**This week's PubMed 1st – 7th January 2023: articles of interest n = 38**

## CPR AND COVID-19

No articles identified.

## CPR/MECHANICAL CHEST COMPRESSION

No articles identified.

## REGISTRIES, REVIEWS AND EDITORIALS

**1.** Crit Care. 2023 Jan 6;27(1):5. doi: 10.1186/s13054-022-04246-z.
**MIRACLE(2) and SCAI grade identify patients for early wakening after out-of-hospital cardiac arrest: a post hoc analysis of the THAW trial.**
Simpson R(1)(2), Karamasis GV(1)(3), Davies J(1)(2), Pareek N(4)(5), Keeble TR(6)(7); Study Group Collaborating Authors.
**NO ABSTRACT AVAILABLE**

**2.** Medicine (Baltimore). 2022 Dec 23;101(51):e32351. doi: 10.1097/MD.0000000000032351.
**Association between scene time interval and clinical outcomes according to key Utstein factors in out-of-hospital cardiac arrest.**
Jung E(1), Ryu HH(1), Ro YS(2), Shin SD(2).
**ABSTRACT**
There is no consensus on the appropriate length of time spent on the scene by emergency medical services. Hence, our study aimed to investigate the association between the scene time interval (STI) and clinical outcomes of out-of-hospital cardiac arrest (OHCA) and determine whether this association is affected by key Utstein factors-witness status, bystander cardiopulmonary resuscitation, and initial electrocardiogram rhythm. This study is a cross-sectional study, using data between 2017 and 2020 from a nationwide, population-based, prospective registry of OHCA. The primary exposure is the STI, which was categorized into 3 groups: short (0 < STI ≤ 12 min), middle (13 ≤ STI ≤ 16 min), long (17 ≤ STI ≤ 30 min). The main outcome was good neurological recovery. Multivariable logistic regression and interaction analyses were performed to estimate the effect of STIs on study outcomes according to key Utstein factors. Witnessed, bystander cardiopulmonary resuscitation, and an initial shockable rhythm were associated with high survival to discharge and good neurological recovery, whereas prolonged STI was associated with low survival to discharge and poor neurological recovery. In patients with witnessed arrest, increased STI caused a more rapid decrease in survival to discharge than in non-witnessed cases (witnessed arrest: 0.56 (0.51-0.62) in middle STI and 0.33 (0.30-0.37) in long STI, non-witnessed arrest: 0.72 (0.61-0.85) in middle STI and 0.53 (0.45-0.62) in long STI. In patients with an initial shockable rhythm, increased STI caused a more rapid decrease in survival to discharge and neurological recovery than in initial non-shockable cases. Longer STIs were associated with poorer OHCA outcomes, and this trend was further emphasized in patients with witnessed OHCA and OHCA with an initial shockable rhythm.

**3.** Resusc Plus. 2022 Dec 23;13:100342. doi: 10.1016/j.resplu.2022.100342. eCollection 2023 Mar.

**Sex difference in the association between type of bystander CPR and clinical outcomes in patients with out of hospital cardiac arrest.**

Kwak J(1), Ok Ahn K(1), Chan PS(2).

**ABSTRACT**

BACKGROUND: A recent study suggested that women with out-of-hospital cardiac arrest have a smaller survival benefit with bystander cardiopulmonary resuscitation than men. We evaluated whether this weaker association between bystander cardiopulmonary resuscitation and survival in women is related to dispatcher-assisted vs unassisted bystander cardiopulmonary resuscitation. METHODS: In a national registry in the Republic of Korea, we identified adult patients with out-of-hospital cardiac arrest during 2013-2018. The main exposure was type of bystander cardio-pulmonary resuscitation (categorized as none, dispatcher-assisted, and unassisted). The primary outcome was favourable neurological survival. Multivariable logistic regression evaluated for an interaction between sex and type of bystander cardiopulmonary resuscitation. RESULTS: Of 93,245 patients with out-of-hospital cardiac arrest, there were 31,578 (33.9%) women and 61,667 (66.1%) men. Overall, both types of bystander cardiopulmonary resuscitation were associated with favourable neurological survival (unassisted: adjusted OR, 1.81 [95% CI: 1.66-1.98]; dispatcher-assisted: adjusted OR, 1.44 [95% CI: 1.33-1.56]). When unassisted cardiopulmonary resuscitation was administered, the association between bystander cardiopulmonary resuscitation and favourable neurological survival was similar between women and men: adjusted ORs of 1.59 (95% CI: 1.30-1.95) in women and 1.88 (95% CI: 1.71-2.08) in men; interaction $p = 0.65$). In contrast, when dispatcher-assisted cardiopulmonary resuscitation was administered, the association differed by sex: adjusted ORs of 1.08 (95% CI: 0.90-1.92) in women and 1.55 (95% CI: 1.42-1.69) in men; interaction $p < 0.0002$). CONCLUSIONS: Dispatcher-assisted cardiopulmonary resuscitation was associated with favourable neurological survival in men but not in women whereas unassisted bystander cardiopulmonary resuscitation was associated with favourable neurological survival in women and men.

**4.** Am J Emerg Med. 2022 Dec 21;65:84-86. doi: 10.1016/j.ajem.2022.12.014. Online ahead of print.

**A comparison between sudden cardiac arrest on military bases and non-military settings.**

Shekhar AC(1), Madhok M(2), Campbell T(3), Blumen IJ(4), Lyon RM(5), Mann NC(6).

**ABSTRACT**

INTRODUCTION: Out-of-hospital cardiac arrests contribute to significant morbidity and mortality in both non-military/civilian and military populations. Early CPR and AED use have been linked with improved outcomes. There is public health interest in identifying communities with high rates of both with the hopes of creating generalizable tactics for improving cardiac arrest survival. METHODS: We examined a national registry of EMS activations in the United States (NEMSIS). Inclusion criteria were witnessed cardiac arrests from January 2020 to September 2022 where EMS providers documented the location of the arrest, whether CPR was provided prior to their arrival (yes/no), and whether an AED was applied prior to their arrival (yes/no). Cardiac arrests were then classified as occurring on a military base or in a non-military setting. RESULTS: A total of 60 witnessed cardiac arrests on military bases and 202,605 witnessed cardiac arrests in non-military settings met inclusion criteria. Importantly, the prevalence of CPR and AED use prior to EMS arrival was significantly higher on military bases compared to non-military settings. CONCLUSIONS: Reasons for the trends we observed may be a greater availability of CPR-trained individuals and AEDs on military bases, as well as a widespread willingness to provide aid to victims of cardiac arrest. Further research should examine cardiac arrests on military bases.

**5.** Heart Rhythm O2. 2022 Dec 16;3(6Part B):857-863. doi: 10.1016/j.hroo.2022.07.009. eCollection 2022 Dec.

**Racial, ethnic, and socioeconomic disparities in out-of-hospital cardiac arrest within the United States: Now is the time for change.**

Mehta NK(1)(2), Allam S(3), Mazimba S(2), Karim S(4).

**ABSTRACT**

This review highlights the current evidence on racial, ethnic, and socioeconomic disparities in cardiac arrest outcomes within the United States. Several studies demonstrate that patients from Black, Hispanic, or lower socioeconomic status backgrounds suffer the most from disparities at multiple levels of the resuscitation pathway, including in the provision of bystander cardiopulmonary resuscitation, defibrillator usage, and postresuscitation therapies. These gaps in care may altogether lead to lower survival rates and worse neurological outcomes for these patients. A multisystem, culturally sensitive approach to improving cardiac arrest outcomes is suggested in this article.

