This week's PubMed 5th – 11th March 2023: articles of interest n = 58

CPR AND COVID-19

1. Resusc Plus. 2023 Jun;14:100372. doi: 10.1016/j.resplu.2023.100372. Epub 2023 Feb 28.
Exposure-response relationship between COVID-19 incidence rate and incidence and survival of out-of-hospital cardiac arrest (OHCA).
Leung KY(1), Chu CMM(2), Lui CT(1).
ABSTRACT
AIM: We aimed to report the epidemiology of OHCA, bystander CPR pattern and other Utstein factors in a region in Hong Kong during the COVID-19 pandemic. In particular, we studied the relationship between COVID-19 incidence, OHCA incidence and survival outcome. METHODS: This was a retrospective cohort study that used data from our registry to compare features of OHCA during pre-pandemic (Jan 2018 to Dec 2019), low-incidence pandemic (Jan 2020 to Dec 2021) and high-incidence pandemic (Jan to Mar 2022). We used multivariable logistic regression to identify survival predictors. RESULTS: Incidence of OHCA increased dramatically with surging COVID-19 incidence (65.9 vs 74.2 vs 159.2 per 100,000 population per year, $p < 0.001$). During the pandemic, there were more indoor OHCA (89.3% vs 92.6% vs 97.4%, $p < 0.001$), fewer witnessed arrest (38.5% vs 38.3% vs 29.6%, $p = 0.001$), and longer median time to basic life support upon receiving call (9 min vs 10 min vs 14 min, $p < 0.001$). There was a higher proportion of OHCA cases with bystander-CPR (26.1% vs 31.3% vs 35.3%, $p < 0.001$). The proportion of cases with survival to admission (STA) (30.8% vs 22.2% vs 15.4%, $p < 0.001$) and survival to discharge (STD) (2.2% vs 1.0% vs 0.2%, $p = 0.001$) were lowered. After controlling for confounders, the odds of STA was reduced by 33% and 55% during the low-incidence and high-incidence pandemic respectively. CONCLUSION: The increase in COVID-19 incidence had an exposure-response relationship with an increased incidence of OHCA and worsened survival outcomes.

CPR/MECHANICAL CHEST COMPRESSION

1. Medicine (Baltimore). 2023 Mar 10;102(10):e33066. doi: 10.1097/MD.0000000000033066.
CPR quality with rotation of every 1 versus 2 minutes as characteristics of rescuers: A randomized crossover simulation study.
Kim DH(1), Seo YW(2), Jang TC(2).
ABSTRACT
BACKGROUND: Fatigue and rotation time are key factors affecting the quality of cardiopulmonary resuscitation (CPR). This study aimed to investigate the effects of rotation time on CPR duration, and sex on chest compression quality. METHODS: In this randomized crossover simulation study, we enrolled 100 paramedic students stratified by sex and randomly grouped into 28 male and 22 female pairs. In the 2- and 1-minute scenarios, 2 participants performed CPR for 20 minutes with a rotation cycle of 2 minutes and 1 minute, respectively. After taking a break, they changed over and performed CPR again for 20 minutes. The switching of roles was performed with the students positioned on opposite sides of the mannequin. For chest compression quality, a set was defined as CPR performed by 1 pair in a 2-minute scenario for 4 minutes. The quality of CPR in each set was compared between the 2 groups. RESULTS: The 1-minute group showed significantly higher chest compression depth than the 2-minute group (54.0 [51.5-57.0] vs 52.5 [48.5-56.5] mm, $P = .001$, respectively). The female 2-minute group showed decreased chest compression depth over time, and the 1-minute group showed significantly increased chest compression depth during all sets

except the 2nd set (54.0 [51.9-55.1] vs 50.5 [48.5-53.8] mm [P = .030], 52.3 [49.4-54.5] vs 50.8 [47.0-53.1] mm [P = .080], 52.8 [49.8-54.5] vs 48.8 [45.4-51.6] mm [P = .002], 51.5 [48.5-53.3] vs 48.3 [44.5-50.6] mm [P = .004], and 50.8 [48.9-54.1] vs 47.5 [44.6-50.1] mm [P = .001], respectively). The fatigue scores in the 2-minute group were significantly higher during sets 4 and 5 than those in the 1-minute group. CONCLUSION: When rescuer fatigue increases during prolonged CPR owing to their physical strength and skill levels, the rotation of rescuers every minute would be helpful in maintaining high-quality CPR.

2. Chest. 2023 Mar;163(3):e129-e131. doi: 10.1016/j.chest.2022.07.037.
The Importance of Real-Time Assessment of Chest Compression Efficacy in Cardiac Arrest.
Romito G(1), Colombo CNJ(2), Mazza GM(1), Mojoli F(3), Tavazzi G(3).
NO ABSTRACT AVAILABLE

REGISTRIES, REVIEWS AND EDITORIALS

1. Crit Care. 2023 Mar 6;27(1):86. doi: 10.1186/s13054-023-04379-9.
Hyperoxemia after reperfusion in cardiac arrest patients: a potential dose-response association with 30-day survival.
Awad A(1), Nordberg P(2)(3), Jonsson M(2), Hofmann R(4), Ringh M(2), Hollenberg J(2), Olson J(#)(4), Joelsson-Alm E(#)(4).
ABSTRACT
BACKGROUND: Hyperoxemia may aggravate reperfusion brain injury after cardiac arrest. The aim of this study was to study the associations between different levels of hyperoxemia in the reperfusion period after cardiac arrest and 30-day survival. METHODS: Nationwide observational study using data from four compulsory Swedish registries. Adult in- and out-of-hospital cardiac arrest patients admitted to an ICU, requiring mechanical ventilation, between January 2010 and March 2021, were included. The partial oxygen pressure (PaO2) was collected in a standardized way at ICU admission (± one hour) according to the simplified acute physiology score 3 reflecting the time interval with oxygen treatment from return of spontaneous circulation to ICU admission. Subsequently, patients were divided into groups based on the registered PaO2 at ICU admission. Hyperoxemia was categorized into mild (13.4-20 kPa), moderate (20.1-30 kPa) severe (30.1-40 kPa) and extreme (> 40 kPa), and normoxemia as PaO2 8-13.3 kPa. Hypoxemia was defined as PaO2 < 8 kPa. Primary outcome was 30-day survival and relative risks (RR) were estimated by multivariable modified Poisson regression. RESULTS: In total, 9735 patients were included of which 4344 (44.6%) were hyperoxemic at ICU admission. Among these, 2217 were classified as mild, 1091 as moderate, 507 as severe, and 529 as extreme hyperoxemia. Normoxemia was present in 4366 (44.8%) patients and 1025 (10.5%) had hypoxemia. Compared to the normoxemia group, the adjusted RR for 30-day survival in the whole hyperoxemia group was 0.87 (95% CI 0.82-0.91). The corresponding results for the different hyperoxemia subgroups were; mild 0.91 (95% CI 0.85-0.97), moderate 0.88 (95% CI 0.82-0.95), severe 0.79 (95% CI 0.7-0.89), and extreme 0.68 (95% CI 0.58-0.79). Adjusted 30-day survival for the hypoxemia compared to normoxemia group was 0.83 (95% CI 0.74-0.92). Similar associations were seen in both out-of-hospital and in-hospital cardiac arrests. CONCLUSION: In this nationwide observational study comprising both in- and out-of-hospital cardiac arrest patients, hyperoxemia at ICU admission was associated with lower 30-day survival.

2. EBioMedicine. 2023 Mar 7;90:104517. doi: 10.1016/j.ebiom.2023.104517. Online ahead of print.
Out-of-hospital cardiac arrest: predict and then protect!
Spadafora L(1), Biondi-Zoccai G(2), Bernardi M(1).

NO ABSTRACT AVAILABLE

3. N Engl J Med. 2023 Mar 9;388(10):941-942. doi: 10.1056/NEJMe2214973.
Temperature Management after Cardiac Arrest - All In or Fold?
Bernard S(1), Bray J(1).
NO ABSTRACT AVAILABLE

4. JAMA. 2023 Mar 7;329(9):766-767. doi: 10.1001/jama.2022.24734.
Lower vs Higher Oxygen Saturation Targets and Survival to Hospital Discharge Among Patients Resuscitated After Out-of-Hospital Cardiac Arrest.
Wetsch WA(1), Böttiger BW(1).
NO ABSTRACT AVAILABLE

5. JAMA. 2023 Mar 7;329(9):767. doi: 10.1001/jama.2022.24737.
Lower vs Higher Oxygen Saturation Targets and Survival to Hospital Discharge Among Patients Resuscitated After Out-of-Hospital Cardiac Arrest-Reply.
Bernard S(1), Bray J(2).
NO ABSTRACT AVAILABLE

6. Prehosp Emerg Care. 2023 Mar 7:1-10. doi: 10.1080/10903127.2023.2188331. Online ahead of print.
First Responder CPR and Survival Differences in Texas Minority and Lower Socioeconomic Status Neighborhoods.
Huebinger R(1)(2), Panczyk M(1)(2), Villa N(1)(2), Al-Araji R(3), Schulz K(1)(2), Humphries A(1)(2), Gill J(1)(2), Persse D(2)(4), Bobrow B(1)(2).
ABSTRACT
INTRODUCTION: First responder (FR) cardiopulmonary resuscitation (CPR) is an important component of out-of-hospital cardiac arrest (OHCA) care. However, little is known about FR CPR disparities. METHODS: We linked the 2014-2021 Texas Cardiac Arrest Registry to Enhance Survival (TX-CARES) database to census tract data. We included non-traumatic OHCAs that were not witnessed by 9-1-1 responders and did not receive bystander CPR. We defined census tracts as having >50% of a race/ethnicity: White, Black, or Hispanic/Latino. We also stratified patients into quartiles based on socioeconomic status (SES): household income, high school graduation, and unemployment. We also combined race/ethnicity and income to create a total of five mixed strata, comparing lower income and minority census tracts to high income White census tracts. We created mixed model logistic regression models, adjusting for confounders and modeling census tract as a random intercept. Using the models, we compared FR CPR rates for census race/ethnicity (Black and Hispanic/Latino compared to White), and SES quartiles (2nd, 3rd, and 4th quartiles compared to 1st quartiles). Secondarily, we evaluated the association between FR CPR and survival for all strata. RESULTS: We included 21,966 OHCAs, and 57.4% had FR CPR. Evaluating the association between census tract characteristic and FR CPR, majority Black (aOR 0.30, 95% CI 0.22-0.41) had a lower bystander CPR rate when compared to majority White. The lowest income quartile had a lower rate of bystander CPR (aOR 0.80, 95% CI 0.65-0.98). The worst unemployment quartile was also associated with a lower rate of FR CPR (aOR 0.75, 95% CI 0.61-0.92). Combining race/ethnicity and income, middle income majority Black (30.0%; aOR 0.27, 95% CI 0.17-0.46) and low income >80% Black (31.8%; aOR 0.27, 95% CI 0.10-0.68) had lower rates of FR CPR in comparison to high income majority White. There were no associations between Hispanic or lower high school graduation and lower rates of FR CPR. We found no association between FR CPR and survival for all three strata.

CONCLUSION: While we identified disparities in FR CPR in low SES and majority Black census tracts, we identified no association between FR CPR and survival in Texas.

