This week's PubMed 30th July – 5th August 2023: articles of interest n = 47

CPR AND COVID-19

No articles identified.

CPR/MECHANICAL CHEST COMPRESSION

No articles identified.

REGISTRIES, REVIEWS AND EDITORIALS

1. Sci Rep. 2023 Aug 4;13(1):12662. doi: 10.1038/s41598-023-39570-z.
Left-sided valvular heart disease and survival in out-of-hospital cardiac arrest: a nationwide registry-based study.
Dejby E(1), Bhatt DL(2), Skoglund K(3)(4)(5), Rawshani A(3)(4)(5), Omerovic E(3)(4), Redfors B(3)(4)(6)(7), Myredal A(4), Petursson P(4), Angerås O(3)(4), Gustafsson A(3), Isaksén D(3)(4), Herlitz J(3)(4), Rawshani A(3)(4)(5).
ABSTRACT
Survival in left-sided valvular heart disease (VHD; aortic stenosis [AS], aortic regurgitation [AR], mitral stenosis [MS], mitral regurgitation [MR]) in out-of-hospital cardiac arrest (OHCA) is unknown. We studied all cases of OHCA in the Swedish Registry for Cardiopulmonary Resuscitation. All degrees of VHD, diagnosed prior to OHCA, were included. Association between VHD and survival was studied using logistic regression, gradient boosting and Cox regression. We studied time to cardiac arrest, comorbidities, survival, and cerebral performance category (CPC) score. We included 55,615 patients; 1948 with AS (3,5%), 384 AR (0,7%), 17 MS (0,03%), and 704 with MR (1,3%). Patients with MS were not described due to low case number. Time from VHD diagnosis to cardiac arrest was 3.7 years in AS, 4.5 years in AR and 4.1 years in MR. ROSC occurred in 28% with AS, 33% with AR, 36% with MR and 35% without VHD. Survival at 30 days was 5.2%, 10.4%, 9.2%, 11.4% in AS, AR, MR and without VHD, respectively. There were no survivors in people with AS presenting with asystole or PEA. CPC scores did not differ in those with VHD compared with no VHD. Odds ratio (OR) for MR and AR showed no difference in survival, while AS displayed OR 0.58 (95% CI 0.46-0.72), vs no VHD. AS is associated with halved survival in OHCA, while AR and MR do not affect survival. Survivors with AS have neurological outcomes comparable to patients without VHD.

2. Am J Emerg Med. 2023 Jul 27;72:151-157. doi: 10.1016/j.ajem.2023.07.044. Online ahead of print.
A simple scoring rule to predict survival to discharge after out of hospital cardiac arrest at the time of ED arrival.
Heo JH(1), Suh GJ(2), Park JH(3), Kim J(4), Kim KH(5), Hwang SO(6), Shin SD(7).
ABSTRACT
BACKGROUND: It is important to be able to predict the chance of survival to hospital discharge upon ED arrival in order to determine whether to continue or terminate resuscitation efforts after out of hospital cardiac arrest. This study was conducted to develop and validate a simple scoring rule that could predict survival to hospital discharge at the time of ED arrival. METHODS: This was a multicenter retrospective cohort study based on a nationwide registry (Korean Cardiac Arrest Research Consortium) of out of hospital cardiac arrest (OHCA). The study included adult OHCA

patients older than 18 years old, who visited one of 33 tertiary hospitals in South Korea from September 1st, 2015 to June 30th, 2020. Among 12,321 screened, 5471 patients were deemed suitable for analysis after exclusion. Pre-hospital ROSC, pre-hospital witness, shockable rhythm, initial pH, and age were selected as the independent variables. The dependent variable was set to be the survival to hospital discharge. Multivariable logistic regression (LR) was performed, and the beta-coefficients were rounded to the nearest integer to formulate the scoring rule. Several machine learning algorithms including the random forest classifier (RF), support vector machine (SVM), and K-nearest neighbor classifier (K-NN) were also trained via 5-fold cross-validation over a pre-specified grid, and validated on the test data. The prediction performances and the calibration curves of each model were obtained. Pre-processing of the registry was done using R, model training & optimization using Python. RESULTS: A total of 5471 patients were included in the analysis. The AUROC of the scoring rule over the test data was 0.7620 (0.7311-0.7929). The AUROCs of the machine learning classifiers (LR, SVM, k-NN, RF) were 0.8126 (0.7748-0.8505), 0.7920 (0.7512-0.8329), 0.6783 (0.6236-0.7329), and 0.7879 (0.7465-0.8294), respectively. CONCLUSION: A simple scoring rule consisting of five, binary variables could aid in the prediction of the survival to hospital discharge at the time of ED arrival, showing comparable results to conventional machine learning classifiers.

3. Heart Lung Circ. 2023 Jul 31:S1443-9506(23)03991-4. doi: 10.1016/j.hlc.2023.06.725. Online ahead of print.

The Digital Hospital: A Scoping Review of How Technology Is Transforming Cardiopulmonary Care.

Carrigan A(1), Roberts N(2), Han J(2), John R(2), Khan U(2), Sultani A(2), Austin EE(3).

ABSTRACT

BACKGROUND: Innovative models of health care that involve advanced technology in the form of a digital hospital are emerging globally. Models include technology such as machine learning and smart wearables, that can be used to integrate patient data and improve continuity of care. This model may have benefits in situations where patient deterioration must be detected quickly so that a rapid response can occur such as cardiopulmonary settings. AIM: The purpose of this scoping review was to examine the evidence for a digital hospital model of care, in the context of cardiac and pulmonary settings. DESIGN: Scoping review. DATA SOURCES: Databases searched were using PsycInfo, Ovid MEDLINE, and CINAHL. Studies written in English and containing key terms related to digital hospital and cardiopulmonary care were included. The Joanna Briggs Institute methodology for systematic reviews was used to assess the risk of bias. RESULTS: Thirteen (13) studies fulfilled the inclusion criteria. For cardiac conditions, a deep-learning-based rapid response system warning system for predicting patient deterioration leading to cardiac arrest had up to 257% higher sensitivity than conventional methods. There was also a reduction in the number of patients who needed to be examined by a physician. Using continuous telemonitoring with a wireless real-time electrocardiogram compared with non-monitoring, there was improved initial resuscitation and 24-hour post-event survival for high-risk patients. However, there were no benefits for survival to discharge. For pulmonary conditions, a natural language processing algorithm reduced the time to asthma diagnosis, demonstrating high predictive values. Virtual inhaler education was found to be as effective as in-person education, and prescription error was reduced following the implementation of computer-based physician order entry electronic medical records and a clinical decision support tool. CONCLUSIONS: While we currently have only a brief glimpse at the impact of technology care delivery for cardiac and respiratory conditions, technology presents an opportunity to improve quality and safety in care, but only with the support of adequate infrastructure and processes.

4. Resuscitation. 2023 Aug 2:109920. doi: 10.1016/j.resuscitation.2023.109920. Online ahead of print.
Longer CPR durations are associated with early ischemic changes on head CT-a perhaps simple finding in need of complex understanding.
Miller AC(1), Dodi AE(1), Moskowitz A(2).
NO ABSTRACT AVAILABLE

5. Am J Emerg Med. 2023 Jul 25;72:137-146. doi: 10.1016/j.ajem.2023.07.033. Online ahead of print.
Disparities in layperson resuscitation education: A scoping review.
Ko YC(1), Hsieh MJ(2), Schnaubelt S(3), Matsuyama T(4), Cheng A(5), Greif R(6).
ABSTRACT
BACKGROUND: The aim of this scoping review was to identify factors that would enable or hinder the opportunity for laypersons to undertake resuscitation education. METHODS: We searched PubMed, Ovid EMBASE, CINAHL, and the Cochrane Central Register of Controlled Trials (CENTRAL) to identify studies published from January 1, 1966 to December 31, 2022 including factors that could influence laypersons to undertake resuscitation education. Data regarding participant characteristics, interventions, and design and outcomes of included studies were extracted. RESULTS: Of the initially identified 6627 studies, 23 studies (20 cross-sectional and 3 cohort studies) were finally included. Among them, a wide variety of enablers and barriers were identified. High heterogeneity among studies was observed. We categorized factors into three themes: personal factors (age, sex, race, family status, language, prior experience of resuscitation, and immigration status), socioeconomic and educational factors (income, societal status, occupation and legislation, and educational attainment), and geographic factors (birthplace and habitancy). Several barriers were identified that affect laypersons from participating in resuscitation training, such as personal factors like advanced age, lower socioeconomic and educational status, as well as being part of marginalized groups due to race or language barriers. On the other hand, several enablers identified in the study included prior experiences of witnessing someone collapsing, awareness of automated external defibrillators in public locations, certain occupations, or legal requirements for training. CONCLUSIONS: Various barriers and enablers were found to influence laypersons to participate in resuscitation training. To enhance layperson response to cardiac arrest, targeted initiatives that aim to eliminate barriers need to be initiated, and further research is required to explore factors relating to populations with special needs.