**6.** Front Cardiovasc Med. 2022 Dec 14;9:1080608. doi: 10.3389/fcvm.2022.1080608. eCollection 2022.

**Genetic characterization of juvenile sudden cardiac arrest and death in Tuscany: The ToRSADE registry.**

Girolami F(1), Spinelli V(2), Maurizi N(3), Focardi M(3)(4), Nesi G(3)(5), Maio V(3)(5), Grifoni R(3)(4), Albora G(3), Bertaccini B(6), Targetti M(3), Coppini R(2), Favilli S(1), Olivotto I(1)(7), Cerbai E(2).

**ABSTRACT**

BACKGROUND: Sudden cardiac arrest (SCA) in young people represents a dramatic event, often leading to severe neurologic outcomes or sudden cardiac death (SCD), and is frequently caused by genetic heart diseases. In this study, we report the results of the Tuscany registry of sudden cardiac death (ToRSADE) registry, aimed at monitoring the incidence and investigating the genetic basis of SCA and SCD occurring in subjects < 50 years of age in Tuscany, Italy. METHODS AND RESULTS: Creation of the ToRSADE registry allowed implementation of a repository for clinical, molecular and genetic data. For 22 patients, in whom a genetic substrate was documented or suspected, blood samples could be analyzed; 14 were collected at autopsy and 8 from resuscitated patients after SCA. Next generation sequencing (NGS) analysis revealed likely pathogenetic (LP) variants associated with cardiomyopathy (CM) or channelopathy in four patients (19%), while 17 (81%) carried variants of uncertain significance in relevant genes (VUS). In only one patient NGS confirmed the diagnosis obtained during autopsy: the p.(Asn480Lysfs*20) PKP2 mutation in a patient with arrhythmogenic cardiomyopathy (AC). CONCLUSION: Systematic genetic screening allowed identification of LP variants in 19% of consecutive patients with SCA/SCD, including subjects carrying variants associated with hypertrophic cardiomyopathy (HCM) or AC who had SCA/SCD in the absence of structural cardiomyopathy phenotype. Genetic analysis combined with clinical information in survived patients and post-mortem evaluation represent an essential multi-disciplinary approach to manage juvenile SCD and SCA, key to providing appropriate medical and genetic assistance to families, and advancing knowledge on the basis of arrhythmogenic mechanisms in inherited cardiomyopathies and channelopathies.

**7.** CNS Neurosci Ther. 2023 Jan;29(1):104-110. doi: 10.1111/cns.13983. Epub 2022 Oct 2.

**The use of ketamine as a neuroprotective agent following cardiac arrest: A scoping review of current literature.**

Ornowska M(1), Wormsbecker A(2)(3), Andolfatto G(4), Leung TS(2)(5)(6), Khan I(2)(4), Medvedev G(2)(7).

**ABSTRACT**

AIMS: The objective of this article is to summarize the state of the literature surrounding the use of ketamine as a neuroprotective agent following cardiac arrest. METHODS: Five electronic databases were used to search for studies related to the use of ketamine for neuroprotection following cardiac arrest. This search was performed once in May 2020, and an updated search was conducted in May 2021 and March 2022. RESULTS: All searches combined retrieved 181 results; no clinical trials were identified. As such, the authors were limited to writing a scoping review of the literature rather than a systematic review. CONCLUSIONS: The current state of the literature describes the mechanism of action of ketamine as a neuroprotective agent through its action as an NMDA antagonist. There is evidence of its efficacy as a neuroprotective agent in preclinical models of cardiac arrest. Current published clinical work supports the use of ketamine ameliorating neurologic outcomes in other conditions such as epilepsy, traumatic brain injury, and depression. The current state of the literature is reflective of the notion that the use of ketamine following cardiac arrest may result in improved neurologic outcomes. Future research directions should focus on the use of ketamine as a possible clinical intervention following cardiac arrest.

## IN-HOSPITAL CARDIAC ARREST

**1.** Resuscitation. 2023 Jan 4:109686. doi: 10.1016/j.resuscitation.2022.109686. Online ahead of print.

**Updating the Model for Risk-Standardizing Survival for In-Hospital Cardiac Arrest to Facilitate Hospital Comparisons.**

Chan PS(1), Kennedy KF(2), Girotra S(2); American Heart Association's Get With The Guidelines®-Resuscitation Investigators(2).

**ABSTRACT**

BACKGROUND: Risk-standardized survival rates (RSSR) for in-hospital cardiac arrest (IHCA) have been widely used for hospital benchmarking and research. The novel coronavirus 2019 (COVID-19) pandemic has led to a substantial decline in IHCA survival as COVID-19 infection is associated with markedly lower survival. Therefore, there is a need to update the model for computing RSSRs for IHCA given the COVID-19 pandemic. METHODS: Within Get With The Guidelines®-Resuscitation, we identified 53,922 adult patients with IHCA from March, 2020 to December, 2021 (the COVID-19 era). Using hierarchical logistic regression, we derived and validated an updated model for survival to hospital discharge and compared the performance of this updated RSSR model with the previous model. RESULTS: The survival rate was 21.0% and 20.8% for the derivation and validation cohorts, respectively. The model had good discrimination (C-statistic 0.72) and excellent calibration. The updated parsimonious model comprised 13 variables-all 9 predictors in the original model as well as 4 additional predictors, including COVID-19 infection status. When applied to data from the pre-pandemic period of 2018-2019, there was a strong correlation (r=0.993) between RSSRs obtained from the updated and the previous models. CONCLUSION: We have derived and validated an updated model to risk-standardize hospital rates of survival for IHCA. The updated model yielded RSSRs that were similar to the initial model for IHCAs in the pre-pandemic period and can be used for supporting ongoing efforts to benchmark hospitals and facilitate research that uses data from either before or after the emergence of COVID-19.

**2.** J Chin Med Assoc. 2023 Jan 1;86(1):1-2. doi: 10.1097/JCMA.0000000000000847. Epub 2023 Jan 2.

**Blood urea nitrogen and creatinine in in-hospital cardiac arrest patients.**

Lee WL(1)(2)(3), Lee FK(4)(5), Wang PH(2)(5)(6)(7).

**NO ABSTRACT AVAILABLE**

**INJURIES AND CPR**

No articles identified.

**CAUSE OF THE ARREST**

**1.** Heart. 2022 Dec 6:heartjnl-2022-321650. doi: 10.1136/heartjnl-2022-321650. Online ahead of print.

**Pre-arrest comorbidity burden and the future risk of out-of-hospital cardiac arrest in Korean adults.**

Hong SI(1), Kim YJ(1), Kim YJ(2), Kim WY(3).

