This week's PubMed 28th May – 3rd June 2023: articles of interest n = 41

CPR AND COVID-19

No articles identified.

CPR/MECHANICAL CHEST COMPRESSION

1. Ir J Med Sci. 2023 Jun 2. doi: 10.1007/s11845-023-03406-6. Online ahead of print.
The effects of cardiopulmonary resuscitation (CPR) performed out-of-hospital and in-hospital with manual or automatic device methods and laboratory parameters on survival of patients with cardiac arrest.
Yıldırım S(1), Varışlı B(2).
ABSTRACT
OBJECTIVE: Determining the predictive factors for cardiac arrest may be helpful in the management of in-hospital cardiac arrest (IHCA) and out-of-hospital cardiac arrest (OHCA) and in estimating the outcome. Therefore, in the present study, we aimed to investigate the effect of demographic data, cardiopulmonary resuscitation (CPR) initiating setting, compression method, and laboratory parameters on survival from cardiac arrest. METHODS: A total of 414 patients who met the inclusion criteria were included in the study. Patients were grouped into those who underwent out-of-hospital CPR and those who underwent CPR in the hospital and patients who received automatic compression and those who did not receive. In addition to pH, lactate and bicarbonate in arterial blood gas, CK-MB, troponin, urea, creatinine, calcium, potassium, and glucose were measured. RESULTS: The mean age of patients was 70.36±15.68 years, and 170 (41.1%) were female. Although the success rate of CPR in the OHCA group (22.2%) was lower than in the patients in the IHCA group (30.9%), the difference was not statistically significant. There was no difference between the two groups in the comparison of mechanical compression devices and manual compression. In the logistic regression analysis, high pH and low lactate values were found to be independent predictors of survival. CONCLUSION: The results of this study revealed no significant difference between IHCA and OHCA CPR applications and between manual and mechanical compressions in terms of survival in patients with cardiac arrest. In addition, higher pH levels and lower lactate levels measured during CPR were independent predictors of survival.

2. Resusc Plus. 2023 May 24;14:100398. doi: 10.1016/j.resplu.2023.100398. eCollection 2023 Jun.
Effects of personal protective equipment on cardiopulmonary resuscitation quality and outcomes: A systematic review.
Chung SP(1), Nehme Z(2)(3), Johnson NJ(4), Lagina A(5), Bray J(3)(6); International Liaison Committee on Resuscitation ILCOR Basic Life Support Task Force.
ABSTRACT
BACKGROUND: The impact of wearing personal protective equipment (PPE) during cardiopulmonary resuscitation (CPR) on CPR quality and patient outcomes is unclear. This systematic review aimed to examine whether wearing PPE during resuscitation affects patient outcomes, CPR quality and rescuer fatigue. METHODS: In this review registered in PROSPERO (CRD42022347746), we searched Medline, EMBASE and Cochrane library between 2000 and 2022. The inclusion criteria were studies: in actual or simulated cardiac arrest; comparing PPE with no PPE; and randomised controlled trials and observational studies with a English abstract. Risk of bias was assessed using Cochrane's Risk of Bias-2 and ROBINS-I tools and outcomes assessed with GRADE. We conducted a meta-analysis

according to the study design. Quantitative data synthesis was done using a random-effect model incorporating the potential heterogeneity. RESULTS: A total of 17 simulation-based studies and 1 clinical study were included. All outcomes were judged to be very low certainty of evidence, subject to high risk of bias. The clinical study showed no difference in survival comparing enhanced and conventional PPE. Meta-analysis of 11 RCTs and 6 observational studies found no difference in CPR quality in rescuers wearing PPE compared with no PPE. Pooled rescuer fatigue was significantly worse in the PPE group (mean difference, 2.7 VAS score out of 10; 95% CI, 1.4-4.0). CONCLUSIONS: PPE was not associated with reduced CPR quality or lower cardiac arrest survival. Rescuers wearing PPE may report more fatigue. This finding was mainly derived from simulation studies, additional clinical studies are needed.

REGISTRIES, REVIEWS AND EDITORIALS

1. Resuscitation. 2023 Jun 1:109858. doi: 10.1016/j.resuscitation.2023.109858. Online ahead of print.

Associations between clinical characteristics of cardiac arrest and early CT head findings of hypoxic ischaemic brain injury following out-of-hospital cardiac arrest.

Srinivasan V(1), Hall J(2), Wahlster S(3), Johnson NJ(4), Branch K(5).

ABSTRACT

BACKGROUND/OBJECTIVE: Post-cardiac arrest patients are vulnerable to hypoxic-ischaemic brain injury (HIBI), but HIBI may not be identified until computed tomography (CT) scan of the brain is obtained post-resuscitation and stabilization. We aimed to evaluate the association of clinical arrest characteristics with early CT findings of HIBI to identify those at the highest risk for HIBI. METHODS: This is a retrospective analysis of out-of-hospital cardiac arrest (OHCA) patients who underwent whole-body imaging. Head CT reports were analyzed with an emphasis on findings suggestive of HIBI; HIBI was present if any of the following were noted on the neuroradiologist read: global cerebral oedema, sulcal effacement, blurred grey-white junction, and ventricular compression. The primary exposure was duration of cardiac arrest. Secondary exposures included age, cardiac vs noncardiac etiology, and witnessed vs unwitnessed arrest. The primary outcome was CT findings of HIBI. RESULTS: A total of 180 patients (average age 54 years, 32% female, 71% White, 53% witnessed arrest, 32% cardiac etiology of arrest, mean CPR duration of 15 ± 10 minutes) were included in this analysis. CT findings of HIBI were seen in 47 (48.3%) patients. Multivariate logistic regression demonstrated a significant association between CPR duration and HIBI (adjusted OR = 1.1, 95% CI 1.01 - 1.11, $p < 0.01$). CONCLUSION: Signs of HIBI are commonly seen on CT head within 6 hours of OHCA, occurring in approximately half of patients, and are associated with CPR duration. Determining risk factors for abnormal CT findings can help clinically identify patients at higher risk for HIBI and target interventions appropriately.

2. J Am Heart Assoc. 2023 Jun 6;12(11):e029052. doi: 10.1161/JAHA.122.029052. Epub 2023 Jun 1.

Rationale and Design of the ORCCA (Outcomes Registry for Cardiac Conditions in Athletes) Study.

Moulson N(1), Petek BJ(2)(3), Ackerman MJ(4), Churchill TW(2)(3), Day SM(5), Kim JH(6), Kliethermes SA(7), Lampert R(8), Levine BD(9), Martinez MW(10), Patel MR(11), Phelan D(12), Harmon KG(13), Baggish AL(14)(15), Drezner JA(13).

ABSTRACT

Background Clinical practice recommendations for participation in sports and exercise among young competitive athletes with cardiovascular conditions at risk for sudden death are based largely on expert consensus with a paucity of prospective outcomes data. Recent guidelines have taken a more permissive approach, using a shared decision-making model. However, the impact and outcomes of

this strategy remain unknown. Methods The ORCCA (Outcomes Registry for Cardiac Conditions in Athletes) study is a prospective, multicenter, longitudinal, observational cohort study designed to monitor clinical outcomes in athletes with potentially life-threatening cardiovascular conditions. The study will assess sports eligibility decision-making, exercise habits, psychosocial well-being, and long-term cardiovascular outcomes among young competitive athletes with cardiovascular conditions. Competitive athletes aged 18 to <35 years diagnosed with a confirmed cardiovascular condition or borderline finding with potential increased risk of major adverse cardiovascular events are eligible. Outcomes will be monitored for an initial 5-year follow-up period or until age 35, and metrics of psychosocial well-being and composite adverse cardiovascular events including arrhythmias, sudden cardiac arrest/sudden cardiac death, and evidence of disease progression will be compared among athletes who continue versus discontinue competitive sports participation. Conclusions The ORCCA study aims to assess the process and results of return to sport decision-making and to monitor major adverse cardiovascular events, exercise habits, and the psychosocial well-being among young competitive athletes diagnosed with confirmed cardiovascular conditions or borderline findings with potential increased risk of major adverse cardiovascular events. The results of this work will generate an evidence base to inform future guidelines.

