

This week's PubMed 29th October – 4th November 2023: articles of interest n = 37

CPR AND COVID-19

No articles identified.

CPR/MECHANICAL CHEST COMPRESSION

1. Eur J Anaesthesiol. 2023 Dec 1;40(12):946-950. doi: 10.1097/EJA.0000000000001918. Epub 2023 Nov 8.

(Re)animation of a stuffed plush bunny: A case report.

Olsen MH(1), Petersen PB, Møller K.

ABSTRACT

An expressed and constant wish of the first author's oldest daughter to enhance interaction with her favourite toy animal led to a (re)animation/resuscitation attempt of a 1½-year-old stuffed plush bunny. Initial physical examination found no vital signs. Based on the lack of identifiable airways, we hypothesised that tissue oxygenation might be caused by passive diffusion throughout the body. Hence, animation was attempted by mechanical chest compressions without including airway management or positive-pressure ventilation. Multimodal monitoring of arterial blood pressure (by proxy), intra-'cranial' pressure and oxygen tension, near-infrared spectroscopy of the head and laser-Doppler blood flow was successfully initiated, whereas an attempt at intracranial microdialysis was unsuccessful. Despite achieving measurable arterial blood pressure (by proxy) (12/3 mmHg) and an increase of cerebral perfusion by 30 points, spontaneous circulation or diffusion was not achieved apparently, and ultimately, animation attempts were ceased. Clinical experience, as well as common sense, forces us to conclude that our measurements were contaminated by the intervention, and that we must rethink the method for the animation of stuffed plush bunnies.

REGISTRIES, REVIEWS AND EDITORIALS

1. Intern Emerg Med. 2023 Oct 29. doi: 10.1007/s11739-023-03449-8. Online ahead of print.

Association between cardiopulmonary resuscitation duration and survival after out-of-hospital cardiac arrest according: a first nationwide study in France.

Jaeger D(1)(2)(3), Lafrance M(4)(5), Canon V(4)(5), Kosmopoulos M(6), Gaisendrees C(6)(7), Debaty G(8), Yannopoulos D(6), Hubert H(4)(5), Chouihed T(9)(10); GR-RéAC.

ABSTRACT

OBJECTIVE: Determining whether to pursue or terminate resuscitation efforts remains one of the biggest challenges of cardiopulmonary resuscitation (CPR). No ideal cut-off duration has been recommended and the association between CPR duration and survival is still unclear for out-of-hospital cardiac arrest (OHCA). The aim of this study was to assess the association between CPR duration and 30-day survival after OHCA with favorable neurological outcomes according to initial rhythm. **METHODS:** This was an observational, retrospective analysis of the French national multicentric registry on cardiac arrest, RéAC. The primary endpoint was neurologically intact 30-day survival according to initial rhythm. **RESULTS:** 20,628 patients were included. For non-shockable rhythms, the dynamic probability of 30-day survival with a Cerebral Performance Category (CPC) of 1 or 2 was less than 1% after 25 min of CPR. CPR duration over 10 min was not associated with 30-day survival with CPC of 1 or 2 (adjusted OR: 1.67; CI 95% 0.95-2.94). For shockable rhythms, the

dynamic probability of 30-day survival with a CPC score of 1 or 2, was less than 1% after 54 min of CPR. CPR duration of 21-25 min was still associated with 30-day survival and 30-day survival with a CPC of 1 or 2 (adjusted OR: 2.77; CI 95% 2.16-3.57 and adjusted OR: 1.82; CI 95% 1.06-3.13, respectively). CONCLUSIONS: Survival decreased rapidly with increasing CPR duration, especially for non-shockable rhythms. Pursuing CPR after 25 min may be futile for patients presenting a non-shockable rhythm. On the other hand, shockable rhythms might benefit from prolonged CPR.

2. Scand J Trauma Resusc Emerg Med. 2023 Oct 26;31(1):63. doi: 10.1186/s13049-023-01131-8.

Where do we need to improve resuscitation? Spatial analysis of out-of-hospital cardiac arrest incidence and mortality.

Buter R(1)(2), van Schuppen H(3), Koffijberg H(4), Hans EW(5)(6), Stieglis R(3), Demirtas D(5)(6).

NO ABSTRACT AVAILABLE

3. Prehosp Emerg Care. 2023;27(8):1054-1057. doi: 10.1080/10903127.2022.2137862. Epub 2022 Nov 16.

The Effect of Missing Data on the Measurement of Cardiac Arrest Outcomes According to Race.

Rykulski NS(1), Berger DA(1), Paxton JH(2), Klausner H(3), Smith G(4), Swor RA(1); CARES

Investigators.

ABSTRACT

INTRODUCTION: High-quality data are important to understanding racial differences in outcome following out of hospital cardiac arrest (OHCA). Previous studies have shown differences in OHCA outcomes according to both race and socioeconomic status. EMS reporting of data on race is often incomplete. We aim to determine the effect of missing data on the determination of racial differences in outcomes for OHCA patients. METHODS: We performed a secondary analysis of a data set developed by probabilistically linking the Michigan Cardiac Arrest Registry to Enhance Survival (CARES) and the Michigan Inpatient Database (MIDB). Adult OHCA patients (age >18) who survived to hospital admission between 2014 and 2017 were included. Both datasets recorded patient race and ethnicity with CARES using a single race/ethnicity variable. Patients were categorized as White, Black, other, or missing and only a single choice was allowed. Due to the small number of Hispanic patients and the combined race/ethnicity variable, these patients were excluded. The outcomes of interest were survival to hospital discharge and survival to discharge with Cerebral Performance Category 1 or 2 (good outcome). Outcomes were stratified according to EMS- or hospital-documented race. RESULTS: We included 3,756 matched patients, after excluding 34 Hispanic patients from analysis. Documentation of patient race was missing in 892 (22.1%) of CARES and 212 (5.6%) of MIDB patients. When both datasets documented Black or White race, agreement in race documentation was excellent ($\kappa=0.83$). White patients were more likely to have good outcomes than Black in both the CARES (27.3% vs 14.8%) and MIDB (26.9% vs 16.1%) databases (both $p < 0.001$), but were not more likely to survive (30.8% vs 27.3% $p = 0.22$; 30.3% vs 28.1%, $p = 0.07$). Moreover, we found no significant difference in outcome measures based on race documentation for White vs Black patients (good outcome [27.3 vs 26.9% (MIDB)] and [16.1% vs 14.8% (CARES)] respectively and survival [30.8% vs 30.3% (MIDB)] and [27.3 vs 28.1% (CARES)] respectively). CONCLUSION: Despite higher rates of missing EMS documentation, we identified statistically similar rates in OHCA outcome measures between databases. Further work is needed to determine the true effect of missing documentation of race on OHCA outcome measures.

4. Heart Rhythm. 2023 Nov;20(11):1510-1511. doi: 10.1016/j.hrthm.2023.08.024. Epub 2023 Aug 20.

Sudden cardiac death-Progress in epidemiology limited by time.

Junttila MJ(1), Holmström LTA(2), Huikuri HV(2).

NO ABSTRACT AVAILABLE

5. Curr Opin Crit Care. 2023 Dec 1;29(6):614-615. doi: 10.1097/MCC.0000000000001113. Epub 2023 Nov 2.

Editorial: Cardiopulmonary resuscitation 2023: saving 300 000 additional lives worldwide every year.

Rott N(1), Böttiger BW

NO ABSTRACT AVAILABLE

IN-HOSPITAL CARDIAC ARREST

1. Rev Assoc Med Bras (1992). 2023 Oct 30;69(12):e20230947. doi: 10.1590/1806-9282.20230947. eCollection 2023.

Reduced mobility is associated with adverse outcomes after in-hospital cardiac arrest.

Lazzarin T(1), Fávero Junior EL(1), Rischini FA(1), Azevedo PS(1), Polegato BF(1), Paiva SAR(1), Zornoff L(1), Minicucci MF(1).