IN-HOSPITAL CARDIAC ARREST

1. J Intensive Care Med. 2023 Aug 1:8850666231192844. doi: 10.1177/08850666231192844. Online ahead of print.
Intensive Care Admissions and Outcome of Cardiac Arrests; A National Cohort Study From the United States.
Mir T(1)(2), Shafi O(3), Balla S(4), Munir MB(5), Qurehi WT(6), Kakouros N(6), Bhat Z(7), Koul P(8), Rab T(9).
ABSTRACT
OBJECTIVE: Outcomes of cardiac arrest among patients who had cardiopulmonary resuscitation (CPR) in intensive care units (ICU) has limited data on the national level basis in the United States. We aimed to study the outcomes of ICU CPRs. METHODS: Data from the national readmissions database (NRD) sample that constitutes 49.1% of the stratified sample of all hospitals in the United States were analyzed for ICU-related hospitalizations for the years 2016 to 2019. ICU CPR was defined by procedure codes. RESULTS: A total of 4,610,154 ICU encounters were reported for the years 2016 to 2019 in the NRD. Of these patients, 426,729 (9.26%) had CPR procedure recorded

during the hospital encounter (mean age 65 ± 17.81; female 42.4%). And 167,597 (39.29%) patients had CPR on the day of admission, of which 63.16% died; while 64,752 (15.18%) patients had CPR on the day of ICU admission, of which 72.85% died. And 36,002 (8.44%) had CPR among patients with length of stay 2 days, of which 73.34% died. A total of 1,222,799 (26.5%) admitted to ICU died, and patients who had ICU CPR had higher mortality, 291,391(68.3%). Higher complication rates were observed among ICU CPR patients, especially who died. Over the years from 2016 to 2019, ICU CPR rates increased from 8.18% (2016) to 8.66% (2019); p-trend = 0.001. The mortality rates among patients admitted to ICU increased from 22.1% (2016) to 24.1% (2019); p-trend = 0.005. CONCLUSION: The majority of ICU CPRs were done on the first day of ICU admission. The trend for ICU CPR was increasing. The mortality trend for overall ICU admissions has increased, which is concerning and would suggest further research to improve the high mortality rates in the CPR group.

2. J Hosp Med. 2023 Aug;18(8):677-684. doi: 10.1002/jhm.13149. Epub 2023 Jun 12.
Checklists and consistency of care after resuscitation from in-hospital cardiac arrest: A pilot study.
Raikhel AV(1)(2), Carlbom DJ(3)(4), Ferraro S(5), Schulte V(6), Johnson NJ(3)(7), Town JA(3)(8).
ABSTRACT
BACKGROUND: In-hospital cardiac arrest (IHCA) with the return of spontaneous circulation (ROSC) is a clinical scenario associated with potentially devastating outcomes. OBJECTIVE: Inconsistencies in post-ROSC care exist and we sought to find a low cost way to decrease this variability. DESIGNS, SETTINGS, AND PARTICIPANTS: We obtained pre and post intervention metrics including percentage of IHCA with a timely electrocardiogram (ECG), arterial blood gas (ABG), physician documentation, and documentation of patient surrogate communication after ROSC. INTERVENTION: We developed and implemented a post-ROSC checklist for IHCA and measured post-ROSC clinical care delivery metrics at our hospital during a 1-year pilot period. MAIN OUTCOME AND RESULTS: After the introduction of the checklist, 83.7% of IHCA had an ECG within 1 h of ROSC, compared to a baseline of 62.8% ($p = 0.01$). The rate of physician documentation within 6 h of ROSC was 74.4% after introduction of the checklist, compared to a baseline of 49.5% ($p < 0.01$). The percentage of IHCA with ROSC that completed all four of the critical post-ROSC tasks after the introduction of the post-ROSC checklist was 51.1% as compared to 19.4% before implementation ($p < 0.01$). CONCLUSIONS: Our study demonstrated improved consistency in completing post-ROSC clinical tasks after the introduction of a post-ROSC checklist to our hospital. This work suggests that the implementation of a checklist can have meaningful impacts on task completion in the post-ROSC setting. Despite this, considerable inconsistencies in post-ROSC care persisted after the intervention indicating the limits of checklists in this setting. Future work is needed to identify interventions that can further improve post-ROSC processes of care.

INJURIES AND CPR

No articles identified.

CAUSE OF THE ARREST

1. Am J Cardiol. 2023 Aug 2;204:104-114. doi: 10.1016/j.amjcard.2023.06.123. Online ahead of print.
Effect of Concomitant Cardiac Arrest on Outcomes in Patients With Acute Coronary Syndrome-Related Cardiogenic Shock.
Zheng WC(1), Dinh D(2), Noaman S(3), Bloom JE(4), Batchelor RJ(5), Lefkovits J(6), Brennan AL(2), Reid CM(7), Al-Mukhtar O(8), Shaw JA(9), Stub D(10), Yang Y(11), French C(12), Kaye DM(4), Cox N(13), Chan W(14).
ABSTRACT

Patients with acute coronary syndrome (ACS)-related cardiogenic shock (CS) with or without concomitant CA may have disparate prognoses. We compared clinical characteristics and outcomes of patients with CS secondary to ACS with and without cardiac arrest (CA). Between 2014 and 2020, 1,573 patients with ACS-related CS with or without CA who underwent percutaneous coronary intervention enrolled in a multicenter Australian registry were analyzed. Primary outcome was 30-day major adverse cardiovascular and cerebrovascular events (MACCE) (composite of mortality, myocardial infarction, stent thrombosis, target vessel revascularization and stroke). Long-term mortality was obtained through linkage to the National Death Index. Compared with the no-CA group (n = 769, 49%), the CA group (n = 804, 51%) was younger (62 vs 69 years, p <0.001) and had fewer comorbidities. Patients with CA more frequently had ST-elevation myocardial infarction (92% vs 86%), occluded left anterior descending artery (43% vs 33%), and severe preprocedural renal impairment (49% vs 42%) (all p <0.001). CA increased risk of 30-day MACCE by 45% (odds ratio 1.45, 95% confidence interval 1.05 to 2.00, p = 0.024) after adjustment. CA group had higher 30-day MACCE (55% vs 42%, p <0.001) and mortality (52% vs 37%, p <0.001). Three-year survival was lower for CA compared with no-CA patients (43% vs 52%, p <0.001). In Cox regression, CS with CA was associated with a trend toward greater long-term mortality hazard (hazard ratio 1.19, 95% confidence interval 1.00 to 1.41, p = 0.055). In conclusion, concomitant CA among patients with ACS-related CS conferred a particularly heightened short-term risk with a diminishing legacy effect over time for mortality. CS survivors continue to exhibit high sustained long-term mortality hazard regardless of CA status.