3. Resusc Plus. 2023 May 18;14:100397. doi: 10.1016/j.resplu.2023.100397. eCollection 2023 Jun.
Prehospital transport and termination of resuscitation of cardiac arrest patients: A review of prehospital care protocols in the United States.
Li T(1), Koloden D(2), Berkowitz J(1)(2), Luo D(3), Luan H(4), Gilley C(4), Kurgansky G(4), Barbara P(1)(2).
ABSTRACT
BACKGROUND: The objective was to describe emergency medical services (EMS) protocol variability in transport expectations for out-of-hospital cardiac arrest (OHCA) patients and the involvement of online medical control for on-scene termination of resuscitation in the United States. Whether other aspects of OHCA care were mentioned, including the definition of a "pediatric" patient, and use of end-tidal carbon dioxide monitoring, mechanical chest compression devices (MCCDs), and extracorporeal membrane oxygenation (ECMO), were also described. METHODS AND RESULTS: Review of EMS protocols publicly accessible from https://www.emsprotocols.org and through searches on the internet when protocols were unavailable on the website from June 2021 to January 2022. Frequencies and proportions were used to describe outcomes. Of 104 protocols reviewed, 51.9% state to initiate transport after return of spontaneous circulation (ROSC), 26.0% do not specify when to initiate transport, and 6.7% state to transport after ≥20 minutes of on-scene cardio-pulmonary resuscitation for adults. For pediatric patients, 38.5% of protocols do not specify when to initiate transport, 32.7% state to transport after ROSC, and 10.6% state to transport as soon as possible. Most protocols (42.3%) did not specify the age that defines "pediatric" in cardiac arrest. More than half (51.9%) of the protocols require online medical control for termination of resuscitation. Most protocols mention the use of end-tidal carbon dioxide monitoring (81.7%), 50.0% mention the use of MCCDs, and 4.8% mention ECMO for cardiac arrest. CONCLUSIONS: In the United States, EMS protocols for initiation of transport and termination of resuscitation for OHCA patients are highly variable.

4. Zhonghua Yi Xue Za Zhi. 2023 Jun 6;103(21):1585-1590. doi: 10.3760/cma.j.cn112137-20230309-00356.
[Enhance the management of cardiac arrest and improve the prognosis of the patients].
[Article in Chinese; Abstract available in Chinese from the publisher]
Zheng W(1), Xu F(1), Bian Y(1), Zhang J(1), Tang MX(1), Li CB(1), Chen YG(1).

ABSTRACT
Cardiac arrest is one of the major public health problems with sudden onset, highmortality and high disability rate. The prevalence of cardiovascular disease continues to rise and the burden of cardiac arrest is increasing in China. It is of great significance to explore more effective prevention and treatment measures to improve the prognosis of patients with cardiac arrest. This article discusses the relevant progress on the treatment ability of emergency and critical cardiovascular diseases, medicines and technologies for cardiac arrest care, and registry studies of cardiac arrest, to further promote the effective improvement of key capacities at various stages of the prevention and treatment of cardiac arrest in China.

5. Europace. 2023 May 19;25(5):euad111. doi: 10.1093/europace/euad111.
Sudden cardiac death and atrial depolarization in coronary artery disease-Authors' reply.
Perkiömäki JS(1), Hekkanen JJ(1), Junttila MJ(1), Huikuri HV(1).
NO ABSTRACT AVAILABLE

6. Resuscitation. 2023 May 29:109854. doi: 10.1016/j.resuscitation.2023.109854. Online ahead of print.
Reply to: Extracorporeal cardiopulmonary resuscitation success - system or selection?
Bosson N(1), Shavelle D(2), Kazan C(3), Gausche-Hill M(4).
NO ABSTRACT AVAILABLE

IN-HOSPITAL CARDIAC ARREST

1. Resuscitation. 2023 Jun 1:109857. doi: 10.1016/j.resuscitation.2023.109857. Online ahead of print.
Pulseless Electrical Activity and Asystole During In-Hospital Cardiac Arrest: Disentangling the 'Nonshockable' Rhythms.
Andrea L(1), Shiloh AL(2), Colvin M(2), Rahmanian M(2), Bangar M(2), Grossestreuer AV(3), Berg KM(4), Gong MN(2), Moskowitz A(2); American Heart Association's Get With The Guidelines®-Resuscitation Investigators.
ABSTRACT
BACKGROUND: Pulseless electrical activity (PEA) and asystole account for 81% of initial in-hospital cardiac arrest (IHCA) rhythms in the U.S.A. These "non-shockable" rhythms are often grouped together in resuscitation research and practice. We hypothesized that PEA and asystole are distinct initial IHCA rhythms with distinguishing features. METHODS: This was an observational cohort study using the prospectively collected nationwide Get With The Guidelines®-Resuscitation registry. Adult patients with an index IHCA and an initial rhythm of PEA or asystole between the years of 2006 and 2019 were included. Patients with PEA vs. asystole were compared with respect to pre-arrest characteristics, resuscitation practice, and outcomes. RESULTS: We identified 147,377 (64.9%) PEA and 79,720 (35.1%) asystolic IHCA. Asystole had more arrests in non-telemetry wards (20,530/147,377 [13.9%] PEA vs. 17,618/79,720 [22.1%] asystole). Asystole had 3% lower adjusted odds of ROSC (91,007 [61.8%] PEA vs. 44,957 [56.4%] asystole, aOR 0.97, 95%CI 0.96-0.97, P<0.01); there was no difference in survival to discharge (28,075 [19.1%] PEA vs. 14,891 [18.7%] asystole, aOR 1.00, 95%CI 1.00-1.01, P=0.63). Duration of resuscitation for those without ROSC were shorter for asystole (29.8 [±22.5] minutes in PEA vs. 26.2 [±21.5] minutes in asystole, adjusted mean difference -3.05 95%CI -3.36--2.74, P<0.01). Interpretation Patients suffering IHCA with an initial PEA rhythm had patient and resuscitation level differences from those with asystole. PEA arrests were more common in monitored settings and received longer resuscitations. Even though PEA was associated with higher rates of ROSC, there was no difference in survival to discharge.

2. J Intensive Care Soc. 2023 May;24(2):222-223. doi: 10.1177/17511437221086890. Epub 2022 Mar 3.
Critical illness related cardiac arrest: Protocol for an investigation of the incidence and outcome of cardiac arrest within intensive care units in the United Kingdom.
Darnell R(1), Newell C(2), Edwards J(1), Gendall E(3), Harrison D(1), Sprinckmoller S(1), Mouncey P(1), Gould D(1), Thomas M(2).
NO ABSTRACT AVAILABLE

INJURIES AND CPR

No articles identified.

CAUSE OF THE ARREST

1. Cardiology. 2023;148(2):134-137. doi: 10.1159/000529501. Epub 2023 Feb 8.
Use of Psychotropic Medication in Victims of Sudden Cardiac Death with Nonischemic Heart Disease.
Kauppila JP(1), Pakanen L(2)(3), Porvari K(3), Vähätalo J(1), Holmström L(1), Haukilahti MAE(1), Perkiömäki J(1), Huikuri HV(1), Junttila MJ(1).
ABSTRACT
BACKGROUND: Nonischemic heart disease (NIHD) is the underlying pathology in about 20% of sudden cardiac deaths (SCDs). Psychotropic medication has been reported as a risk factor for SCD among patients with coronary artery disease, but similar information concerning NIHD is scarce. OBJECTIVES: We evaluated the use of psychotropic medication in victims of SCD due to NIHD and compared it to the general medication use in Finland. METHOD: Study population was derived from the Finnish Genetic Study of Arrhythmic Events (Fingesture) (n = 5,869, mean age: 65 ± 12, 79% males; 1,404 victims of SCD due to NIHD, mean age: 57 ± 13, 77% males). All deaths occurred in Northern Finland during 1998-2017. All victims underwent a medicolegal autopsy. Data on use of medication were defined using postmortem toxicology results and patient records. Subjects with neither toxicological analysis nor information of medication use available were excluded. Information on general medication use was derived from Finnish Statistics on Medicines 2018 and presented as defined daily dose/1,000 inhabitants/day. RESULTS: Psychotropic medication was used by 579 (41%) subjects with NIHD, whereas in the general population, only 12% were estimated to use psychotropics. The results were similar in subgroups of psychotropic medication: 27% versus 2.3% for benzodiazepines, 19% versus 7.5% for antidepressants, and 18% versus 2.2% for antipsychotics. CONCLUSIONS: Use of psychotropic medication is common in victims of SCD due to NIHD compared to the general population.