ABSTRACT

OBJECTIVE: In-hospital cardiac arrest is a critical medical emergency. Knowledge of prognostic factors could assist in cardiopulmonary resuscitation decision-making. Frailty and functional status are emerging risk factors and may play a role in prognostication. The objective was to evaluate the association between reduced mobility and in-hospital cardiac arrest outcomes. **METHODS:** This retrospective cohort study included patients over 18 years of age with in-hospital cardiac arrest in Botucatu, Brazil, from April 2018 to December 2021. Exclusion criteria were patients with a do-not-resuscitate order or patients with recurrent in-hospital cardiac arrest. Reduced mobility was defined as the need for a bed bath 48 h before in-hospital cardiac arrest. The outcomes of no return of spontaneous circulation and in-hospital mortality were evaluated. **RESULTS:** A total of 387 patients were included in the analysis. The mean age was 65.4±14.8 years; 53.7% were males and 75.4% had reduced mobility. Among the evaluated outcomes, the no return of spontaneous circulation rate was 57.1%, and in-hospital mortality was 94.3%. In multivariate analysis, reduced mobility was associated with no return of spontaneous circulation when adjusted by age, gender, initial shockable rhythm, duration of cardiopulmonary resuscitation, and epinephrine administration. However, in multiple logistic regression, there was no association between reduced mobility and in-hospital mortality. **CONCLUSION:** In patients with in-hospital cardiac arrest, reduced mobility is associated with no return of spontaneous circulation. However, there is no relation to in-hospital mortality.

INJURIES AND CPR

No articles identified.

CAUSE OF THE ARREST

1. Ann Med. 2023;55(2):2258911. doi: 10.1080/07853890.2023.2258911. Epub 2023 Oct 5.

Characteristics of women with ischemic sudden cardiac death.

Hookana I(1), Holmström L(1), Eskuri MAE(1), Pakanen L(2)(3), Ollila MM(4), Kiviniemi AM(1), Kenttä T(1), Vähätalo J(1), Tulppo M(1), Lepojärvi ES(1), Piltonen T(4), Perkiömäki J(1), Tikkanen JT(1), Huikuri HV(1), Junttila MJ(1).

ABSTRACT

BACKGROUND: Sudden cardiac death (SCD) is a significant mode of death causing 15-20% of all deaths in high-income countries. Coronary artery disease (CAD) is the most common cause of SCD in both sexes, and SCD is often the first manifestation of underlying CAD in women. This case-control study aimed to determine the factors associated with SCD due to CAD in women. **METHODS:** The study group consisted of women with CAD-related SCD (N = 888) derived from the Fingesture study conducted in Northern Finland from 1998 to 2017. All SCDs underwent medicolegal autopsy. The control group consisted of women with angiographically verified CAD without SCD occurring during the 5-year-follow-up (N = 610). To compare these groups, we used medical records, autopsy findings, echocardiograms, and electrocardiograms (ECGs). **RESULTS:** Subjects with SCD were older (73.2 ± 11.3 vs. 68.8 ± 8.0 , $p < 0.001$) and were more likely to be smokers or ex-smokers (37.1% vs. 27.6%, $p = 0.045$) compared to control patients. The proportion of subjects with prior myocardial infarction (MI) was higher in controls (46.9% vs. 41.4% in SCD subjects, $p = 0.037$), but in contrast, SCD subjects were more likely to have underlying silent MI (25.6% vs. 2.4% in CAD controls, $p < 0.001$). Left ventricular hypertrophy (LVH) was more common finding in SCD subjects (70.9% vs. 55.1% in controls, $p < 0.001$). Various electrocardiographic abnormalities were more common in subjects with SCD, including higher heart rate, atrial fibrillation, prolonged QTc interval, wide or fragmented QRS complex and early repolarization. The prevalence of Q waves and T inversions did not differ between the groups. **CONCLUSIONS:** Underlying LVH and previous MI with myocardial scarring are common and often undiagnosed in women with CAD-related SCD. These results suggest that untreated CAD with concomitant myocardial disease is an important factor in SCD in women.

2. *Card Electrophysiol Clin.* 2023 Dec;15(4):493-503. doi: 10.1016/j.ccep.2023.07.004. Epub 2023 Aug 30.

Prediction of Sudden Death Risk in Patients with Congenital Heart Diseases.

Kumthekar R(1), Webster G(2).

ABSTRACT

Risk stratification for sudden death should be discussed with patients with congenital heart disease at each stage of personal and cardiac development. For most patients, risk is low through teenage years and the critical factors to consider are anatomy, ventricular function, and symptoms. By adulthood, these are supplemented by screening for atrial arrhythmias, ventricular arrhythmias, and pulmonary hypertension. Therapies include medication, ablation, and defibrillator placement.

END-TIDAL CO₂

1. *Ann Emerg Med.* 2023 Nov;82(5):558-563. doi: 10.1016/j.annemergmed.2023.03.001. Epub 2023 Apr 13.

Out-of-Hospital Arterial to End-Tidal Carbon Dioxide Gradient in Patients With Return of Spontaneous Circulation After Out-of-Hospital Cardiac Arrest: A Retrospective Study.

Eichlseder M(1), Eichinger M(1), Pichler A(2), Freidorfer D(1), Rief M(1), Zoidl P(1), Zajic P(1).

ABSTRACT

STUDY OBJECTIVE: End-tidal carbon dioxide (etCO₂) is used to guide ventilation after achieving return of spontaneous circulation (ROSC) in certain out-of-hospital systems, despite an unknown difference between arterial and end-tidal CO₂ (partial pressure of carbon dioxide [paCO₂]-etCO₂ difference) levels in this population. The primary aim of this study was to evaluate and quantify the paCO₂-etCO₂ difference in out-of-hospital patients with ROSC after nontraumatic cardiac arrest. **METHODS:** This retrospective single-center study included patients aged 18 years and older with sustained ROSC after nontraumatic out-of-hospital cardiac arrest. In patients with an existing out-of-

hospital arterial blood gas analysis within 30 minutes after achieving ROSC, matching etCO₂ values were evaluated. Linear regression and Bland-Altman plot analysis were performed to ascertain the primary endpoint of interest. RESULTS: We included data of 60 patients in the final analysis. The mean paCO₂-etCO₂ difference was 32 (\pm 18) mmHg. Only a moderate correlation (R²=0.453) between paCO₂ and etCO₂ was found. Bland-Altman analysis showed a bias of 32 mmHg (95% confidence interval [CI], 27 to 36) [the upper limit of agreement of 67 mmHg (95% CI, 59 to 74) and the lower limit of agreement of -3 mmHg (95% CI, -11 to 5)]. CONCLUSION: The paCO₂-etCO₂ difference in patients with ROSC after out-of-hospital cardiac arrest is far from physiologic ranges, and the between-patient variability is high. Therefore, etCO₂-guided adaption of ventilation might not provide adequate accuracy in this setting.

ORGAN DONATION

No articles identified.

FEEDBACK

1. World J Cardiol. 2023 Oct 26;15(10):531-541. doi: 10.4330/wjc.v15.i10.531.

Do cardiopulmonary resuscitation real-time audiovisual feedback devices improve patient outcomes? A systematic review and meta-analysis.

Sood N(1), Sangari A(2), Goyal A(2), Sun C(3), Horinek M(2), Hauger JA(4), Perry L(2).