**ABSTRACT**

OBJECTIVE: To investigate the impact of pre-arrest comorbidities on future out-of-hospital cardiac arrest (OHCA) development using a nationwide dataset. METHODS: This population-based, matched case-control study used the national health insurance claims data relevant to OHCA in South Korea from January 2009 to December 2018. Case patients were randomly matched to controls by age, sex and date of cardiac arrest. Controls were defined as patients who did not experience OHCA based on claim codes in national health screening data. The comorbidity burden was assessed using the Charlson Comorbidity Index (CCI). RESULTS: A total of 191 370 OHCA patients were matched to 347 568 controls. The mean CCI in the case group was 3.76, which was significantly higher than that in the control group (1.75, p<0.001). Overall, OHCA was 1.35 (95% CI 1.34 to 1.35) times more likely to occur with every 1 point increase in the CCI. All other comorbidities constituting the CCI were associated with the OHCA risk (p<0.001). Patients with CCI ≥3 presented an OR of 3.71 (95% CI 3.67 to 3.76) for the risk of OHCA occurrence. This association was more pronounced in patients aged <70 years than in those aged ≥70 years (OR (95% CI) 16.07 (15.48 to 16.68) vs 6.50 (6.33 to 6.68)). CONCLUSION: A high burden of pre-arrest comorbidity was associated with a higher risk of OHCA development, which was more pronounced in patients with less advanced age.

**2.** Pediatrics. 2023 Jan 1;151(1):e2022056798. doi: 10.1542/peds.2022-056798.

**Preparticipation State Cardiac Screening Forms for Athletes.**

Blank ZJ(1), Spicer RL(2)(3), Robinson JA(2)(3).

**ABSTRACT**

BACKGROUND AND OBJECTIVES: Annual preparticipation physical evaluation (PPE) is used in the United States to screen adolescents for potential causes of sudden cardiac death. The American Heart Association recommends 14 screening elements of history and physical examination. This study sought to define the utilization of these screening elements by each of the 50 states before high school athletics. METHODS: PPE forms were obtained from the public website of the high school athletics governing body in every state. Form content was analyzed to identify which of the 14 screening elements were explicitly fulfilled. Additional PPE forms provided by private/parochial schools, other professional societies, or independent groups were excluded from this study. RESULTS: A total of 48 states (96%) had PPE forms posted online. The remaining 2 states (4%) deferred the specific method of PPE documentation to individual school districts and provided no standardized form. Of the 48 states providing PPE forms, 13 (27%) included all 14 American Heart Association screening elements. The median criteria included by each state was 11 (range 3-14). The 3 criteria most commonly absent were (1) the examination of femoral pulses to exclude coarctation (58%), (2) a family history of specific inherited cardiac disease (31%), and (3) personal history of hypertension (27%). CONCLUSIONS: Annual preparticipation forms are important screening tools.

Only a minority of states include all 14 cardiac screening elements recommended by the American Heart Association.

**3.** Asian J Psychiatr. 2023 Jan;79:103314. doi: 10.1016/j.ajp.2022.103314. Epub 2022 Nov 3.
**Sudden unexplained death in schizophrenia patients: An autopsy-based comparative study from China.**
Wang S(1), He M(2), Andersen J(3), Lin Y(4), Zhang M(5), Liu Z(6), Li L(7).
**ABSTRACT**
Explainable sudden deaths in schizophrenia patients due to both cardiac (SCD) and non-cardiac causes (SNCD) have been extensively documented. However, sudden unexplained death (SUD) in this cohort remains to be elucidated. This study retrospectively analyzed 18 SUD cases that underwent systematic autopsy at our institutes during the period 2010-2022. The etiological, demographic, and autopsy features of the SUD cases were then compared with 37 year-matched sudden explainable deaths (23 SCD cases and 14 SNCD cases). Our results showed that the average age of the SUD was 39.0 ( ± 8.4) years, with the disease duration of 11.8 ( ± 8.1) years and a male/female ratio of 11:7. Most cases occurred during daytime (72.2%) and outside of hospital (77.8%). A large proportion of the SUD cases (77.8%) had persistent psychiatric episodes before death. Clozapine was found to be the most commonly used antipsychotic (33.3%), followed by Olanzapine (27.8%), Risperidone (27.8%) and Chlorpromazine (27.8%) in the SUD cases. When compared among groups, the SUD cases showed significantly younger ages ($p = 0.035$), lower heart weight ($p = 0.004$) and lower proportion of Clozapine use ($p = 0.045$). The presence of persistent psychiatric episodes was significantly higher in the SUD group than in any explainable deaths ($p = 0.018$) and was an independent risk factor for SUD (OR = 4.205, $p = 0.040$). This is the first autopsy-based study of SUD cases from China. We conclude that a stable mental state maintained by antipsychotics (i.e., Clozapine) is vital to schizophrenia patients.

## END-TIDAL $CO_2$

No articles identified.

## ORGAN DONATION

**1.** Perfusion. 2023 Jan 2:2676591221150358. doi: 10.1177/02676591221150358. Online ahead of print.
**Addressing inadequate blood flow during normothermic regional perfusion for in-situ donation after circulatory death grafts preservation.**
Squiccimarro E(1)(2), Colombaro C(1), Civita A(3), Rociola R(1), Buys D(4), Gesualdo L(5), Paparella D(1)(6), Lorusso R(2)(7).
**ABSTRACT**
Donation after circulatory death (DCD) has emerged as attainable strategy to tackle the issue of organ shortage, expanding the donor pool. The DCD concept has been applied to the multiple declinations of circulatory arrest, as per the Modified Maastricht Classification. Notwithstanding, whichever the scenario, DCD donors experience a variable warm ischemia time whose correlation with graft dysfunction is ascertained. This applies to both "controlled" (cDCD) donors (i.e., the timespan from the withdrawal of life-sustaining therapies to the onset of in-situ perfusion), and "uncontrolled" DCD (uDCD) (i.e., the low-flow period during cardiopulmonary resuscitation - CPR). This sums up to the no-flow time from cardiac arrest to the start of CPR for uDCD donors, and to the

no-touch period for both uDCDs and cDCDs. Static and hypothermic storage may not be appropriate for DCD grafts. In order to overcome this ischemic insult, extracorporeal membrane oxygenation devices are adopted to guarantee the in-situ grafts preservation by means of techniques such as the normothermic regional perfusion (NRP) which consists in a selective abdominal perfusion obtained via the endovascular or surgical occlusion of the thoracic aorta. The maintenance of an adequate pump flood throughout NRP is therefore a sine qua non to accomplish the DCD donation. The issue of insufficient pump flow during NRP is prevalent and clinically significant but its management remains technically challenging and not standardized. Hereby we propose a systematic algorithmic approach to address this relevant occurrence.

## FEEDBACK

No articles identified.

## DRUGS

No articles identified.

## TRAUMA

**1.** Injury. 2023 Jan;54(1):15-18. doi: 10.1016/j.injury.2022.09.059. Epub 2022 Sep 30.
**Pre-hospital CPR after traumatic arrest: Outcomes at a level 1 pediatric trauma center.**
Stewart S(1), Briggs KB(2), Fraser JA(2), Svetanoff WJ(2), Waddell V(2), Oyetunji TA(3).
**ABSTRACT**
BACKGROUND: The survival of traumatic cardiopulmonary arrest (TCA) requiring pre-hospital cardiopulmonary resuscitation (P-CPR) is abysmal across age groups. We aim to describe the mechanisms of injury and outcomes of children suffering from TCA leading to P-CPR at our institution. METHODS: A retrospective review was conducted to identify children ages 0-17 years who suffered TCA leading to P-CPR at our institution between 5/2009 and 3/2020. For analysis, patients were stratified into those still undergoing CPR at arrival and those who attained pre-hospital return of spontaneous circulation (ROSC). Primary outcome was discharge alive from the hospital. RESULTS: P-CPR was initiated for 48 patients who had TCA; 23 had pre-hospital ROSC. Of the 25 children undergoing CPR at presentation, none survived to discharge. The median duration of CPR, from initiation to time of death declaration was 34 min [29,50]. Seventeen patients died after resuscitation attempts in the ED, while 8 died after admission to the PICU. Of the 23 patients who attained pre-hospital ROSC, 6 survived to discharge. All survivors required intensive rehabilitation services at discharge and at most recent follow-up, 5 had residual deficits requiring medical attention. CONCLUSION: There are poor outcomes in children with pre-hospital traumatic cardiopulmonary arrest, particularly in those without pre-hospital ROSC. These data further support the need for standardized guidelines for resuscitation in children with traumatic cardiopulmonary arrest.