2. Cardiovasc Diabetol. 2023 Jul 27;22(1):190. doi: 10.1186/s12933-023-01918-0.
Triglyceride-glucose index is associated with the occurrence and prognosis of cardiac arrest: a multicenter retrospective observational study.
Boshen Y(#)(1), Yuankang Z(#)(2)(3), Xinjie Z(#)(4), Taixi L(1), Kaifan N(1), Zhixiang W(1), Juan S(5), Junli D(2)(3), Suiji L(6), Xia L(7), Chengxing S(8).
ABSTRACT
BACKGROUND: Triglyceride-glucose (TyG) index is an efficient indicator of insulin resistance and is proven to be a valuable marker in several cardiovascular diseases. However, the relationship between TyG index and cardiac arrest (CA) remains unclear. The present study aimed to investigate the association of the TyG index with the occurrence and clinical outcomes of CA. METHODS: In this retrospective, multicenter, observational study, critically ill patients, including patients post-CA, were identified from the eICU Collaborative Research Database and evaluated. The TyG index for each patient was calculated using values of triglycerides and glucose recorded within 24 h of intensive care unit (ICU) admission. In-hospital mortality and ICU mortality were the primary clinical outcomes. Logistic regression, restricted cubic spline (RCS), and correlation analyses were performed to explore the relationship between the TyG index and clinical outcomes. Propensity score matching (PSM), overlap weighting (OW), and inverse probability of treatment weighting (IPTW) were adopted to balance the baseline characteristics of patients and minimize selection bias to confirm the robustness of the results. Subgroup analysis based on different modifiers was also performed. RESULTS: Overall, 24,689 critically ill patients, including 1021 patients post-CA, were enrolled. The TyG index was significantly higher in patients post-CA than in those without CA (9.20 (8.72-9.69) vs. 8.89 (8.45-9.41)), and the TyG index had a moderate discrimination ability to identify patients with CA from the overall population (area under the curve = 0.625). Multivariate logistic regression indicated that the TyG index was an independent risk factor for in-hospital mortality (OR = 1.28, 95% CI: 1.03-1.58) and ICU mortality (OR = 1.27, 95% CI: 1.02-1.58) in patients post-CA. RCS curves revealed that an increased TyG index was linearly related to higher risks of in-hospital and ICU mortality (P for nonlinear: 0.225 and 0.271, respectively). Even after adjusting by PSM, IPTW, and

OW, the TyG index remained a risk factor for in-hospital mortality and ICU mortality in patients experiencing CA, which was independent of age, BMI, sex, etc. Correlation analyses revealed that TyG index was negatively correlated with the neurological status of patients post-CA. CONCLUSION: Elevated TyG index is significantly associated with the occurrence of CA and higher mortality risk in patients post-CA. Our findings extend the landscape of TyG index in cardiovascular diseases, which requires further prospective cohort study.

3. Europace. 2023 Jul 4;25(7):euad220. doi: 10.1093/europace/euad220.
Arrhythmogenic mechanism of a novel ryanodine receptor mutation underlying sudden cardiac death.
Qian Y(1)(2), Zuo D(3)(4), Xiong J(1)(2), Yin Y(1)(2), Qi R(5), Ma X(5), Yan A(5), Yang Y(3), Liu P(4), Zhang J(1), Tang K(1), Peng W(1)(2), Xu Y(1)(2), Liu Z(1)(2)(5).
ABSTRACT
AIMS: The ryanodine receptor 2 (RyR2) is essential for cardiac muscle excitation-contraction coupling; dysfunctional RyR2 participates in the development of inherited arrhythmogenic cardiac disease. In this study, a novel RyR2 mutation A690E is identified from a patient with family inheritance of sudden cardiac death, and we aimed to investigate the pathogenic basis of the mutation. METHODS AND RESULTS: We generated a mouse model that carried the A690E mutation. Mice were characterized by adrenergic-induced ventricular arrhythmias similar to clinical manifestation of the patient. Optical mapping studies revealed that isolated A690E hearts were prone to arrhythmogenesis and displayed frequency-dependence calcium transient alternans. Upon β-adrenoceptor challenge, the concordant alternans was shifted towards discordant alternans that favour triggering ectopic beats and Ca2+ re-entry; similar phenomenon was also found in the A690E cardiomyocytes. In addition, we found that A690E cardiomyocytes manifested abnormal Ca2+ release and electrophysiological disorders, including an increased sensitivity to cytosolic Ca2+, an elevated diastolic RyR2-mediated Ca2+ leak, and an imbalance between Ca2+ leak and reuptake. Structural analyses reveal that the mutation directly impacts RyR2-FK506 binding protein interaction. CONCLUSION: In this study, we have identified a novel mutation in RyR2 that is associated with sudden cardiac death. By characterizing the function defects of mutant RyR2 in animal, whole heat, and cardiomyocytes, we demonstrated the pathogenic basis of the disease-causing mutation and provided a deeper mechanistic understanding of a life-threatening cardiac arrhythmia.

END-TIDAL CO_2

No articles identified.

ORGAN DONATION

1. Intensive Care Med Exp. 2023 Aug 4;11(1):46. doi: 10.1186/s40635-023-00534-2.
Multiorgan recovery in a cadaver body using mild hypothermic ECMO treatment in a murine model.
Madrahimov N(1), Mutsenko V(2), Natanov R(3), Radaković D(2), Klapproth A(2), Hassan M(2), Rosenfeldt M(4), Kleefeldt F(5), Aleksic I(2), Ergün S(5), Otto C(6), Leyh RG(2), Bening C(2).
ABSTRACT
BACKGROUND: Transplant candidates on the waiting list are increasingly challenged by the lack of organs. Most of the organs can only be kept viable within very limited timeframes (e.g., mere 4-6 h

for heart and lungs exposed to refrigeration temperatures ex vivo). Donation after circulatory death (DCD) using extracorporeal membrane oxygenation (ECMO) can significantly enlarge the donor pool, organ yield per donor, and shelf life. Nevertheless, clinical attempts to recover organs for transplantation after uncontrolled DCD are extremely complex and hardly reproducible. Therefore, as a preliminary strategy to fulfill this task, experimental protocols using feasible animal models are highly warranted. The primary aim of the study was to develop a model of ECMO-based cadaver organ recovery in mice. Our model mimics uncontrolled organ donation after an "out-of-hospital" sudden unexpected death with subsequent "in-hospital" cadaver management post-mortem. The secondary aim was to assess blood gas parameters, cardiac activity as well as overall organ state. The study protocol included post-mortem heparin-streptokinase administration 10 min after confirmed death induced by cervical dislocation under full anesthesia. After cannulation, veno-arterial ECMO (V-A ECMO) was started 1 h after death and continued for 2 h under mild hypothermic conditions followed by organ harvest. Pressure- and flow-controlled oxygenated blood-based reperfusion of a cadaver body was accompanied by blood gas analysis (BGA), electrocardiography, and histological evaluation of ischemia-reperfusion injury. For the first time, we designed and implemented, a not yet reported, miniaturized murine hemodialysis circuit for the treatment of severe hyperkalemia and metabolic acidosis post-mortem. RESULTS: BGA parameters confirmed profound ischemia typical for cadavers and incompatible with normal physiology, including extremely low blood pH, profound negative base excess, and enormously high levels of lactate. Two hours after ECMO implantation, blood pH values of a cadaver body restored from < 6.5 to 7.3 ± 0.05, pCO2 was lowered from > 130 to 41.7 ± 10.5 mmHg, sO2, base excess, and HCO3 were all elevated from below detection thresholds to 99.5 ± 0.6%, - 4 ± 6.2 and 22.0 ± 6.0 mmol/L, respectively (Student T test, $p < 0.05$). A substantial decrease in hyperlactatemia (from > 20 to 10.5 ± 1.7 mmol/L) and hyperkalemia (from > 9 to 6.9 ± 1.0 mmol/L) was observed when hemodialysis was implemented. On balance, the first signs of regained heart activity appeared on average 10 min after ECMO initiation without cardioplegia or any inotropic and vasopressor support. This was followed by restoration of myocardial contractility with a heart rate of up to 200 beats per minute (bpm) as detected by an electrocardiogram (ECG). Histological examinations revealed no evidence of heart injury 3 h post-mortem, whereas shock-specific morphological changes relevant to acute death and consequent cardiac/circulatory arrest were observed in the lungs, liver, and kidney of both control and ECMO-treated cadaver mice. CONCLUSIONS: Thus, our model represents a promising approach to facilitate studying perspectives of cadaveric multiorgan recovery for transplantation. Moreover, it opens new possibilities for cadaver organ treatment to extend and potentiate donation and, hence, contribute to solving the organ shortage dilemma.

FEEDBACK

No articles identified.