ABSTRACT

BACKGROUND: Cardiac arrest is a leading cause of mortality in America and has increased in the incidence of cases over the last several years. Cardiopulmonary resuscitation (CPR) increases survival outcomes in cases of cardiac arrest; however, healthcare workers often do not perform CPR within recommended guidelines. Real-time audiovisual feedback (RTAVF) devices improve the quality of CPR performed. This systematic review and meta-analysis aims to compare the effect of RTAVF-assisted CPR with conventional CPR and to evaluate whether the use of these devices improved outcomes in both in-hospital cardiac arrest (IHCA) and out-of-hospital cardiac arrest (OHCA) patients. **AIM:** To identify the effect of RTAVF-assisted CPR on patient outcomes and CPR quality with in- and OHCA. **METHODS:** We searched PubMed, SCOPUS, the Cochrane Library, and EMBASE from inception to July 27, 2020, for studies comparing patient outcomes and/or CPR quality metrics between RTAVF-assisted CPR and conventional CPR in cases of IHCA or OHCA. The primary outcomes of interest were return of spontaneous circulation (ROSC) and survival to hospital discharge (SHD), with secondary outcomes of chest compression rate and chest compression depth. The methodological quality of the included studies was assessed using the Newcastle-Ottawa scale and Cochrane Collaboration's "risk of bias" tool. Data was analyzed using R statistical software 4.2.0. results were statistically significant if $P < 0.05$. **RESULTS:** Thirteen studies ($n = 17600$) were included. Patients were on average 69 ± 17.5 years old, with 7022 (39.8%) female patients. Overall pooled ROSC in patients in this study was 37% (95% confidence interval = 23%-54%). RTAVF-assisted CPR significantly improved ROSC, both overall [risk ratio (RR) 1.17 (1.001-1.362); $P = 0.048$] and in cases of IHCA [RR 1.36 (1.06-1.80); $P = 0.002$]. There was no significant improvement in ROSC for OHCA (RR 1.04; 0.91-1.19; $P = 0.47$). No significant effect was seen in SHD [RR 1.04 (0.91-1.19); $P = 0.47$] or chest compression rate [standardized mean difference (SMD) -2.1; (-4.6-0.5)]; $P = 0.09$]. A significant improvement was seen in chest compression depth [SMD 1.6; (0.02-3.1); $P = 0.047$]. **CONCLUSION:** RTAVF-assisted CPR increases ROSC in cases of IHCA and chest compression depth but has no significant effect on ROSC in cases of OHCA, SHD, or chest compression rate.

DRUGS

1. *Pediatr Crit Care Med*. 2023 Nov 1;24(11):975-978. doi: 10.1097/PCC.0000000000003355. Epub 2023 Nov 2.

Cardiopulmonary Resuscitation, Epinephrine, and Extracorporeal Membrane Oxygenation: Finding the Right Balance.

Butt W(1).

NO ABSTRACT AVAILABLE

TRAUMA

No articles identified.

VENTILATION

1. *Crit Care*. 2023 Oct 5;27(1):387. doi: 10.1186/s13054-023-04669-2.

Restrictive versus high-dose oxygenation strategy in post-arrest management following adult non-traumatic cardiac arrest: a meta-analysis.

Macherey-Meyer S(1), Heyne S(2), Meertens MM(2)(3), Braumann S(2), Hueser C(4)(5), Mauri V(2), Baldus S(2), Lee S(#)(2), Adler C(#)(2).

ABSTRACT

PURPOSE: Neurological damage is the main cause of death or withdrawal of care in comatose survivors of cardiac arrest (CA). Hypoxemia and hyperoxemia following CA were described as potentially harmful, but reports were inconsistent. Current guidelines lack specific oxygen targets after return of spontaneous circulation (ROSC). **OBJECTIVES:** The current meta-analysis assessed the effects of restrictive compared to high-dose oxygenation strategy in survivors of CA. **METHODS:** A structured literature search was performed. Randomized controlled trials (RCTs) comparing two competing oxygenation strategies in post-ROSC management after CA were eligible. The primary end point was short-term survival (≤ 90 days). The meta-analysis was prospectively registered in PROSPERO database (CRD42023444513). **RESULTS:** Eight RCTs enrolling 1941 patients were eligible. Restrictive oxygenation was applied to 964 patients, high-dose regimens were used in 977 participants. Short-term survival rate was 55.7% in restrictive and 56% in high-dose oxygenation group (8 trials, RR 0.99, 95% CI 0.90 to 1.10, $P = 0.90$, $I^2 = 18\%$, no difference). No evidence for a difference was detected in survival to hospital discharge (5 trials, RR 0.98, 95% CI 0.79 to 1.21, $P = 0.84$, $I^2 = 32\%$). Episodes of hypoxemia more frequently occurred in restrictive oxygenation group (4 trials, RR 2.06, 95% CI 1.47 to 2.89, $P = 0.004$, $I^2 = 13\%$). **CONCLUSION:** Restrictive and high-dose oxygenation strategy following CA did not result in differences in short-term or in-hospital survival. Restrictive oxygenation strategy may increase episodes of hypoxemia, even with restrictive oxygenation targets exceeding intended saturation levels, but the clinical relevance is unknown. There is still a wide gap in the evidence of optimized oxygenation in post-ROSC management and specific targets cannot be concluded from the current evidence.

2. *Am J Ther*. 2023 Nov-Dec 01;30(6):e509-e518. doi: 10.1097/MJT.0000000000001636. Epub 2023 Aug 17.

Oxygen Targets After Cardiac Arrest: A Meta-analysis of Randomized Controlled Trials.

Singh S(1), Rout A(2), Chaudhary R(3), Garg A(4), Tantry US(5), Gurbel PA(5)(6).

ABSTRACT

BACKGROUND: Optimal oxygen saturation target in patients resuscitated after cardiac arrest is unknown. Previous randomized controlled trials (RCTs) comparing restrictive oxygen therapy with liberal therapy have shown conflicting results. **STUDY QUESTION:** We performed a meta-analysis of available RCTs to consolidate the contrasting findings regarding the oxygen targets after cardiac arrest. **DATA SOURCES:** We searched electronic databases for RCTs comparing restrictive versus liberal oxygen targets in patients resuscitated after cardiac arrest. **STUDY DESIGN:** End points of interest were mortality, unfavorable neurological outcomes, and rearrests. Random-effects meta-analysis was performed to estimate the risk ratio (RR) with a 95% confidence interval (CI). **RESULTS:** Eight RCTs with 1641 patients (restrictive n = 833, liberal n = 808) were included in the analysis. The oxygen targets were defined by either saturation, partial pressure (PaO₂), or supplementation rates. The mean age and male percentage were 63 years and 80%, respectively. There was no significant difference observed in the 2 groups for overall mortality (RR = 0.91, 95% CI = 0.75-1.10, P = 0.33), unfavorable neurological outcomes (RR = 0.93, 95% CI = 0.74-1.18, P = 0.56), and rearrests (RR = 0.67, 95% CI = 0.22-1.98, P = 0.47). **CONCLUSIONS:** Overall, this meta-analysis shows no significant difference in mortality, unfavorable neurological outcomes, and rearrests when using restrictive or liberal oxygen targets in patients after cardiac arrest. The limitations in the newer trials should be kept in mind while interpreting the overall results.

CEREBRAL MONITORING

No articles identified.

ULTRASOUND AND CPR

No articles identified.

ORGANISATION AND TRAINING

1. World J Cardiol. 2023 Oct 26;15(10):508-517. doi: 10.4330/wjc.v15.i10.508.

Establishment of a prediction model for prehospital return of spontaneous circulation in out-of-hospital patients with cardiac arrest.

Wang JJ(1), Zhou Q(1), Huang ZH(1), Han Y(1), Qin CZ(1), Chen ZQ(1), Xiao XY(1), Deng Z(2).

ABSTRACT

BACKGROUND: Out-of-hospital cardiac arrest (OHCA) is a leading cause of death worldwide. **AIM:** To explore factors influencing prehospital return of spontaneous circulation (P-ROSC) in patients with OHCA and develop a nomogram prediction model. **METHODS:** Clinical data of patients with OHCA in Shenzhen, China, from January 2012 to December 2019 were retrospectively analyzed. Least absolute shrinkage and selection operator (LASSO) regression and multivariate logistic regression were applied to select the optimal factors predicting P-ROSC in patients with OHCA. A nomogram prediction model was established based on these influencing factors. Discrimination and calibration were assessed using receiver operating characteristic (ROC) and calibration curves. Decision curve analysis (DCA) was used to evaluate the model's clinical utility. **RESULTS:** Among the included 2685 patients with OHCA, the P-ROSC incidence was 5.8%. LASSO and multivariate logistic regression analyses showed that age, bystander cardiopulmonary resuscitation (CPR), initial rhythm, CPR duration, ventilation mode, and pathogenesis were independent factors influencing P-ROSC in these patients. The area under the ROC was 0.963. The calibration plot demonstrated that the predicted P-ROSC model was concordant with the actual P-ROSC. The good clinical usability of the prediction

model was confirmed using DCA. **CONCLUSION:** The nomogram prediction model could effectively predict the probability of P-ROSC in patients with OHCA.