## VENTILATION

**1.** Resuscitation. 2023 Jan 4:109685. doi: 10.1016/j.resuscitation.2022.109685. Online ahead of print.

**Mechanical ventilation during cardiopulmonary resuscitation: influence of positive end expiratory pressure and head-torso elevation.**

Segond N(1), Terzi N(2), Duhem H(3), Bellier A(4), Aygalin M(5), Fuste L(5), Viglino D(6), Fontecave-Jallon J(5), Lurie K(7), Guérin C(8), Debaty G(3).

**ABSTRACT**

BACKGROUND: Efficient ventilation is important during cardiopulmonary resuscitation (CPR). Nevertheless, there is insufficient knowledge on how the patient's position affects ventilatory parameters during mechanically assisted CPR. We studied ventilatory parameters at different positive end-expiratory pressure (PEEP) levels and when using an inspiratory impedance valve (ITD) during horizontal and head-up CPR (HUP-CPR). METHODS: In this human cadaver experimental study, we measured tidal volume (VT) and pressure during CPR at different randomized PEEP levels (0, 5 or 10 cmH2O) or with an ITD. CPR was performed, in the following order: horizontal (FLAT), at 18° and then at 35° head-thorax elevation. During the inspiratory phase we measured the net tidal volume (VT) adjusted to predicted body weight (VTPBW), reversed airflow (RAF), and maximum and minimum airway pressure (Pmax and Pmin). RESULTS: Using ten thawed fresh-frozen cadavers we analyzed the inspiratory phase of 1843 respiratory cycles, 229 without CPR and 1614 with CPR. In a mixed linear model, thoracic position and PEEP significantly impacted VTPBW ($p < 0.001$ for each), and the insufflation time, thoracic position and PEEP significantly affected the RAF ($p < 0.001$ for each) and Pmax ($p < 0.001$). For Pmin, only PEEP was significant ($p < 0.001$). In subgroup analysis, at 35° VTPBW and Pmax were significantly reduced compared with the flat or 18° position. CONCLUSION: When using mechanical ventilation during CPR, it seems that the PEEP level and patient position are important determinants of respiratory parameters. Moreover, tidal volume seems to be lower when the thorax is positioned at 35°.

**CERERBRAL MONITORING**

**1.** BMJ Open. 2022 Dec 20;12(12):e063633. doi: 10.1136/bmjopen-2022-063633.

**Early Neurological ASsessment with pupillometrY during Cardiac Arrest REsuscitation (EASY-CARE): protocol for an observational multicentre prospective study.**

Zerbi SM(1)(2), Sandroni C(3), Botteri M(2), Bellasi A(4), Latronico N(5), Rasulo F(6).

**ABSTRACT**

INTRODUCTION: Out-of-hospital cardiac arrest is burdened with a high rate of ineffective resuscitation and poor neurological outcome among survivors. To date, there are few perfusion assessment tools during cardiopulmonary resuscitation and none of them provide reliable data. Despite the lack of information, physicians must decide whether to extend or terminate resuscitation efforts. METHOD AND ANALYSIS: This is a multicentre prospective, observational cohort study, involving adult patients, victims of unexpected out-of-hospital cardiac arrest. Early Neurological ASsessment with pupillometrY during Cardiac Arrest Resuscitation aims to primarily describe the reliability of quantitative pupillometry through use of the Neurological Pupillary Index (NPi) during the manoeuvre of cardiopulmonary resuscitation, as a predictor of the return of spontaneous circulation. The second objective is to seek and describe the association between the NPi and neurological outcome in the surviving cohort. Patients will be excluded if they are less than 18 years of age, have sustained traumatic brain injury, cerebrovascular emergencies, direct injury to the eyes or have pupil anomalies. Neurological outcome will be collected at intensive care unit discharge, at 30 days, 6 months and at 1 year. The Glasgow Coma Scale (GCS) will be used in the emergency department; modified Rankin Score will be adopted for neurological assessment; biomarkers and neurophysiology exams will be collected as well. ETHICS AND DISSEMINATION: The study has been approved by Ethics Committee of Milano. Local committee acceptance is required for each of the centres involved in the clinical and follow-up data collection. Data will be disseminated

to the scientific community through original articles submitted to peer-reviewed journals and abstracts to conferences.

**ULTRASOUND AND CPR**

No articles identified.

**ORGANISATION AND TRAINING**

**1.** Prehosp Disaster Med. 2023 Jan 5:1-8. doi: 10.1017/S1049023X22002424. Online ahead of print.

**Out-of-Hospital Cardiac Arrest Prospective Epidemiology Monitoring during the First Five Years of EuReCa Program Implementation in Serbia.**

Randjelovic SS(1), Nikolovski SS(2), Tijanic JZ(3), Obradovic IA(4), Fiser ZZ(5), Lazic AD(6), Raffay VI(7).

**ABSTRACT**

INTRODUCTION: Poor outcome is still a challenging concern in patients with out-of-hospital cardiac arrest (OHCA) world-wide and there are large differences between European countries regarding not only incidence rates, but survival rates as well. In 2014, Serbian Resuscitation Council initiated regular data collection on epidemiology of OHCA, according to the European Registry of Cardiac Arrest (EuReCa) study protocol. STUDY OBJECTIVE: The aim of this study is to analyze the results of the first five-year period after initiation of EuReCa study protocol elements implementation in OHCA epidemiological data collection in Serbia. METHODS: The observed period in this study is about the data on OHCA, collected within the observed area of 16 municipalities covering 1,604,015 citizens, during the period from October 1, 2014 - December 31, 2019. The study included data on all-cause OHCA in both adult and pediatric patients, according to the EuReCa One study protocol, of which all segments were observed. RESULTS: Within the study period, 5,196 OHCA patients were observed with annual incidence of 83.60/100,000. Of all registered events, 43.9% were witnessed. The most common collapse location was patient's residence (88.7%). Within the group of initiated cardiopulmonary resuscitation (CPR), cardiac etiology was observed in 80.5% of cases and shockable rhythm in 21.7%. Return of spontaneous circulation (ROSC) prior to hospital admission was significantly more frequently achieved and maintained on admission in witnessed cases, cases occurring out of patient's residence, and in cases with shockable initial rhythm (P <.01). CONCLUSION: The OHCA incidence in Serbia is comparable with the incidence in the majority of European countries, and survival rates are now significantly higher in Utstein events compared to previous results from Serbia. Enrolment of witnessing bystanders in initiating CPR measures remains a concern requiring effort towards understanding of CPR initiation importance and education of general population in administering CPR measures.