2. Curr Drug Saf. 2023;18(3):307-317. doi: 10.2174/1574886317666220525115232.
Drug-induced Sudden Death: A Scoping Review.
Amaro-Hosey K(1)(2)(3), Castells X(2), Blanco-Silvente L(3), Loma-Osorio P(4), Capellà D(3).
ABSTRACT
BACKGROUND: The risk of sudden cardiac death (SCD) can be increased with the use of drugs. However, it has been described heterogeneously in the literature. OBJECTIVE: This study aims to systematically review epidemiological studies dealing with druginduced sudden death, describe their methodologies, and summarize the results found. METHODS: A scoping review has been carried out using Medline electronic database. The search was limited up to 2020. Epidemiological studies were

included, and case reports or case series were excluded. RESULTS: Out of 3,114 potential articles, 74 were included. Most studies originated from North America (40.5%) or Europe (39.2%). Case-control (47.3%) or cohort (40.5%) studies were the most common designs. The data for outcomes and exposure were retrieved mainly from administrative databases (37.8%) or medical charts/hospital discharge reports (32.4%), but most studies used several sources of information. A composite variable of sudden death or SCD, mainly with ventricular arrhythmia, was the most frequently used endpoint. Only 18.9% of the studies included autopsy results to confirm the death. Psychotropic drugs were the most frequently studied. An increased risk of different outcomes for typical antipsychotics, tricyclic antidepressants, domperidone, and antiepileptics is suggested. CONCLUSION: The methodologies used were highly heterogeneous, and the results were, in general, not conclusive. An improvement of the methodologies is needed to achieve a conclusion regarding the risk of SCD associated with drug use.

END-TIDAL CO_2

No articles identified.

ORGAN DONATION

No articles identified.

FEEDBACK

No articles identified.

DRUGS

1. Resuscitation. 2023 May 29;188:109855. doi: 10.1016/j.resuscitation.2023.109855. Online ahead of print.

Epinephrine dosing strategies during pediatric extracorporeal cardiopulmonary resuscitation reveal novel impacts on survival: A multicenter study utilizing time-stamped epinephrine dosing records.

Ortmann LA(1), Reeder RW(2), Raymond TT(3), Brunetti MA(4), Himebauch A(4), Bhakta R(5), Kempka J(6), di Bari S(6), Lasa JJ(7).

ABSTRACT

OBJECTIVES: To describe epinephrine dosing distribution using time-stamped data and assess the impact of dosing strategy on survival after ECPR in children. METHODS: This was a retrospective study at five pediatric hospitals of children <18 years with an in-hospital ECPR event. Mean number of epinephrine doses was calculated for each 10-minute CPR interval and compared between survivors and non-survivors. Patients were also divided by dosing strategy into a frequent epinephrine group (dosing interval of ≤5 min/dose throughout the first 30 minutes of the event), and a limited epinephrine group (dosing interval of ≤5 min/dose for the first 10 minutes then >5 min/dose for the time between 10 and 30 minutes). RESULTS: A total of 191 patients were included. Epinephrine was not evenly distributed throughout ECPR, with 66% of doses being given during the first half of the event. Mean number of epinephrine doses was similar between survivors and non-survivors the first 10 minutes (2.7 doses). After 10 minutes, survivors received fewer doses than non-

survivors during each subsequent 10-minute interval. Adjusted survival was not different between strategy groups [OR of survival for frequent epinephrine strategy: 0.78 (95% CI 0.36-1.69), p = 0.53]. CONCLUSIONS: Survivors received fewer doses than non-survivors after the first 10 minutes of CPR and although there was no statistical difference in survival based on dosing strategy, the findings of this study question the conventional approach to EPCR analysis that assumes dosing is evenly distributed.

2. Front Cardiovasc Med. 2023 May 15;10:1179815. doi: 10.3389/fcvm.2023.1179815. eCollection 2023.

aMplitude spectral area of ventricular fibrillation and amiOdarone Study in patients with out-of-hospital cArdIaC arrest. The MOSAIC study.

Gentile FR(1)(2), Wik L(3)(4), Aramendi E(5), Baldi E(1), Isasi I(5), Steen-Hansen JE(6), Compagnoni S(1)(2), Fasolino A(1)(2), Contri E(7), Palo A(7), Primi R(1), Bendotti S(1), Currao A(1), Savastano S(1).

ABSTRACT

OBJECTIVE: Antiarrhythmic drugs are recommended for out of hospital cardiac arrest (OHCA) with shock-refractory ventricular fibrillation (VF). Amplitude Spectral Area (AMSA) of VF is a quantitative waveform measure that describes the amplitude-weighted mean frequency of VF, it correlates with intramyocardial adenosine triphosphate (ATP) concentration, it is a predictor of shock efficacy and an emerging indicator to guide defibrillation and resuscitation efforts. How AMSA might be influenced by amiodarone administration is unknown. METHODS: In this international multicentre observational study, all OHCAs receiving at least one shock were included. AMSA values were calculated by retrospectively analysing the pre-shock ECG interval of 2 s. Multivariable models were run and a propensity score based on the probability of receiving amiodarone was created to compare two randomly matched samples. RESULTS: 2,077 shocks were included: 1,407 in the amiodarone group and 670 in the non-amiodarone group. AMSA values were lower in the amiodarone group [8.8 (6-12.7) mV·Hz vs. 9.8 (6-14) mV·Hz, p = 0.035]. In two randomly matched propensity score-based groups of 261 shocks, AMSA was lower in the amiodarone group [8.2 (5.8-13.5) mV·Hz vs. 9.6 (5.6-11.6), p = 0.042]. AMSA was a predictor of shock success in both groups but the predictive power was lower in the amiodarone group [Area Under the Curve (AUC) non-amiodarone group 0.812, 95%CI: 0.78-0.841 vs. AUC amiodarone group 0.706, 95%CI: 0.68-0.73; p < 0.001]. CONCLUSIONS: Amiodarone administration was independently associated with the probability of recording lower values of AMSA. In patients who have received amiodarone during cardiac arrest the predictive value of AMSA for shock success is significantly lower, but still statistically significant.

3. SAGE Open Med. 2023 May 22;11:20503121231175318. doi: 10.1177/20503121231175318. eCollection 2023.

Comparison between internal jugular vein access using midline catheter and peripheral intravenous access during cardiopulmonary resuscitation in adults.

Chai HS(1), Kim YM(1), Park GJ(1), Kim SC(1)(2), Kim H(1)(2), Lee SW(1)(2), Park HJ(2), Lee JH(3).

ABSTRACT

OBJECTIVES: Vascular access is an important procedure for drug administration during the resuscitation of a patient with cardiac arrest; however, it can be challenging under emergent conditions. This study aimed to investigate the efficiency of ultrasound-guided internal jugular venous access using a midline catheter versus peripheral intravenous access during cardiopulmonary resuscitation. METHODS: This was a prospective single-center observational study among patients who received cardiopulmonary resuscitation. The primary outcomes were the success rate of first attempt and the time taken for vascular access via the internal jugular and peripheral veins. We also

measured the diameter of the internal jugular and peripheral veins at the access point and the distance from the access point to the heart. RESULTS: In all, 20 patients were included in the study. Internal jugular and peripheral venous access had a first-attempt success rate of 85% and 65%, respectively ($p = 0.152$). The time to access the internal jugular and peripheral veins was 46.4 ± 40.5 s and 28.8 ± 14.7 s, respectively ($p = 0.081$). The diameter of the internal jugular and peripheral veins was 10.8 ± 2.6 mm and 2.8 ± 0.8 mm, respectively ($p < 0.001$). The distance from the vascular access point to the heart was 20.3 ± 4.7 cm and 48.8 ± 13.1 cm for the internal jugular and peripheral veins, respectively ($p < 0.001$). CONCLUSIONS: There was a trend toward higher success rates in the internal jugular vein rather than the peripheral intravenous approach, which was not statistically significant.

TRAUMA

No articles identified.

VENTILATION

No articles identified.

CERERBRAL MONITORING

1. Resuscitation. 2023 Jun 1:109858. doi: 10.1016/j.resuscitation.2023.109858. Online ahead of print.

Associations between clinical characteristics of cardiac arrest and early CT head findings of hypoxic ischaemic brain injury following out-of-hospital cardiac arrest.

Srinivasan V(1), Hall J(2), Wahlster S(3), Johnson NJ(4), Branch K(5).

ABSTRACT

BACKGROUND/OBJECTIVE: Post-cardiac arrest patients are vulnerable to hypoxic-ischaemic brain injury (HIBI), but HIBI may not be identified until computed tomography (CT) scan of the brain is obtained post-resuscitation and stabilization. We aimed to evaluate the association of clinical arrest characteristics with early CT findings of HIBI to identify those at the highest risk for HIBI. METHODS: This is a retrospective analysis of out-of-hospital cardiac arrest (OHCA) patients who underwent whole-body imaging. Head CT reports were analyzed with an emphasis on findings suggestive of HIBI; HIBI was present if any of the following were noted on the neuroradiologist read: global cerebral oedema, sulcal effacement, blurred grey-white junction, and ventricular compression. The primary exposure was duration of cardiac arrest. Secondary exposures included age, cardiac vs noncardiac etiology, and witnessed vs unwitnessed arrest. The primary outcome was CT findings of HIBI. RESULTS: A total of 180 patients (average age 54 years, 32% female, 71% White, 53% witnessed arrest, 32% cardiac etiology of arrest, mean CPR duration of 15 ± 10 minutes) were included in this analysis. CT findings of HIBI were seen in 47 (48.3%) patients. Multivariate logistic regression demonstrated a significant association between CPR duration and HIBI (adjusted OR = 1.1, 95% CI 1.01 - 1.11, $p < 0.01$). CONCLUSION: Signs of HIBI are commonly seen on CT head within 6 hours of OHCA, occurring in approximately half of patients, and are associated with CPR duration. Determining risk factors for abnormal CT findings can help clinically identify patients at higher risk for HIBI and target interventions appropriately.

