortisone infusion (200 mg/day for one week), achieving complete resolution of pneumonia. He recovered fully without vasopressors or invasive ventilation and was discharged after 21 days.

Results

Pneumonia-associated ARDS likely increased pulmonary vascular resistance, leading to transient RV–PA uncoupling and venous congestion that clinically mimicked heart failure exacerbation. Sequential evaluation of dynamic echocardiographic parameters - integrating functional, coupling, and congestion indices - helped haemodynamic interpretation and guided a shift from heart failure-oriented therapy to infection-targeted management.

Conclusion

In advanced heart failure, dynamic echocardiographic indices reveal haemodynamic adaptations beyond LVEF and help differentiate cardiac from pneumogenic dyspnea, improving diagnostic accuracy and therapeutic precision.

34 - CLINICAL AND HEMODYNAMIC EFFECT OF INTRAVENOUS CALCIUM ADMINISTRATION IN CARDIAC SURGERY: A SYSTEMATIC REVIEW

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Clinical and hemodynamic effect of intravenous calcium administration in cardiac surgery: a systematic review

Background: Intravenous calcium is frequently administered in cardiac surgery patients to improve hemodynamics. Our aim is to assess safety and efficacy of intravenous calcium administration in this population.

Methods: We searched PubMed and Scopus up to March 15th, 2025. All studies investigating intravenous calcium administration in patients undergoing cardiac surgery were included. Animal studies and studies investigating oral calcium administration were excluded. We abstracted data on study design, sample size, setting, calcium formulation, dose and timing of administration. Primary outcome was all-cause mortality. Secondary outcomes included rate of myocardial ischemia, postoperative release of cardiac necrosis biomarkers, adverse events, and hemodynamic data. Only data from randomized controlled trials (RCTs) were included in the quantitative analysis.

Results: Twenty-five studies were selected (nine RCTs, eight pediatric studies, 10 including a control group), with a total sample size of 1,278 patients (809 receiving calcium). The most common formulation was calcium chloride. Most studies followed up patients for less than 60 minutes. Only one non-RCT study with a control group reported mortality data (4/66 [6.1%] calcium group vs 8/69 [11.6%] control group). Intravenous calcium transiently increases mean arterial pressure (MAP) and

reduces heart rate, with effects fading within 10-20 minutes. Calcium administration may blunt hemodynamic response to catecholamines

Conclusions: There are no data on the effects of intravenous calcium on major clinical outcomes in patients undergoing cardiac surgery. Calcium may transiently improve MAP and reduce heart rate. Large RCTs are needed to assess the effects of calcium on clinically relevant endpoints.

35 - COST-EFFECTIVENESS ANALYSIS OF PROPHYLACTIC AMINO ACIDS THERAPY FOR POSTOPERATIVE RENAL PROTECTION

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Cost-effectiveness analysis of prophylactic amino acids therapy for postoperative renal protection

Introduction

Intravenous amino acids (AA) reduce acute kidney injury (AKI) after cardiac surgery. However, their cost effectiveness is uncertain. We aimed to assess the cost-effectiveness of AA versus placebo among adult patients after cardiac surgery.

Methods

We conducted a modelled cost-effectiveness analysis comparing intravenous AA therapy versus placebo in adult patients following cardiac surgery. Resource use and clinical outcomes were extracted from the primary studies included in a recent meta-analysis and incorporated into a decision-tree model to estimate incremental costs and health outcomes. Analyses were performed separately for Australia, the United States, China, Italy, and the United Kingdom using country-specific unit costs.

Results:

The cost-effectiveness analyses expressed outcomes in terms of cost per instance of AKI averted with an in-hospital time horizon and from a healthcare payer perspective. The expected total healthcare cost after surgery in patients treated with AA ranged from $1,871 in China to $37,692 in the United States versus $2,055 in China to $40,213 in the United States for the placebo group with a per patient cost saving ranging from $184 (95%Confidence Interval [CI] -$331, -$32) in China to $2,521 (95%CI - $3,770, -$1,260) in the United States. AA also resulted in a 5.2% (95%CI 5.1%, 5.3%) absolute risk reduction in AKI. AA was dominant (cost-saving and cost-effective) across all jurisdictions.

Conclusions:

Compared with placebo, AA infusion decreases the occurrence of AKI and is cost-saving. Perioperative AA therapy is a rational approach to patient care, which simultaneously protects renal function and decreases healthcare costs.

32 - EFFECT OF LEVOSIMENDAN ON DELAYED CEREBRAL ISCHEMIA IN PATIENTS WITH SUBARACHNOID HEMORRHAGE: A SYSTEMATIC REVIEW

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Effect of levosimendan on delayed cerebral ischemia in patients with subarachnoid hemorrhage: a systematic review

Background: Levosimendan is an inodilator commonly used in the treatment of acute heart failure. Delayed cerebral ischemia (DCI) following vasospasm occurs frequently in patients with subarachnoid hemorrhage (SAH) and is associated with relevant morbidity and mortality. Due to its vasodilatory mechanism of action, levosimendan may be potentially useful in the treatment of cerebral vasospasm. However, data on its use in this setting remains sparse. We performed a systematic review to assess safety and efficacy of levosimendan in patients with SAH.