2. *Curr Opin Crit Care*. 2023 Dec 1;29(6):616-620. doi: 10.1097/MCC.0000000000001111. Epub 2023 Oct 9.

Education of schoolchildren in cardiopulmonary resuscitation - overview of the current literature.

Schroeder DC(1)(2), Finke SR(1), Grübl T(2), Jänig CW(2), Böttiger BW(1).

ABSTRACT

PURPOSE OF REVIEW: Recognition of cardiac arrest and initiation of cardiopulmonary resuscitation (CPR) can be learned and adequately replicated by schoolchildren. Regular instruction of schoolchildren in CPR is therefore a core element to increase low bystander CPR rates. Thereby, schoolchildren CPR training evolved as own scientific field within the last decade. Aim was to describe current evidence in terms of epidemiology, teaching approaches and political aspects. **RECENT FINDINGS:** Schoolchildren demonstrate a high motivation to be trained in CPR. Teaching approaches that combine theoretical and practical learning sessions guarantee a sustainable learning effect. Schoolchildren can adequately perform chest compressions and mouth-to-mouth ventilation from the age of 12 years. Use of digital media is a highly promising teaching approach. CPR training conducted by teachers from the own school is effective and guarantees continuous development of CPR skills. Integration of schoolchildren CPR training into school curricula is the foundation for a sustainable increase of lay resuscitation rates in the population. Scientific and political promotion of schoolchildren CPR training is needed to sensitize the population and move bystander CPR in the social focus. **SUMMARY:** While bystander CPR rates are low in Europe comprehensive establishment of schoolchildren CPR training may sustainably increase survival after cardiac arrest.

3. *Eur Rev Med Pharmacol Sci*. 2023 Oct;27(19):9363-9374. doi: 10.26355/eurrev_202310_33964.

The Sapienza University of Rome network of automated external defibrillators: a prototype webMap developed to speed access to community defibrillators and increase survival from out-of-hospital cardiac arrest.

Pesaresi C(1), Pavia D, Casini L, Renzi E, Failla G, Kerr M, Villari P, De Vito C.

ABSTRACT

OBJECTIVE: In Italy, only around 10% of people who experience out-of-hospital cardiac arrest (OHCA) survive. A large portion of OHCA events in public settings are characterized by an initial shockable rhythm, which requires prompt defibrillation. We aimed to create a system to quickly locate nearby public access automated external defibrillators (AEDs) on the campus of Sapienza University of Rome, the largest public university in Europe. **MATERIALS AND METHODS:** We developed the AED webMap through a 6-step process involving the: 1) collection of information and geographical coordinates for each AED from the university management system; 2) development of a new geolocation database; 3) integration of information contained in the new database with data provided by university departments; 4) geolocation of AEDs in the Google MyMaps environment; 5) graphic representation of all AEDs on digital map templates using specific symbols, with pop-ups containing additional information for each AED; and 6) publication of the webMap on the university website. **RESULTS:** The AED webMap was published on the university website (<https://www.uniroma1.it/it/pagina/defibrillatori-sapienza-in-rete>) and facilitates prompt identification of nearby AEDs by providing: 1) detailed AED geolocalization with interactive pop-up information for each AED, including whether the AED is located internally or externally; 2) the option to use different base maps (e.g., digital street map); 3) calculation and display of the route to reach the chosen AED; and 4) the possibility to migrate towards multiple platforms. **CONCLUSIONS:** The

webMap can help bystanders quickly identify, locate, and reach nearby AEDs present on the campus of the largest public university in Europe, a measure that could help speed defibrillation and maximize the life-saving potential of AEDs in the event of OHCA.

4. Prehosp Emerg Care. 2023;27(8):1041-1047. doi: 10.1080/10903127.2022.2128126. Epub 2022 Oct 6.

Disparities in Out-of-Hospital Cardiac Arrest Treatment and Outcomes of Males and Females.

Gramm ER(1), Salcido DD(2), Menegazzi JJ(2).

ABSTRACT

Background: Previous studies comparing the treatment of males and females during out-of-hospital cardiac arrests (OHCA) have been contradictory. Understanding differences in treatment and outcomes is important to assuring appropriate care to both sexes. Hypothesis: Females with OHCA receive fewer interventions and have lower rates of survival to hospital discharge when compared to males with OHCA. Methods: We conducted a secondary analysis of the Resuscitation Outcomes Consortium (ROC) Cardiac Arrest Epistry 3 data collected from April 2011 to June 2015. We included all OHCA cases treated by emergency medical services (EMS) who had sex recorded. We analyzed 36 treatment and outcome variables. We calculated descriptive statistics and compared treatment and outcomes between males and females using chi-square and t-tests. We performed multivariate regressions adjusting for baseline characteristics. Results: Of 120,306 total subjects, 65,241 were included (23,924 female, 41,317 male). Females were 9.9% less likely to have OHCA in public, 10.9% less likely to have a shockable rhythm, and were a median of 5 years older. In the unadjusted analysis, females were defibrillated by EMS less often (OR 1.81, 95% CI [1.74, 1.88]), received epinephrine less often (OR 1.15, 95% CI [1.10, 1.19]), took an average of 67 seconds longer to achieve first return of spontaneous circulation (ROSC) (coefficient -66.75, 95% CI [-83.98, -49.52]), and had 2.2% lower survival to emergency department (ED) arrival (OR 1.09, 95% CI [1.06, 1.13]). After adjusting for age, bystander CPR, witness status, episode location, and initial rhythm, the odds of surviving to hospital discharge were higher in males (OR 1.12, 95% CI [1.05, 1.21]), and the odds of surviving to ED arrival favored females (OR 0.87, 95% CI [0.84-0.90]). Additionally, odds of receiving epinephrine (OR 1.22, 95% CI [1.16, 1.27]) and odds of receiving defibrillation (OR 1.36, 95% CI [1.29, 1.44]) were both higher in males, and time to achieve first ROSC was no longer associated with sex ($p = 0.114$, 95% CI [-3.32, 31.11]). Conclusions: After adjusting for case characteristics, females were less likely to receive some key treatments, including epinephrine and defibrillation. Females also had poorer survival to hospital discharge but had higher odds of surviving to ED arrival.

5. Heart Rhythm. 2023 Nov;20(11):1504-1509. doi: 10.1016/j.hrthm.2023.07.005. Epub 2023 Jul 14.

Differences among young unwitnessed sudden cardiac death, according to time from last seen alive: Insights from a 15-year nationwide study.

Hansen CJ(1), Svane J(2), Lynge TH(3), Stampe NK(3), Bhardwaj P(2), Torp-Pedersen C(4), Banner J(5), Tfelt-Hansen J(2), Winkel BG(3).

ABSTRACT

BACKGROUND: More than half of all sudden cardiac deaths (SCDs) are unwitnessed, but the composition of the unwitnessed SCD population is poorly described. OBJECTIVE: The purpose of this study was to compare clinical and autopsy characteristics of young unwitnessed SCD subjects, based on the time from last contact to being found dead. METHODS: All unwitnessed SCD subjects aged 1-35 years in Denmark from 2000-2014 identified through a multisource approach were included. Time from last seen alive to being found dead was dichotomized to <1 hour or 1-24 hours. Clinical characteristics and autopsy results were compared, and predictors of autopsy were assessed by logistic regression. RESULTS: Of 440 unwitnessed SCD subjects, 366 (83%) had not been seen alive

within 1 hour of being found dead. Comorbidities differed between the groups, with more epilepsy (17% vs 5%) and psychiatric diseases (13% vs 7%) in the 24-hour group. Patients in the 24-hour group died more frequently during sleep (64% vs 23%), the autopsy rate was higher (75% vs 61%), and deaths were more often unexplained after autopsy (69% vs 53%). Having been seen within 1 hour of death independently decreased the chance of being autopsied (odds ratio 0.51; 95% confidence interval 0.27-1.00; $P = .0497$). **CONCLUSION:** The majority of unwitnessed SCD subjects had not been seen alive within 1 hour of being found dead. Clinical- and autopsy-related characteristics differed between the 2 groups. Differences were mainly attributable to death-related circumstances and comorbidities. Excluding SCD cases not seen alive within 1 hour of being found dead would severely underestimate the burden of SCD.