7. Am J Emerg Med. 2023 Feb 25;67:135-143. doi: 10.1016/j.ajem.2023.02.028. Online ahead of print.

Bystander basic life support and survival after out-of-hospital cardiac arrest: A propensity score matching analysis.

Lafrance M(1), Recher M(2), Javaudin F(3), Chouihed T(4), Wiel E(5), Helft G(6), Hubert H(7), Canon V(7); GR-RéAC(8).

ABSTRACT

INTRODUCTION AND OBJECTIVES: In out-of-hospital cardiac arrest, early recognition, calling for emergency medical assistance, and early cardiopulmonary resuscitation are acknowledged to be the three most important components in the chain of survival. However, bystander basic life support (BLS) initiation rates remain low. The objective of the present study was to evaluate the association between bystander BLS and survival after an out-of-hospital cardiac arrest (OHCA). METHODS: We conducted a retrospective cohort study of all patients with OHCA with a medical etiology treated by a mobile intensive care unit (MICU) in France from July 2011 to September 2021, as recorded in the French National OHCA Registry (RéAC). Cases in which the bystander was an on-duty fire fighter, paramedic, or emergency physician were excluded. We assessed the characteristics of patients who received bystander BLS vs. those who did not. The two classes of patient were then matched 1:1, using a propensity score. Conditional logistic regression was then used to probe the putative association between bystander BLS and survival. RESULTS: During the study, 52,303 patients were included; BLS was provided by a bystander in 29,412 of these cases (56.2%). The 30-day survival rates were 7.6% in the BLS group and 2.5% in the no-BLS group ($p < 0.001$). After matching, bystander BLS was associated with a greater 30-day survival rate (odds ratio (OR) [95% confidence interval (CI)] = 1.77 [1.58-1.98]). Bystander BLS was also associated with greater short-term survival (alive on hospital admission; OR [95%CI] = 1.29 [1.23-1.36]). CONCLUSIONS: The provision of bystander BLS was associated with a 77% greater likelihood of 30-day survival after OHCA. Given than only one in two OHCA bystanders provides BLS, a greater focus on life saving training for laypeople is essential.

8. Anaesth Intensive Care. 2023 Mar 8:310057X221129631. doi: 10.1177/0310057X221129631. Online ahead of print.

Intraoperative cardiac arrest in the lateral position: Is rapid repositioning always necessary?

Geoghegan AC(1), Leonard IE(1).

NO ABSTRACT AVAILABLE

9. Pediatr Res. 2023 Feb;93(3):466-468. doi: 10.1038/s41390-022-02411-2. Epub 2022 Dec 12.

Is epinephrine effective during neonatal resuscitation?

Sankaran D(1)(2), Molloy EJ(3), Lakshminrusimha S(4).

ABSTRACT

In the original research article published in Pediatric Research, Anderson et al provide valuable data from a placebo-controlled randomized trial on epinephrine in 12-hour-old piglets in cardiac arrest. In this commentary, we discuss briefly the existing evidence supporting use of epinephrine during neonatal resuscitation.

IN-HOSPITAL CARDIAC ARREST

1. Intern Med J. 2023 Mar 6. doi: 10.1111/imj.16046. Online ahead of print.
A Survey of Hospital Practitioners: Common Understanding of CPR Definition and Outcomes.
Berry-Kilgour NAH(1), Paulin JR(2), Psirides A(3), Pegg TJ(4).
ABSTRACT
BACKGROUND: Cardiopulmonary resuscitation (CPR) is internationally defined as chest compressions and rescue breaths, and is a subset of resuscitation. First used for out-of-hospital cardiac arrest, CPR is now frequently used for in-hospital cardiac arrest (IHCA) with different aetiology and outcomes. This paper aims to describe clinical understanding of the role of in-hospital CPR and perceived outcomes for IHCA. METHODS: An online survey of a secondary care staff involved in resuscitation was conducted, focussing on definitions of CPR, features of do-not-attempt-CPR (DNACPR) conversations with patients and clinical case scenarios. Data were analysed using a simple descriptive approach. RESULTS: Of 652 responses, 500 were complete and used for analysis. 211 respondents were senior medical staff covering acute medical disciplines. Ninety-one percent of respondents agreed or strongly agreed that defibrillation is part of cardiopulmonary resuscitation, and 96% believed CPR for IHCA included defibrillation. Responses to clinical scenarios were dissonant, with nearly half of respondents demonstrating a pattern of underestimating survival and subsequently showing a desire to offer CPR in similar scenarios with poor outcomes. This was unaffected by seniority and level of resuscitation training. CONCLUSIONS: The common use of CPR in hospital reflects the broader definition of resuscitation. Recapturing the CPR definition for clinicians and patients as only chest compressions and rescue breaths may allow clinicians to better discuss individualised resuscitation care to aide meaningful shared decision making around patient deterioration. This may involve reframing current in-hospital algorithms and uncoupling CPR from wider resuscitative measures.

INJURIES AND CPR

No articles identified.

CAUSE OF THE ARREST

1. J Clin Med. 2023 Mar 6;12(5):2064. doi: 10.3390/jcm12052064.
Differences in Outcome of Patients with Cardiogenic Shock Associated with In-Hospital or Out-of-Hospital Cardiac Arrest.
Rusnak J(1)(2), Schupp T(1)(2), Weidner K(1)(2), Ruka M(1)(2), Egner-Walter S(1)(2), Forner J(1)(2), Bertsch T(3), Kittel M(4), Mashayekhi K(5), Tajti P(6), Ayoub M(7), Behnes M(1)(2), Akin I(1)(2).
ABSTRACT
Cardiogenic Shock (CS) complicated by in-hospital (IHCA) or out-of-hospital cardiac arrest (OHCA) has a poor outcome. However, studies regarding the prognostic differences between IHCA and OHCA in CS are limited. In this prospective, observational study, consecutive patients with CS were included in a monocentric registry from June 2019 to May 2021. The prognostic impact of IHCA and OHCA on 30-day all-cause mortality was tested within the entire group and in the subgroups of patients with acute myocardial infarction (AMI) and coronary artery disease (CAD). Statistical analyses included univariable t-test, Spearman's correlation, Kaplan-Meier analyses, as well as uni- and multivariable Cox regression analyses. A total of 151 patients with CS and cardiac arrest were included. IHCA on ICU admission was associated with higher 30-day all-cause mortality compared to OHCA in univariable COX regression and Kaplan-Meier analyses. However, this association was solely driven by patients with AMI (77% vs. 63%; log rank p = 0.023), whereas IHCA was not associated with 30-

day all-cause mortality in non-AMI patients (65% vs. 66%; log rank p = 0.780). This finding was confirmed in multivariable COX regression, in which IHCA was solely associated with higher 30-day all-cause mortality in patients with AMI (HR = 2.477; 95% CI 1.258-4.879; p = 0.009), whereas no significant association could be seen in the non-AMI group and in the subgroups of patients with and CAD. CS patients with IHCA showed significantly higher all-cause mortality at 30 days compared to patients with OHCA. This finding was primarily driven by a significant increase in all-cause mortality at 30 days in CS patients with AMI and IHCA, whereas no difference could be seen when differentiated by CAD.

2. J Clin Med. 2023 Mar 6;12(5):2068. doi: 10.3390/jcm12052068.
Obesity Is Indirectly Associated with Sudden Cardiac Arrest through Various Risk Factors.
Kim YG(1), Jeong JH(1), Roh SY(2), Han KD(3), Choi YY(1), Min K(4), Shim J(1), Choi JI(1), Kim YH(1).
ABSTRACT
Although obesity is a well-established risk factor of cardiovascular event, the linkage between obesity and sudden cardiac arrest (SCA) is not fully understood. Based on a nationwide health insurance database, this study investigated the impact of body weight status, measured by body-mass index (BMI) and waist circumference, on the SCA risk. A total of 4,234,341 participants who underwent medical check-ups in 2009 were included, and the influence of risk factors (age, sex, social habits, and metabolic disorders) was analyzed. For 33,345,378 person-years follow-up, SCA occurred in 16,352 cases. The BMI resulted in a J-shaped association with SCA risk, in which the obese group (BMI ≥ 30) had a 20.8% increased risk of SCA compared with the normal body weight group (18.5 ≤ BMI < 23.0) (p < 0.001). Waist circumference showed a linear association with the risk of SCA, with a 2.69-fold increased risk of SCA in the highest waist circumference group compared with the lowest waist circumference group (p < 0.001). However, after adjustment of risk factors, neither BMI nor waist circumference was associated with the SCA risk. In conclusion, obesity is not independently associated with SCA risk based on the consideration of various confounders. Rather than confining the findings to obesity itself, comprehensive consideration of metabolic disorders as well as demographics and social habits might provide better understanding and prevention of SCA.

3. Int J Cardiol Heart Vasc. 2023 Feb 27;45:101188. doi: 10.1016/j.ijcha.2023.101188. eCollection 2023 Apr.
Bundle branch block in cardiac arrest survivors without ischemic heart disease.
Holm JT(1), Stampe NK(1), Bhardwaj P(1)(2), Jabbari R(1), Gustafsson F(1)(3), Risum N(1), Tfelt-Hansen J(1)(2), Winkel BG(1).
ABSTRACT
AIMS: Cardiac arrest (CA) survivors with left/right bundle branch block (LBBB/RBBB) and no ischemic heart disease (IHD) have not been previously characterized. The aim of this study was to describe heart failure, implantable cardioverter defibrillator (ICD) therapy and mortality in this population. METHODS: Between 2009 and 2019 we consecutively identified all CA survivors with a consistent bundle branch block (BBB) defined as a QRS ≥ 120 ms, who had a secondary prophylactic ICD implanted. Patients with congenital and ischemic heart disease (IHD) were excluded. RESULTS: Among 701 CA-survivors who survived to discharge and received an ICD, a total of 58 (8%) were free from IHD and had BBB; 46 (79%) had LBBB, 10 (17%) had RBBB and 2 (3%) had non-specific BBB (NSBBB). The prevalence of LBBB was 7%. Pre-arrest ECG were available in 34 (59%) patients; 20 patients (59%) had LBBB, 6 (18%) had RBBB, 2 (6%) had NSBBB, 1 had (3%) incomplete LBBB, and 4 (12%) without BBB. At discharge, patients with LBBB had a significantly lower left ventricular ejection fraction (LVEF) than patients with other types of BBB, p < 0.001. During follow-up, 7 (12%) died after a median of 3.6 years (IQR: 2.6-5.1) with no difference between BBB subtypes. CONCLUSION: We

identified 58 CA-survivors with BBB and no IHD. The prevalence of LBBB among all CA-survivors was high, 7%. During CA hospitalization LBBB patients presented with a significantly lower LVEF than patients with other types of BBB (P < 0.001). ICD treatment and mortality did not differ between BBB subtypes during follow-up.

4. Am J Cardiol. 2023 Feb 1:S0002-9149(23)00013-9. doi: 10.1016/j.amjcard.2023.01.012. Online ahead of print.

Trends and Outcomes in Cardiac Arrest Among Heart Failure Admissions.

Chouairi F(1), Miller PE(2), Loriaux DB(3), Katz JN(3), Sen S(2), Ahmad T(2), Fudim M(4).