DRUGS

1. Prehosp Emerg Care. 2023;27(6):751-757. doi: 10.1080/10903127.2022.2120135. Epub 2022 Sep 26.

One and Done Epinephrine in Out-of-Hospital Cardiac Arrest? Outcomes in a Multiagency United States Study.

Ashburn NP(1)(2), Beaver BP(3), Snavely AC(1)(4), Nazir N(5), Winslow JT(1), Nelson RD(1), Mahler SA(1)(6)(7), Stopyra JP(1).

ABSTRACT
BACKGROUND: Cardiac arrest guidelines recommend epinephrine every 3-5 minutes during cardiac arrest resuscitation. However, it is unclear if multiple epinephrine doses are associated with improved outcomes. The objective of this study was to determine if a single-dose epinephrine protocol was associated with improved survival compared to traditional multidose protocols. METHODS: We conducted a pre-post study across five North Carolina EMS agencies from 11/1/2016 to 10/29/2019. Patients ≥18 years old with attempted resuscitation for non-traumatic prehospital cardiac arrest were included. Data were collected 1 year before and after implementation of the single-dose epinephrine protocol. Prior to implementation, all agencies used a multidose epinephrine protocol. The Cardiac Arrest Registry to Enhance Survival (CARES) was used to obtain patient outcomes. Study outcomes were survival to hospital discharge (primary) and return of spontaneous circulation (ROSC). Analysis was by intention to treat. Outcomes were compared pre- vs. post-implementation using generalized estimating equations to account for clustering within EMS agencies. Adjusted analyses included age, sex, race, shockable vs. non-shockable rhythm, witnessed arrest, automatic external defibrillator availability, EMS response interval, and bystander cardiopulmonary resuscitation. RESULTS: During the study period there were 1,690 encounters (899 pre- and 791 post-implementation). The population was 74.7% white, 61.1% male, and had a median age of 65 (IQR 53-76) years. Survival to hospital discharge was similar pre- vs. post-implementation [13.6% (122/899) vs. 15.4% (122/791); OR 1.19, 95%CI 0.89-1.59]. However, ROSC was more common post-implementation [42.3% (380/899) vs. 32.5% (257/791); OR 0.66, 95%CI 0.54-0.81]. After adjusting for covariates, the single-dose protocol was associated with similar survival to discharge rates (aOR 0.88, 95%CI 0.77-1.29), but with decreased ROSC rates (aOR 0.58, 95%CI 0.47 0.72). CONCLUSION: A prehospital single-dose epinephrine protocol was associated with similarsurvival to hospital discharge, but decreased ROSC rates compared to the traditional multidose epinephrine protocol.

2. Resuscitation. 2023 Aug 3:109922. doi: 10.1016/j.resuscitation.2023.109922. Online ahead of print.

Vasopressin and Methylprednisolone and Hemodynamics after In-Hospital Cardiac Arrest - A Post Hoc Analysis of the VAM-IHCA Trial.

Andersen LW(1), Holmberg MJ(2), Høybye M(3), Isbye D(4), Kjærgaard J(5), Darling S(6), Zwisler ST(6), Larsen JM(7), Rasmussen BS(8), Iversen K(9), Schultz M(10), Sindberg B(11), Fink Valentin M(12), Granfeldt A(13).

ABSTRACT
INTRODUCTION: The Vasopressin and Methylprednisolone for In-Hospital Cardiac Arrest (VAM-IHCA) trial demonstrated a significant improvement in return of spontaneous circulation (ROSC) with no clear effect on long-term outcomes. The objective of the current manuscript was to evaluate the hemodynamic effects of intra-cardiac arrest vasopressin and methylprednisolone during the first 24 hours after ROSC. METHODS: The VAM-IHCA trial randomized patients with in-hospital cardiac arrest to a combination of vasopressin and methylprednisolone or placebo during the cardiac arrest. This study is a post hoc analysis focused on the hemodynamic effects of the intervention after ROSC. Post-ROSC data on the administration of glucocorticoids, mean arterial blood pressure, heart rate, blood gases, vasopressor and inotropic therapy, and sedation were collected. Total vasopressor dose between the two groups was calculated based on noradrenaline-equivalent doses for adrenaline, phenylephrine, terlipressin, and vasopressin. RESULTS: The present study included all 186 patients who achieved ROSC in the VAM IHCA-trial of which 100 patients received vasopressin and methylprednisolone and 86 received placebo. The number of patients receiving glucocorticoids during the first 24 hours was 22/86 (26%) in the placebo group and 14/100 (14%) in the

methylprednisolone group with no difference in the cumulative hydrocortisone-equivalent dose. There was no significant difference between the groups in the mean cumulative noradrenaline-equivalent dose (vasopressin and methylprednisolone: 603 ug/kg [95CI% 227; 979] vs. placebo: 651 ug/kg [95CI% 296; 1007], mean difference -48 ug/kg [95CI% -140; 42.9], p = 0.30), mean arterial blood pressure, or lactate levels. There was no difference between groups in arterial blood gas values and vital signs. CONCLUSION: Treatment with vasopressin and methylprednisolone during cardiac arrest caused no difference in mean arterial blood pressure, vasopressor use, or arterial blood gases within the first 24 hours after ROSC when compared to placebo.

TRAUMA

1. Am Surg. 2023 Jul;89(7):3125-3130. doi: 10.1177/00031348231161089. Epub 2023 Feb 28.
A National Survey Assessing the Variability in the Management of Traumatic Cardiac Arrest.
Roche KF(1), Quinn M(2), Mannino EA(1), Ventura L(3), Brown C(1), Lawson CM(1), Burns BJ(1).
ABSTRACT
BACKGROUND: Resuscitation of traumatic cardiac arrest (TCA) is variable, with approaches that overlap Advanced Trauma Life Support (ATLS) and Advanced Cardiac Life Support (ACLS) algorithms. There is no standard algorithm for TCA, with some withholding ACLS protocols given abysmal outcomes. This study aims to assess surgeon practices and attitudes toward resuscitation practices in TCA. MATERIALS AND METHODS: A 16-question web-based survey was distributed to the membership of a national trauma association. Respondent demographics and management of TCA were analyzed. Chi-squared tests determined statistical significance. Open-ended responses were coded and analyzed inductively. RESULTS: Two hundred and three surveys were completed. 73.4% of respondents reported utilizing ACLS, while 26.6% reported they never utilized ACLS. A statistically significant difference in the performance of ACLS was found based on number of years in practice (P = .025) and the state of practice (P = .006). There was no significant difference in self-reported survival rates or legal, ethical, or interpersonal conflicts. Qualitative data highlighted themes of interpersonal conflict and futility. DISCUSSION: This study shows that one-quarter of respondents never utilize ACLS in TCA. Of those that utilize ACLS, there was variability in the technique, indication, and duration of resuscitation. Despite significant variability in technique, there appears to be similar survival rates and incidence of conflict. The association between years in practice and ACLS use suggests this may represent an emerging change in practice. The low response rate limits generalizability; however, there is significant variability in practice, highlighting a need for evidence-based guidelines.

VENTILATION

1. Resusc Plus. 2023 Jul 18;15:100430. doi: 10.1016/j.resplu.2023.100430. eCollection 2023 Sep.
Randomised trial of the clinical and cost effectiveness of a supraglottic airway device compared with tracheal intubation for in-hospital cardiac arrest (AIRWAYS-3): Protocol, design and implementation.
Watkins S(1), Chowdhury FJ(2), Norman C(2), Brett SJ(3), Couper K(2), Goodwin L(1), Gould DW(4), Ae Harrison D(4), Hossain A(2), Lall R(2), Mason J(2), Nolan JP(2)(5), Nwankwo H(2), Perkins GD(2), Samuel K(6), Schofield B(1), Soar J(6), Starr K(2), Thomas M(7), Voss S(1), Benger JR(1)(7).
ABSTRACT
Survival from in-hospital cardiac arrest is approximately 18%, but for patients who require advanced airway management survival is lower. Those who do survive are often left with significant disability. Traditionally, resuscitation of cardiac arrest patients has included tracheal intubation, however

insertion of a supraglottic airway has gained popularity as an alternative approach to advanced airway management. Evidence from out-of-hospital cardiac arrest suggests no significant differences in mortality or morbidity between these two approaches, but there is no randomised evidence for airway management during in-hospital cardiac arrest. The aim of the AIRWAYS-3 randomised trial, described in this protocol paper, is to determine the clinical and cost effectiveness of a supraglottic airway versus tracheal intubation during in-hospital cardiac arrest. Patients will be allocated randomly to receive either a supraglottic airway or tracheal intubation as the initial advanced airway management. We will also estimate the relative cost-effectiveness of these two approaches. The primary outcome is functional status, measured using the modified Rankin Scale at hospital discharge or 30 days post-randomisation, whichever occurs first. AIRWAYS-3 presents ethical challenges regarding patient consent and data collection. These include the enrolment of unconscious patients without prior consent in a way that avoids methodological bias. Other complexities include the requirement to randomise patients efficiently during a time-critical cardiac arrest. Many of these challenges are encountered in other emergency care research; we discuss our approaches to addressing them.