Methods: PubMed, Embase and Central were searched for studies investigating use of levosimendan in patients with SAH. We included randomized controlled trials, observational studies and case reports. Primary outcome was rate of DCI. Secondary outcomes included mortality, rate of vasospasm, and adverse events.

Results: Nine manuscripts (five case reports, two case series, and two case-control studies) were included, with 42 patients receiving levosimendan and 37 in the control group. The overall rate of DCI was 0/19 (0%) in patients receiving levosimendan vs. 8/37 (21.6%) in control patients. New vasospasm episodes occurred in 5/19 (26.3%) receiving levosimendan vs. 24/37 (64.8%) in control group. Mortality was 4/42 (9.5%) vs. 10/37 (27%) in the levosimendan and control group, respectively. No treatment-related adverse events were reported.

Conclusions: Limited data from non-randomized studies suggests that levosimendan may reduce rate of DCI in patients with SAH, without increasing adverse events. Randomized controlled trials are justified and warranted to confirm these promising findings.

33 - EXTRACORPOREAL BLOOD PURIFICATION WITH CYTOSORB® IN PATIENTS WITH SHOCK: STANDALONE CIRCUIT CONFIGURATION VERSUS INTEGRATED USE WITHIN EXTRACORPOREAL MEMBRANE OXYGENATION

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Extracorporeal Blood Purification with CytoSorb® in Patients with Shock: Standalone Circuit Configuration Versus Integrated Use Within Extracorporeal Membrane Oxygenation

Introduction

Extracorporeal hemoadsorption with CytoSorb® is being increasingly adopted in different critically ill settings to allow for both enhanced organ protection and control of inflammation derangement. We evaluated the characteristics and performances of two different CytoSorb® circuit configurations to generate data that may contribute to optimize and inform clinical practice.

Methods

We performed a secondary analysis of the largest currently available cohort of critically ill patients undergoing extracorporeal hemoadsorption with CytoSorb® at a referral center[1]. Data from 148 patients (41%) receiving CytoSorb® as a standalone circuit were compared to data from 211 patients (59%) who had the CytoSorb® cartridge integrated within the ECMO circuit.

Results

Patients with concomitant ECMO were admitted to ICU mainly for cardiac arrest or cardiogenic shock (73.9%) and underwent hemadsorption with CytoSorb® to mitigate inflammatory derangement, while patients without contemporary ECMO were admitted for either cardiogenic shock or after cardiac surgery (77.3%) and the prevalent indication for CytoSorb® treatment was hyperbilirubinemia ($p<0.001$). Patients in the ECMO group exhibited more severe shock and higher inotropic load at baseline (20 (10-35) vs 15 (5-30), $p=0.001$). 80.3% were administered renal replacement therapy, with a prevalence in patients undergoing concomitant ECMO ($p<0.001$). Patients received a median of 2 CytoSorb® cartridges within a single cycle. The duration of each cartridge and CytoSorb® efficacy, as documented by improvement in shock and organ failure laboratory parameters and intropic score reduction (Figure 1), was comparable in both groups. ICU and hospital survival were higher in patients treated with CytoSorb® as a standalone circuit (54.1% vs 34.1%, $p<0.001$ and 49.3% vs 30.8%, $p<0.001$, respectively) (Figure 1).

Conclusions

CytoSorb® treatment proved safe and effective in both configurations. Despite great inter-group diversity at baseline and in their clinical outcomes, the choice of CytoSorb® configuration had no impact on cartridge performance and duration.

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31 - REMIMAZOLAM BESYLATE VERSUS PROPOFOL FOR PROCEDURAL SEDATION IN PATIENTS UNDERGOING ELECTRICAL CARDIOVERSION.

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Remimazolam besylate versus propofol for procedural sedation in patients undergoing electrical cardioversion.

Introduction: Remimazolam besylate is a novel, short-acting benzodiazepine with a more favorable hemodynamic and respiratory profile than traditional hypnotics and may be suitable for procedural sedation. The objective of this study was to assess the safety, feasibility, and clinical advantages of remimazolam compared to propofol for procedural sedation during electrical cardioversion.

Methods: This was a prospective observational study of adults undergoing electrical cardioversion for atrial arrhythmias. Patients receiving remimazolam were compared to those receiving propofol for procedural sedation. The primary outcome was time to loss of consciousness and was evaluated in a non-inferiority analysis. Other outcomes included adequacy of sedation, the time course of hemodynamics, and time to recovery of consciousness, and adverse drug events.