ABSTRACT

There is limited large, national data investigating the prevalence, characteristics, and outcomes of cardiac arrest (CA) in patients hospitalized for heart failure (HF). The goal of this study was to examine the characteristics, trends, and outcomes of HF hospitalizations complicated by in-hospital CA. We used the National Inpatient Sample to identify all primary HF admissions from 2016 to 2019. Cohorts were built based on the presence of a codiagnosis of CA. Diagnoses were identified using International Classification of Diseases, Tenth Revision, Clinical Modification codes. Associations with CA were then analyzed using multivariate logistic regression. We identified a total of 4,905,564 HF admissions, 56,170 (1.1%) of which had CA. Hospitalizations complicated by CA were significantly more likely to be male, to have coronary artery disease, renal disease, and less likely to be White (p <0.001, all). Age <65 (odds ratio [OR] 1.18, p <0.001), renal disease (OR 2.41, p <0.001), and coronary artery disease (OR 1.26, p <0.001) had higher odds of CA while female gender (OR 0.84, confidence interval [CI] 0.83 to 0.86, p <0.001) or HFpEF (OR 0.49, CI 0.48 to 0.50, p <0.001) had lower odds of CA. Patients with CA had higher inpatient mortality (CA 54.2% vs no CA 2.1%, p <0.001), which persisted after multivariate adjustment (OR 64.8, CI 63.5 to 66.0, p <0.001). CA occurs in >1 in 1,000 HF hospitalizations and remains a prominent and serious event associated with a high mortality. Further research is needed to examine long-term outcomes and mechanical circulatory support utilization with more granularity in HF patients with in-hospital CA.

5. J Intensive Care Soc. 2023 Feb;24(1):47-52. doi: 10.1177/17511437221105774. Epub 2022 Jun 1.

Critical care drowning admissions in Southwest England 2009-2020, a retrospective study.

Brayne AB(1), Jones W(2), Lee A(3), Chatfield-Ball C(4), Kaye D(5), Ball M(6), Sacher G(1); South West Anaesthetic Research Matrix (SWARM); Morgan P(7)(8)(9)(10)(11).

ABSTRACT

AIM: In the United Kingdom (UK), 600 deaths per annum are attributable to drowning. Despite this there is scarce critical care data on drowning patients globally. We describe drowning cases admitted to critical care units with a focus on functional outcomes. MATERIALS AND METHODS: Medical records for critical care admissions following a drowning event were retrospectively reviewed across six hospitals in Southwest England for cases presenting in the period between 2009 and 2020. Data was collected according to the Utstein international consensus guidelines on drowning. RESULTS: Forty-nine patients were included, 36 males and 13 females, including seven children. Median submersion duration was 2.5 min 20 cases were in cardiac arrest when rescued. At discharge 22 patients had preserved functional status, 10 patients had a reduced functional status. 17 patients died in hospital. CONCLUSION: Admission to critical care following drowning is uncommon and associated with high rates of mortality and poor functional outcomes. We find that 31% of those who survived a drowning event subsequently required an increased level of assistance with their activities of daily living.

6. Front Cardiovasc Med. 2023 Feb 16;10:1100187. doi: 10.3389/fcvm.2023.1100187. eCollection 2023.

Pre-percutaneous coronary intervention sudden cardiac arrest in ST-elevation myocardial infarction: Incidence, predictors, and related outcomes.

Machado GP(1)(2), Theobald AL(1)(2), de Araujo GN(3)(4), da Silveira AD(1)(2), Wainstein RV(1)(2), Fracasso JF(5), Niches M(5), Chies A(5), Goncalves SC(1)(2), Pimentel M(1)(2), Wainstein MV(1)(2)(5).

ABSTRACT

BACKGROUND: ST-segment elevation myocardial infarction (STEMI) is a frequent cause of sudden cardiac arrest (SCA) and early percutaneous coronary intervention (PCI) is associated with increased survival. Despite constant improvements in SCA management, survival remains poor. We aimed to assess pre-PCI SCA incidence and related outcomes in patients admitted with STEMI. METHODS: This was a prospective cohort study of patients admitted with STEMI in a tertiary university hospital over 11 years. All patients were submitted to emergency coronary angiography. Baseline characteristics, details of the procedure, reperfusion strategies, and adverse outcomes were assessed. The primary outcome was in-hospital mortality. The secondary outcome was 1-year mortality after hospital discharge. Predictors of pre-PCI SCA was also assessed. RESULTS: During the study period 1,493 patients were included; the mean age was 61.1 years (±12), and 65.3% were male. Pre-PCI SCA was present in 133 (8.9%) patients. In-hospital mortality was higher in the pre-PCI SCA group (36.8% vs. 8.8%, $p < 0.0001$). In multivariate analysis, anterior MI, cardiogenic shock, age, pre-PCI SCA and lower ejection fraction remained significantly associated with in-hospital mortality. When we analyzed the interaction between pre-PCI SCA and cardiogenic shock upon admission there is a further increase in mortality risk when both conditions are present. For predictors of pre-PCI SCA, only younger age and cardiogenic shock remained significantly associated after multivariate analysis. Overall 1-year mortality rates were similar between pre-PCI SCA survivors and non-pre-PCI SCA group. CONCLUSION: In a cohort of consecutive patients admitted with STEMI, pre-PCI SCA was associated with higher in-hospital mortality, and its association with cardiogenic shock further increases mortality risk. However, long-term mortality among pre-PCI SCA survivors was similar to non-SCA patients. Understanding characteristics associated with pre-PCI SCA may help to prevent and improve the management of STEMI patients.

7. Chest. 2023 Mar;163(3):e125-e127. doi: 10.1016/j.chest.2022.06.050.

The Cause and Effect of Prolonged Cardiac Arrest.

Balakrishnan R(1), Shiloh AL(2).

NO ABSTRACT AVAILABLE

END-TIDAL CO_2

No articles identified.

ORGAN DONATION

No articles identified.

FEEDBACK

1. Kardiol Pol. 2023;81(2):177-179. doi: 10.33963/KP.a2023.0004. Epub 2023 Jan 3.

Improvement in chest compression quality performed by paramedics and evaluated with a real-time feedback device: Randomized trial.
Jaskuła J(1)(2), Stolarz-Skrzypek K(3), Jaros K(4), Wordliczek J(5)(6), Cebula G(7), Kloch M(7).
NO ABSTRACT AVAILABLE

DRUGS

1. Crit Care. 2023 Mar 2;27(1):81. doi: 10.1186/s13054-023-04301-3.
Improving vasopressor use in cardiac arrest.
Perkins GD(1), Couper K(2).
ABSTRACT
The Chain of Survival highlights the effectiveness of early recognition of cardiac arrest and call for help, early cardiopulmonary resuscitation and early defibrillation. Most patients, however, remain in cardiac arrest despite these interventions. Drug treatments, particularly the use of vasopressors, have been included in resuscitation algorithms since their inception. This narrative review describes the current evidence base for vasopressors and reports that adrenaline (1 mg) is highly effective at achieving return of spontaneous circulation (number needed to treat 4) but is less effective on long-term outcomes (survival to 30 days, number needed to treat 111) with uncertain effects on survival with a favourable neurological outcome. Randomised trials evaluating vasopressin, either as an alternative to or in addition to adrenaline, and high-dose adrenaline have failed to find evidence of improved long-term outcomes. There is a need for future trials to evaluate the interaction between steroids and vasopressin. Evidence for other vasopressors (e.g. noradrenaline, phenylephedrine) is insufficient to support or refute their use. The use of intravenous calcium chloride as a routine intervention in out of hospital cardiac arrest is not associated with benefit and may cause harm. The optimal route for vascular access between peripheral intravenous versus intraosseous routes is currently the subject of two large randomised trials. Intracardiac, endobronchial, and intramuscular routes are not recommended. Central venous administration should be limited to patients where an existing central venous catheter is in situ and patent.

TRAUMA

1. Am J Emerg Med. 2023 Mar 1;68:28-32. doi: 10.1016/j.ajem.2023.02.034. Online ahead of print.
CAB versus ABC approach for resuscitation of patients following traumatic injury: Toward improving patient safety and survival.
Breeding T(1), Martinez B(1), Katz J(1), Kim J(1), Havron W(2), Hoops H(3), Elkbuli A(4).
ABSTRACT
INTRODUCTION: Though a circulation-airway-breathing (CAB) resuscitation sequence is now widely accepted in administering CPR over the airway-breathing-circulation (ABC) sequence following cardiac arrest, current evidence and guidelines vary considerably for complex polytraumas, with some prioritizing management of the airway and others advocating for initial treatment of hemorrhage. This review aims to evaluate existing literature comparing ABC and CAB resuscitation sequences in adult trauma patients in-hospital to direct future research and guide evidence-based recommendations for management. METHODS: A literature search was conducted on PubMed, Embase, and Google Scholar until September 29, 2022. Articles were assessed for comparison between CAB and ABC resuscitation sequences, adult trauma patients, in-hospital treatment, patient volume status, and clinical outcomes. RESULTS: Four studies met the inclusion criteria. Two studies compared the CAB and ABC sequences specifically in hypotensive trauma patients, one study

evaluated the sequences in trauma patients with hypovolemic shock, and one study in patients with all types of shock. Hypotensive trauma patients who underwent rapid sequence intubation before blood transfusion had a significantly higher mortality rate than those who had blood transfusion initiated first (50 vs 78% $P < 0.05$) and a significant drop in blood pressure. Patients who subsequently experienced post-intubation hypotension (PIH) had increased mortality over those without PIH. overall mortality was higher in patients that developed PIH (mortality, n (%): PIH = 250/753 (33.2%) vs 253/1291 (19.6%), $p < 0.001$). CONCLUSION: This study found that hypotensive trauma patients, especially those with active hemorrhage, may benefit more from a CAB approach to resuscitation, as early intubation may increase mortality secondary to PIH. However, patients with critical hypoxia or airway injury may still benefit more from the ABC sequence and prioritization of the airway. Future prospective studies are needed to understand the benefits of CAB with trauma patients and identify which patient subgroups are most affected by prioritizing circulation before airway management.

2. Am Surg. 2023 Mar 6:31348231161082. doi: 10.1177/00031348231161082. Online ahead of print.
Early Use of Extracorporeal Membrane Oxygenation for Traumatically Injured Patients: A National Trauma Database Analysis.
Lammers D(1)(2), Rokayak O(2), Uhlich R(2), Hu P(2), Baird E(2), Rakestraw S(2), Betzold R(1)(2), McClellan J(3), Eckert M(4).

ABSTRACT
INTRODUCTION: Extracorporeal membrane oxygenation (ECMO) in acute trauma patients is a poorly characterized event. While ECMO most commonly has been deployed for advanced cardio-pulmonary or respiratory failure following initial resuscitation, growing levels of evidence for out of hospital cardiac arrest support early ECMO cannulation as part of resuscitative efforts. We sought to perform a descriptive analysis evaluating traumatically injured patients, who were placed on ECMO, during their initial resuscitation period. METHODS: We performed a retrospective analysis of the Trauma Quality Improvement Program Database from 2017 to 2019. All traumatically injured patients who received ECMO within the first 24 hours of their hospitalization were assessed. Descriptive statistics were used to define patient characteristics and injury patterns associated with the need for ECMO, while mortality represented the primary outcome evaluated. RESULTS: A total of 696 trauma patients received ECMO during their hospitalization, of which 221 were placed on ECMO within the first 24 hours. Early ECMO patients were on average 32.5 years old, 86% male, and sustained a penetrating injury 9% of the time. The average ISS was 30.7, and the overall mortality rate was 41.2%. Prehospital cardiac arrest was noted in 18.2% of the patient population resulting in a 46.8% mortality. Of those who underwent resuscitative thoracotomy, a 53.3% mortality rate was present. CONCLUSION: Early cannulation for ECMO in severely injured patients may provide an opportunity for rescue therapy following severe injury patterns. Further evaluation regarding the safety profile, cannulation strategies, and optimal injury patterns for these techniques should be evaluated.