2. Eur Heart J Acute Cardiovasc Care. 2023 May 31:zuad056. doi: 10.1093/ehjacc/zuad056. Online ahead of print.
Biomarkers for neuroprognostication after out-of-hospital cardiac arrest.
Isse YA(1), Meyer MAS(1), Hassager C(1)(2).
NO ABSTRACT AVAILABLE

3. Resusc Plus. 2023 May 24;14:100399. doi: 10.1016/j.resplu.2023.100399. eCollection 2023 Jun.
Specific thresholds of quantitative pupillometry parameters predict unfavorable outcome in comatose survivors early after cardiac arrest.
Nyholm B(1), Obling LER(1), Hassager C(1)(2), Grand J(1), Møller JE(1), Othman MH(3), Kondziella D(2)(3), Kjaergaard J(1)(2).
ABSTRACT
AIM: Quantitative pupillometry is the guideline-recommended method for assessing pupillary light reflex for multimodal prognostication in comatose patients resuscitated from out-of-hospital cardiac arrest (OHCA). However, threshold values predicting an unfavorable outcome have been inconsistent across studies; therefore, we aimed to identify specific thresholds for all quantitative pupillometry parameters. METHODS: Comatose post-OHCA patients were consecutively admitted to the cardiac arrest center at Copenhagen University Hospital Rigshospitalet from April 2015 to June 2017. The parameters of quantitatively assessed pupillary light reflex (qPLR), Neurological Pupil index (NPi), average/max constriction velocity (CV/MCV), dilation velocity (DV), and latency of constriction (Lat) were recorded on the first three days after admission. We evaluated the prognostic performance and identified thresholds achieving zero percent false positive rate (0% PFR) for an unfavorable outcome of 90-day Cerebral Performance Category (CPC) 3-5. Treating physicians were blinded for pupillometry results. RESULTS: Of the 135 post-OHCA patients, the primary outcome occurred for 53 (39%) patients.On any day during hospitalization, a qPLR < 4%, NPi < 2.45, CV < 0.1 mm/s, and an MCV < 0.335 mm/s predicted 90-day unfavorable neurological outcome with 0% FPR (95%CI: 0-0%), with sensitivities of 28% (17-40%), 9% (2-19%), 13% (6-23%), and 17% (8-26%), respectively on day 1. CONCLUSION: We found that specific thresholds of all quantitative pupillometry parameters, measured at any time following hospital admission until day 3, predicted a 90-day unfavorable outcome with 0% FPR in comatose patients resuscitated from OHCA. However, at 0% FPR, thresholds resulted in low sensitivity. These findings should be further validated in larger multicenter clinical trials.

ULTRASOUND AND CPR

No articles identified.

ORGANISATION AND TRAINING

1. Resuscitation. 2023 Jun 1:109859. doi: 10.1016/j.resuscitation.2023.109859. Online ahead of print.
Learn how to Save the Life of a Victim of Out-of-Hospital Cardiac Arrest by Playing a Serious Smartphone Game.
Fijačko N(1), Metličar Š(2), Vinojčić D(3), Greif R(4), Masterson Creber R(5).
NO ABSTRACT AVAILABLE

2. Med Klin Intensivmed Notfmed. 2023 Jun 3. doi: 10.1007/s00063-023-01024-9. Online ahead of print.

[Role of German cardiac arrest centers in mediating basic life support].

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

Voigt I(1), Rott N(2)(3), Kersken M(4), Mügge A(5), Böttiger BW(2)(3), Preusch M(6), Wengenmayer T(7), Michels G(8).

ABSTRACT

BACKGROUND AND OBJECTIVE: Despite a measurable increase in recent years, the bystander resuscitation rate in Germany lags behind the European comparison. Special centers for the care of patients after cardiac arrest, so-called cardiac arrest centers (CAC), have been established. The aim of this work is to evaluate the role of CACs, in addition to in-hospital patient care, in improving the bystander resuscitation rate in Germany and what obstacles exist in the implementation of resuscitation training. MATERIALS AND METHODS: Online survey by the working group cardiopulmonary resuscitation (AG42) of the German Society of Cardiology (DGK) and the German Resuscitation Council (GRC) RESULTS: Of the 74 participating clinics (78.4% certified as CAC), 23 (31.1%) conduct lay resuscitation training. These mainly take place within the framework of action days for resuscitation (82.6%) or in schools (39.1%). Permanent cooperation with at least one school existed in 52.2%. Basic life support (BLS) resuscitation dummies are available in 63.5% of these clinics and an automated external defibrillator (AED) demonstration device in 43.2%. According to the interviewees, the biggest obstacles to the consistent implementation of resuscitation courses in schools include lack of qualified instructors, lack of refinancing and difficulties with regard to coordinating activities between schools and providers. CONCLUSIONS: Direct training of lay rescuers by hospitals faces several obstacles. To increase the bystander resuscitation rate, focusing on targeted training of teachers as multipliers (train-the-trainer) can be a good approach for cardiac arrest centers.

3. Resusc Plus. 2023 May 24;14:100400. doi: 10.1016/j.resplu.2023.100400. eCollection 2023 Jun.

Who is the real team leader? Comparing leadership performance of the team leader and CPR Coach during simulated cardiac arrest.

Lin Y(1), Savage T(2), Gravel G(3), Davidson J(1), Tofil N(4), Duff J(5), Cheng A(6).

ABSTRACT

PURPOSE: To describe the leadership performance of team leaders and CPR Coaches, and to determine if there is a correlation between leadership scores and CPR performance during management of simulated pediatric cardiac arrest events. METHODS: This is a secondary analysis of data from a prior randomized controlled trial. We observed the performance of both team leaders and CPR coaches during the management of an 18-minute simulated cardiac arrest scenario which was run for 20 resuscitation teams comprised of CPR-certified professionals from four pediatric tertiary care centers. CPR Coaches were responsible for providing real-time verbal feedback of CPR performance to compressors. Two raters were trained to use the Behavioral Assessment Tool (BAT) to assess leadership performance of the team leader and CPR Coach. BAT scores of team leaders and CPR coaches were compared and linked with objective CPR performance. RESULTS: There was no significant difference between the BAT scores of team leaders and CPR coaches (median score 27/40 vs 28.8/40, $p = 0.16$). Higher BAT scores of team leaders were significantly associated with higher percentage of excellent CPR ($r = 0.52$, $p = 0.02$), while higher BAT scores of CPR coaches were significantly associated with higher chest compression fraction ($r = 0.48$, $p = 0.03$). CONCLUSIONS: Both team leaders and CPR coaches have similarly high leadership performance during the management of simulated cardiac arrest. Leadership behaviors were associated with quality of CPR performance.

4. Circulation. 2023 Jun 2. doi: 10.1161/CIRCULATIONAHA.122.063651. Online ahead of print.
Prediction of Shock-Refractory Ventricular Fibrillation During Resuscitation of Out-of-Hospital Cardiac Arrest.
Coult J(1), Yang BY(2), Kwok H(3), Kutz JN(4), Boyle PM(5)(6)(7), Blackwood J(8), Rea TD(1)(8), Kudenchuk PJ(9).
ABSTRACT
BACKGROUND: Out-of-hospital cardiac arrest due to shock-refractory ventricular fibrillation (VF) is associated with relatively poor survival. The ability to predict refractory VF (requiring ≥3 shocks) in advance of repeated shock failure could enable preemptive targeted interventions aimed at improving outcome, such as earlier administration of antiarrhythmics, reconsideration of epinephrine use or dosage, changes in shock delivery strategy, or expedited invasive treatments. METHODS: We conducted a cohort study of VF out-of-hospital cardiac arrest to develop an ECG-based algorithm to predict patients with refractory VF. Patients with available defibrillator recordings were randomized 80%/20% into training/test groups. A random forest classifier applied to 3-s ECG segments immediately before and 1 minute after the initial shock during cardiopulmonary resuscitation was used to predict the need for ≥3 shocks based on singular value decompositions of ECG wavelet transforms. Performance was quantified by area under the receiver operating characteristic curve. RESULTS: Of 1376 patients with VF out-of-hospital cardiac arrest, 311 (23%) were female, 864 (63%) experienced refractory VF, and 591 (43%) achieved functional neurological survival. Total shock count was associated with decreasing likelihood of functional neurological survival, with a relative risk (95% CI) of 0.95 (95% CI, 0.93-0.97) for each successive shock (P<0.001). In the 275 test patients, the area under the receiver operating characteristic curve (95% CI) for predicting refractory VF was 0.85 (95% CI, 0.79-0.89), with specificity of 91%, sensitivity of 63%, and a positive likelihood ratio of 6.7. CONCLUSIONS: A machine learning algorithm using ECGs surrounding the initial shock predicts patients likely to experience refractory VF, and could enable rescuers to preemptively target interventions to potentially improve resuscitation outcome.