**2.** Eur J Med Res. 2023 Jan 4;28(1):8. doi: 10.1186/s40001-022-00955-x.

**Survival outcome among patients with out-of-hospital cardiac arrest who received cardiopulmonary resuscitation in China: a systematic review and meta-analysis.**

Zhou G(#)(1), Wang Y(#)(2), Sun Z(3), Yuan M(4), Ma Y(2), Wu Q(4), Wu C(4), Xu J(5), Li Y(6), Liu Y(7), Wang Z(8), Song C(9).

**ABSTRACT**

BACKGROUND: This study aimed to assess the survival outcomes among patients with out-of-hospital cardiac arrest (CA) who received cardiopulmonary resuscitation (CPR) in China. METHODS: Relevant studies, published between January 1, 2010 and September 5, 2022, were retrieved from databases, including EMBASE, PubMed, Cochrane Library, the China Biology Medicine disk, China National Knowledge Infrastructure, and Wanfang databases. We included clinical studies in which all

patients were diagnosed with CA and underwent out-of-hospital CPR, and the outcome variables were at least one of the following: return of spontaneous circulation (ROSC), survival to admission, survival to hospital discharge, 1-month survival, achieved good neurological outcomes, and 1-year survival. Two investigators independently extracted the study data and assessed its quality using a modified Newcastle-Ottawa Scale tool. The data were pooled using random-effects models. RESULTS: Of the 3620 identified studies, 49 (63,378 patients) were included in the meta-analysis. The pooled ROSC rate was 9.0% (95% confidence interval [CI] 7.5-10.5%, I2 = 97%), the pooled survival to admission rate was 5.0% (95% CI 2.7-8.0%, I2 = 98%), and the pooled survival to discharge rate was 1.8% (95% CI 1.2-2.5%, I2 = 95%). Additionally, the ROSC rate of patients with bystander CPR was significantly higher than that of those without bystander CPR, and the pooled odds ratio (OR) was 7.92 (95% CI 4.32-14.53, I2 = 85%). The ROSC rate of participants who started CPR within 5 min was significantly higher than that of those who started CPR after 5 min, and the pooled OR was 5.92 (95% CI 1.92-18.26, I2 = 85%). The ROSC rate of participants with defibrillation was significantly higher than that of those without defibrillation, and the pooled OR was 8.52 (95% CI 3.72-19.52, I2 = 77%). CONCLUSION: The survival outcomes of out-of-hospital CPR in China are far below the world average. Therefore, the policy of providing automated external defibrillators (AEDs) in public places and strengthening CPR training for healthcare providers and public personnel should be encouraged and disseminated nationwide.

**3.** Br J Hosp Med (Lond). 2022 Dec 2;83(12):1-12. doi: 10.12968/hmed.2022.0259. Epub 2022 Dec 9.
**Maternal collapse in pregnancy.**
Knapp C(1), Bhatia K(2).
**ABSTRACT**
Maternal collapse is a rare life-threatening event that can occur at any stage of pregnancy or up to 6 weeks postpartum. Prompt identification and timely intervention by a multidisciplinary team that includes an obstetrician, midwifery staff and an obstetric anaesthetist are essential to improve maternal and fetal outcomes. Standard adult resuscitation guidelines need to be followed with some modifications, taking into account the maternal-fetal physiology, which clinicians should be familiar with. During cardiac arrest, the emphasis is on advanced airway management, manual uterine displacement to relieve aortocaval compression and performing a resuscitative hysterotomy (peri-mortem caesarean delivery) swiftly in patients who are more than 20 weeks gestation to improve maternal survival. Annual multidisciplinary simulation training is recommended for all professionals involved in maternity care; this can improve teamwork, communication and emergency preparedness during maternal collapse.

**4.** Mymensingh Med J. 2023 Jan;32(1):207-212.
**Assessing the Effectiveness of Clinical Skills Laboratory and Traditional Lecture in Teaching Basic Life Support and Performance Evaluation According to Different Domains of Revised Bloom's Taxonomy.**
Selina F(1), Hasan MF, Talha KA, Al-Muhaimin M, Momo FR, Debnath J, Begum S, Ahmad J.
**ABSTRACT**
Sudden cardiac arrest out-side hospital is serious global concern. If non-medical people are taught to initiate the basic life support (BLS) training with cardiopulmonary resuscitation (CPR) then the mortality could be reduced significantly. This was a non-randomized controlled study to evaluate clinical skills laboratory (CSL) as teaching tool for basic life support (BLS) training in comparison to traditional lecture. Sample size was 68 and performed in Sylhet Women's Medical College from July 2022 to September 2022. All the participants were third year nursing students. They were enrolled in to two groups. Group-A were taught BLS by clinical skills laboratory (CSL) and Group-B were taught

by traditional lecture (TL). At the end of the teaching all of them were tested by a vetted multiple choice question (MCQ) set. The questions were set according the 5 levels of revised Blood's taxonomy. Mean score of Group-A (CSL) were higher the TL group (p=0.0003). Among the revised Bloom's taxonomy understand, apply and evaluate domains were significantly better taught (p<0.05) by CSL. The sensitivity of CSL was 0.559 in comparison to TL for BLS training. In the modern medical education teaching and assessment should be focused on the higher levels of learning taxonomy. Introducing CSL in medical education could boost up the psychomotor and cognition both in the medical education.

**5.** Zhongguo Yi Liao Qi Xie Za Zhi. 2022 Nov 30;46(6):648-654. doi: 10.3969/j.issn.1671-7104.2022.06.013.
**[Status and Development of Intelligent Cardiopulmonary Resuscitation Equipment].**
[Article in Chinese]
Ye Z(1), Gao G(2), Wang S(2), Chen H(3), Dou J(4), Cui D(2), Wang R(2).
**ABSTRACT**
The current status of cardiopulmonary resuscitation in China were introduced. The function and working principle of cardiopulmonary resuscitation equipment were described. The research status of cardiopulmonary resuscitation equipment was summarized. The main problem existing in cardiopulmonary resuscitation equipment were analyzed. Finally, according to the main technical direction involved in the conception, the existing technologies were reviewed from four aspects: path planning, human-computer interaction, automatic defibrillation and intelligent compression.

**6.** Eur Heart J. 2023 Jan 2:ehac748. doi: 10.1093/eurheartj/ehac748. Online ahead of print.
**Increasing equitable and effective delivery of cardiopulmonary resuscitation training and public access of automated electrical defibrillators through schools.**
Khanji MY(1)(2)(3), Iqbal Z(4).
**NO ABSTRACT AVAILABLE**

**7.** Nat Rev Cardiol. 2023 Jan 6. doi: 10.1038/s41569-022-00830-6. Online ahead of print.
**Hidden disparities in the rising prevalence of bystander cardiopulmonary resuscitation.**
Ong MEH(1)(2), Siddiqui FJ(3).
**NO ABSTRACT AVAILABLE**

## POST-CARDIAC ARREST TREATMENTS

**1.** Crit Care. 2023 Jan 5;27(1):4. doi: 10.1186/s13054-022-04289-2.
**The effect of blood pressure on mortality following out-of-hospital cardiac arrest: a retrospective cohort study of the United Kingdom Intensive Care National Audit and Research Centre database.**
McGuigan PJ(1)(2), Giallongo E(3), Blackwood B(2), Doidge J(3), Harrison DA(3), Nichol AD(4)(5)(6), Rowan KM(3), Shankar-Hari M(7)(8), Skrifvars MB(9)(10), Thomas K(3), McAuley DF(1)(2), McGuigan PJ(11)(12).
**ABSTRACT**
BACKGROUND: Hypotension following out-of-hospital cardiac arrest (OHCA) may cause secondary brain injury and increase mortality rates. Current guidelines recommend avoiding hypotension. However, the optimal blood pressure following OHCA is unknown. We hypothesised that exposure to hypotension and hypertension in the first 24 h in ICU would be associated with mortality following OHCA. METHODS: We conducted a retrospective analysis of OHCA patients included in the Intensive Care National Audit and Research Centre Case Mix Programme from 1 January 2010 to 31 December 2019. Restricted cubic splines were created following adjustment for important prognostic variables.