VENTILATION

No articles identified.

CERERBRAL MONITORING

1. Resuscitation. 2023 Mar 8:109761. doi: 10.1016/j.resuscitation.2023.109761. Online ahead of print.

Association between the extent of diffusion restriction on brain diffusion-weighted imaging and neurological outcomes after an out-of-hospital cardiac arrest.

Yoon Park J(1), Hwan Kim Y(2), Jun Ahn S(1), Ho Lee J(1), Woo Lee D(1), Youn Hwang S(1), Gyu Song Y(3).

ABSTRACT

BACKGROUND: This study evaluated the association between the extent of diffusion restriction on brain diffusion-weighted imaging (DWI) and neurological outcomes in patients who underwent targeted temperature management (TTM) after an out-of-hospital cardiac arrest (OHCA). METHODS: Patients who underwent brain magnetic resonance imaging within 10 days of OHCA between 2012 and 2021 were analysed. The extent of diffusion restriction was described according to the modified DWI Alberta Stroke Program Early Computed Tomography Score (DWI-ASPECTS). The 35 predefined brain regions were assigned a score if diffuse signal changes were concordantly present in DWI scans and apparent diffusion coefficient maps. The primary outcome was an unfavourable neurological outcome at 6 months. The sensitivity, specificity, and receiver operating characteristic (ROC) curves for the measured parameters were analysed. Cut-off values were determined to predict the primary outcome. The predictive cut-off DWI-ASPECTS was internally validated using five-fold cross-validation. RESULTS: Of the 301 patients, 108 (35.9%) had 6-month favourable neurological outcomes. Patients with unfavourable outcomes had higher whole-brain DWI-ASPECTS (median, 31 [26-33] vs. 0 [0-1], $P < 0.001$) than those with favourable outcomes. The area under the ROC curve (AUROC) of whole-brain DWI-ASPECTS was 0.957 (95% confidence interval [CI] 0.928-0.977). A cut-off value of ≥8 for unfavourable neurological outcomes had specificity and sensitivity of 100% (95% CI 96.6-100) and 89.6% (95% CI 84.4-93.6), respectively. The mean AUROC was 0.956. CONCLUSION: More extensive diffusion restriction on DWI-ASPECTS in patients with OHCA who underwent TTM was associated with 6-month unfavourable neurological outcomes. Running title: Diffusion restriction and neurological outcomes after cardiac arrest.

2. JAMA Neurol. 2023 Mar 6:e230050. doi: 10.1001/jamaneurol.2023.0050. Online ahead of print.

Alzheimer Disease Blood Biomarkers in Patients With Out-of-Hospital Cardiac Arrest.

Ashton NJ(1)(2)(3)(4), Moseby-Knappe M(5), Benedet AL(1), Grötschel L(1), Lantero-Rodriguez J(1), Karikari TK(1)(6), Hassager C(7), Wise MP(8), Stammet P(9)(10), Kjaergaard J(7), Friberg H(11), Nielsen N(11), Cronberg T(5), Zetterberg H(1)(12)(13)(14)(15), Blennow K(1)(12).

ABSTRACT

IMPORTANCE: Blood phosphorylated tau (p-tau) and amyloid-β peptides (Aβ) are promising peripheral biomarkers of Alzheimer disease (AD) pathology. However, their potential alterations due to alternative mechanisms, such as hypoxia in patients resuscitated from cardiac arrest, are not known. OBJECTIVE: To evaluate whether the levels and trajectories of blood p-tau, Aβ42, and Aβ40 following cardiac arrest, in comparison with neural injury markers neurofilament light (NfL) and total tau (t-tau), can be used for neurological prognostication following cardiac arrest. DESIGN, SETTING, AND PARTICIPANTS: This prospective clinical biobank study used data from the randomized Target Temperature Management After Out-of-Hospital Cardiac Arrest (TTM) trial. Unconscious patients with cardiac arrest of presumed cardiac origin were included between November 11, 2010, and January 10, 2013, from 29 international sites. Serum analysis for serum NfL and t-tau were performed between August 1 and August 23, 2017. Serum p-tau, Aβ42, and Aβ40 were analyzed between July 1 and July 15, 2021, and between May 13 and May 25, 2022. A total of 717 participants

from the TTM cohort were examined: an initial discovery subset (n = 80) and a validation subset. Both subsets were evenly distributed for good and poor neurological outcome after cardiac arrest. EXPOSURES: Serum p-tau, Aβ42, and Aβ40 concentrations using single molecule array technology. Serum levels of NfL and t-tau were included as comparators. MAIN OUTCOMES AND MEASURES: Blood biomarker levels at 24 hours, 48 hours, and 72 hours after cardiac arrest. Poor neurologic outcome at 6-month follow-up, defined according to the cerebral performance category scale as category 3 (severe cerebral disability), 4 (coma), or 5 (brain death). RESULTS: This study included 717 participants (137 [19.1%] female and 580 male [80.9%]; mean [SD] age, 63.9 [13.5] years) who experienced out-of-hospital cardiac arrest. Significantly elevated serum p-tau levels were observed at 24 hours, 48 hours, and 72 hours in cardiac arrest patients with poor neurological outcome. The magnitude and prognostication of the change was greater at 24 hours (area under the receiver operating characteristic curve [AUC], 0.96; 95% CI, 0.95-0.97), which was similar to NfL (AUC, 0.94; 95% CI, 0.92-0.96). However, at later time points, p-tau levels decreased and were weakly associated with neurological outcome. In contrast, NfL and t-tau maintained high diagnostic accuracies, even 72 hours after cardiac arrest. Serum Aβ42 and Aβ40 concentrations increased over time in most patients but were only weakly associated with neurological outcome. CONCLUSIONS AND RELEVANCE: In this case-control study, blood biomarkers indicative of AD pathology demonstrated different dynamics of change after cardiac arrest. The increase of p-tau at 24 hours after cardiac arrest suggests a rapid secretion from the interstitial fluid following hypoxic-ischemic brain injury rather than ongoing neuronal injury like NfL or t-tau. In contrast, delayed increases of Aβ peptides after cardiac arrest indicate activation of amyloidogenic processing in response to ischemia.

ULTRASOUND AND CPR

No articles identified.

ORGANISATION AND TRAINING

1. Resuscitation. 2023 Mar 3:109758. doi: 10.1016/j.resuscitation.2023.109758. Online ahead of print.

Evaluating Current Guidelines for Cardiopulmonary Resuscitation using an Integrated Computational Model of the Cardiopulmonary System.

Daudre-Vignier C(1), Bates DG(2), Scott TE(3), Hardman JG(4), Laviola M(5).

ABSTRACT

OBJECTIVE: We aimed to use a high-fidelity computational model that captures key interactions between the cardiovascular and pulmonary systems to investigate whether current CPR protocols could potentially be improved. METHODS: We developed and validated the computational model against available human data. We used a global optimisation algorithm to find CPR protocol parameters that optimise the outputs associated with return of spontaneous circulation in a cohort of 10 virtual subjects. RESULTS: Compared with current protocols, myocardial tissue oxygen volume was more than 5 times higher, and cerebral tissue oxygen volume was nearly doubled, during optimised CPR. While the optimal maximal sternal displacement (5.5 cm) and compression ratio (51%) found using our model agreed with the current American Heart Association guidelines, the optimal chest compression rate was lower (67 compressions min-1). Similarly, the optimal ventilation strategy was more conservative than current guidelines, with an optimal minute ventilation of 1500 ml min-1 and inspired fraction of oxygen of 80%. The end compression force

was the parameter with the largest impact on CO, followed by PEEP, the compression ratio and the CC rate. CONCLUSIONS: Our results indicate that current CPR protocols could potentially be improved. Excessive ventilation could be detrimental to organ oxygenation during CPR, due to the negative haemodynamic effect of increased pulmonary vascular resistance. Particular attention should be given to the chest compression force to achieve satisfactory CO. Future clinical trials aimed at developing improved CPR protocols should explicitly consider interactions between chest compression and ventilation parameters.

2. J Healthc Qual Res. 2023 Mar 9:S2603-6479(23)00005-2. doi: 10.1016/j.jhqr.2023.02.004. Online ahead of print.

[Differences between Spain's autonomous communities in the availability of semi-automatic external defibrillators outside the healthcare setting]. [Article in Spanish]

Ballesteros-Peña S(1), Fernández-Aedo I(2), Vallejo de la Hoz G(3).

ABSTRACT

BACKGROUND: Early defibrillation is one of the interventions that can most influence the prognosis of cardiac arrest. The objectives of this study were to determine the number of automatic external defibrillators outside the healthcare setting in each autonomous community in Spain and to compare the legislation of each autonomous community on the mandatory installation of defibrillators outside the healthcare setting. METHODS: A cross-sectional observational study was carried out between December 2021 and January 2022 by consulting official data in the 17 Spanish autonomous communities. RESULTS: Complete data on the number of registered defibrillators were obtained from 15 autonomous communities. The number of defibrillators ranged from 35 to 126 per 100,000 inhabitants. At the global level, differences were observed between communities with mandatory defibrillator installation and those without (92.1 vs. 57.8 defibrillators/100,000 inhabitants). CONCLUSIONS: There is heterogeneity in the provision of defibrillators outside the health care setting, which seems to be related to the diversity of legislation on the mandatory installation of defibrillators.

3. Int J Med Inform. 2023 Feb 26;173:105025. doi: 10.1016/j.ijmedinf.2023.105025. Online ahead of print.

Improved immune algorithm for sudden cardiac death first aid drones site selection.

Yukun J(1), Yanmang S(2), Yan W(3), Bei W(4), Shurui F(4).

ABSTRACT

AIMS: Out-of-hospital cardiac arrest (OHCA) requires a fast emergency response, while traditional emergency takes too long to meet the demand. Combining a drone with a defibrillator can provide rapid resuscitation of OHCA patients. The aims are to improve survival in OHCA and to minimize the total system cost. METHODS: We developed an integer planning model for sudden cardiac death (SCD) first aid drone siting based on a set covering model with the stability of the siting system as the main constraint, considering the rescue time and total system cost. Using 300 points to simulate potential cardiac arrest locations in the main municipal district of Tianjin, China, the SCD first aid drone siting points are solved using an improved immune algorithm. RESULTS: Based on the actual parameters set by the SCD first aid drone, 25 siting points were solved in the main municipal district of Tianjin, China. These 25 sites were able to cover 300 simulated potential demand points. The average rescue time was 127.18 s and the maximum rescue time was 296.99 s. The total system cost was 136,824.46 Yuan. Comparing the pre- and post-algorithm solutions, the system stability was improved by 42.22%, and the maximum number of siting points corresponding to demand points was reduced by 29.41% and the minimum number was increased by 16.86%, which is closer to the average. CONCLUSIONS: We propose the SCD emergency system and use the improved immune

algorithm for example solving. Comparing the solution results using the pre- and post-improvement algorithms, the cost solved by the post-improvement algorithm is less and the system is more stable.