2. Am J Emerg Med. 2023 Jul 29;72:158-163. doi: 10.1016/j.ajem.2023.07.046. Online ahead of print.
Surgical mask-to-mouth ventilation as an alternative ventilation technique during CPR: A crossover randomized controlled trial.
Tangpaisarn T(1), Chaiyakot N(2), Saenpan K(3), Sriphrom S(4), Owattanapanich N(5), Kotruchin P(6), Phungoen P(7).

ABSTRACT
INTRODUCTION: Chest compression with rescue breathing improves outcomes in cardiac arrest. However, the efficacy of rescue breathing through surgical masks has not been investigated. OBJECTIVE: We aimed to compare the tidal volume generated by mouth-to-mouth ventilation (MMV) with that generated by surgical mask-to-mouth ventilation (SMV), mouth-to-surgical mask ventilation (MSV), and surgical mask-to-surgical mask ventilation (SSV) in a manikin. METHODS: A crossover randomized controlled trial was conducted in 42 medical personnel volunteers randomly assigned to perform four ventilation techniques: MMV (no protective equipment), SMV (participant wearing a mask), MSV (manikin wearing a mask), and SSV, (both participant and manikin wearing a mask). The average tidal volume and the proportion of adequate ventilation, evaluated using a manikin, were compared across different ventilation methods. RESULTS: The average tidal volume of MMV (828 ± 278 ml) was significantly higher than those of the MSV (648 ± 250 ml, $P < 0.001$) and SSV (466 ± 301 ml, $P < 0.001$), but not SMV (744 ± 288 ml, $P = 0.054$). Adequate ventilation was achieved in 144/168 (85.7%) cases in the MMV group, a proportion significantly higher than in the SMV (77.4%, $P = 0.02$), MSV (66.7%, $P < 0.001$) and SSV (39.3%, $P < 0.001$) groups. The willingness to perform SMV was higher than that to perform MMV. CONCLUSIONS: MMV resulted in a superior average tidal volume when compared to both MSV and SSV. However, SMV achieved a comparable average tidal volume to MMV.

CERERBRAL MONITORING

No articles identified.

ULTRASOUND AND CPR

No articles identified.

ORGANISATION AND TRAINING

1. Sci Rep. 2023 Aug 2;13(1):12552. doi: 10.1038/s41598-023-39726-x.

A comparative analysis of aerosol exposure and prevention strategies in bystander, pre-hospital, and inpatient cardiopulmonary resuscitation using simulation manikins.

Hung TY(1)(2)(3), Wen CS(1), Yu SH(1), Chen YC(4), Chen HL(1), Chen WL(1), Wu CC(1), Su YC(#)(5)(6), Lin CL(#)(1), Hu SC(#)(4), Lin T(#)(4).

ABSTRACT

To evaluate aerosol exposure risk and prevention strategies during bystander, pre-hospital, and inpatient cardiopulmonary resuscitation (CPR). This study compared hands-only CPR, CPR with a surgical or N95 mask, and CPR with a non-rebreather mask at 15 L/min. 30:2 compression-ventilation ratio CPR was tested with face-mask ventilation (FMV), FMV with a high efficiency particulate air (HEPA) filter; supraglottic airway (SGA), SGA with a surgical mask, SGA with a HEPA filter, or SGA with both. Continuous CPR was tested with an endotracheal tube (ET), ET with a surgical mask, a HEPA filter, or both. Aerosol concentration at the head, trunk, and feet of the mannequin were measured to evaluate exposure to CPR personnel. Hands-only CPR with a surgical or N95 face mask coverings and ET tube ventilation CPR with filters showed the lowest aerosol exposure among all study groups, including CPR with NRM oxygenation, FMV, and SGA ventilation. NRM had a mask effect and reduced aerosol exposure at the head, trunk, and feet of the mannequin. FMV with filters during 30:2 CPR reduced aerosol exposure at the head and trunk, but increased at the feet of the mannequin. A tightly-sealed SGA when used with a HEPA filter, reduced aerosol exposure by 21.00-63.14% compared with a loose-fitting one. Hands-only CPR with a proper fit surgical or N95 face mask coverings is as safe as ET tube ventilation CPR with filters, compared with CPR with NRM, FMV, and SGA. FMV or tight-sealed SGA ventilation with filters prolonged the duration to achieve estimated infective dose of SARS-CoV-2 2.4-2.5 times longer than hands-on CPR only. However, a loose-fitting SGA is not protective at all to chest compressor or health workers standing at the foot side of the victim, so should be used with caution even when using with HEPA filters.

2. Front Cardiovasc Med. 2023 Jul 18;10:1207918. doi: 10.3389/fcvm.2023.1207918. eCollection 2023.

Knowledge, attitude, and proficiency of healthcare providers in cardiopulmonary resuscitation in a public primary healthcare setting in Qatar.

Veettil ST(1), Anodiyil MS(2), Khudadad H(1), Kalathingal MA(3), Hamza AH(4), Ummer FP(5), Alnuaimi AS(1).

ABSTRACT

INTRODUCTION: Early and effective cardiopulmonary resuscitation (CPR) increases both survival rate and post-cardiac arrest quality of life. This study aims to assess the current knowledge and ability of physicians and nurses in health centers (HCs) operated by the Primary Health Care Corporation (PHCC) in Doha, Qatar, to perform CPR. METHODOLOGY: This study consists of two parts. The first part is a descriptive cross-sectional survey using an online form targeting physicians and nurses working in all HCs to assess their CPR knowledge and attitude. The second part is a direct observation of CPR drills to evaluate the skills and competencies of code blue team members in a convenient sample of 14 HCs. A multivariate model was employed to test the independent effect of explanatory variables on the total knowledge score. RESULTS: A total of 569 physicians and nurses responded to the survey. Only one-half (48.7%) formally received training on basic life support within the last year. Furthermore, 62.7% have tried to revive a dying person with no pulse. All the participants recognize the importance of knowing how to revive a dying adult or child as part of their job. The study showed that being a nurse was the most important predictor of a higher knowledge

score in both components. Attending more resuscitation courses (3-6 courses in the last 3 years) ranked second in importance, and a longer experience in clinical practice (5-10 and >10 years) ranked third in predictive power. In addition, the direct observation of CPR drill performance revealed a satisfactory outcome. CONCLUSION: The level of CPR knowledge and skills practice among healthcare providers in PHCC is deemed satisfactory as most providers reported having performed CPR in the past. Considering that PHCC is the first step to people's healthcare in Qatar, clinical staff should be certified and assessed regularly to ensure retention of resuscitation knowledge and skills.

3. Prehosp Emerg Care. 2023;27(6):744-750. doi: 10.1080/10903127.2022.2113189. Epub 2022 Aug 29.

Utilization and Effect of Direct Medical Oversight during Out-of-Hospital Cardiac Arrest.

Zimmerman TM(1), Neth MR(1), Tanski ME(1), Chess L(1), Thompson K(1), Jui J(1), Sahni R(1), Daya MR(1), Lupton JR(1).