We report the adjusted odds ratio for associations between lowest and highest mean arterial pressure (MAP) and systolic blood pressure (SBP) in the first 24 h of ICU care and hospital mortality. RESULTS: A total of 32,349 patients were included in the analysis. Hospital mortality was 56.2%. The median lowest and highest MAP and SBP were similar in survivors and non-survivors. Both hypotension and hypertension were associated with increased mortality. Patients who had a lowest recorded MAP in the range 60-63 mmHg had the lowest associated mortality. Patients who had a highest recorded MAP in the range 95-104 mmHg had the lowest associated mortality. The association between SBP and mortality followed a similar pattern to MAP. CONCLUSIONS: We found an association between hypotension and hypertension in the first 24 h in ICU and mortality following OHCA. The inability to distinguish between the median blood pressure of survivors and non-survivors indicates the need for research into individualised blood pressure targets for survivors following OHCA.

## TARGETED TEMPERATURE MANAGEMENT

**1.** Can J Cardiol. 2023 Jan 4:S0828-282X(23)00002-8. doi: 10.1016/j.cjca.2022.12.026. Online ahead of print.

**Targeted Temperature Management Following Out-of-Hospital Cardiac Arrest: Integrating Evidence into Real World Practice.**

Barker M(1), Sekhon M(2), Krychtiuk KA(3), van Diepen S(4), Alviar CL(5), Granger CB(3), Fordyce CB(1).

**ABSTRACT**

Targeted temperature management (TTM) post-out of hospital cardiac arrest (OHCA) has been a focus of debate in an attempt to improve post-arrest outcomes. Contemporary trials examining the role of TTM post-cardiac arrest suggest that targeting normothermia should be the standard of care for initially comatose survivors of cardiac arrest. Differences in patient populations have been demonstrated across trials and important subgroups may be under-represented in clinical trials compared to real-world registries. In this review, we aimed to describe the populations represented in international OHCA registries and to propose a pathway to integrate clinical trial evidence into practice. The patient case-mix among registries including survivors to hospital admission was similar compared to the pivotal trials (shockable rhythm, witnessed arrest), suggesting reasonable external validity. Therefore, for the majority of OHCA, targeted normothermia should be the strategy of choice. There remains conflicting evidence for patients with a non-shockable rhythm with no clear evidence-based justification for mild hypothermia over targeted normothermia.

**2.** PLoS One. 2023 Jan 6;18(1):e0279653. doi: 10.1371/journal.pone.0279653. eCollection 2023.

**Coagulation measures after cardiac arrest (CMACA).**

Kim HJ(1), Michael K(2), Wee JH(3), Oh JS(4), Kim WY(5), Cho IS(6), Lee MJ(7), Lee DH(8), Kim YH(9), Youn CS(1).

**ABSTRACT**

BACKGROUND: During cardiac arrest (CA) and after cardiopulmonary resuscitation, activation of blood coagulation and inadequate endogenous fibrinolysis occur. The aim of this study was to describe the time course of coagulation abnormalities after out-of-hospital CA (OHCA) and to examine the association with clinical outcomes in patients undergoing targeted temperature management (TTM) after OHCA. METHODS: This prospective, multicenter, observational cohort study was performed in eight emergency departments in Korea between September 2018 and September 2019. Laboratory findings from hospital admission and 24 hours after return of spontaneous circulation (ROSC) were analyzed. The primary outcome was cerebral performance category (CPC) at discharge, and the secondary outcome was in-hospital mortality. RESULTS: A total

of 170 patients were included in this study. The lactic acid, prothrombin time (PT), activated partial thrombin time (aPTT), international normalized ratio (INR), and D-dimer levels were higher in patients with poor neurological outcomes at admission and 24 h after ROSC. The lactic acid and D-dimer levels decreased over time, while fibrinogen increased over time. PT, aPTT, and INR did not change over time. The PT at admission and D-dimer levels 24 h after ROSC were associated with neurological outcomes at hospital discharge. Coagulation-related factors were moderately correlated with the duration of time from collapse to ROSC. CONCLUSION: The time-dependent changes in coagulation-related factors are diverse. Among coagulation-related factors, PT at admission and D-dimer levels 24 h after ROSC were associated with poor neurological outcomes at hospital discharge in patients treated with TTM.

## ELECTROPHYSIOLOGY AND DEFIBRILLATION

No articles identified.

## PEDIATRICS AND CHILDREN

**1.** Arch Dis Child. 2022 Dec 5:archdischild-2022-324916. doi: 10.1136/archdischild-2022-324916. Online ahead of print.
**Therapeutic hypothermia for neonates with sudden unexpected postnatal collapse.**
Mackay CA(1), O'Dea MI(1)(2), Athalye-Jape G(3)(4).
**NO ABSTRACT AVAILABLE**

## EXTRACORPOREAL LIFE SUPPORT

**1.** Am J Emerg Med. 2022 Dec 23:S0735-6757(22)00777-X. doi: 10.1016/j.ajem.2022.12.033. Online ahead of print.
**Shortening low-flow duration of ECPR did not improve outcomes in patients with out-of-hospital cardiac arrest.**
Higashi A(1), Abe R(1), Oshima T(1), Shimada T(1), Hattori N(1), Oami T(1), Tomita K(1), Imaeda T(1), Shinozaki K(2), Nakada TA(3).
**NO ABSTRACT AVAILABLE**

**2.** Curr Probl Cardiol. 2022 Dec 29:101578. doi: 10.1016/j.cpcardiol.2022.101578. Online ahead of print.
**Outcomes of patients with in- and out-of-hospital cardiac arrest on extracorporeal cardiopulmonary resuscitation: A Single-Center Retrospective Cohort Study.**
Elmelliti H(1), Azimi AV(2), Albazoon F(3), Alqahwachi H(4), Akbar A(5), Shehata AL(6), Hassan IF(6), Ibrahim AS(6), Hssain AA(7).
**ABSTRACT**
INTRODUCTION: Extracorporeal membrane oxygenation (ECMO) support has been suggested to improve the survival rate in patients with refractory in- and out-of-hospital cardiac arrest (IHCA and OHCA). Several factors predict outcome in these patients, including initial heart rhythm and low-flow time. Literature shows variable survival rates among patients who received EPCR. The objective of this study is to analyze the outcomes (survival rate as well as neurological and disability outcomes) of patients treated with ECPR following refractory OHCA and IHCA. METHODS: This single-center, retrospective cohort study was conducted on patients with refractory cardiac arrest treated with ECPR between February 2016 and March 2020. The primary outcomes were 24-h, hospital discharge

and 1-year survival after CA and the secondary endpoints were neurological and disability outcomes. RESULTS: 48 patients were included in the analysis. 11/48 patients are In Hospital Cardiac Arrest (IHCA) and 37/48 patients are Out of Hospital Cardiac Arrest (OHCA). Time from collapse to CPR for 79.2% of the patients was less than 5 minutes. The median CPR duration and collapse to ECMO were 40 and 45 minutes, respectively. The rate of survival was significantly higher in patient who presented with initial shockable rhythm (p=0.006) and to whom targeted temperature management (TTM) post cardiac arrest was applied (p=0.048). CONCLUSION: This first descriptive study about ECPR in the middle east region shows that 20.8% of ECPR patients survived until hospital discharge. Our analysis revealed that initial shockable rhythm and TTM are most important prognostic factors that predicts favorable neurological survival.