4. Front Public Health. 2023 Feb 20;11:1121779. doi: 10.3389/fpubh.2023.1121779. eCollection 2023.

Urban-suburb disparities in pre-hospital emergency medical resources and response time among patients with out-of-hospital cardiac arrest: A mixed-method cross-sectional study.

Jin Y(1)(2), Chen H(3), Ge H(4), Li S(1)(2), Zhang J(5), Ma Q(4).

ABSTRACT

AIM: To investigate (1) the association between pre-hospital emergency medical resources and pre-hospital emergency medical system (EMS) response time among patients with Out-of-hospital cardiac arrest (OHCA); (2) whether the association differs between urban and suburbs. METHODS: Densities of ambulances and physicians were independent variables, respectively. Pre-hospital emergency medical system response time was dependent variable. Multivariate linear regression was used to investigate the roles of ambulance density and physician density in pre-hospital EMS response time. Qualitative data were collected and analyzed to explore reasons for the disparities in pre-hospital resources between urban areas and suburbs. RESULTS: Ambulance density and physician density were both negatively associated with call to ambulance dispatch time, with odds ratios (ORs) 0.98 (95% confidence interval [CI] 0.96-0.99; P = 0.001) and 0.97 (95% CI; 0.93-0.99; P < 0.001), respectively. ORs of ambulance density and physician density in association with total response time were 0.99 (95% CI: 0.97-0.99; P = 0.013) and 0.90 (95% CI: 0.86-0.99; P = 0.048). The effect of ambulance density on call to ambulance dispatch time in urban areas was 14% smaller than that in suburb areas and that on total response time in urban areas was 3% smaller than the effect in suburbs. Similar effects were identified for physician density on urban-suburb disparities in call to ambulance dispatch time and total response time. The main reasons summarized from stakeholders for a lack of physicians and ambulances in suburbs included low income, poor personal incentive mechanisms, and inequality in financial distribution of the healthcare system. CONCLUSION: Improving pre-hospital emergency medical resources allocation can reduce system delay and narrow urban-suburb disparity in EMS response time for OHCA patients.

5. Zhonghua Wei Zhong Bing Ji Jiu Yi Xue. 2023 Jan;35(1):5-22. doi: 10.3760/cma.j.cn121430-20221208-01074.

[Chinese consensus of cardiopulmonary resuscitation guides prevention, treatment and rescue of cardiac arrest in pregnancy]. [Article in Chinese]

Mi Y(1), Zhou F, Wang L, Li Y, Meng Q, Zhang J, Zhang X.

ABSTRACT

Pregnant women are a group of people in a special period, once sudden cardiac arrest (CA) occurs, it will threaten the life of both mother and child. It has become a great challenge for hospital, doctors and nurses to minimize maternal mortality during pregnancy. All the efforts should ensure the safety of both mother and child throughout the perinatal period. Because difference of the cardio-pulmonary resuscitation strategies for common CA patients of the same age, the resuscitation strategies for CA patients during pregnancy need consider the patient's gestational age and fetal condition. Different resuscitation techniques, such as manual left uterine displacement (MLUD), will involve perimortem cesarean delivery (PMCD). At the same time, drugs should be reasonably used for different causes of CA during pregnancy, such as hypoxemia, hypovolemia, hyperkalemia or hypokalemia and other electrolyte disorders and hypothermia in 4Hs, as well as thrombosis, pericardial tamponade, tension pneumothorax and toxicosis in 4Ts. In view of the fact that many causes of CA in pregnancy are preventable, it is more necessary to introduce guidelines for CA in

pregnancy in line with our national conditions for clinical guidance. This paper systematically reviewed the pathophysiological characteristics of CA during pregnancy, the high-risk factors of CA during pregnancy, and identified the correct resuscitation methods and prevention and treatment strategies of CA during pregnancy.

6. J Multidiscip Healthc. 2023 Mar 3;16:603-611. doi: 10.2147/JMDH.S401939. eCollection 2023.
Self-Assessed Capabilities, Attitudes, and Stress among Pediatric Nurses in Relation to Cardiopulmonary Resuscitation.
Hendy A(1), Hassani R(2), Ali Abouelela M(3), Nuwayfi Alruwaili A(4), Abdel Fattah HA(5), Abd Elfattah Atia G(6)(7), Reshia FAA(8)(9).
ABSTRACT
BACKGROUND: In emergency medicine, cardiopulmonary resuscitation (CPR) is one of the most stressful scenarios for nurses who conduct both basic and advanced resuscitation methods. AIM: This study aimed to assess nurses' self-assessed capabilities, attitudes, and stress related to CPR. METHODS: This cross-sectional, observational study was carried out on 748 pediatric nurses at six governmental hospitals. A self-assessed ability questionnaire and a structured stress and attitude questionnaire was used for data collection. RESULTS: For self-assessed abilities, 45.5% of the nurses had moderate scores. Concerning stress, 48.3% had moderate scores and 63.1% negative attitudes. Also, attitude and self-assessed abilities had a high-frequency negative effect on stress scores ($P<0.05$). CONCLUSION: Attitude scores increased and stress scores decreased significantly with postgraduate educational level, attendance at training courses on pediatric basic life support and automated external defibrillator use, being exposed to >10 cardiac arrest cases in the previous year, and having an advanced life-support license ($P<0.05$). Positive attitudes and improving self-assessed abilities decreased the nurses' stress levels related to CPR.

7. J Emerg Nurs. 2023 Mar;49(2):287-293. doi: 10.1016/j.jen.2022.11.013. Epub 2022 Dec 2.
Role Delineation of the Code Blue Team: A Quasi-Experimental Study During COVID-19.
DeGroot D, Callis A.
ABSTRACT
INTRODUCTION: The purpose of this study was to assess if implementing a code role delineation intervention in an emergency department would improve the times to defibrillation and medication administration and improve the nurse perception of teamwork. METHODS: A quantitative quasi-experimental study used a retrospective chart review to gather data. A pre- and post-test measured nurse perception of teamwork in a code using the Mayo High Performance Teamwork Scale (MHPTS) after a code role delineation intervention using a paired samples t-test. Pearson r correlations were used to determine relationships between nurse participant (N = 30) demographics and results of the MHPTS scores. RESULTS: A significant increase in teamwork was noted in 5 of the 16 items on the MHPTS regarding improved communication and identified roles in a code: the team leader assures maintenance of an appropriate balance between command authority and team member participation ($t = -5.607$, $P < .001$), team members demonstrated a clear understanding of roles ($t = -5.415$, $P < .001$), team members repeat back instructions and clarifications to indicate that they heard them correctly ($t = -2.400$, $P = .029$), all members of the team are appropriately involved and participate in the activity ($t = -2.236$, $P = .041$), and conflicts among team members are addressed without a loss of situation awareness ($t = -2.704$, $P = .016$). There was significance between total pre- and post-test scores ($t = -3.938$, $P = .001$). DISCUSSION: Implementation of code role delineation identifiers is an effective method of improving teamwork in a code in an emergency department setting.

8. Heart Lung Circ. 2023 Feb;32(2):E3-E4. doi: 10.1016/j.hlc.2022.10.003.
Prioritising Bereavement After Sudden Cardiac Death.
Kovoor JG(1), Page GJ(2), Kovoor P(3).
NO ABSTRACT AVAILABLE

9. Int J Environ Res Public Health. 2023 Feb 24;20(5):4095. doi: 10.3390/ijerph20054095.
Efficacy of Virtual Reality Simulation in Teaching Basic Life Support and Its Retention at 6 Months.
Castillo J(1), Rodríguez-Higueras E(1), Belmonte R(1), Rodríguez C(1), López A(1), Gallart A(1).
ABSTRACT
Educational efficiency is the predetermining factor for increasing the survival rate of patients with cardiac arrest. Virtual reality (VR) simulation could help to improve the skills of those undergoing basic life support-automated external defibrillation (BLS-AED) training. Our purpose was to evaluate whether BLS-AED with virtual reality improves the skills and satisfaction of students enrolled in in-person training after completing the course and their retention of those skills 6 months later. This was an experimental study of first-year university students from a school of health sciences. We compared traditional training (control group-CG) with virtual reality simulation (experimental group EG). The students were evaluated using a simulated case with three validated instruments after the completion of training and at 6 months. A total of 241 students participated in the study. After the training period, there were no statistically significant differences in knowledge evaluation or in practical skills when assessed using a feedback mannequin. Statistically significant results on defibrillation were poorer in the EG evaluated by the instructor. Retention at 6 months decreased significantly in both groups. The results of the teaching methodology using VR were similar to those obtained through traditional methodology: there was an increase in skills after training, and their retention decreased over time. Defibrillation results were better after traditional learning.

POST-CARDIAC ARREST TREATMENTS

1. JACC Cardiovasc Interv. 2023 Mar 1:S1936-8798(22)02242-7. doi: 10.1016/j.jcin.2022.11.031. Online ahead of print.
Immediate vs Delayed Coronary Angiography for Out-of-Hospital Cardiac Arrest: A Meta-Analysis of Randomized Controlled Trials.
Kundu A, Dewaswala N, Bhopalwala H, Moliterno DJ.
NO ABSTRACT AVAILABLE

2. Heart. 2023 Mar 7:heartjnl-2022-321266. doi: 10.1136/heartjnl-2022-321266. Online ahead of print.
Interventional management of out-of-hospital cardiac arrest.
Karam N(1)(2), Spaulding C(3)(2).
NO ABSTRACT AVAILABLE

3. Ther Hypothermia Temp Manag. 2023 Mar;13(1):23-28. doi: 10.1089/ther.2022.0019. Epub 2022 Jun 24.
Association Between Procalcitonin Level at 72 Hours After Cardiac Arrest and Neurological Outcomes in Cardiac Arrest Survivors.
Lee JH(1), Lee DH(1), Lee BK(1)(2), Kim DK(1), Ryu SJ(1).
ABSTRACT
The association between procalcitonin (PCT) level measured 72 hours after cardiac arrest (CA) and neurological outcomes is unknown. We aimed to examine the association of serial PCT levels up to 72 hours with neurological outcomes in patients who underwent targeted temperature

management (TTM) after CA. This retrospective observational study included adult comatose patients with CA undergoing TTM (33℃ for 24 hours) at the Chonnam National University Hospital in Gwangju, Korea, between January 2018 and December 2020. PCT levels were measured at admission and at 24, 48, and 72 hours after CA. The presence of early-onset infections (within 7 days after CA) was confirmed by reviewing clinical, radiological, and microbiological data. The primary outcome was poor neurological outcomes at 6 months and was defined by cerebral performance category 3-5. Among the CA survivors, 118 were included and 67 (56.8%) had poor neurological outcomes. The PCT level at 72 hours in the poor outcome group (3.01 [0.88-12.71]) was higher than that in good outcome group (0.56 [0.18-1.32]). The multivariate analysis revealed that the PCT level at 72 hours (adjusted odds ratio 1.241; 95% confidence interval, 1.059-1.455) was independently associated with poor neurological outcomes, showed good performance for poor outcomes (area under the receiver operating characteristic curve of 0.823), and was not associated with early-onset infections. The PCT level at 72 hours after CA can be helpful in predicting prognosis, and it did not correlate with early-onset infections in the study.