5. Resusc Plus. 2023 May 25;14:100401. doi: 10.1016/j.resplu.2023.100401. eCollection 2023 Jun.
Data-informed debriefing for cardiopulmonary arrest: A randomized controlled trial.
Cheng A(1), Davidson J(2), Wan B(2), St-Onge-St-Hilaire A(2), Lin Y(2).
ABSTRACT
AIM: To determine if data-informed debriefing, compared to a traditional debriefing, improves the process of care provided by healthcare teams during a simulated pediatric cardiac arrest. METHODS: We conducted a prospective, randomized trial. Participants were randomized to a traditional debriefing or a data-informed debriefing supported by a debriefing tool. Participant teams managed a 10-minute cardiac arrest simulation case, followed by a debriefing (i.e. traditional or data-informed), and then a second cardiac arrest case. The primary outcome was the percentage of overall excellent CPR. The secondary outcomes were compliance with AHA guidelines for depth and rate, chest compression (CC) fraction, peri-shock pause duration, and time to critical interventions. RESULTS: A total of 21 teams (84 participants) were enrolled, with data from 20 teams (80 participants) analyzed. The data-informed debriefing group was significantly better in percentage of overall excellent CPR (control vs intervention: 53.8% vs 78.7%; MD 24.9%, 95%CI: 5.4 to 44.4%, p = 0.02), guideline-compliant depth (control vs. intervention: 60.4% vs 85.8%, MD 25.4%, 95%CI: 5.5 to 45.3%, p = 0.02), CC fraction (control vs intervention: 88.6% vs 92.6, MD 4.0%, 95%CI: 0.5 to 7.4%, p = 0.03), and peri-shock pause duration (control vs intervention: 5.8 s vs 3.7 s, MD -2.1 s, 95%CI: -3.5 to -0.8 s, p = 0.004) compared to the control group. There was no significant difference in time to critical interventions between groups. CONCLUSION: When compared with traditional debriefing,

data-informed debriefing improves CPR quality and reduces pauses in CPR during simulated cardiac arrest, with no improvement in time to critical interventions.

6. Front Cardiovasc Med. 2023 May 15;10:955060. doi: 10.3389/fcvm.2023.955060. eCollection 2023.

Perceived self-efficacy and empowerment in patients at increased risk of sudden cardiac arrest.

Davies B(1), Allan KS(2), Carroll SL(3), Gibbs K(1), Roberts JD(4), MacIntyre C(5), Steinberg C(6), Tadros R(7), Dorian P(2), Healey JS(3), Gardner M(5), Laksman ZWM(1), Krahn AD(1), Fournier A(8), Seifer C(9), Lauck SB(1).

ABSTRACT

BACKGROUND: The role of multidisciplinary clinics for psychosocial care is increasingly recognized for those living with inherited cardiac conditions (ICC). In Canada, access to healthcare providers differ between clinics. Little is known about the relationship between access to specialty care and a patient's ability to cope with, and manage their condition. METHODS: We leveraged the Hearts in Rhythm Organization (HiRO) to conduct a cross-sectional, community-based survey of individuals with ICC and their family members. We aimed to describe access to services, and explore the relationships between participants' characteristics, cardiac history and self-reported health status and self-efficacy (GSE: General Self-Efficacy Scale) and empowerment (GCOS-24: Genetic Counseling Outcome Scale). RESULTS: We collected 235 responses from Canadian participants in 10 provinces and territories. Overall, 63% of participants reported involvement of a genetic counsellor in their care. Access to genetic testing was associated with greater empowerment [mean GCOS-24: 121.14 (SD = 20.53) vs. 105.68 (SD = 21.69); p = 0.004]. Uncertain genetic test results were associated with lower perceived self-efficacy (mean GSE: uncertain = 28.85 vs. positive = 33.16, negative = 34.13; p = 0.01). Low global mental health scores correlated with both lower perceived self-efficacy and empowerment scores, with only 11% of affected participants reporting involvement of psychology services in their care. CONCLUSION: Differences in resource accessibility, clinical history and self-reported health status impact the perceived self-efficacy and empowerment of patients with ICC. Future research evaluating interventions to improve patient outcomes is recommended.

7. Europace. 2023 May 19;25(5):euad091. doi: 10.1093/europace/euad091.

Spotlight on the 2022 ESC guideline management of ventricular arrhythmias and prevention of sudden cardiac death: 10 novel key aspects.

Könemann H(1), Dagres N(2), Merino JL(3), Sticherling C(4), Zeppenfeld K(5), Tfelt-Hansen J(6)(7), Eckardt L(1).

ABSTRACT

Sudden cardiac death and ventricular arrhythmias are a global health issue. Recently, a new guideline for the management of ventricular arrhythmias and prevention of sudden cardiac death has been published by the European Society of Cardiology that serves as an update to the 2015 guideline on this topic. This review focuses on 10 novel key aspects of the current guideline: As new aspects, public basic life support and access to defibrillators are guideline topics. Recommendations for the diagnostic evaluation of patients with ventricular arrhythmias are structured according to frequently encountered clinical scenarios. Management of electrical storm has become a new focus. In addition, genetic testing and cardiac magnetic resonance imaging significantly gained relevance for both diagnostic evaluation and risk stratification. New algorithms for antiarrhythmic drug therapy aim at improving safe drug use. The new recommendations reflect increasing relevance of catheter ablation of ventricular arrhythmias, especially in patients without structural heart disease or stable coronary artery disease with only mildly impaired ejection fraction and haemodynamically tolerated ventricular tachycardias. Regarding sudden cardiac death risk stratification, risk calculators

for laminopathies, and long QT syndrome are now considered besides the already established risk calculator for hypertrophic cardiomyopathy. Generally, 'new' risk markers beyond left ventricular ejection fraction are increasingly considered for recommendations on primary preventive implantable cardioverter defibrillator therapy. Furthermore, new recommendations for diagnosis of Brugada syndrome and management of primary electrical disease have been included. With many comprehensive flowcharts and practical algorithms, the new guideline takes a step towards a user-oriented reference book.

8. J Forensic Leg Med. 2023 May;96:102517. doi: 10.1016/j.jflm.2023.102517. Epub 2023 Mar 28.
Risk factors of sudden cardiac death in women: A 10 years study in Tunisia.
Belhaj A(1), Shimi M(2), Kort I(3), Zaara MA(3), Hamdoun M(3), Ben Khelil M(4).
ABSTRACT
BACKGROUND: Sudden cardiac death (SCD) represents a frequent etiology of sudden death. It represents a major public health issue. Few data about SCD in women are available from the Arab world. Our work aimed to analyze the risk factors of sudden cardiac death in Tunisian women in comparison with men. METHODS: A cross-sectional retrospective study including all sudden cardiac death cases, conducted in the Forensic Medicine Department of the main teaching hospital of Tunis, between January 2010 and December 2019. RESULTS: We counted 417 cases of sudden cardiac death in women representing 17.5% of the total number of sudden cardiac deaths recorded during the study period. The average age was 60.03 ± 15.01 years with a predominance of urban married women. The most frequent cardiac risk factors were high blood pressure (50%), diabetes (36.2%), and cardiac disease history (34.2%). Predominately married women with a history of High blood pressure and diabetes, had a high predictive of sudden cardiac death. CONCLUSION: Cardiac sudden death is no longer a male focused issue. As a matter of facts Rates of SCD in women are rising with a different pattern. We will highlight the importance of adopting specific preventive measures of SCD in female.