POST-CARDIAC ARREST TREATMENTS

1. *Curr Opin Crit Care*. 2023 Dec 1;29(6):640-647. doi: 10.1097/MCC.0000000000001116. Epub 2023 Oct 12.

Postresuscitation management.

Behringer W(1), Skrifvars MB(2), Taccone FS(3).

ABSTRACT

PURPOSE OF REVIEW: To describe the most recent scientific evidence on ventilation/oxygenation, circulation, temperature control, general intensive care, and prognostication after successful resuscitation from adult cardiac arrest. **RECENT FINDINGS:** Targeting a lower oxygen target (90-94%) is associated with adverse outcome. Targeting mild hypercapnia is not associated with improved functional outcomes or survival. There is no compelling evidence supporting improved outcomes associated with a higher mean arterial pressure target compared to a target of >65 mmHg. Noradrenalin seems to be the preferred vasopressor. A low cardiac index is common over the first 24 h but aggressive fluid loading and the use of inotropes are not associated with improved outcome. Several meta-analyses of randomized clinical trials show conflicting results whether hypothermia in the 32-34°C range as compared to normothermia or no temperature control improves functional outcome. The role of sedation is currently under evaluation. Observational studies suggest that the use of neuromuscular blockade may be associated with improved survival and functional outcome. Prophylactic antibiotic does not impact on outcome. No single predictor is entirely accurate to determine neurological prognosis. The presence of at least two predictors of severe neurological injury indicates that an unfavorable neurological outcome is very likely. **SUMMARY:** Postresuscitation care aims for normoxemia, normocapnia, and normotension. The optimal target core temperature remains a matter of debate, whether to implement temperature management within the 32-34°C range or focus on fever prevention, as recommended in the latest European Resuscitation Council/European Society of Intensive Care Medicine guidelines. Prognostication of neurological outcome demands a multimodal approach.

TARGETED TEMPERATURE MANAGEMENT

1. *Ther Hypothermia Temp Manag*. 2023 Nov 1. doi: 10.1089/ther.2023.0039. Online ahead of print.

Soluble Urokinase-Type Plasminogen Activator Receptor in Comatose Survivors After Out-of-Hospital Cardiac Arrest Treated with Targeted Temperature Management.

Bro-Jeppesen J(1), Grejs AM(2)(3), Andersen O(4), Jeppesen AN(5), Duez C(6), Kirkegaard H(3)(7).

ABSTRACT

Exposure to whole-body ischemia/reperfusion after out-of-hospital cardiac arrest (OHCA) triggers a systemic inflammatory response where soluble urokinase plasminogen activator receptor (suPAR) is released. This study investigated serial levels of suPAR in differentiated target temperature

management and the associations with mortality and 6-month neurological outcome. This is a single-center substudy of the randomized Targeted Temperature Management (TTM) for 24-hour versus 48-hour trial. In this analysis, we included 82 patients and measured serial levels of suPAR at 24, 48, and 72 hours after achievement of target temperature (32-34°C). We assessed all-cause mortality and neurological function evaluated by the Cerebral Performance Categories (CPC) at 6 months after OHCA. Levels of suPAR between TTH groups were evaluated in repeated measures mixed models. Mortality was assessed by the Kaplan-Meier method and serial measurements of suPAR (log2 transformed) were investigated by Cox proportional-hazards models. Good neurological outcome at 6 months was assessed by logistic regression analyses. Levels of suPAR were significantly different between TTH groups (pinteraction = 0.04) with the highest difference at 48 hours, 4.7 ng/mL (95% CI: 4.1-5.4 ng/mL) in the TTH24 group compared to 2.8 ng/mL (95% CI: 2.2-3.5 ng/mL) in the TTH48 group, $p < 0.0001$. Levels of suPAR above the median value were significantly associated with increased all-cause mortality at any time point (plog-rank<0.05). The interaction of suPAR levels and TTH group was not significant (pinteraction = NS). A twofold increase in levels of suPAR was significantly associated with a decreased odds ratio of a good neurological outcome in both unadjusted and adjusted analyses without interaction of TTH group (pinteraction = NS). Prolonged TTM of 48 hours versus 24 hours was associated with lower levels of suPAR. High levels of suPAR were associated with increased mortality and lower odds for good neurological outcome at 6 months with no significant interaction of TTH group.

ELECTROPHYSIOLOGY AND DEFIBRILLATION

1. Curr Opin Crit Care. 2023 Dec 1;29(6):628-632. doi: 10.1097/MCC.0000000000001109. Epub 2023 Oct 4.

Automated external defibrillators and the link to first responder systems.

Jonsson M(1), Berglund E(1), Müller MP(2).

ABSTRACT

PURPOSE OF REVIEW: Automated external defibrillators are a very effective treatment to convert ventricular fibrillation (VF) in out-of-hospital cardiac arrest. The purpose of this paper is to review recent publications related to automated external defibrillators (AEDs). **RECENT FINDINGS:** Much of the recent research focus on ways to utilize publicly available AEDs included in different national/regional registers. More and more research present positive associations between engaging volunteers to increase the use of AEDs. There are only a few recent studies focusing on professional first responders such as fire fighters/police with mixed results. The use of unmanned aerial vehicles (drones) lacks clinical data and is therefore difficult to evaluate. On-site use of AED shows high survival rates but suffers from low incidence of out-of-hospital cardiac arrest (OHCA). **SUMMARY:** The use of public AEDs in OHCA are still low. Systems focusing on engaging volunteers in the cardiac arrest response have shown to be associated with higher AED usage. Dispatching drones equipped with AEDs is promising, but research lacks clinical data. On-site defibrillation is associated with high survival rates but is not available for most cardiac arrests.

PEDIATRICS AND CHILDREN

1. Int J Emerg Med. 2023 Nov 3;16(1):76. doi: 10.1186/s12245-023-00564-3.

Parental perceptions of the importance of pediatric out-of-hospital cardiopulmonary resuscitation for the survival rate in Saudi Arabia: a cross-sectional survey.

Almutairi NS(1), Alharthy NA(2)(3), Almaziad AM(1), Alsalloum AT(1), AlHarbi RA(1), Almulhem SA(1), Yousif A(4)(5), Othman F(6)(7).

ABSTRACT

BACKGROUND: Pediatric out-of-hospital cardiac arrest is associated with high morbidity and mortality rates. Cardiopulmonary resuscitation (CPR), the practice of chest compressions combined with rescue breathing, is crucial for the success of out-of-hospital resuscitation after sudden cardiac arrest. Thus, imparting the requisite knowledge and skills to parents/caregivers can significantly enhance survival rates. This study investigated parental awareness of the impact of out-of-hospital pediatric CPR on survival rates in Saudi Arabia. **METHODS:** This cross-sectional study was conducted using an online questionnaire administered to Saudi parents from all regions of the Kingdom of Saudi Arabia. Data were collected using the convenience sampling method, as the questionnaire was distributed via social media platforms. The questionnaire consisted of five parts: (1) demographic data, (2) questions about parents' perception of basic life support (BLS), (3) evaluation of parents' knowledge of the impact of prehospital CPR on survival rates, (4) measurement of parents' competency in performing pediatric CPR, and (5) assessment of whether parents' confidence was affected by prior training. Statistical analyses were conducted using the chi-squared test or Fisher's exact test, and the t-test was used to compare the mean scores of the groups of parents with medical and non-medical professional backgrounds. **RESULTS:** A total of 1,065 individuals responded to the survey. The respondents' mean age was 41 ± 0.2 years and 46.5% were men. We found that 73.9% of respondents had no prior experience with BLS, 87% had never taken a BLS course, and 61% did not know where to find one. The majority of participants agreed that bystander CPR contributes to overall survival rates, and 77% agreed to the importance of BLS training. Medical professionals showed a higher percentage of agreement on the importance of BLS than those from non-medical backgrounds (90% vs. 76%, $p = 0.036$), especially parents of high-risk children. **CONCLUSION:** This study showed evidence of interest in CPR and BLS training in Saudi parents, despite the low levels of knowledge regarding BLS training.