Results: A total of 60 consecutive patients were enrolled in the study with 30 allocated to each group. Achievement of satisfactory sedation was similar between the remimazolam (n = 29, 97%) and propofol (n = 30, 100%) groups. The mean difference in time to loss of consciousness between the groups was within the margin of non-inferiority (0.41 min, 95% CI -0.38 to 1.20 min). In the linear mixed-effects model, remimazolam produced significantly more favorable blood pressure indexes and similar oxygen saturations compared to propofol over the course of the procedure. Three patients in the propofol group required rescue ventilation.

Conclusion: Remimazolam was associated with similar sedation adequacy, and more favorable hemodynamics compared to propofol when used for procedural sedation in adults undergoing electrical cardioversion for atrial arrhythmias.

26 - BRONCOSCOPIA IN URGENZA: ESPERIENZA DA UN CENTRO SPOKE NON DOTATO DI SERVIZIO DEDICATO

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Introduzione

La broncoscopia flessibile (FBS) è una procedura diagnostico-terapeutica fondamentale in area critica, utile nella gestione delle ostruzioni delle vie aeree e nelle infezioni respiratorie per un campionamento microbiologico e per l'ottimizzazione della gestione diagnostica e terapeutica del paziente critico. In letteratura è stato dimostrato come la FBS in pronto soccorso (PS) ed in reparto di terapia sub-intensiva (TSI), se eseguita da team addestrato di urgentisti ed in contesti adeguati, migliora il quadro clinico con un basso rischio di complicanze. Sulla base di queste evidenze, è stato avviato un progetto di implementazione della FBS presso il PS e TSI del nostro ospedale, privo di servizio endoscopico dedicato.

Metodi

Lo studio è iniziato a Marzo 2025 tramite la creazione di un percorso di formazione teorico-pratica adeguata alla formazione di un team multidisciplinare di medici, infermieri ed operatori socio-sanitaria (OSS) sub-intensivisti abili all'esecuzione di FBS in un setting di urgenza. La FBS è stata eseguita in tutti i casi entro 72h circa dall'ingresso del pz in DEA o reparto di TSI in una stanza con postazione dedicata utilizzando un broncoscopio flessibile (in dotazione sia sterilizzabile che monouso) con monitor video dedicato, un sistema di aspirazione per raccolta dei campioni microbiologici ed un monitoraggio multiparametrico continuo. In ogni procedura il team era formato da due equipe: una dedicata all'esecuzione della FBS composta da due medici, un infermiere ed un OSS; una dedicata alla sedazione ed al monitoraggio del paziente composta da un medico urgentista ed un infermiere. Per ogni paziente sono stati raccolti dati relativi ad indicazione, modalità e tempistiche della procedura, eventuale utilizzo di sedazione procedurale, esito delle indagini ed eventuali complicante. Infine lo studio ha valutato l'impatto di tale procedura sulla gestione diagnostica e terapeutica del paziente.

Risultati:

Nel periodo di osservazione da 12/03/2025 al 28/10/2025 sono state eseguite 21 broncoscopie.

I risultati sono riportati nella tabella sottostante.

<table>
<tr><td colspan="2">Totale procedure</td><td colspan="6">21</td></tr>
<tr><td colspan="2">Indicazioni</td><td colspan="2">Ostruzioni bronchiali
15%</td><td colspan="2">Polmonite-ARDS
80%</td><td colspan="2">Emottisi
5%</td></tr>
<tr><td colspan="2" rowspan="2">Caratteristiche cliniche</td><td colspan="2">Età media</td><td colspan="2">Sesso</td><td>P/F pre FBS</td><td colspan="2">Ipercapnia</td></tr>
<tr><td colspan="2">73 anni</td><td>M
13</td><td>F
8</td><td>195</td><td colspan="2">8/21</td></tr>
<tr><td rowspan="4">Ossigenazione</td><td></td><td>NIV</td><td colspan="2">HFNC</td><td>MV</td><td>Cn</td><td>aa</td></tr>
<tr><td>preFBS</td><td>4/21</td><td colspan="2">8/21</td><td>2/21</td><td>4/21</td><td>3/21</td></tr>
<tr><td>IntraFBS</td><td>4/21</td><td colspan="2">17/21</td><td>0/21</td><td>0/21</td><td>0/21</td></tr>
<tr><td>postFBS
1 settimana</td><td>0/21</td><td colspan="2">1/21</td><td>1/21</td><td>11/21</td><td>8/21</td></tr>
<tr><td colspan="2" rowspan="2">Farmaci sedo-analgesia
(dosaggio medio pro/kg)</td><td colspan="2">Propofol-Midazolam
(8/21)</td><td colspan="2">Ketamina-Midazolam
(5/21)</td><td colspan="2">Midazolam
(8/21)</td></tr>
<tr><td colspan="2">1.08 - 0.06 mg/kg</td><td colspan="2">1.28 - 0.07 mg/kg</td><td colspan="2">0.08 mg/kg</td></tr>
<tr><td colspan="2" rowspan="2">Premedicazione</td><td colspan="2">Morfina (5/21)</td><td colspan="2">Fentanyl (4/21)</td><td colspan="2">Scopolamina butilbromuro</td></tr>
<tr><td colspan="2">0.08 mg/kg</td><td colspan="2">1.04 mcg/kg</td><td colspan="2">20 mg/ml in dose unica</td></tr>
<tr><td colspan="2" rowspan="2">Follow up
1 settimana</td><td colspan="2">Dimessi</td><td colspan="2">Trasferiti in medicina</td><td>Ricovero TSI</td><td>Decessi</td></tr>
<tr><td colspan="2">11/21</td><td colspan="2">8/21</td><td>1/21</td><td>1/21</td></tr>
</table>