**3.** Aust Crit Care. 2023 Jan 3:S1036-7314(22)00242-9. doi: 10.1016/j.aucc.2022.11.009. Online ahead of print.

**Extracorporeal membrane oxygenation and Extracorporeal Membrane Oxygenation Cardiopulmonary Resusciation (ECPR) research priorities in Australia: A clinician survey.**

Dennis M(1), Southwood TJ(2), Oliver M(2), Nichol A(3), Burrell A(3), Hodgson C(3).

**ABSTRACT**

BACKGROUND: The use of extracorporeal membrane oxygenation (ECMO) for cardiorespiratory failure and during cardiopulmonary resuscitation has increased significantly and is resource intensive. High-quality evidence to guide management of patients on ECMO is limited. OBJECTIVES: The objective of this study was to determine the research priorities of clinicians for ECMO and Extracorporeal Membrane Oxygenation Cardiopulmonary Resusciation (ECPR) in Australia and New Zealand. METHODS: A prospective, binational survey of clinicians was conducted in May 2022. RESULTS: There were 133 respondents; 110 (84%) worked at an Australian ECMO centre; 28 (21%) were emergency, 45 (34%) were intensive care, and 41 (31%) were nursing clinicians. All aspects of ECMO care were identified by respondents as being important for further research; however, appropriate patient selection and determining long-term outcomes were ranked the highest. While most believed ECMO was efficacious, they felt that there was insufficient evidence to determine cost-effectiveness. There was uncertainty of the best model of ECPR provision. Equipoise exists for randomised studies into anticoagulation, blood product usage, and ECPR. CONCLUSIONS: This survey found strong support amongst clinicians for further research into the optimal use of ECMO and ECPR and provides a frame work for prioritising future clinical trials and research agendas.

## EXPERIMENTAL RESEARCH

**1.** Cardiovasc Drugs Ther. 2023 Jan 7. doi: 10.1007/s10557-022-07419-8. Online ahead of print.

**Canagliflozin Pretreatment Attenuates Myocardial Dysfunction and Improves Postcardiac Arrest Outcomes After Cardiac Arrest and Cardiopulmonary Resuscitation in Mice.**

Ju F(1), Abbott GW(2), Li J(1), Wang Q(1), Liu T(1), Liu Q(1), Hu Z(3).

**ABSTRACT**

OBJECTIVE: The SGLT2 inhibitor, canagliflozin, not only reduces glycemia in patients with type 2 diabetes but also exerts cardioprotective effects in individuals without diabetes. However, its potential beneficial effects in cardiac arrest have not been characterized. The purpose of this study was to examine the protective effect of canagliflozin pretreatment on postresuscitation-induced cardiac dysfunction in vivo. METHODS: Male C57/BL6 mice were randomized to vehicle (sham and control) or canagliflozin treatment groups. All mice except for the sham-operated mice were subjected to potassium chloride-induced cardiac arrest followed by chest compressions and intravenous epinephrine for resuscitation. Canagliflozin therapy efficacies were evaluated by electrocardiogram, echocardiography, histological analysis, inflammatory response, serum markers

of myocardial injury, protein phosphorylation analysis, and immunohistological assessment. RESULTS: Canagliflozin-pretreated mice exhibited a higher survival rate ($P < 0.05$), a shorter return of spontaneous circulation (ROSC) time ($P < 0.01$) and a higher neurological score ($P < 0.01$ or $P < 0.001$) than control mice after resuscitation. Canagliflozin was effective at improving cardiac arrest and resuscitation-associated cardiac dysfunction, indicated by increased left ventricular ejection fraction and fractional shortening ($P < 0.001$). Canagliflozin reduced serum levels of LDH, CK-MB and α-HBDH, ameliorated systemic inflammatory response, and diminished the incidence of early resuscitation-induced arrhythmia. Notably, canagliflozin promoted phosphorylation of cardiac STAT-3 postresuscitation. Furthermore, pharmacological inhibition of STAT-3 by Ag490 blunted STAT-3 phosphorylation and abolished the cardioprotective actions of canagliflozin. CONCLUSIONS: Canagliflozin offered a strong cardioprotective effect against cardiac arrest and resuscitation-induced cardiac dysfunction. This canagliflozin-induced cardioprotection is mediated by the STAT-3-dependent cell-survival signaling pathway.

**2.** Intensive Care Med Exp. 2023 Jan 6;11(1):3. doi: 10.1186/s40635-022-00485-0.

**Ventilation during continuous compressions or at 30:2 compression-to-ventilation ratio results in similar arterial oxygen and carbon dioxide levels in an experimental model of prolonged cardiac arrest.**

Kopra J(1), Litonius E(2), Pekkarinen PT(3), Laitinen M(4), Heinonen JA(2), Fontanelli L(5), Mäkiaho TP(6), Skrifvars MB(6).

**ABSTRACT**

BACKGROUND: In refractory out-of-hospital cardiac arrest, transportation to hospital with continuous chest compressions (CCC) from a chest compression device and ventilation with 100% oxygen through an advanced airway is common practice. Despite this, many patients are hypoxic and hypercapnic on arrival, possibly related to suboptimal ventilation due to the counterpressure caused by the CCC. We hypothesized that a compression/ventilation ratio of 30:2 would provide better ventilation and gas exchange compared to asynchronous CCC during prolonged experimental cardiopulmonary resuscitation (CPR). METHODS: We randomized 30 anaesthetized domestic swine (weight approximately 50 kg) with electrically induced ventricular fibrillation to the CCC or 30:2 group and bag-valve ventilation with a fraction of inspired oxygen ($FiO_2$) of 100%. We started CPR after a 5-min no-flow period and continued until 40 min from the induction of ventricular fibrillation. Chest compressions were performed with a Stryker Medical LUCAS® 2 mechanical chest compression device. We collected arterial blood gas samples every 5 min during the CPR, measured ventilation distribution during the CPR using electrical impedance tomography (EIT) and analysed post-mortem computed tomography (CT) scans for differences in lung aeration status. RESULTS: The median (interquartile range [IQR]) partial pressure of oxygen ($PaO_2$) at 30 min was 110 (52-117) mmHg for the 30:2 group and 70 (40-171) mmHg for the CCC group. The median (IQR) partial pressure of carbon dioxide ($PaCO_2$) at 30 min was 70 (45-85) mmHg for the 30:2 group and 68 (42-84) mmHg for the CCC group. No statistically significant differences between the groups in $PaO_2$ ($p = 0.40$), $PaCO_2$ ($p = 0.79$), lactate ($p = 0.37$), mean arterial pressure (MAP) ($p = 0.47$) or $EtCO_2$ ($p = 0.19$) analysed with a linear mixed model were found. We found a deteriorating trend in $PaO_2$, $EtCO_2$ and MAP and rising $PaCO_2$ and lactate levels through the intervention. There were no differences between the groups in the distribution of ventilation in the EIT data or the post-mortem

CT findings. CONCLUSIONS: The 30:2 and CCC protocols resulted in similar gas exchange and lung pathology in an experimental prolonged mechanical CPR model.