4. J Clin Med. 2023 Mar 2;12(5):1968. doi: 10.3390/jcm12051968.
Lapses of the Heart: Frequency and Subjective Salience of Impressions Reported by Patients after Cardiac Arrest.
Sterz F(1), Berger ML(2), Ruzicka G(1), Beisteiner R(3).
ABSTRACT
After cardiac arrest (CA), some patients report impressions with highly realistic features, often referred to as near-death experience (NDE). The frequency of such episodes seems to be variable, with various types of content. In a prospective study, we subjected 126 CA cases treated at the Department of Emergency Medicine of the Medical University of Vienna under carefully controlled conditions to a structured interview. We included all patients admitted due to CA, whose communicative abilities were restored and who agreed to participate in the study. The questionnaire inquired as to living conditions, attitudes towards issues of life and death, and last recollections before and first impressions after the CA. The majority of the subjects (91 = 76%) replied to inquiries concerning impressions during CA with "nothing" or "blackout", but 20 (16%) gave a detailed account. A German version of the Greyson questionnaire specifically addressing NDE phenomena (included towards the end of the interview) resulted in ≥7 points in five patients (4%). Three patients reported a meeting with deceased relatives (one with 6 Greyson points), one an out-of-body episode, and one having been sucked into a colorful tunnel. Eleven of these twenty cases had their cardiopulmonary resuscitation (CPR) started within the first min of CA, a higher fraction than cases without experience. Reported experience after CA was of high significance for the patients; many of them changed their point of view on issues of life and death.

5. J Behav Med. 2023 Mar 9:1-7. doi: 10.1007/s10865-023-00405-x. Online ahead of print.
The relationship between mindfulness and enduring somatic threat severity in long-term cardiac arrest survivors.
Presciutti AM(1)(2), Bannon SM(3)(4), Yamin JB(5), Newman MM(6), Parker RA(7)(8), Elmer J(9), Wu O(10)(11), Donnino MW(5), Perman SM(12), Vranceanu AM(3)(4).
ABSTRACT
BACKGROUND: Cardiac arrest (CA) survivors experience continuous exposures to potential traumas though chronic cognitive, physical and emotional sequelae and enduring somatic threats (ESTs) (i.e., recurring somatic traumatic reminders of the event). Sources of ESTs can include the daily sensation of an implantable cardioverter defibrillator (ICD), ICD-delivered shocks, pain from rescue compressions, fatigue, weakness, and changes in physical function. Mindfulness, defined as non-judgmental present-moment awareness, is a teachable skill that might help CA survivors cope with ESTs. Here we describe the severity of ESTs in a sample of long-term CA survivors and explore the cross-sectional relationship between mindfulness and severity of ESTs. METHODS: We analyzed

survey data of long-term CA survivors who were members of the Sudden Cardiac Arrest Foundation (collected 10-11/2020). We assessed ESTs using 4 cardiac threat items from the Anxiety Sensitivity Index-revised (items range from 0 "very little" to 4 "very much") which we summed to create a score reflecting total EST burden (range 0-16). We assessed mindfulness using the Cognitive and Affective Mindfulness Scale-Revised. First, we summarized the distribution of EST scores. Second, we used linear regression to describe the relationship between mindfulness and EST severity adjusting for age, gender, time since arrest, COVID-19-related stress, and loss of income due to COVID. RESULTS: We included 145 CA survivors (mean age: 51 years, 52% male, 93.8% white, mean time since arrest: 6 years, 24.1% scored in the upper quarter of EST severity). Greater mindfulness (β: -30, p = 0.002), older age (β: -0.30, p = 0.01) and longer time since CA (β: -0.23, p = 0.005) were associated with lower EST severity. Male sex was also associated with greater EST severity (β: 0.21, p = 0.009). CONCLUSION: ESTs are common among CA survivors. Mindfulness may be a protective skill that CA survivors use to cope with ESTs. Future psychosocial interventions for the CA population should consider using mindfulness as a core skill to reduce ESTs.

TARGETED TEMPERATURE MANAGEMENT

1. N Engl J Med. 2023 Mar 9;388(10):888-897. doi: 10.1056/NEJMoa2212528. Epub 2022 Nov 6.
Duration of Device-Based Fever Prevention after Cardiac Arrest.
Hassager C(1), Schmidt H(1), Møller JE(1), Grand J(1), Mølstrøm S(1), Beske RP(1), Boesgaard S(1), Borregaard B(1), Bekker-Jensen D(1), Dahl JS(1), Frydland MS(1), Høfsten DE(1), Isse YA(1), Josiassen J(1), Lind Jørgensen VR(1), Kondziella D(1), Lindholm MG(1), Moser E(1), Nyholm BC(1), Obling LER(1), Sarkisian L(1), Søndergaard FT(1), Thomsen JH(1), Thune JJ(1), Venø S(1), Wiberg SC(1), Winther-Jensen M(1), Meyer MAS(1), Kjaergaard J(1).
ABSTRACT
BACKGROUND: Guidelines recommend active fever prevention for 72 hours after cardiac arrest. Data from randomized clinical trials of this intervention have been lacking. METHODS: We randomly assigned comatose patients who had been resuscitated after an out-of-hospital cardiac arrest of presumed cardiac cause to device-based temperature control targeting 36°C for 24 hours followed by targeting of 37°C for either 12 or 48 hours (for total intervention times of 36 and 72 hours, respectively) or until the patient regained consciousness. The primary outcome was a composite of death from any cause or hospital discharge with a Cerebral Performance Category of 3 or 4 (range, 1 to 5, with higher scores indicating more severe disability; a category of 3 or 4 indicates severe cerebral disability or coma) within 90 days after randomization. Secondary outcomes included death from any cause and the Montreal Cognitive Assessment score (range, 0 to 30, with higher scores indicating better cognitive ability) at 3 months. RESULTS: A total of 393 patients were randomly assigned to temperature control for 36 hours, and 396 patients were assigned to temperature control for 72 hours. At 90 days after randomization, a primary end-point event had occurred in 127 of 393 patients (32.3%) in the 36-hour group and in 133 of 396 patients (33.6%) in the 72-hour group (hazard ratio, 0.99; 95% confidence interval, 0.77 to 1.26; P = 0.70) and mortality was 29.5% in the 36-hour group and 30.3% in the 72-hour group. At 3 months, the median Montreal Cognitive Assessment score was 26 (interquartile range, 24 to 29) and 27 (interquartile range, 24 to 28), respectively. There was no significant between-group difference in the incidence of adverse events. CONCLUSIONS: Active device-based fever prevention for 36 or 72 hours after cardiac arrest did not result in significantly different percentages of patients dying or having severe disability or coma.

2. Ther Hypothermia Temp Manag. 2023 Mar;13(1):16-22. doi: 10.1089/ther.2022.0008. Epub 2022 Jun 16.

The Association Between Induction Rate and Neurologic Outcome in Patients Undergoing Targeted Temperature Management at 33°C.

Lee DH(1), Lee BK(1)(2), Cho YS(1), Jeung KW(1)(2), Jung YH(1)(2), Ryu SJ(1), Kim DK(1).

ABSTRACT

To determine the association between the induction rate and 6-month neurologic outcomes in out-of-hospital cardiac arrest (OHCA) survivors who underwent targeted temperature management (TTM). This retrospective observational study analyzed data prospectively collected from adult comatose OHCA survivors treated with TTM at the Chonnam National University Hospital in Gwangju, Korea, between October 2015 and December 2020. We measured the core body temperature (BT) through an esophageal probe and recorded it every 5 minutes throughout TTM. Induction time was defined as the elapsed time between the initiation of TTM and the achievement of target BT of 33°C. We calculated the induction rate as the change of BT divided by induction time. The primary outcome was a poor 6-month neurologic outcome, defined as cerebral performance category 3-5. Of the OHCA survivors, 218 patients were included, and 137 (62.8%) patients had a poor neurologic outcome. Patients with a poor neurologic outcome had lower BT at the initiation of TTM, shorter induction time, and higher induction rate than those with good neurologic outcomes. After adjusting for confounders, induction time (odds ratio [OR] 0.995; 95% confidence interval [CI], 0.992-0.999) and induction rate (OR 2.362; 95% CI, 1.178-4.734) were independently associated with poor neurologic outcome. BT at TTM initiation was not associated with a poor neurologic outcome. Induction rate was independently associated with a poor neurologic outcome in OHCA survivors who underwent TTM at 33°C.

ELECTROPHYSIOLOGY AND DEFIBRILLATION

1. Front Neurosci. 2023 Feb 15;17:988394. doi: 10.3389/fnins.2023.988394. eCollection 2023.

Predicting neurological outcome after cardiac arrest by combining computational parameters extracted from standard and deviant responses from auditory evoked potentials.

Floyrac A(1), Doumergue A(1), Legriel S(2)(3), Deye N(4)(5), Megarbane B(4)(6), Richard A(7), Meppiel E(7), Masmoudi S(7), Lozeron P(7)(8), Vicaut E(9), Kubis N(7)(8), Holcman D(1).

ABSTRACT

BACKGROUND: Despite multimodal assessment (clinical examination, biology, brain MRI, electroencephalography, somatosensory evoked potentials, mismatch negativity at auditory evoked potentials), coma prognostic evaluation remains challenging. METHODS: We present here a method to predict the return to consciousness and good neurological outcome based on classification of auditory evoked potentials obtained during an oddball paradigm. Data from event-related potentials (ERPs) were recorded noninvasively using four surface electroencephalography (EEG) electrodes in a cohort of 29 post-cardiac arrest comatose patients (between day 3 and day 6 following admission). We extracted retrospectively several EEG features (standard deviation and similarity for standard auditory stimulations and number of extrema and oscillations for deviant auditory stimulations) from the time responses in a window of few hundreds of milliseconds. The responses to the standard and the deviant auditory stimulations were thus considered independently. By combining these features, based on machine learning, we built a two-dimensional map to evaluate possible group clustering. RESULTS: Analysis in two-dimensions of the present data revealed two separated clusters of patients with good versus bad neurological outcome. When favoring the highest specificity of our mathematical algorithms (0.91), we found a sensitivity of 0.83 and an accuracy of 0.90, maintained when calculation was performed using data from only one central electrode. Using Gaussian, K-neighborhood and SVM classifiers, we could predict the neurological outcome of post-anoxic comatose patients, the validity of the method being tested by a cross-validation procedure.

Moreover, the same results were obtained with one single electrode (Cz). CONCLUSION: statistics of standard and deviant responses considered separately provide complementary and confirmatory predictions of the outcome of anoxic comatose patients, better assessed when combining these features on a two-dimensional statistical map. The benefit of this method compared to classical EEG and ERP predictors should be tested in a large prospective cohort. If validated, this method could provide an alternative tool to intensivists, to better evaluate neurological outcome and improve patient management, without neurophysiologist assistance.