9. Resusc Plus. 2023 May 19;14:100396. doi: 10.1016/j.resplu.2023.100396. eCollection 2023 Jun.
Enhancing CPR training and installation of defibrillators in public places - A solution to tackle sudden cardiac arrest.
Suvvari TK(1), Lopinti A(2), Boddapalli CD(3).
NO ABSTRACT AVAILABLE

10. Age Ageing. 2023 May 1;52(5):afad072. doi: 10.1093/ageing/afad072.
1-year functional outcomes after cardiopulmonary resuscitation for older adults with pre-existing long-term care needs.
Ohbe H(1), Nakajima M(1)(2)(3), Miyamoto Y(4), Shibahashi K(1)(5), Matsui H(1), Yasunaga H(1), Sasabuchi Y(6)(7).
ABSTRACT
OBJECTIVE: To investigate the 1-year functional outcomes after cardiopulmonary resuscitation (CPR) in adults aged ≥65 years with pre-existing long-term care needs. METHODS: This population-based cohort study was conducted in Tochigi Prefecture, one of 47 prefectures in Japan. We used medical and long-term care administrative databases, which included data on functional and cognitive impairment that were assessed with the nationally standardised care-needs certification system. Among individuals aged ≥65 years registered between June 2014 and February 2018, patients who underwent CPR were identified. The primary outcome was mortality and care needs at 1 year after CPR. The outcome was stratified by pre-existing care needs before CPR based on the total daily

estimated care minutes: no care needs, support levels 1 and 2 and care-needs level 1 (estimated care time 25-49 min), care-needs levels 2 and 3 (50-89 min) and care-needs levels 4 and 5 (≥90 min). RESULTS: Among 594,092 eligible individuals, 5,086 (0.9%) underwent CPR. The 1-year mortalities after CPR in patients with no care needs, support levels 1 and 2 and care-needs level 1, care-needs levels 2 and 3 and care-needs levels 4 and 5 were 94.6% (n = 2,207/2,332), 96.1% (n = 736/766), 94.5% (n = 930/984) and 95.9% (n = 963/1,004), respectively. Among survivors, most patients had no change in care needs before and at 1 year after CPR. There was no significant association between pre-existing functional and cognitive impairment and 1-year mortality and care needs after adjusting for potential confounders. CONCLUSION: Healthcare providers need to discuss poor survival outcomes after CPR with all older adults and their families in shared decision making.

11. J Interprof Care. 2023 Jul-Aug;37(4):623-628. doi: 10.1080/13561820.2022.2140130. Epub 2022 Nov 13.

A simulation-enhanced, spaced learning, interprofessional "code blue" curriculum improves ACLS algorithm adherence and trainee resuscitation skill confidence.

Toft LEB(1), Bottinor W(2), Cobourn A(1), Blount C(3), Tripathi A(4), Mehta I(5), Koch J(6).

ABSTRACT

In-hospital cardiac arrest resuscitation training often happens in silos, with minimal interprofessional training. The aim of this study was to implement and evaluate a simulation-enhanced, inter-professional cardiac arrest curriculum in a university hospital. The curriculum ran monthly for 12 months, training interprofessional teams of internal medicine residents, nurses, respiratory therapists, and pharmacy residents. Teams participated in a 90-min high-fidelity simulation including "code blue" (30 min) followed by a 30-min debriefing and a repeat identical simulated "code blue" scenario. Teams were tested in an unannounced mock Code Blue the following month. Advanced Cardiac Life Support (ACLS) algorithm adherence was assessed using a standardized checklist. In-hospital cardiac arrest (IHCA) incidence and survival was tracked for 2 years prior, during, and 1 year after curriculum implementation. Team ACLS-algorithm adherence at baseline varied from 47% to 90% (mean of 71 ± 11%) and improved immediately following training (mean 88 ± 4%, range 80-93%, p = .011). This improvement persisted but decreased in magnitude over 1 month (mean 81 ± 7%, p = .013). Medical resident self-reported comfort levels with resuscitation skills varied widely at baseline, but improved for all skills post-curriculum. This simulation-enhanced, spaced practice, interprofessional curriculum resulted in a sustained improvement in team ACLS algorithm adherence.

POST-CARDIAC ARREST TREATMENTS

No articles identified.

TARGETED TEMPERATURE MANAGEMENT

No articles identified.

ELECTROPHYSIOLOGY AND DEFIBRILLATION

No articles identified.

PEDIATRICS AND CHILDREN

1. Resuscitation. 2023 May 29:109856. doi: 10.1016/j.resuscitation.2023.109856. Online ahead of print.

Pediatric in-hospital cardiac arrest: respiratory failure characteristics and association with outcomes.

Shepard LN(1), Reeder RW(2), O'Halloran A(3), Kienzle M(3), Dowling J(3), Graham K(3), Keim GP(3), Topjian AA(3), Yehya N(3), Sutton RM(3), Morgan RW(3).

ABSTRACT

AIMS: To characterize respiratory failure prior to pediatric in-hospital cardiac arrest (IHCA) and to associate pre-arrest respiratory failure characteristics with survival outcomes. METHODS: This is a single-center, retrospective cohort study from a prospectively identified cohort of children <18 years in intensive care units (ICUs) who received cardiopulmonary resuscitation (CPR) for ≥ 1 minute between January 1, 2017 and June 30, 2021, and were receiving invasive mechanical ventilation (IMV) in the hour prior to IHCA. Patient characteristics, ventilatory support and gas exchange immediately pre-arrest were described and their association with the return of spontaneous circulation (ROSC) was measured. RESULTS: In the 187 events among 154 individual patients, the median age was 0.9 [0.2, 2.4] years, and CPR duration was 7.5 [3, 29] minutes. Respiratory failure was acute prior to 106/187 (56.7%) events, and the primary indication for IMV was respiratory in nature in 107/187 (57.2%) events. Immediately pre-arrest, the median positive end-expiratory pressure was 8 [5,10] cmH2O; mean airway pressure was 13 [10,18] cmH2O; peak inspiratory pressure was 28 [24, 35] cmH2O; and fraction of inhaled oxygen (FiO2) was 0.40 [0.25, 0.80]. Pre-arrest FiO2 was lower in patients with ROSC vs. without ROSC (0.30 vs 0.99; p<0.001). Patients without ROSC had greater severity of pre-arrest oxygenation failure (p<0.001) as defined by oxygenation index, oxygen saturation index, P/F ratio or S/F ratio. CONCLUSIONS: There was substantial heterogeneity in respiratory failure characteristics and ventilatory requirements pre-arrest. Higher pre-arrest oxygen requirement and greater degree of oxygenation failure were associated with worse survival outcomes.

EXTRACORPOREAL LIFE SUPPORT

1. Resuscitation. 2023 May 26;188:109853. doi: 10.1016/j.resuscitation.2023.109853. Online ahead of print.

Hospital ECMO capability is associated with survival in pediatric cardiac arrest.

Pollack BE(1), Barbaro RP(2), Gorga SM(3), Carlton EF(2), Gaies M(4), Kohne JG(2).

ABSTRACT

AIM: Extracorporeal membrane oxygenation (ECMO) provides temporary support in severe cardiac or respiratory failure and can be deployed in children who suffer cardiac arrest. However, it is unknown if a hospital's ECMO capability is associated with better outcomes in cardiac arrest. We evaluated the association between pediatric cardiac arrest survival and the availability of pediatric extracorporeal membrane oxygenation (ECMO) at the treating hospital. METHODS: We identified cardiac arrest hospitalizations, including in- and out-of-hospital, in children (0-18 years old) using data from the Health Care Utilization Project (HCUP) National Inpatient Sample (NIS) between 2016 and 2018. The primary outcome was in-hospital survival. Hierarchical logistic regression models were built to test the association between hospital ECMO capability and in-hospital survival. RESULTS: We identified 1276 cardiac arrest hospitalizations. Survival of the cohort was 44%; 50% at ECMO-capable hospitals and 32% at non-ECMO hospitals. After adjusting for patient-level factors and hospital factors, receipt of care at an ECMO- capable hospital was associated with higher in-hospital survival,

with an odds ratio of 1.49 [95% CI 1.09, 2.02]. Patients who received treatment at ECMO-capable hospitals were younger (median 3 years vs 11 years, $p < 0.001$) and more likely to have a complex chronic condition, specifically congenital heart disease. A total of 10.9% (88/811) of patients at ECMO-capable hospitals received ECMO support. CONCLUSION: A hospital's ECMO capability was associated with higher in-hospital survival among children suffering cardiac arrest in this analysis of a large United States administrative dataset. Future work to understand care delivery differences and other organizational factors in pediatric cardiac arrest is necessary to improve outcomes.

2. Resuscitation. 2023 May 27;188:109852. doi: 10.1016/j.resuscitation.2023.109852. Online ahead of print.

Hypothermia after extracorporeal cardiopulmonary resuscitation not associated with improved neurologic complications or survival in children: An analysis of the ELSO registry.

Sanford EL(1), Bhaskar P(2), Li X(3), Thiagarajan R(4), Raman L(2).