ABSTRACT

STUDY OBJECTIVE: Direct medical oversight (DMO), where emergency medical services (EMS) clinicians contact a physician for real-time medical direction, is used by many EMS systems across the United States. Our objective was to characterize the recommendations made by DMO during out-of-hospital cardiac arrests (OHCA) and to determine their effect on EMS transport decisions and patient outcomes. METHODS: This is a secondary analysis of DMO call recordings from OHCA cases in the Portland, Oregon metropolitan area from January 1, 2018 to February 28, 2021. Data extracted from the audio recordings were linked to OHCA cases in the Portland Cardiac Arrest Epidemiologic Registry (PDX Epistry). The primary outcomes are recommendations made by DMO: transport, continued field resuscitation, or termination of resuscitation (TOR). Secondary outcomes include EMS transport decisions, survival to hospital admission, and survival to hospital discharge. We used descriptive statistics, unpaired t-tests, and chi-square tests as appropriate for data analysis. RESULTS: There were 239 OHCA cases for which DMO was contacted by EMS. The median time from EMS arrival to DMO contact was 25.6 min, and EMS requested TOR for 72.0% of patients. Compared to patients where EMS requested further treatment advice, patients for whom EMS requested TOR had poor prognostic signs including older age, asystole as an initial rhythm, and lower rates of transient return of spontaneous circulation prior to DMO call compared with cases where EMS did not request TOR. DMO recommended transport, continued field resuscitation, or TOR in 21.8%, 18.0%, and 60.2% of patients, respectively. Of the 239 patients, 59 (24.7%) were ultimately transported by EMS to the hospital, 14 (5.9%) survived to admission, and only 1 patient (0.4%) survived to hospital discharge and had an acceptable neurologic outcome (Cerebral Performance Category score of 2). CONCLUSIONS: Patients for whom EMS contacts DMO for further treatment advice or requesting field TOR after prolonged OHCA resuscitation have poor outcomes, even when DMO recommends transport or further resuscitation, and may represent opportunities to reduce unnecessary DMO contact or patient transports. More research is needed to determine which OHCA patients benefit from DMO contact.

4. Prehosp Emerg Care. 2023;27(6):736-743. doi: 10.1080/10903127.2022.2099601. Epub 2022 Jul 29.

Effects of a Designated Ambulance Team Response on Prehospital Return of Spontaneous Circulation and Advanced Cardiac Life Support of Out-of-Hospital Cardiac Arrest: A Nationwide Natural Experimental Study.

Lee SH(1)(2), Lee SY(3)(4)(5), Park JH(2)(5)(6), Song KJ(5)(6)(7), Shin SD(2)(5)(6).

ABSTRACT

OBJECTIVES: This study aimed to investigate the effects of adding advanced cardiac life support (ACLS) training to an existing basic life support program and the operation of a designated team response for patients with out-of-hospital cardiac arrest (OHCA) on prehospital return of spontaneous circulation (ROSC) and ACLS management. METHODS: A natural experimental study was conducted for emergency medical service (EMS)-treated adult patients with OHCA in 2020. In 2019, a quarter of the EMS clinicians were trained in a 3-day ACLS courses, and they were designated to be dispatched first in suspected OHCA. Some were dispatched only to major emergencies, such as OHCA and myocardial infarction (dedicated team), while others were dispatched to all emergencies with priority to major ones (non-dedicated team). The exposure was the ambulance response type: dedicated, non-dedicated, and basic teams (others). The primary outcome was prehospital ROSC. The secondary outcomes were prehospital ACLS (advanced airway management and intravenous access). A multivariable logistic regression analysis was conducted to investigate the effect of ambulance response type on study outcomes. RESULTS: Among 23,512 eligible patients with OHCA, 54.8% (12,874) were treated by the basic team, 36.5% (8,580) by the non-dedicated ACLS team, and 8.8% (2,058) were treated by the dedicated ACLS team. Prehospital ROSC was greater for the designated team than for the basic team (dedicated ACLS team 13.8%, non-dedicated ACLS team 11.3%, and basic team 6.7%) ($p < 0.01$). In the final logistic regression analysis, compared with the basic team, the designated ACLS team was associated with a higher probability of prehospital ROSC (AOR (95% CIs), 1.88 (1.68-2.09) compared to the non-dedicated ACLS team, and 2.46 (2.09-2.90) compared to the dedicated ACLS team), prehospital advanced airway management (1.72 (1.57-1.87) and 1.73 (1.48-2.03), respectively), and intravenous access (2.29 (2.16-2.43) and 2.76 (2.50-3.04), respectively). CONCLUSION: Additional ACLS training and operation of a designated OHCA team response were associated with higher rates of prehospital ROSC and prehospital ACLS provision. However, further research is needed to find the optimal operation for EMS to improve survival outcomes.

5. Resuscitation. 2023 Aug 3:109921. doi: 10.1016/j.resuscitation.2023.109921. Online ahead of print.

Effects of a volunteer responder system for out-of-hospital cardiac arrest in areas of different population density- a retrospective cohort study.

Lapidus O(1), Jonsson M(2), Svensson L(3), Hollenberg J(2), Berglund E(2), Riva G(2), Claesson A(2), Nordberg P(2), Rosenqvist M(4), Forsberg S(2), Nord A(2), Ringh M(2).

ABSTRACT

BACKGROUND: Volunteer responder dispatch to nearby out-of-hospital cardiac arrests using a smartphone application can increase the proportion of patients receiving cardiopulmonary resuscitation. It is unknown how population density is related to the efficacy of a volunteer responder system. This study aimed to compare the response time of volunteer responders and EMS dispatched to suspected OHCAs in areas of different population density. METHODS: A total of 2630 suspected OHCAs in Stockholm County during 2018-2020 where at least one dispatched volunteer responder reached the patient were identified through the HeartRunner™ application database. Study outcome was the proportion of cases where volunteer responders arrived at the scene before EMS, as well as the difference in time between the arrival of volunteer responders and EMS. ResultsVolunteer responders arrived before EMS in 68% of examined cases (n=1613). Higher population density was associated with a lower proportion of cases where volunteer responders arrived at the scene before EMS. Time on scene before arrival of EMS was highest in areas of low population density and averaged 4:07 (mm:ss). Response time was significantly shorter for volunteer responders compared to EMS across all population density groups at 4:47 vs 8:11 (mm:ss) ($p<0.001$); the largest difference in response time was found in low population density areas. CONCLUSION:

Volunteer responders have significantly shorter response time than EMS regardless of population density, with the greatest difference in low population density areas. Although their impact on clinical outcome remains unknown, the benefits of dispatching volunteer responders to OHCAs may be greatest in rural areas.

6. BMC Emerg Med. 2023 Jul 27;23(1):79. doi: 10.1186/s12873-023-00849-z.
Characterization of non-cardiac arrest PulsePoint activations in public and private settings.
Blackwood J(1), Daya MR(2)(3), Sorenson B(3), Schaeffer B(4), Dawson M(4), Charter M(5), Nania JM(4)(5)(6), Charbonneau J(7), Robertson J(7), Mancera M(8), Carbon C(9), Jorgenson DB(10), Gao M(10), Price R(11), Rosse C(12), Rea T(13)(12).
ABSTRACT
BACKGROUND: Geospatial smartphone application alert systems are used in some communities to crowdsource community response for out-of-hospital cardiac arrest (OHCA). Although the clinical focus of this strategy is OHCA, dispatch identification of OHCA is imperfect so that activation may occur for the non-arrest patient. The frequency and clinical profile of such non-arrest patients has not been well-investigated. METHODS: We undertook a prospective 3-year cohort investigation of patients for whom a smartphone geospatial application was activated for suspected OHCA in four United States communities (total population ~1 million). The current investigation evaluates those patients with an activation for suspected OHCA who did not experience cardiac arrest. The volunteer response cohort included off-duty, volunteer public safety personnel (verified responders) notified regardless of location (public or private) and laypersons notified to public locations. The study linked the smartphone application information with the EMS records to report the frequency, condition type, and EMS treatment for these non-arrest patients. RESULTS: Of 1779 calls where volunteers were activated, 756 had suffered OHCA, resulting in 1023 non-arrest patients for study evaluation. The most common EMS assessments were syncope (15.9%, n=163), altered mental status (15.5%, n=159), seizure (14.3%, n=146), overdose (13.0%, n=133), and choking (10.5%, n=107). The assessment distribution was similar for private and public locations. Overall, the most common EMS interventions included placement of an intravenous line (43.1%, n=441), 12-Lead ECG(27.9%, n=285), naloxone treatment (9.8%, n=100), airway or ventilation assistance (8.7%, n=89), and oxygen administration (6.6%, n=68). CONCLUSIONS: More than half of patients activated for suspected OHCA had conditions other than cardiac arrest. A subset of these conditions may benefit from earlier care that could be provided by both layperson and public safety volunteers if they were appropriately trained and equipped.