PEDIATRICS AND CHILDREN

1. JACC Asia. 2023 Feb 15;3(1):166. doi: 10.1016/j.jacasi.2022.11.011. eCollection 2023 Feb.
Improving Mortality in Pediatric Out-of-Hospital Cardiac Arrest Events Requires a Multifactorial Approach.
Punniyakotty B, Ong XL, Ahmad M, Kirresh A.
NO ABSTRACT AVAILABLE

EXTRACORPOREAL LIFE SUPPORT

1. Crit Care. 2023 Mar 6;27(1):87. doi: 10.1186/s13054-023-04384-y.
Extracorporeal cardiopulmonary resuscitation for adult out-of-hospital cardiac arrest patients: time-dependent propensity score-sequential matching analysis from a nationwide population-based registry.
Choi Y(1)(2)(3), Park JH(4)(5)(6), Jeong J(1)(2)(3), Kim YJ(1)(2)(3), Song KJ(1)(2)(7), Shin SD(1)(2)(3).
ABSTRACT
BACKGROUND: There is inconclusive evidence regarding the effectiveness of extracorporeal cardiopulmonary resuscitation (ECPR) for out-of-hospital cardiac arrest (OHCA) patients. We aimed to evaluate the association between ECPR and neurologic recovery in OHCA patients using time-dependent propensity score matching analysis. METHODS: Using a nationwide OHCA registry, adult medical OHCA patients who underwent CPR at the emergency department between 2013 and 2020 were included. The primary outcome was a good neurological recovery at discharge. Time-dependent propensity score matching was used to match patients who received ECPR to those at risk for ECPR within the same time interval. Risk ratios (RRs) and 95% confidence intervals (CIs) were estimated, and stratified analysis by the timing of ECPR was also performed. RESULTS: Among 118,391 eligible patients, 484 received ECPR. After 1:4 time-dependent propensity score matching, 458 patients in the ECPR group and 1832 patients in the no ECPR group were included in the matched cohort. In the matched cohort, ECPR was not associated with good neurological recovery (10.3% in ECPR and 6.9% in no ECPR; RR [95% CI] 1.28 [0.85-1.93]). In the stratified analyses according to the timing of matching, ECPR with a pump-on within 45 min after emergency department arrival was associated with favourable neurological outcomes (RR [95% CI] 2.51 [1.33-4.75] in 1-30 min, 1.81 [1.11-2.93] in 31-45 min, 1.07 (0.56-2.04) in 46-60 min, and 0.45 (0.11-1.91) in over 60 min). CONCLUSIONS: ECPR itself was not associated with good neurological recovery, but early ECPR was positively associated with good neurological recovery. Research on how to perform ECPR at an early stage and clinical trials to evaluate the effect of ECPR is warranted.

2. Crit Care Clin. 2023 Apr;39(2):255-275. doi: 10.1016/j.ccc.2022.09.003. Epub 2022 Dec 22.
Extracorporeal Membrane Oxygenation Then and Now; Broadening Indications and Availability.
Pollack BE(1), Kirsch R(2), Chapman R(3), Hyslop R(4), MacLaren G(5), Barbaro RP(6).
ABSTRACT

Extracorporeal membrane oxygenation (ECMO) is a life support technology provided to children to support respiratory failure, cardiac failure, or cardiopulmonary resuscitation after failure of conventional management. Over the decades, ECMO has expanded in use, advanced in technology, shifted from experimental to a standard of care, and evidence supporting its use has increased. The expanded ECMO indications and medical complexity of children have also necessitated focused studies in the ethical domain such as decisional authority, resource allocation, and equitable access.

EXPERIMENTAL RESEARCH

1. Int J Mol Sci. 2023 Mar 6;24(5):5059. doi: 10.3390/ijms24055059.
Ginsenoside Rb1 Improves Post-Cardiac Arrest Myocardial Stunning and Cerebral Outcomes by Regulating the Keap1/Nrf2 Pathway.
Chen L(1), Geng N(2), Chen T(2), Xiao Q(1), Zhang H(2), Huo H(1), Jiang L(1), Shao Q(1), He B(1).
ABSTRACT
The prognosis of cardiac arrest (CA) is dismal despite the ongoing progress in cardiopulmonary resuscitation (CPR). ginsenoside Rb1 (Gn-Rb1) has been verified to be cardioprotective in cardiac remodeling and cardiac ischemia/reperfusion (I/R) injury, but its role is less known in CA. After 15 min of potassium chloride-induced CA, male C57BL/6 mice were resuscitated. Gn-Rb1 was blindly randomized to mice after 20 s of CPR. We assessed the cardiac systolic function before CA and 3 h after CPR. Mortality rates, neurological outcome, mitochondrial homeostasis, and the levels of oxidative stress were evaluated. We found that Gn-Rb1 improved the long-term survival during the post-resuscitation period but did not affect the ROSC rate. Further mechanistic investigations revealed that Gn-Rb1 ameliorated CA/CPR-induced mitochondrial destabilization and oxidative stress, partially via the activation of Keap1/Nrf2 axis. Gn-Rb1 improved the neurological outcome after resuscitation partially by balancing the oxidative stress and suppressing apoptosis. In sum, Gn-Rb1 protects against post-CA myocardial stunning and cerebral outcomes via the induction of the Nrf2 signaling pathway, which may offer a new insight into therapeutic strategies for CA.

2. Physiol Rep. 2023 Mar;11(5):e15619. doi: 10.14814/phy2.15619.
Mechanistic insights into spontaneous transition from cellular alternans to ventricular fibrillation.
You T(1)(2), Xie Y(1), Luo C(3), Zhang K(4), Zhang H(1)(5).
ABSTRACT
T-wave alternans (TWA) has been used for predicting the risk of malignant cardiac arrhythmias and sudden cardiac death (SCD) in multiple clinical settings; however, possible mechanism(s) underlying the spontaneous transition from cellular alternans reflected by TWA to arrhythmias in impaired repolarization remains unclear. The healthy guinea pig ventricular myocytes under E-4031 blocking IKr (0.1 μM, N = 12; 0.3 μM, N = 10; 1 μM, N = 10) were evaluated using whole-cell patch-clamp. The electrophysiological properties of isolated perfused guinea pig hearts under E-4031 (0.1 μM, N = 5; 0.3 μM, N = 5; 1 μM, N = 5) were evaluated using dual- optical mapping. The amplitude/ threshold/restitution curves of action potential duration (APD) alternans and potential mechanism(s) underlying the spontaneous transition of cellular alternans to ventricular fibrillation (VF) were examined. There were longer APD80 and increased amplitude and threshold of APD alternans in E-4031 group compared with baseline group, which was reflected by more pronounced arrhythmogenesis at the tissue level, and were associated with steep restitution curves of the APD and the conduction velocity (CV). Conduction of AP alternans augmented tissue's functional

spatiotemporal heterogeneity of regional AP/Ca alternans, as well as the AP/Ca dispersion, leading to localized uni-directional conduction block that spontaneous facilitated the formation of reentrant excitation waves without the need for additional premature stimulus. Our results provide a possible mechanism for the spontaneous transition from cardiac electrical alternans in cellular action potentials and intercellular conduction without the involvement of premature excitations, and explain the increased susceptibility to ventricular arrhythmias in impaired repolarization. In this study, we implemented voltage-clamp and dual-optical mapping approaches to investigate the underlying mechanism(s) for the arrhythmogenesis of cardiac alternans in the guinea pig heart at cellular and tissue levels. Our results demonstrated a spontaneous development of reentry from cellular alternans, arising from a combined actions of restitution properties of action potential duration, conduction velocity of excitation wave and interplay between alternants of action potential and the intracellular Ca handling. We believe this study provides new insights into underlying the mechanism, by which cellular cardiac alternans spontaneously evolves into cardiac arrhythmias.

3. Pediatr Res. 2023 Feb;93(3):511-519. doi: 10.1038/s41390-022-02126-4. Epub 2022 Jun 9.
Epinephrine vs placebo in neonatal resuscitation: ROSC and brain MRS/MRI in term piglets.
Andersen HB(1), Andersen M(2), Andelius TCK(2), Pedersen MV(2), Løfgren B(3)(4), Pedersen M(5), Ringgaard S(6), Kyng KJ(2), Henriksen TB(2)(4).
ABSTRACT
BACKGROUND: We aimed to investigate the effect of epinephrine vs placebo on return of spontaneous circulation (ROSC) and brain magnetic resonance spectroscopy and imaging (MRS/MRI) in newborn piglets with hypoxic cardiac arrest (CA). METHODS: Twenty-five piglets underwent hypoxia induced by endotracheal tube clamping until CA. The animals were randomized to CPR + intravenous epinephrine or CPR + placebo (normal saline). The primary outcome was ROSC, and secondary outcomes included time-to-ROSC, brain MRS/MRI, and composite endpoint of death or severe brain MRS/MRI abnormality. RESULTS: ROSC was more frequent in animals treated with epinephrine than placebo; 10/13 vs 4/12, RR = 2.31 (95% CI: 1.09-5.77). We found no difference in time-to-ROSC (120 (113-211) vs 153 (116-503) seconds, p = 0.7) or 6-h survival (7/13 vs 3/12, p = 0.2). Among survivors, there was no difference between groups in brain MRS/MRI. We found no difference in the composite endpoint of death or severe brain MRS/MRI abnormality; RR = 0.7 (95% CI: 0.37-1.19). CONCLUSIONS: Resuscitation with epinephrine compared to placebo improved ROSC frequency after hypoxic CA in newborn piglets. We found no difference in time-to-ROSC or the composite endpoint of death or severe brain MRS/MRI abnormality. IMPACT: In a newborn piglet model of hypoxic cardiac arrest, resuscitation with epinephrine compared to placebo improved the rate of return of spontaneous circulation and more than doubled the 6-h survival. Brain MRS/MRI biomarkers were used to evaluate the effect of epinephrine vs placebo. We found no difference between groups in the composite endpoint of death or severe brain MRS/MRI abnormality. This study adds to the limited evidence regarding the effect and safety of epinephrine; the lack of high-quality evidence from randomized clinical trials was highlighted in the latest ILCOR 2020 guidelines, and newborn animal studies were specifically requested.

CASE REPORTS

1. Br Paramed J. 2023 Mar 1;7(4):46-50. doi: 10.29045/14784726.2023.3.7.4.46.
Surviving an out-of-hospital hypothermic cardiac arrest in the United Kingdom.
Evans S(1).
ABSTRACT

INTRODUCTION: Hypothermia is an uncommon cause of cardiac arrest in the United Kingdom, and more commonly occurs in countries experiencing avalanches and significant winter climates; however, this case demonstrates that the presentation can occur in the United Kingdom. This case adds to a body of evidence that prolonged resuscitation can be successful in patients suffering a cardiac arrest secondary to hypothermia, leading to a good neurological outcome. CASE PRESENTATION: The patient suffered a witnessed out-of-hospital cardiac arrest following rescue from a free-flowing river, and underwent prolonged resuscitation. The patient presented in persistent ventricular fibrillation, unresponsive to defibrillation attempts. An oesophageal probe recorded the patient's temperature as 24°C. Rescuers were guided by the Resuscitation Council UK advanced life support algorithm to withhold drug therapy and limit defibrillation attempts to three, until the patient had been rewarmed to above 30°C. Appropriate triage of the patient to an extracorporeal life support (ECLS) capable centre allowed specialised treatment to be initiated, and culminated in successful resuscitation once normothermia was restored. After a short stay in intensive care, the patient was discharged for rehabilitation due to a hypoxic spinal cord injury before discharge home. CONCLUSION: This case highlights that hypothermia is a reversible cause of cardiac arrest, which needs to be recognised and acted upon appropriately to provide the best possible chance for a positive outcome. Low-reading thermometers capable of identifying the temperature thresholds stated in the Resuscitation Council UK guidelines are required, to allow clinicians to adapt their practice according to the presenting situation. Tympanic thermometers are often limited to their lowest recordable temperature, and invasive monitoring such as oesophageal or rectal probes are not common in UK ambulance service practice. With the necessary equipment, patients can be triaged to an ECLS-capable centre, allowing them to receive the specialist rewarming that they require.