2. Zhonghua Er Ke Za Zhi. 2023 Nov 2;61(11):1018-1023. doi:10.3760/cma.j.cn112140-20230625-00419.

[Survey on the application of external cardiopulmonary resuscitation in Chinese children with sudden cardiac arrest].

[Article in Chinese; Abstract available in Chinese from the publisher]

Yang X(1), Cheng Y(1), Hong XY(2), Guo YX(3), Wang X(4), Yang YY(5), Chu JP(6), Jin YP(7), Cheng YB(8), Zhang YC(9), Lu GP(1).

ABSTRACT

Objectives: To investigate the current application status and implementation difficulties of extracorporeal cardiopulmonary resuscitation (ECPR) in children with sudden cardiac arrest. **Methods:** This cross-sectional survey was conducted in 35 hospitals. A Children's ECPR Information Questionnaire on the implementation status of ECPR technology (abbreviated as the questionnaire) was designed, to collect the data of 385 children treated with ECPR in the 35 hospitals. The survey extracted the information about development of ECPR, the maintenance of extracorporeal membrane oxygenation (ECMO) machine, the indication of ECPR, and the difficulties of implementation in China. These ECPR patients were grouped based on their age, the hospital location and level, to compare the survival rates after weaning and discharge. The statistical analysis used Chi-square test and one-way analysis of variance for the comparison between the groups, LSD method for post hoc testing, and Bonferroni method for pairwise comparison. **Results:** Of the 385 ECPR cases, 224 were males and 161 females. There were 185 (48.1%) survival cases after weaning and 157 (40.8%) after discharge. There were 324 children (84.2%) receiving ECPR for cardiac disease

and 27 children (7.0%) for respiratory failure. The primary cause of death in ECPR patients was circulatory failure (82 cases, 35.9%), followed by brain failure (80 cases, 35.0%). The most common place of ECPR was intensive care unit (ICU) (278 cases, 72.2%); ECPR catheters were mostly inserted through incision (327 cases, 84.9%). There were 32 hospitals (91.4%) had established ECMO emergency teams, holding 125 ECMO machines in total. ECMO machines mainly located in ICU (89 pieces, 71.2%), and the majority of hospitals (32 units, 91.4%) did not have pre-charged loops. There were no statistically significant differences in the post-withdrawal and post-discharge survival rates of ECPR patients among different age groups, regions, and hospitals (all $P > 0.05$). The top 5 difficulties in implementing ECPR in non-ICU environments were lack of ECMO machines (16 times), difficulty in placing CPR pipes (15 times), long time intervals between CPR and ECMO transfer (13 times), lack of conventional backup ECMO loops (10 times), and inability of ECMO emergency teams to quickly arrive at the site (5 times). Conclusion: ECPR has been gradually developed in the field of pediatric critical care in China, and needs to be further standardized. ECPR in non-ICU environment remains a challenge.

3. Heart Rhythm. 2023 Nov;20(11):1532-1533. doi: 10.1016/j.hrthm.2023.08.014. Epub 2023 Aug 18.
Pediatric out-of-hospital cardiac arrest: Robust dataset shows sobering reality but provides clues to improvement.

Burns KM(1).

NO ABSTRACT AVAILABLE

EXTRACORPOREAL LIFE SUPPORT

1. Crit Care Med. 2023 Nov 3. doi: 10.1097/CCM.0000000000006102. Online ahead of print.
Post-Cardiac Arrest Care in Adult Patients After Extracorporeal Cardiopulmonary Resuscitation.
Kang JK(1), Darby Z(1), Bleck TP(2), Whitman GJR(1), Kim BS(1)(3), Cho SM(1)(4).

ABSTRACT

OBJECTIVES: Extracorporeal cardiopulmonary resuscitation (ECPR) serves as a lifesaving intervention for patients experiencing refractory cardiac arrest. With its expanding usage, there is a burgeoning focus on improving patient outcomes through optimal management in the acute phase after cannulation. This review explores systematic post-cardiac arrest management strategies, associated complications, and prognostication in ECPR patients. **DATA SOURCES:** A PubMed search from inception to 2023 using search terms such as post-cardiac arrest care, ICU management, prognostication, and outcomes in adult ECPR patients was conducted. **STUDY SELECTION:** Selection includes original research, review articles, and guidelines. **DATA EXTRACTION:** Information from relevant publications was reviewed, consolidated, and formulated into a narrative review. **DATA SYNTHESIS:** We found limited data and no established clinical guidelines for post-cardiac arrest care after ECPR. In contrast to non-ECPR patients where systematic post-cardiac arrest care is shown to improve the outcomes, there is no high-quality data on this topic after ECPR. This review outlines a systematic approach, albeit limited, for ECPR care, focusing on airway/breathing and circulation as well as critical aspects of ICU care, including analgesia/sedation, mechanical ventilation, early oxygen/Co₂, and temperature goals, nutrition, fluid, imaging, and neuromonitoring strategy. We summarize common on-extracorporeal membrane oxygenation complications and the complex nature of prognostication and withdrawal of life-sustaining therapy in ECPR. Given conflicting outcomes in ECPR randomized controlled trials focused on pre-cannulation care, a better understanding of hemodynamic, neurologic, and metabolic abnormalities and early management goals may be necessary to improve their outcomes. **CONCLUSIONS:** Effective post-cardiac arrest care during the acute phase of ECPR is paramount in optimizing patient outcomes. However, a dearth of

evidence to guide specific management strategies remains, indicating the necessity for future research in this field.

2. Crit Care Med. 2023 Nov 3. doi: 10.1097/CCM.0000000000006116. Online ahead of 2print.

Prognostic Significance of Signs of Life in Out-of-Hospital Cardiac Arrest Patients Undergoing Extracorporeal Cardiopulmonary Resuscitation.

Bunya N(1), Ohnishi H(2), Kasai T(1), Katayama Y(1), Kakizaki R(1), Nara S(3), Ijuin S(4), Inoue A(4), Hifumi T(5), Sakamoto T(6), Kuroda Y(7), Narimatsu E(1); Study of Advanced life support for Ventricular fibrillation with Extracorporeal circulation in Japan II (SAVE-J II) Study Group.

ABSTRACT

OBJECTIVES: Signs of life (SOLs) during cardiac arrest (gaspings, pupillary light reaction, or any form of body movement) are suggested to be associated with favorable neurologic outcomes in out-of-hospital cardiac arrest (OHCA). While data has demonstrated that extracorporeal cardiopulmonary resuscitation (ECPR) can improve outcomes in cases of refractory cardiac arrest, it is expected that other contributing factors lead to positive outcomes. This study aimed to investigate whether SOL on arrival is associated with neurologic outcomes in patients with OHCA who have undergone ECPR. **DESIGN:** Retrospective multicenter registry study. **SETTING:** Thirty-six facilities participating in the Study of Advanced life support for Ventricular fibrillation with Extracorporeal circulation in Japan II (SAVE-J II). **PATIENTS:** Consecutive patients older than 18 years old who were admitted to the Emergency Department with OHCA between January 1, 2013, and December 31, 2018, and received ECPR. **INTERVENTIONS:** None. **MEASUREMENTS AND MAIN RESULTS:** Patients were classified into two groups according to the presence or absence of SOL on arrival. The primary outcome was a favorable neurologic outcome (Cerebral Performance Category 1 or 2) at discharge. Of the 2157 patients registered in the SAVE-J II database, 1395 met the inclusion criteria, and 250 (17.9%) had SOL upon arrival. Patients with SOL had more favorable neurologic outcomes than those without SOL (38.0% vs. 8.1%; $p < 0.001$). Multivariate analysis showed that SOL on arrival was independently associated with favorable neurologic outcomes (odds ratio, 5.65 [95% CI, 3.97-8.03]; $p < 0.001$). **CONCLUSIONS:** SOL on arrival was associated with favorable neurologic outcomes in patients with OHCA undergoing ECPR. In patients considered for ECPR, the presence of SOL on arrival can assist the decision to perform ECPR.