7. West Afr J Med. 2023 Jul 28;40(7):697-703.
High-Impact Medical Education in Basic Life Support: A Comparative Study of Doctors and Medical Students in a Tertiary Hospital.
Owobu AC(1), Omosofe FO(2), Owobu CI(3), Azeke TA(3), Oyewusi MA(1), Ileli SO(1), Ugbeni HE(1).
ABSTRACT
INTRODUCTION: Although very crucial in medicine, mastery of cardiopulmonary resuscitation remains poor in many low and-medium income countries (LMICs) due mainly to the lack of readily accessible training facilities and expertise. SUBJECTS AND METHODS: The current study was aimed at evaluating the knowledge of Basic Life Support (BLS) among senior-level medical students and doctors in Nigeria, as well as to evaluate the value of a video teaching method in improving the knowledge base of BLS. It was a two-cohort prospective study carried out over a duration of one month. Each group of participants had an initial assessment of their knowledge of Basic Life Support using a questionnaire. Thereafter, the 45-minute CHEMPIONS-BLS video was projected. On completion of the video session, the same questionnaire was again administered to each group of

participants. This was followed by a practical, hands-on workshop at the skills laboratory. Data was collected using the questionnaires and comparisons were made between the pre and post-test responses. RESULTS: Seventy-five medical students and 41 doctors were enrolled into this study. Overall, their knowledge of BLS and their exposure to previous BLS training were poor, but there was a significant improvement in the mean scores, and the overall performance after viewing the video just one time; $t = 27.30$, $p = .000$ and $\chi^2 = 116.01$; $p = .000$ respectively. CONCLUSION: This study reveals poor knowledge and exposure to basic life support training among both medical students and practicing doctors. It further reveals the value of a novel training method in improving BLS knowledge.

8. PLoS One. 2023 Jul 27;18(7):e0288436. doi: 10.1371/journal.pone.0288436. eCollection 2023.
Family-authored ICU diaries to reduce fear in patients experiencing a cardiac arrest (FAID fear): A pilot randomized controlled trial.
Cornelius T(1), Mendieta M(1), Cumella RM(1), Lopez Veneros D(1)(2), Tincher IM(3), Agarwal S(3), Kronish I(1).
ABSTRACT
Survivors of cardiac arrest (CA) and their family members often experience significant fear-based distress (cardiac fear; i.e., fear about the CA survivor's heart). Fear-based distress after CA is associated with higher rates of cardiac event recurrence and mortality in CA survivors. As posited in Dyadic Disruption Theory (DDT), cardiac fear in family members may contribute to the development of distress in CA survivors via socially-based mechanisms. Thus, interventions to reduce family distress may improve CA survivors' outcomes. ICU diaries are easy to implement and scalable and show promise for reducing distress after CA but are primarily targeted towards survivors. The primary aim of the Family-Authored ICU Diaries to reduce Fear in Patients Experiencing a CA (FAID Fear) pilot randomized controlled trial was to test feasibility of an ICU diary intervention targeted towards family member distress alone. Family members of patients hospitalized after CA (N = 16) were randomized 2:1 to receive the FAID Fear intervention or usual care. Intervention participants were provided brief instructions and were asked to write in the diary twice per week until the end of hospital care. Assessments occurred at baseline enrollment, end of hospital care, and 30 days later. Participants' mean age was 50.73 years (SD = 13.41; 80% cis-gender female; 60% White). Recruitment (16/25 referred; 64.0%), retention (14/16 enrolled; 87.5%), and intervention adherence (7/10 completed; 70%) were promising. Most agreed that the ICU diary intervention was appropriate (7/10 completed; 70.0%), feasible (9/10 completed; 90.0%]), and acceptable (8/10 completed; 80.0%). Fear was nonsignificantly lower in intervention participants (v. control) at end of hospital care and 30 days later. FAID Fear represents a first step in building theory-based dyadic interventions that can be implemented to support family members of CA survivors in the ICU, with potential to improve outcomes in CA survivors.

9. Simul Healthc. 2023 Aug 1;18(4):240-246. doi: 10.1097/SIH.0000000000000679. Epub 2022 Aug 5.
The Effect of a Plastic Barrier Drape on Resuscitation Performance and Provider Contamination: A Randomized Controlled Simulation-Based Pilot Trial.
Young LC(1), Lau J, Buan J, Duty O, Herrera T, Luu C, Rake A, Chan M, Bragg EA, Langga L, Guerrero E, Chang TP.
ABSTRACT
BACKGROUND: Patient barriers to protect health care workers from COVID-19 exposure have been studied for airway management. Few are tested for cardiopulmonary resuscitation (CPR). We sought to determine whether a plastic drape barrier affects resuscitation performance and contamination risks for a simulated cardiopulmonary arrest scenario. METHODS: This pilot trial randomized in-

hospital resuscitation teams of 4 to 6 participants to a plastic drape or without a drape in an in situ cardiopulmonary arrest simulation. The mannequin's airway emanated simulated virus particles (GloGerm, Moab, UT), detectable through UV light. Primary outcomes included airway management and CPR quality measures. Secondary outcomes included visible contamination on personal protective equipment (PPE). We used the Non-Technical Skills (NO-TECHS) instrument to measure perceived team performance and the NASA Task Load Index (NASA-TLX) to measure individual workload. Outcome variables were analyzed using an analysis of covariance (ANCOVA) with participant number as a covariate. RESULTS: Seven teams were allocated to the intervention (plastic drape) group and 7 to the control. Intubation and ventilation performance ($\eta 2 = 0.09$, $P > 0.3$) and chest compression quality ($\eta 2 = 0.03$-0.19, $P > 0.14$) were not affected by the plastic drape. However, mean contaminated PPE per person decreased with the drape (2.8 ± 0.3 vs. 3.7 ± 0.3, partial $\eta 2 = 0.29$, $P = 0.05$). No differences in perceived workload nor team performance were noted ($P > 0.09$). CONCLUSIONS: In this pilot study, the use of a plastic drape barrier seems not to affect resuscitation performance on simulated cardiopulmonary arrest but decreases health care worker contamination risk. Further implementation trials could characterize the true risk reduction and any effect on resuscitation outcomes.

POST-CARDIAC ARREST TREATMENTS

No articles identified.

TARGETED TEMPERATURE MANAGEMENT

1. Am J Cardiol. 2023 Aug 15;201:158-165. doi: 10.1016/j.amjcard.2023.05.058. Epub 2023 Jun 27.
Meta-Analysis Comparing Hypothermia Versus Normothermia in Patients After a Cardiac Arrest.
Duhan S(1), Keisham B(2), Singh S(1), Rout A(3).

ABSTRACT

The current American Heart Association 2022 guidelines recommend actively preventing fever by targeting a temperature ≤37.5°C for comatose patients after cardiac arrest. Contemporary randomized controlled trials (RCTs) show conflicting results regarding the benefit of targeted hypothermia (TH). We performed this updated meta-analysis of RCTs to evaluate the role of hypothermia in patients after a cardiac arrest. We searched Cochrane, MEDLINE, and EMBASE from inception to December 2022. Trials with patients randomly allocated for targeted temperature monitoring and reported neurologic and mortality outcomes were included. Statistical analysis was performed using Cochrane Review Manager using the random-effects model and calculated the pooled risk ratios of outcomes using the Mantel-Haenszel method. A total of 12 RCTs and 4,262 patients were included in the review. Compared with normothermia, the TH group had significantly improved neurologic outcomes (risk ratio 0.90, 95% confidence interval 0.83 to 0.98). However, no significant difference in mortality was observed (risk ratio 0.97, 95% confidence interval 0.90 to 1.06) between the groups. This meta-analysis supports the role of TH in patients after a cardiac arrest, especially secondary to improvement in neurologic outcomes.