ABSTRACT

AIM: To analyze the association between hypothermia and neurologic complications among children who were treated with extracorporeal cardiopulmonary resuscitation (ECPR) using the Extracorporeal Life Support Organization (ELSO) international registry. METHODS: We conducted a retrospective, multicenter, database study utilizing ELSO data for ECPR encounters from January 1, 2011, through December 31, 2019. Exclusion criteria included multiple ECMO runs and lack of variable data. The primary exposure was hypothermia under 34 °C for greater than 24 hours. The primary outcome, determined a priori, was a composite of neurologic complications defined by ELSO registry including brain death, seizures, infarction, hemorrhage, diffuse ischemia. Secondary outcomes were mortality on ECMO and mortality prior to hospital discharge. Multivariable logistic regression determined the odds of neurologic complications, mortality on ECMO or prior to hospital discharge associated with hypothermia after adjustment for available pertinent covariables. RESULTS: Of the 2,289 ECPR encounters, no difference in odds of neurologic complications were found between the hypothermia and non-hypothermia groups (AOR 1.10, 95% CI 0.80-1.51). However, hypothermia exposure was associated with decreased odds of mortality on ECMO (AOR 0.76, 95% CI 0.59-0.97), but no difference in mortality prior to hospital discharge (AOR 0.96, 95% CI 0.76-1.21). CONCLUSION: Analysis of a large, multicenter, international dataset demonstrates that hypothermia for greater than 24 hours among children who undergo ECPR is not associated with decreased neurologic complications or mortality benefit at time of hospital discharge.

EXPERIMENTAL RESEARCH

1. Med. 2023 May 19:S2666-6340(23)00143-5. doi: 10.1016/j.medj.2023.05.003. Online ahead of print.

Single-cell transcriptomics reveal a hyperacute cytokine and immune checkpoint axis after cardiac arrest in patients with poor neurological outcome.

Tamura T(1), Cheng C(2), Chen W(3), Merriam LT(4), Athar H(4), Kim YH(4), Manandhar R(1), Amir Sheikh MD(4), Pinilla-Vera M(4), Varon J(1), Hou PC(5), Lawler PR(6), Oldham WM(1), Seethala RR(5), Tesfaigzi Y(1); Immunology of Cardiac Arrest Network (I-CAN); Weissman AJ(7), Baron RM(1), Ichinose F(8), Berg KM(9), Bohula EA(10), Morrow DA(10), Chen X(11), Kim EY(12).

ABSTRACT

BACKGROUND: Most patients hospitalized after cardiac arrest (CA) die because of neurological injury. The systemic inflammatory response after CA is associated with neurological injury and mortality but remains poorly defined. METHODS: We determine the innate immune network induced by clinical CA at single-cell resolution. FINDINGS: Immune cell states diverge as early as 6 h post-CA between patients with good or poor neurological outcomes 30 days after CA. Nectin-2+ monocyte and Tim-3+ natural killer (NK) cell subpopulations are associated with poor outcomes, and

interactome analysis highlights their crosstalk via cytokines and immune checkpoints. Ex vivo studies of peripheral blood cells from CA patients demonstrate that immune checkpoints are a compensatory mechanism against inflammation after CA. Interferon γ (IFNγ)/interleukin-10 (IL-10) induced Nectin-2 on monocytes; in a negative feedback loop, Nectin-2 suppresses IFNγ production by NK cells. CONCLUSIONS: The initial hours after CA may represent a window for therapeutic intervention in the resolution of inflammation via immune checkpoints.

2. FASEB J. 2023 Jul;37(7):e22999. doi: 10.1096/fj.202300253R.
The plant-derived alkaloid aloperine prevents ischemia/reperfusion injury-induced sudden cardiac death.
Hu Z(1), Li J(1), Liu Q(1), Manville RW(2), Abbott GW(2).
ABSTRACT
Sudden cardiac death (SCD) remains a major cause of global mortality. In addition to modern interventions, botanical folk medicines have long been used to treat cardiovascular disease, although the efficacy and underlying mechanisms are often unresolved. Aloperine, a bioactive quinolizidine alkaloid isolated from Sophora alopecuroides plants, exhibits antioxidant, anti-inflammatory, antitumor, and vasorelaxant properties, but possible antiarrhythmic effects of aloperine in SCD are unclear. Here, we examined whether aloperine protects against ischemia and reperfusion injury-associated lethal ventricular arrhythmia and sudden cardiac death. Rats were divided into sham, control, and aloperine groups, and reperfusion-provoked ventricular arrhythmogenesis, cardiac damage markers, and signaling pathways quantified following left main coronary artery ischemia and reperfusion. In vitro studies of effects of aloperine on hERG and Kv4.3 cardiac voltage-gated potassium (Kv) channels were performed using two-electrode voltage clamp analysis of cloned channels expressed in Xenopus laevis oocytes. Aloperine pretreatment (10 mg/kg) did not affect baseline cardiac electrical stability; yet, it reduced ventricular arrhythmogenesis and susceptibility to SCD (mortality rate: control: 64.3%; aloperine: 0%) induced by reperfusion injury. Aloperine also reduced serum levels of LDH, CK-MB, α-HBDH, and cTnI post-I/R, and stimulated phosphorylation of ventricular ERK1/2 and STAT-3, which are key components of RISK and SAFE signaling pathways. Inhibition of either ERK1/2 (with U0126) or STAT-3 (with Ag490) abolished aloperine-induced anti-arrhythmic effects and ERK1/2 and STAT-3 phosphorylation. Interestingly, while aloperine (100 μM) had no effect on cloned Kv4.3 activity, aloperine (1 μM and up) negative-shifted the voltage dependence of hERG activation by ~10 mV and increased peak hERG current by 35%. Thus, aloperine exerts striking anti-arrhythmic effects against myocardial ischemia and reperfusion injury-induced severe lethal ventricular arrhythmia and sudden cardiac death via the ERK1/2/STAT-3 signaling pathway, with potential additional contribution from increased cardiac myocyte repolarization capacity via augmented hERG activity.

3. J Cell Mol Med. 2023 May 29. doi: 10.1111/jcmm.17782. Online ahead of print.
Hypoxic preconditioned mesenchymal stem cells ameliorate rat brain injury after cardiopulmonary resuscitation by suppressing neuronal pyroptosis.
Tang X(1), Ke J(1)(2)(3), Chen F(1)(2)(3), Lin Q(1)(2)(3), You Y(4), Zheng N(1)(2)(3), Gong Z(1)(2)(3), Han X(1)(2)(3), Zhuang Y(1)(2)(3), Chen F(1)(2)(3).
ABSTRACT
Cardiac arrest (CA) can result in cerebral ischaemia-reperfusion injury and poor neurological outcomes. While bone marrow-derived mesenchymal stem cells (BMSCs) have been shown to have protective effects in brain ischaemic disease, their efficacy can be reduced by the poor oxygen environment. In this study, we investigated the neuroprotective effects of hypoxic preconditioned BMSCs (HP-BMSCs) and normoxic BMSCs (N-BMSCs) in a cardiac arrest rat model by examining their

ability to ameliorate cell pyroptosis. The mechanism underlying the process was also explored. Cardiac arrest was induced in rats for 8 min and surviving rats received 1 × 106 normoxic/hypoxic BMSCs or PBS via intracerebroventricular (ICV) transplantation. Neurological function of rats was evaluated using neurological deficit scores (NDSs) and examined for brain pathology. Serum S100B and neuron-specific enolase (NSE) levels and cortical proinflammatory cytokines were measured to evaluate brain injury. Pyroptosis-related proteins in the cortex after cardiopulmonary resuscitation (CPR) were measured using western blotting and immunofluorescent staining. Transplanted BMSCs were tracked using bioluminescence imaging. Results showed significantly better neurological function and neuropathological damage after transplantation with HP-BMSCs. In addition, HP-BMSCs reduced levels of pyroptosis-related proteins in the rat cortex after CPR and significantly reduced levels of biomarkers for brain injury. Mechanistically, HP-BMSCs alleviated brain injury by reducing the expressions of HMGB1, TLR4, NF-κB p65, p38 MAPK and JNK in the cortex. Our study demonstrated that hypoxic preconditioning could enhance the efficacy of BMSCs in alleviating post-resuscitation cortical pyroptosis. This effect may be related to the regulation of the HMGB1/TLR4/NF-κB, MAPK signalling pathways.