3. Scand J Trauma Resusc Emerg Med. 2023 Oct 31;31(1):68. doi: 10.1186/s13049-023-01126-5.

Extracorporeal cardiopulmonary resuscitation for hypothermic refractory cardiac arrests in urban areas with temperate climates.

Soumagnac T(1)(2), Raphalen JH(1), Bougouin W(3)(4), Vimpere D(1), Ammar H(1), Yahiaoui S(1), Dagrón C(1), An K(1), Mungur A(1), Carli P(1)(5), Hutin A(1)(6), Lamhaut L(7)(8)(9).

ABSTRACT

BACKGROUND: Accidental hypothermia designates an unintentional drop in body temperature below 35 °C. There is a major risk of ventricular fibrillation below 28 °C and cardiac arrest is almost inevitable below 24 °C. In such cases, conventional cardiopulmonary resuscitation is often inefficient. In urban areas with temperate climates, characterized by mild year-round temperatures, the outcome of patients with refractory hypothermic out-of-hospital cardiac arrest (OHCA) treated with extracorporeal cardiopulmonary resuscitation (ECPR) remains uncertain. **METHODS:** We conducted a retrospective monocentric observational study involving patients admitted to a university hospital in Paris, France. We reviewed patients admitted between January 1, 2011 and April 30, 2022. The primary outcome was survival at 28 days with good neurological outcomes, defined as Cerebral Performance Category 1 or 2. We performed a subgroup analysis distinguishing hypothermic refractory OHCA as either asphyxic or non-asphyxic. **RESULTS:** A total of 36 patients were analysed, 15 of whom (42%) survived at 28 days, including 13 (36%) with good neurological outcomes. Within the asphyxic subgroup, only 1 (10%) patient survived at 28 days, with poor neurological outcomes. A low-flow time of less than 60 min was not significantly associated with

good neurological outcomes ($P = 0.25$). Prehospital ECPR demonstrated no statistically significant difference in terms of survival with good neurological outcomes compared with inhospital ECPR ($P = 0.55$). Among patients treated with inhospital ECPR, the HOPE score predicted a 30% survival rate and the observed survival was 6/19 (32%). **CONCLUSION:** Hypothermic refractory OHCA occurred even in urban areas with temperate climates, and survival with good neurological outcomes at 28 days stood at 36% for all patients treated with ECPR. We found no survivors with good neurological outcomes at 28 days in submersed patients.

4. World J Emerg Med. 2023;14(5):354-359. doi: 10.5847/wjem.j.1920-8642.2023.087.

The neuro-prognostic value of the ion shift index in cardiac arrest patients following extracorporeal cardiopulmonary resuscitation.

Wang G(1), Wang Z(1), Zhu Y(1), Zhang Z(1), Li W(1), Chen X(1), Mei Y(1)(2).

ABSTRACT

BACKGROUND: The ion shift index (ISI) as a prognostic indicator that can show the severity of hypoxic-ischemic injury. We aimed to evaluate the performance of the ISI in predicting unfavorable neurological outcomes at hospital discharge in cardiac arrest (CA) patients following extracorporeal cardiopulmonary resuscitation (ECPR) and to compare its performance to other prognostic predictors. **METHODS:** This was a retrospective observational study including adult CA patients treated with ECPR between January 2018 and December 2022 in a tertiary hospital. Data regarding clinical characteristics and laboratory parameters were collected from medical records. The ISI was determined based on the first available serum electrolyte levels after ECPR. The primary outcome was unfavorable neurological status at hospital discharge, defined as Cerebral Performance Categories 3-5. Comparisons of the characteristics between the two groups were made using the χ^2 test for categorical variables and the t-test or non-parametric Mann-Whitney U-test for continuous variables, as appropriate. Correlation analysis was performed using Spearman's rank correlation coefficient. A two-tailed P-value <0.05 was considered statistically significant. **RESULTS:** Among the 122 patients involved, 46 (37.7%) had out-of-hospital CA, and 88 had unfavorable neurological outcomes. The ISI was significantly higher in the unfavorable outcome group than in the favorable outcome group (3.74 [3.15-4.57] vs. 2.69 [2.51-3.07], $P < 0.001$). A higher ISI level was independently related to unfavorable outcome (odds ratio=6.529, 95% confidence interval 2.239-19.044, $P = 0.001$). An ISI level >3.12 predicted unfavorable outcomes with a sensitivity and specificity of 74.6% and 85.2%, respectively ($P < 0.001$). The prognostic performance of ISI (area under the curve [AUC]=0.887) was similar to that of other predictors, such as gray-to-white matter ratio (AUC=0.850, $P = 0.433$) and neuron-specific enolase (AUC=0.925, $P = 0.394$). **CONCLUSION:** ISI may be used as a prognostic biomarker to predict neurological outcomes in CA patients following ECPR.

5. Intensive Care Med Exp. 2023 Oct 30;11(1):74. doi: 10.1186/s40635-023-00558-8.

Extracorporeal cardiopulmonary resuscitation in 2023.

Wengenmayer T(1), Tigges E(2), Staudacher DL(3).

NO ABSTRACT AVAILABLE

EXPERIMENTAL RESEARCH

1. Anaesthesia. 2023 Nov 3. doi: 10.1111/anae.16162. Online ahead of print.

A quantitative evaluation of aerosol generation during cardiopulmonary resuscitation.

Shrimpton AJ(1), Brown V(2)(3), Vassallo J(4)(5), Nolan JP(6)(7), Soar J(8), Hamilton F(9), Cook TM(7), Bzdek BR(10), Reid JP(10), Makepeace CH(11), Deutsch J(11), Ascione R(12)(13), Brown JM(8), Bengler JR(14), Pickering AE(1)(15).

ABSTRACT

It is unclear if cardiopulmonary resuscitation is an aerosol-generating procedure and whether this poses a risk of airborne disease transmission to healthcare workers and bystanders. Use of airborne transmission precautions during cardiopulmonary resuscitation may confer rescuer protection but risks patient harm due to delays in commencing treatment. To quantify the risk of respiratory aerosol generation during cardiopulmonary resuscitation in humans, we conducted an aerosol monitoring study during out-of-hospital cardiac arrests. Exhaled aerosol was recorded using an optical particle sizer spectrometer connected to the breathing system. Aerosol produced during resuscitation was compared with that produced by control participants under general anaesthesia ventilated with an equivalent respiratory pattern to cardiopulmonary resuscitation. A porcine cardiac arrest model was used to determine the independent contributions of ventilatory breaths, chest compressions and external cardiac defibrillation to aerosol generation. Time-series analysis of participants with cardiac arrest (n = 18) demonstrated a repeating waveform of respiratory aerosol that mapped to specific components of resuscitation. Very high peak aerosol concentrations were generated during ventilation of participants with cardiac arrest with median (IQR [range]) 17,926 (5546-59,209 [1523-242,648]) particles.l-1, which were 24-fold greater than in control participants under general anaesthesia (744 (309-2106 [23-9099]) particles.l-1, p < 0.001, n = 16). A substantial rise in aerosol also occurred with cardiac defibrillation and chest compressions. In a complimentary porcine model of cardiac arrest, aerosol recordings showed a strikingly similar profile to the human data. Time-averaged aerosol concentrations during ventilation were approximately 270-fold higher than before cardiac arrest (19,410 (2307-41,017 [104-136,025]) vs. 72 (41-136 [23-268]) particles.l-1, p = 0.008). The porcine model also confirmed that both defibrillation and chest compressions generate high concentrations of aerosol independent of, but synergistic with, ventilation. In conclusion, multiple components of cardiopulmonary resuscitation generate high concentrations of respiratory aerosol. We recommend that airborne transmission precautions are warranted in the setting of high-risk pathogens, until the airway is secured with an airway device and breathing system with a filter.