2. Int J Environ Res Public Health. 2023 Feb 24;20(5):4028. doi: 10.3390/ijerph20054028.
Heat Stroke in the Work Environment: Case Report of an Underestimated Phenomenon.
Marrone M(1), Buongiorno L(1), Caricato P(1), Pititto F(1), De Luca BP(1), Angeletti C(1), Sebastiani G(1), Cascardi E(2)(3), Ingravallo G(4), Stellacci A(1), Cazzato G(4).
ABSTRACT
Average global temperatures continue to trend upward, and this phenomenon is part of the more complex climate change taking place on our planet over the past century. Human health is directly affected by environmental conditions, not only because of communicable diseases that are clearly affected by climate, but also because of the relationship between rising temperatures and increased morbidity for psychiatric diseases. As global temperatures and the number of extreme days increase, so does the risk associated with all those acute illnesses related to these factors. For example, there is a correlation between out-of-hospital cardiac arrest and heat. Then, there are pathologies that recognize excessive heat as the main etiological agent. This is the case with so-called "heat stroke", a form of hyperthermia accompanied by a systemic inflammatory response, which causes multi-organ dysfunction and sometimes death. Starting with a case that came to their attention of a young man in good general health who died while working unloading fruit crates from a truck, the authors wanted to express some thoughts on the need to adapt the world of work, including work-specific hazards, in order to protect the worker exposed to this "new risk" and develop multidisciplinary adaptation strategies that incorporate climatology, indoor/building environments, energy use, regulatory perfection of work and human thermal comfort.

3. World J Pediatr Congenit Heart Surg. 2023 Mar 9:21501351231151664. doi: 10.1177/21501351231151664. Online ahead of print.

Anomalous Origin of Left Circumflex Coronary Artery From Right Pulmonary Artery: An Unusual Cause of Sudden Cardiac Arrest.

Schmiady MO(1)(2)(3), Cesnjevar R(2)(3), Yakupoglu Y(4), Adjibodou OB(4), Spirig A(5), Bettex D(6), Meier L(7), Carrel T(1).

ABSTRACT

Anomalous origin of the left circumflex coronary artery from the right pulmonary artery is an extremely rare coronary anomaly out of the group of anomalous coronary arteries arising from the pulmonary artery. We present the case of a 27-year-old male, in whom the diagnosis of an anomalous left circumflex coronary artery from the pulmonary artery was made after sudden cardiac arrest. The diagnosis was confirmed by multimodal imaging and the patient underwent successful surgical correction. Abnormal origins of a coronary artery may become symptomatic later in life and may occur as an isolated cardiac malformation. Due to a potentially unfavorable clinical course, surgical correction should be considered as soon as a diagnosis is made.

4. J Crit Care Med (Targu Mures). 2023 Feb 8;9(1):39-42. doi: 10.2478/jccm-2023-0004. eCollection 2023 Jan.

Brief Report: Diabetic Keto-Acidosis (DKA) Induced Hypothermia may be Neuroprotective in Cardiac Arrest.

Shiber J(1), Fontane E(1).

ABSTRACT

Despite the decreased survival associated with diabetes with out-of-hospital cardiac arrest and the overall low survival to hospital discharge, we would like to present two cases of OHCA in diabetics who despite prolonged resuscitation efforts had complete neurological recovery likely due to concomitant hypothermia. There is a steady decreasing rate of ROSC with longer durations of CPR so that outcomes are best when <20 minutes compared to prolonged resuscitation efforts (>30-40 minutes). It has been previously recognized that hypothermia prior to cardiac arrest can be neurologically protective even with up to 9 hours of cardiopulmonary resuscitation. Hypothermia has been associated with DKA and although often indicates sepsis with mortality rates of 30-60%, it may indeed be protective if occurring prior to cardiac arrest. The critical factor for neuroprotection may be a slow drop to a temperature <250C prior to OHCA as is achieved in deep hypothermic circulatory arrest for operative procedures of the aortic arch and great vessels. It may be worthwhile continuing aggressive resuscitation efforts even for prolonged periods before attaining ROSC for OHCA in patients found hypothermic from metabolic illnesses as compared to only from environmental exposures (avalanche victims, cold water submersions, etc.) as has been traditionally reported in the medical literature.

5. Trauma Case Rep. 2023 Feb 18;44:100800. doi: 10.1016/j.tcr.2023.100800. eCollection 2023 Apr.

Resuscitation of traumatic maternal cardiac arrest: A case report and summary of recommendations from Obstetric Life Support™.

de Assis V(1), Shields AD(2), Johansson A(2), Shumbusho DI(3), York BM(4).

ABSTRACT

Traumatic maternal cardiac arrest (MCA) is a challenging scenario for the healthcare team. Expanding the focused assessment with sonography for trauma (FAST) and modifying cardiopulmonary resuscitation (CPR) is necessary. Critical components in the resuscitation of reproductive-age women with traumatic cardiac arrest are highlighted using recommendations from Obstetric Life Support™. A morbidly obese female presented to the Emergency Department (ED) with ongoing CPR and massive hemorrhage from two gunshot wounds to the chest. Ultrasound used during secondary survey, revealed an intrauterine pregnancy, with uterine fundus palpated above

the umbilicus. Four minutes after arrival at the ED, the trauma surgeon initiated a resuscitative cesarean delivery (RCD) by transverse abdominal incision. The on-call obstetrician completed the procedure, and the neonate was resuscitated and transferred to the neonatal intensive care unit (NICU). Multiple agents and surgical techniques were required to control ongoing uterine and abdominal wall hemorrhage during intermittent return of spontaneous circulation (ROSC). Despite ongoing CPR and management of the patient's chest, pelvic and abdominal wounds, eventually, there was no return of cardiac activity, no organized cardiac rhythm, no measurable end-tidal carbon dioxide, and no palpable pulse. Further resuscitation and initiation of extracorporeal cardio-pulmonary resuscitation (ECPR) were deemed futile by the multidisciplinary team and stopped at the 60-minute mark. Our case summarizes essential techniques addressing MCA recommended in OBLS™ courses. Including 1) expanding the FAST exam to assess for pregnancy status, 2) estimating gestational age by fundal height or point-of-care ultrasound, 3) performing a RCD via midline vertical incision at 4 min if pregnancy is suspected to be ≥20 weeks' gestation (fundal height at or above the umbilicus, femoral length of ≥30 mm or biparietal diameter of ≥45 mm), and 4) execution of ECPR for refractory cardiac arrest.

6. Ulus Travma Acil Cerrahi Derg. 2023 Mar;29(3):440-442. doi: 10.14744/tjtes.2022.34124.
Delayed postmortem cesarean section due to trauma.
Oncel Yel G(1), Kemanci A(2), Yılmaz A(3), Özdemir ÖMA(4), Erdur B(3).
ABSTRACT
Cardiopulmonary arrest is an occasional occurrence during pregnancy. As soon as maternal arrest is noticed in a woman in the second half of her pregnancy, medical teams should be called for perimortem cesarean (C/S). A 31-week-pregnant female patient was brought to our emergency department by the emergency medical service team with cardiopulmonary resuscitation (CPR) after a traffic accident. The patient, with no pulse or spontaneous breathing, was recognized as exitus. However, CPR was sustained to maintain fetal well-being. Before the arrival of the on-call gynecologist, we as emergency physicians initiated C/S both for fetal well-being and to avoid heighten-ing the risk of fetal mortality and morbidity. The Apgar scores were 0/3/4 and oxygen saturation values were 35/65/75% at 1/5/10 min, respectively. On the postnatal 11th day, the patient did not respond despite the advanced cardiac life support (ACLS) and thus was con-sidered exitus. The ACLS team should be knowledgeable and well-equipped to perform C/S, to do aftercare, to watch for related risks in the infant. In our case, it took 40 min for the fetus to be removed from the mother's womb, starting from the estimated time of exitus.

7. Front Cardiovasc Med. 2023 Feb 15;10:984572. doi: 10.3389/fcvm.2023.984572. eCollection 2023.
A case report of sudden cardiac arrest and torsade de pointes induced by the second-generation tyrosine kinase inhibitor dasatinib combined with fluconazole.
Yuan Y(1), Wang C(2), Yao H(1).
ABSTRACT
A-41-year-old man diagnosed with acute myeloid leukemia (AML) survived dasatinib + fluconazole drug-induced long QT syndrome, sudden cardiac arrest, and torsade de pointes. Drug features and interaction jointly contributed to the whole process. Therefore, appropriate attention to drug interaction and close ECG monitoring are highly recommended for hospitalized patients, especially for those undergoing multi-drug regimens.

8. Leg Med (Tokyo). 2023 Mar;61:102186. doi: 10.1016/j.legalmed.2022.102186. Epub 2022 Dec 16.
Sudden cardiac death related to left coronary artery anomalies including hypoplasia and anomalous origin with retro-aortic course.

Fiorentini C(1), Leone O(2), Bronzetti G(3), Pascali JP(4), Graziosi M(5), Pelotti S(1), Fais P(1).
ABSTRACT
Congenital anomalies of the coronary arteries are a rare condition with an incidence of 0.3-1.3% in the general population. Clinically, sometimes these anomalies increase the risk of myocardial ischemia, which can present with a wide spectrum of symptoms, from angina to sudden cardiac death (SCD). This case report is about the SCD of an 8-year-old male, in apparent good health, during a football training. Although basic life support maneuvers were performed timely from bystanders and medical staff, the automated external defibrillator (AED) was not used. Autopsy revealed multiple left coronary artery (LCA) anomalies: origin from a separate ostium in the right sinus of Valsalva, slit-like shape of the ostium, acute angle take-off of the LCA from the aorta, retro-aortic course and focal coronary hypoplasia of some branches of the LCA. Microscopic examination revealed diffuse ischemic consequences at a different stage of tissue repair and mild multifocal lymphocytic infiltration. No other significant elements were detected at post-mortem examination. We discuss the forensic evaluation about the cause and the manner of death, considering also the modality of the resuscitation attempts and the claimed malpractice, as often occurs in case of sudden unexpected death in young athletes.

9. Ther Hypothermia Temp Manag. 2023 Mar;13(1):38-41. doi: 10.1089/ther.2022.0035. Epub 2022 Oct 26.
A Cooling Conundrum: Is Therapeutic Hypothermia Safe in the Immunosuppressed?
Roman A(1), Faircloth E(1)(2), Fernandez AB(1)(2).
ABSTRACT
Targeted temperature management (TTM) may increase the risk of infection, and immuno-suppression is considered a relative contraindication despite the lack of robust evidence for this risk. We present a case of a 44-year-old immunosuppressed woman who suffered an out-of-hospital cardiac arrest, underwent TTM, and recovered neurological function without serious complications. The aim of this case is to navigate the challenging decision-making process regarding postcardiac arrest care in a patient on immunosuppressants.