**3.** Anal Cell Pathol (Amst). 2022 Dec 26;2022:4588999. doi: 10.1155/2022/4588999. eCollection 2022.
**Shenfu Injection Protects Brain Injury in Rats with Cardiac Arrest through Nogo/NgR Pathway.**
Deng H(1)(2), Tang Z(1), Tuo P(2), Wu R(3), Jia S(3), Zhao X(2), Huang D(2), Gao Y(2), Lan Z(2).
**ABSTRACT**
The effect of Shenfu injection on brain injury after cardiac arrest (CA) and cardiopulmonary resuscitation (CPR) along with the underlying mechanism of axonal regeneration was explored. CA/CPR model in rats was established for subsequent experiments. A total of 160 rats were randomly divided into sham group, model group, conventional western medicine (CWM) group, Shenfu group, and antagonist group (n = 32 per group). After 3 hours, 24 hours, 3 days, and 7 days of drug administration, the modified Neurological Severity Score tests were performed. The ultrastructure of the brain and hippocampus was observed by electron microscopy. Real-time quantitative polymerase chain reaction (PCR), western blotting, and immunohistochemistry were used to detect Nogo receptor (NgR) expression in the hippocampus and cerebral cortex, and Nogo-NgR expression in CA/CPR model. Neurological deficits in the model group were severe at 3 hours, 24 hours, 3 days, and 7 days after the recovery of natural circulation, whereas the neurological deficits in CWM, antagonist, and Shenfu group were relatively mild. The ultrastructure of neuronal cells in Shenfu group had relatively complete cell membranes and more vesicles than those in the model group. The results of PCR and western blotting showed lower messenger ribonucleic acid and protein expression of NgR in Shenfu group than the model group and CWM group. Immunohistochemical examination indicated a reduction of Nogo-NgR expression in Shenfu group and antagonist group. Our results suggested that Shenfu injection reduced brain injury by attenuating Nogo-NgR signaling pathway and promoting axonal regeneration.

## CASE REPORTS

**1.** Clin Case Rep. 2022 Dec 27;10(12):e6805. doi: 10.1002/ccr3.6805. eCollection 2022 Dec.
**Cardiac arrest during a diving session: A case report and differential diagnosis.**
Ippolito M(1)(2), Tubiolo M(1), Falletta A(3), Federico A(2), Simone B(1), Ingoglia G(1)(2), Gregoretti C(1)(4), Raineri SM(1)(2), Cortegiani A(1)(2), Giarratano A(1)(2).
**ABSTRACT**
We report a case of out-of-hospital cardiac arrest occurred in a 61-year-old recreational female diver. After resuscitation, the patient was referred to the hospital. With data provided by witnesses and appropriate medical investigations, drowning related to a failed rebreather system was the most plausible explanation. Patient outcome was favorable.

**2.** Front Cardiovasc Med. 2022 Dec 16;9:996644. doi: 10.3389/fcvm.2022.996644. eCollection 2022.
**Case report: Cardiac arrest during carotid body tumor resection indicating carotid sinus hypersensitivity.**
Duan HY(1)(2), Guan Q(1)(2), Guo YJ(1)(2), Liang N(1)(2).
**ABSTRACT**
BACKGROUND: Carotid body tumor surgery is associated with various complications. However, intraoperative cardiac arrest is very rare and no more than 10 cases have been reported. CASE DESCRIPTION: A 58-year-old woman diagnosed with bilateral carotid body tumors underwent right

carotid body tumor surgery. Sudden cardiac arrest occurred during the resection and was attributed to carotid sinus hypersensitivity. The patient recovered after prompt treatment and the tumor was removed completely with no complications. CONCLUSION: Cardiac arrest attributed to carotid sinus hypersensitivity during carotid body tumor resection is very rare. Proper treatments can reverse intraoperative cardiac arrest. If carotid sinus hypersensitivity is detected preoperatively, prophylactic temporary pacemaker implantation may be appropriate.

**3.** Perfusion. 2023 Jan 6:2676591231151318. doi: 10.1177/02676591231151318. Online ahead of print.

**Fulminant sepsis secondary to severe lung contusion from the Lund University Cardiopulmonary Assist System device.**

Li M(1), Al-Qudsi O(1).

**ABSTRACT**

INTRODUCTION: Portable mechanical chest compression devices have been developed to improve upon many problems of manual compression, increase patient survival, and improve neurologic outcomes. However, the use of these devices is not without risk of harm to the patient. CASE REPORT: We describe a patient who received chest compressions from a mechanical compression device after cardiac arrest and subsequently developed fulminant sepsis secondary to lung contusions and a necrotizing pulmonary infection. DISCUSSION: Although injuries from the LUCAS have been reported, we believe this is the first reported fatal complication related to direct pulmonary injury from a mechanical compression device. CONCLUSION: More investigation is needed to determine the safety and efficacy of the LUCAS especially in obese patients.

**4.** J Card Surg. 2022 Dec;37(12):5521-5523. doi: 10.1111/jocs.17066. Epub 2022 Oct 26.

**Concomitant cardiac surgery and fixation of bilateral rib fractures sustained during cardiopulmonary resuscitation.**

Comanici M(1), Farmidi A(1), Bhudia SK(1), Anikin V(2)(3).

**ABSTRACT**

BACKGROUND: Chest compressions during cardiopulmonary resuscitation (CPR) may cause sternal or rib fractures and chest wall instability. This can complicate medical management and significantly impair respiratory function. Surgical management of flail chest is technically demanding, and it becomes even more challenging if the patient requires a concomitant cardiac procedure. CASE PRESENTATION: A 78-year-old male suffered a cardiac arrest and sustained sternal and bilateral rib fractures during a successful CPR. He underwent a concomitant coronary artery bypass grafting and aortic valve replacement combined with stabilization of the chest wall. We discuss the possibility of fixation of bilateral rib fractures and its role in postoperative recovery after cardiac surgery. CONCLUSIONS: Chest wall stabilization for an already fragile patient, with impaired respiratory system performance, could help improve overall outcomes, pulmonary function, weaning from mechanical ventilation, and rehabilitation. It may be used together with a cardiac procedure for a life-threatening cardiac pathology.

**5.** Prehosp Emerg Care. 2023;27(1):107-111. doi: 10.1080/10903127.2021.2022257. Epub 2022 Feb 3.

**Paramedic-Performed Carotid Artery Ultrasound Heralds Return of Spontaneous Circulation in Out-of-Hospital Cardiac Arrest: A Case Report.**

Humphries AL(1), White JMB(2), Guinn RE(3), Braude DA(2)(3)(4).

**ABSTRACT**

Point-of-Care Ultrasound (POCUS) has been demonstrated to have multiple applications in the care of critically ill and injured patients, especially given its portability and ease of use. These characteristics of POCUS make it ideal for use in the prehospital environment as well. We present a case that highlights a novel application of ultrasound in the prehospital management of out-of-hospital cardiac arrest (OHCA).