2. Crit Care Med. 2023 Nov 3. doi: 10.1097/CCM.0000000000006089. Online ahead of print.

Sodium Bicarbonate and Calcium Chloride for the Treatment of Hyperkalemia-Induced Cardiac Arrest: A Randomized, Blinded, Placebo-Controlled Animal Study.

Eggertsen MA(1)(2), Munch Johannsen C(1)(2), Kovacevic A(2), Fink Vallentin M(3), Mørk Vammen L(1)(2), Andersen LW(1)(2)(3), Granfeldt A(1)(2).

ABSTRACT

OBJECTIVES: Current international guidelines recommend administering calcium chloride and sodium bicarbonate to patients with hyperkalemia-induced cardiac arrest, despite limited evidence. The aim of this study was to evaluate the efficacy of calcium chloride and sodium bicarbonate on return of spontaneous circulation (ROSC) in a pig model of hyperkalemia-induced cardiac arrest. **DESIGN:** A randomized, blinded, placebo-controlled experimental pig study. Hyperkalemia was induced by continuous infusion of potassium chloride over 45 minutes followed by a bolus. After a no flow period of 7 minutes, pigs first received 2 minutes of basic cardiopulmonary resuscitation and subsequently advanced life support. The first intervention dose was administered after the fifth

rhythm analysis, followed by a defibrillation attempt at the sixth rhythm analysis. A second dose of the intervention was administered after the seventh rhythm analysis if ROSC was not achieved. In case of successful resuscitation, pigs received intensive care for 1 hour before termination of the study. SETTING: University hospital laboratory. SUBJECTS: Fifty-four female Landrace/Yorkshire/Duroc pigs (38-42 kg). INTERVENTIONS: The study used a 2 × 2 factorial design, with calcium chloride (0.1 mmol/kg) and sodium bicarbonate (1 mmol/kg) as the interventions. MEASUREMENTS AND MAIN RESULTS: Fifty-two pigs were included in the study. Sodium bicarbonate significantly increased the number of animals achieving ROSC (24/26 [92%] vs. 13/26 [50%]; odds ratio [OR], 12.0; 95% CI, 2.3-61.5; p = 0.003) and reduced time to ROSC (hazard ratio [HR] 3.6; 95% CI, 1.8-7.5; p < 0.001). There was no effect of calcium chloride on the number of animals achieving ROSC (19/26 [73%] vs. 18/26 [69%]; OR, 1.2; 95% CI, 0.4-4.0; p = 0.76) or time to ROSC (HR, 1.5; 95% CI, 0.8-2.9; p = 0.23). CONCLUSIONS: Administration of sodium bicarbonate significantly increased the number of animals achieving ROSC and decreased time to ROSC. There was no effect of calcium chloride on the number of animals achieving ROSC or time to ROSC.

CASE REPORTS

1. Eur Rev Med Pharmacol Sci. 2023 Oct;27(20):9788-9792. doi: 10.26355/eurrev_202310_34153.

Successful percutaneous coronary intervention with extracorporeal membrane oxygenation for patient with acute coronary syndrome and cardiac arrest: a case report.

Gu ZC(1), Liang KR.

ABSTRACT

BACKGROUND: The incidence rate of acute coronary syndrome (ACS) in China is on the rise and is considered a leading cause of death. Emergency percutaneous coronary intervention (PCI) is the preferred treatment method for ACS. However, severe complications may hinder emergency PCI and lead to increased mortality. Extracorporeal membrane oxygenation (ECMO) redirects blood flow and oxygenates it before returning. Therefore, ECMO support during PCI may improve functional recovery and outcomes. This case report presents a successful case of extracorporeal membrane oxygenation (ECMO)-assisted emergency PCI treatment of an outpatient with ACS. CASE REPORT: Male, 43 years old, experienced sudden, severe, and persistent squeezing-like chest pains accompanied by profuse sweating. After half an hour, the patient suddenly lost consciousness and was unable to exhale. After ECMO-assisted PCI, the patient's blood pressure and blood oxygen status improved, and the autonomous rhythm was restored. Imaging results showed 100% occlusion of the middle to distal anterior descending branch. After undergoing distal thrombus aspiration, a stent was implanted in the proximal end of the anterior descending branch. Repeated angiography showed good stent adhesion and restored blood flow in the anterior descending branch. The postoperative patient was transferred to the coronary care unit (CCU) ward with ECMO and ventilator for monitoring. CONCLUSIONS: ECMO-assisted emergency PCI effectively improved the blood pressure and oxygen status of the ACS patient with cardiac arrest, and restored the autonomous rhythm, with a good rehabilitation effect.

2. Pediatr Neurol. 2023 Sep 15;149:184-186. doi: 10.1016/j.pediatrneurol.2023.09.004. Online ahead of print.

Neonatal Cardiac Arrest Following Lacosamide Treatment: A Case Report.

Huberman MA(1), Mallar C(2), Kalika PM(2).

ABSTRACT

BACKGROUND: Lacosamide is an antiepileptic drug with US Food and Drug Administration approval for the treatment of partial-onset seizures in patients older than one month. Lacosamide works by

selective enhancement of proteins that induce preferential slow promotion of sodium channels to the hyperpolarized inactive state. Lacosamide is generally well-tolerated; however, clinical and nonclinical studies have linked its use with cardiac side effects including PR prolongation and atrioventricular (AV) block. **RESULTS:** We present the case of a three-week-old female neonatal patient born at 25 weeks' gestation who developed second-degree AV heart block and cardiac arrest after initiating lacosamide therapy. The patient was being treated for neonatal seizure complicated by intraventricular hemorrhage (grade II) and electrolyte disturbances with phenobarbital, levetiracetam, and phenytoin. Before addition of lacosamide therapy, the patient had an unremarkable electrocardiogram and no known cardiac risk factors for lacosamide. After medication discontinuation, the patient experienced no reoccurring episodes or other cardiac events. **CONCLUSION:** Use of lacosamide for neonatal populations is currently under evaluation. This is the first report of adverse cardiac event (AV block) in the setting of neonatal lacosamide use. Risk of future adverse cardiac events should be evaluated when determining the safety and efficacy of lacosamide in the neonatal population.

3. J Cardiovasc Imaging. 2023 Oct;31(4):214-216. doi: 10.4250/jcvi.2023.0016.

Bone SPECT/CT Findings of Complications Resulting From Cardiopulmonary Resuscitation With Defibrillation.

Kim MH(1), Kim DW(2).

NO ABSTRACT AVAILABLE

4. J Sci Med Sport. 2023 Oct 20:S1440-2440(23)00450-4. doi: 10.1016/j.jsams.2023.10.010. Online ahead of print.

An unusual case of marathon-related exercise associated collapse: Case report and some considerations for medical care at endurance mass participation events.

Carenzo L(1), Ghio FE(2), Mariani N(2), Adami PE(3), Cecconi M(4), Bonizzato S(5).

ABSTRACT

This article presents a unique exercise-associated collapse case during a marathon, highlighting the significance of evidence-based management for athletes on field. The patient, a 61-year-old experienced runner, collapsed near the finish line of the Milano City Marathon. He was aided immediately with CPR and AED. After excluding, through validated algorithms, common and life-threatening causes of collapse, the patient was transferred to hospital. The patient underwent diagnostic procedures, including CT and MRI scans, and hormonal tests that revealed pituitary hemorrhage and underlying coronary artery disease. Follow-up assessments and personalized care were instrumental in the patient's successful recovery and safe return to exercise.

5. Braz J Cardiovasc Surg. 2023 Oct 6;38(6):e20210428. doi: 10.21470/1678-9741-2021-0428.

Ventricular Fibrillation Is a Sign of Life.

Dib N(1), Martins R(2), Flécher E(1).

ABSTRACT

Ventricular fibrillation (VF) is a deadly rhythm problem. With asystole, it represents one of the most extreme emergencies that may engage vital prognosis within only few minutes if appropriated treatment is not instituted. It is learned in all medical schools worldwide that VF is not compatible with consciousness and sustained life. Moreover, at 37°C, and without restauration of cardiac flow, VF may be responsible for severe and most often irreversible brain damage after 3 minutes.