Il tempo di esecuzione dell'esame è risultato essere di 16 minuti circa e le complicanze sono risultate lievi, transitorie ed autolimitanti senza mai riportare eventi maggiori (PNX, scompenso emodinamico severo, ipossia refrattaria, morte). Ogni esame è stato preceduto da una sedazione procedurale che ha permesso di ottenete un livello di sedazione secondo la scala Richmond Agitation Sedation Scale (RASS) media fra -2 e -3 senza eventi avversi rilevanti. La raccolta di BAL ha fornito colture significative nel 75% dei casi determinando una modifica della terapia antibiotica nel 40% dei pazienti ed una riduzione della necessità di ossigeno.

Conclusioni

La nostra esperienza conferma che la FBS in PS/TSI rappresenta una procedura sicura ed efficace, capace di orientare tempestivamente la terapia antibiotica mirata, migliorando l'outcome clinico e l'efficienza del percorso assistenziale. Le complicanze osservate sono risultate di minima rilevanza clinica dimostrando che la broncoscopia non comporta rischi significativi per il paziente se eseguita da personale formato ed all'interno di un setting organizzato ed attrezzato a gestire eventuali criticità. Inoltre la possibilità di eseguire la procedura direttamente in contesti periferici garantisce un trattamento più rapido e tempestivo della patologia senza dover organizzare trasferimenti di pazienti critici ed instabili verso centri Hub riservando a questi solo procedure di II livello o casi ad elevato rischio clinico.

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A case of fatal Fat Embolism in traumatized child with Duchenne dystrophy

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Introduction

Fat embolism syndrome (FES) is a rare but potentially fatal complication in patients with Duchenne muscular dystrophy (DMD), particularly after long bone fractures. DMD patients are predisposed to osteoporosis and traumatic fractures due to chronic corticosteroid therapy, loss of ambulation, and obesity. (1) Clinical diagnosis of FES remains challenging, as radiological findings are often inconclusive and treatment is mainly supportive. We describe a case of a child with DMD who developed fatal FES after low-energy trauma.

Methods

We describe the clinical course of a 13-year-old boy with genetically confirmed DMD who was admitted to our Intensive Care Unit following a wheelchair fall that caused femoral and tibial fractures. Clinical data, laboratory findings, imaging studies, and therapeutic interventions were analyzed. Diagnostic criteria were compared with Gurd's major and minor signs.

Results

The patient presented with rapid neurological deterioration and hypoxemia shortly after trauma. Initial CT imaging was unremarkable, but MRI revealed multiple microembolic ischemic lesions in basal ganglia and cortical territories. Laboratory evaluation demonstrated anemia, thrombocytopenia, elevated D-dimer, and high troponin levels. Clinical progression was characterized by petechial rash, worsening respiratory failure, and hemodynamic instability requiring mechanical ventilation and vasoactive support. Despite aggressive treatment with protective ventilation, corticosteroids, anticoagulation, osmotherapy, and orthopedic stabilization, the patient developed cerebral edema, fixed mydriasis, and eventually cardiogenic shock leading to death within four days. (2) Post-mortem examination was arranged to confirm fat embolism.

Conclusions

This case highlights the diagnostic and therapeutic challenges of FES in pediatric DMD patients. The combination of multiple long bone fractures, rapid neurological decline, petechiae, and respiratory compromise strongly supported the diagnosis. Preventive strategies, including careful patient handling, fracture stabilization, and cautious fluid management, remain crucial as

therapeutic options are limited and largely supportive. Clinicians should maintain a high index of suspicion for FES in DMD patients with fractures, as delayed recognition may contribute to poor outcomes.(3) Further studies are required to evaluate preventive measures and potential pharmacological interventions such as corticosteroids, statins, or albumin therapy. (4-5)

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M

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O

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Q

R

S

T

V

X

Z

Sommario

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