4. FASEB J. 2023 Jul;37(7):e23001. doi: 10.1096/fj.202202063R.
Insufficient oxygen inhalation during cardiopulmonary resuscitation induces early changes in hemodynamics followed by late and unfavorable systemic responses in post-cardiac arrest rats.
Aoki T(1), Wong V(1), Endo Y(1), Hayashida K(1), Takegawa R(1), Shoaib M(1), Miyara SJ(1), Choudhary RC(1), Yin T(1), Saeki K(1), Robson SC(2), Becker LB(1)(3), Shinozaki K(1)(3)(4).
ABSTRACT
Cardiac arrest (CA) and concomitant post-CA syndrome lead to a lethal condition characterized by systemic ischemia-reperfusion injury. Oxygen (O2) supply during cardiopulmonary resuscitation (CPR) is the key to success in resuscitation, but sustained hyperoxia can produce toxic effects post CA. However, only few studies have investigated the optimal duration and dosage of O2 administration. Herein, we aimed to determine whether high concentrations of O2 at resuscitation are beneficial or harmful. After rats were resuscitated from the 10-min asphyxia, mechanical ventilation was restarted at an FIO2 of 1.0 or 0.3. From 10 min after initiating CPR, FIO2 of both groups were maintained at 0.3. Bio-physiological parameters including O2 consumption (VO2) and mRNA gene expression in multiple organs were evaluated. The FIO2 0.3 group decreased VO2 , delayed the time required to achieve peak MAP, lowered ejection fraction (75.1 ± 3.3% and 59.0 ± 5.7% with FIO2 1.0 and 0.3, respectively; $p < .05$), and increased blood lactate levels (4.9 ± 0.2 mmol/L and 5.6 ± 0.2 mmol/L, respectively; $p < .05$) at 10 min after CPR. FIO2 0.3 group had significant increases in hypoxia-inducible factor, inflammatory, and apoptosis-related mRNA gene expression in the brain. Likewise, significant upregulations of hypoxia-inducible factor and apoptosis-related gene expression were observed in the FIO2 0.3 group in the heart and lungs. Insufficient O2 supplementation in the first 10 min of resuscitation could prolong ischemia, and may result in unfavorable biological responses 2 h after CA. Faster recovery from the impairment of O2 metabolism might contribute to the improvement of hemodynamics during the early post-resuscitation phase; therefore, it may be reasonable to provide the maximum feasible O2 concentrations during CPR.

CASE REPORTS

1. Int J Surg Case Rep. 2023 Jun 1;107:108371. doi: 10.1016/j.ijscr.2023.108371. Online ahead of print.

Massive pulmonary embolism after caesarean section managed with surgical thrombectomy bridged with extracorporeal membrane oxygenation: A case report.

Park JH(1), Hong SC(2), Yun HY(3), Jeon YG(1), Kim S(1), Song SW(4).

ABSTRACT

INTRODUCTION: Pulmonary embolism (PE) is a rare but fatal complication in postpartum women. Mortality is as high as 65% in massive PE, in which systemic hypotension persists or circulatory collapse occurs. This case report describes a patient who underwent a caesarean section complicated by massive PE. The patient was managed with early surgical embolectomy and bridged with extracorporeal membrane oxygenation (ECMO). PRESENTATION OF CASE: A 36 years old postpartum patient with an unremarkable medical history had sudden cardiac arrest due to PE on the day after a caesarean section. The patient recovered spontaneous cardiac rhythm after cardiopulmonary resuscitation; however, hypoxia and shock persisted. Cardiac arrest and spontaneous circulation recovery were repeated twice per hour. Veno-arterial (VA) ECMO rapidly improved the patient's condition. Surgical embolectomy was conducted 6 h after the initial collapse by the experienced cardiovascular surgeon. The patient's condition improved rapidly, and was weaned from ECMO on postoperative day three. The patient recovered normal heart function and no pulmonary hypertension was observed on follow-up echocardiography performed 15 months later. DISCUSSION: Timely intervention is important in the management of PE because of its rapid progression. VA ECMO is a useful bridge therapy to prevent derangement and severe organ failure. Surgical embolectomy is appropriate following the use of ECMO in postpartum patients because of the risk of major haemorrhagic complications or intracranial haemorrhage. CONCLUSION: In patients who have undergone caesarean section complicated by massive PE, surgical embolectomy is preferred because of the risk of haemorrhagic complications and their relatively young age.

2. J Surg Case Rep. 2023 May 27;2023(5):rjad258. doi: 10.1093/jscr/rjad258. eCollection 2023 May.

Successful use of left ventricular support device (Impella 5.0) and extracorporeal membrane oxygenation (ECMO) for postoperative cardiac arrest after lung cancer surgery: a case report.

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ABSTRACT

Postoperative hemodynamic support with an Impella 5.0 was effective in a man who underwent lung lobectomy for lung cancer and cardiogenic shock. A 75-year-old man presented to hospital with an abnormal chest shadow on radiography. After thorough examination, the patient was diagnosed with lung cancer, and left lower lobectomy was performed. On the 2nd postoperative day, the patient experienced cardiac arrest because of a sudden drop in saturation of percutaneous oxygen. After a third defibrillation, his heartbeat resumed, and he was intubated and placed on a ventilator. Coronary angiography revealed acute coronary syndrome and the patient fell into a state of shock, which required venoarterial extracorporeal membrane oxygenation (VA-ECMO) support. Nevertheless, the circulatory dynamics are unstable, and Impella 5.0 was introduced. VA-ECMO and the Impella 5.0 were discontinued on the 6th and 8th postoperative days, respectively. The patient was eventually transferred to a nearby facility for further rehabilitation 109 days later.

3. Herzschrittmacherther Elektrophysiol. 2023 Jun;34(2):165-168. doi: 10.1007/s00399-023-00935-6. Epub 2023 Apr 7.

[Sudden cardiac death after cardioversion].

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

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ABSTRACT

An 83-year-old woman with heart failure due to atrial tachycardia with reduced left ventricular ejection fraction died after cardioversion. Holter monitoring showed a massive prolongation of the QT interval resulting in torsade de pointe tachycardia with lethal outcome. The only reason of the QT prolongation was impaired left ventricular (LV) function and atrial ectopy.

4. Dent Clin North Am. 2023 Jul;67(3):503-506. doi: 10.1016/j.cden.2023.02.030. Epub 2023 Apr 4.
A Patient with a History of Myocardial Infarction and a Stent Presenting for Full Mouth Extractions.
Mistry N(1), Kufta K(1), Mupparapu M(2), Panchal N(3).
ABSTRACT
The scenario presented is of a patient in the dental chair who had history of myocardial infarction and history of stent placed in the left anterior descending coronary artery who now presents with acute chest pain, chest tightness, and extreme dizziness. Confirming cardiopulmonary arrest and beginning basic life support are the first steps in the management followed by defibrillation, advanced cardiac life support, post-resuscitation care, and long-term management.

5. Medicina (Kaunas). 2023 May 19;59(5):981. doi: 10.3390/medicina59050981.
Local Anesthetic Systemic Toxicity Following Inadvertent Intravenous Levobupivacaine Infusion in Infants: A Case Report.
Jermolajevaite J(1), Razlevice I(1), Gurskis V(2), Grinkeviciute DE(2), Lukosiene L(1), Macas A(1).
ABSTRACT
Background and objectives: Local anesthetic systemic toxicity (LAST) in children is extremely rare, occurring at an estimated rate of 0.76 cases per 10,000 procedures. However, among reported cases of LAST in the pediatric population, infants and neonates represent approximately 54% of reported LAST cases. We aim to present and discuss the clinical case of LAST with full clinical recovery due to accidental levobupivacaine intravenous infusion in a healthy 1.5-month-old patient, resulting in cardiac arrest necessitating resuscitation. Case presentation: A 4-kilogram, 1.5-month-old female infant, ASA I, presented to the hospital for elective herniorrhaphy surgery. Combined anesthesia was planned, involving general endotracheal and caudal anesthesia. After anesthesia induction, cardiovascular collapse was noticed, resulting in bradycardia and later cardiac arrest with EMD (Electromechanical Dissociation). It was noticed that during induction, levobupivacaine was accidentally infused intravenously. A local anesthetic was prepared for caudal anesthesia. LET (lipid emulsion therapy) was started immediately. Cardiopulmonary resuscitation was carried out according to the EMD algorithm, which lasted 12 min until spontaneous circulation was confirmed and the patient was transferred to the ICU. In ICU, the girl was extubated the second day, and the third day she was transferred to the regular pediatric unit. Finally, the patient was discharged home after a total of five days of hospitalization with full clinical recovery. A four-week follow-up has revealed that the patient recovered without any neurological or cardiac sequelae. Conclusions: The clinical presentation of LAST in children usually begins with cardiovascular symptoms because pediatric patients are already under general anesthesia when anesthetics are being used, as was the case in our case. Treatment and management of LAST involve cessation of local anesthetic infusion, stabilization of the airway, breathing, and hemodynamics, as well as lipid emulsion therapy. Early recognition of LAST as well as immediate CPR if needed and targeted treatment for LAST can lead to good outcomes.