2. Acad Emerg Med. 2023 Jul 31. doi: 10.1111/acem.14785. Online ahead of print.
Therapeutic Hypothermia Following Cardiac Arrest.
Long B(1), Gottlieb M(2).

NO ABSTRACT AVAILABLE

3. Am J Cardiol. 2023 Aug 15;201:25-33. doi: 10.1016/j.amjcard.2023.06.005. Epub 2023 Jun 21.
Variation in the Use of Targeted Temperature Management for Cardiac Arrest.
Wolfe JD(1), Waken RJ(1), Fanous E(1), Fox DK(1), May AM(1), Maddox KEJ(2).
ABSTRACT
Targeted temperature management (TTM) is recommended for patients who do not respond after return of spontaneous circulation after cardiac arrest. However, the degree to which patients with cardiac arrest have access to this therapy on a national level is not known. Understanding hospital- and patient-level factors associated with receipt of TTM could inform interventions to improve access to this treatment among appropriate patients. Therefore, we performed a retrospective analysis using National Inpatient Sample data from 2016 to 2019. We used International Classification of Diseases, Tenth Edition diagnosis and procedure codes to identify adult patients with in-hospital and out-of-hospital cardiac arrest and receipt of TTM. We evaluated patient and hospital factors associated with receiving TTM. We identified 478,419 patients with cardiac arrest. Of those, 4,088 (0.85%) received TTM. Hospital use of TTM was driven by large, nonprofit, urban, teaching hospitals, with less use at other hospital types. There was significant regional variation in TTM capabilities, with the proportion of hospitals providing TTM ranging from >21% in the Mid-Atlantic region to <11% in the East and West South Central and Mountain regions. At the patient level, age >74 years (odds ratio [OR] 0.54, p <0.001), female gender (OR 0.89, p >0.001), and Hispanic ethnicity (OR 0.74, p <0.001) were all associated with decreased odds of receiving TTM. Patients with Medicare (OR 0.75, p <0.001) and Medicaid (OR 0.89, p = 0.027) were less likely than patients with private insurance to receive TTM. Part of these differences was driven by inequitable access to TTM-capable hospitals. In conclusion, TTM is rarely used after cardiac arrest. Hospital use of TTM is predominately limited to a subset of academic hospitals with substantial regional variation. Older age, female gender, Hispanic ethnicity, and Medicare or Medicaid insurance are all associated with a decreased likelihood of receiving TTM.

ELECTROPHYSIOLOGY AND DEFIBRILLATION

1. Prehosp Emerg Care. 2023;27(6):728-735. doi: 10.1080/10903127.2022.2096160. Epub 2022 Jul 20.
Association of Initial Pulseless Electrical Activity Heart Rate and Clinical Outcomes following Adult Non-Traumatic Out-of-Hospital Cardiac Arrest.
Cournoyer A(1)(2)(3)(4), Cavayas YA(5)(6)(7), Albert M(5)(6)(7), Segal E(2)(4)(8)(9), Lamarche Y(6)(7)(10), Potter BJ(5)(11), de Montigny L(4), Chauny JM(1)(2), Paquet J(2), Marquis M(2), Cossette S(12), Castonguay V(1)(2), Morris J(1)(2), Lessard J(1)(2), Daoust R(1)(2).
ABSTRACT
OBJECTIVE: Studies evaluating the prognostic value of the pulseless electrical activity (PEA) heart rate in out-of-hospital cardiac arrest (OHCA) patients have reported conflicting results. The objective of this study was to evaluate the association between the initial PEA heart rate and favorable clinical outcomes for OHCA patients. METHODS: The present post-hoc cohort study used the Resuscitation Outcomes Consortium Cardiac Epidemiologic Registry Version 3, which included OHCA patients in seven US and three Canadian sites from April 2011 to June 2015. The primary outcome was survival to hospital discharge and the secondary outcome was survival with a good functional outcome. For the primary analysis, the patients were separated into eight groups according to their first rhythms and PEA heart rates: (1) initial PEA heart rate of 1-20 beats per minute (bpm); (2) 21-40 bpm; (3) 41-60 bpm; (4) 61-80 bpm; (5) 81-100 bpm; (6) 101-120 bpm; (7) over 120 bpm; (8) initial shockable rhythm (reference category). Multivariable logistic regression models were used to assess the associations of interest. RESULTS: We identified 17,675 patients (PEA: 7,089 [40.1%]; initial

shockable rhythm: 10,797 [59.9%]). Patients with initial PEA electrical frequencies ≤100 bpm were less likely to survive to hospital discharge than patients with initial shockable rhythms (1-20 bpm: adjusted odds ratio [AOR] = 0.15 [95%CI 0.11-0.21]; 21-40 bpm: AOR = 0.21 [0.18-0.25]; 41-60 bpm: AOR = 0.30 [0.25-0.36]; 61-80 bpm: AOR = 0.37 [0.28-0.49]; 81-100 bpm: AOR = 0.55 [0.41-0.65]). However, there were no statistical outcome differences between PEA patients with initial electrical frequencies of >100 bpm and patients with initial shockable rhythms (101-120 bpm: AOR = 0.65 [95%CI 0.42-1.01]; >120 bpm: AOR = 0.72 [95%CI 0.37-1.39]). Similar results were observed for survival with good functional outcomes (101-120 bpm: AOR = 0.60 [95%CI 0.31-1.15]; >120 bpm: AOR = 1.08 [95%CI 0.50-2.28]). CONCLUSIONS: We observed a good association between higher initial PEA electrical frequency and favorable clinical outcomes for OHCA patients. As there is no significant difference in outcomes between patients with initial PEA heart rates of more than 100 bpm and those with initial shockable rhythms, we can hypothesize that these patients could be considered in the same prognostic category.

PEDIATRICS AND CHILDREN

1. Pediatr Res. 2023 Aug 4. doi: 10.1038/s41390-023-02764-2. Online ahead of print.
Mortality after cardiac arrest in children less than 2 years: relevant factors.
Bae G(1), Eun SH(2), Yoon SH(2), Kim HJ(2), Kim HR(3), Kim MK(2), Lee HN(4), Chung HS(5), Koo C(6).
ABSTRACT
BACKGROUND: There are only scant studies of predicting outcomes of pediatric resuscitation due to lack of population-based data. This study aimed to determine variable factors that may impact the survival of resuscitated children aged under 24 months. METHODS: This is a retrospective study of 66 children under 24 months. Cardiopulmonary resuscitation (CPR) with pediatric advanced life support guideline was performed uniformly for all children. Linear regression analysis with variable factors was conducted to determine impacts on mortality. RESULT: Factors with statistically significant increases in mortality were the number of administered epinephrine (p value < 0.001), total CPR duration (p value < 0.001), in-hospital CPR duration of out-hospital cardiac arrest (p value < 0.001), and changes in cardiac rhythm (p value < 0.040). However, there is no statistically significant association between patient outcomes and remaining factors such as age, sex, underlying disease, etiology, time between last normal to CPR, initial CPR location, initial cardiac rhythm, venous access time, or inotropic usage. CONCLUSION: More than 10 times of epinephrine administration and CPR duration longer than 30 minutes were associated with a higher mortality rate, while each epinephrine administration and prolonged CPR time increased mortality. IMPACT STATEMENT: This study analyzed various factors influencing mortality after cardiac arrest in patients under 24 months. Increased number of administered epinephrine and prolonged cardiopulmonary resuscitation duration do not increase survival rate in patients under 24 months. In patients with electrocardiogram rhythm changes during CPR, mortality increased when the rhythm changed into asystole in comparison to no changes occurring in the rhythm.

2. Crit Care. 2023 Aug 2;27(1):304. doi: 10.1186/s13054-023-04582-8.
Paediatric out-of-hospital cardiac arrest: Time to update registries?
Katzenschlager S(#)(1), Kelpanides IK(#)(2)(3), Skogvoll E(4)(5), Grindheim G(6), Wnent J(7)(8)(9), Popp E(10), Weigand MA(10), Kramer-Johansen J(3)(7)(11), Tjelmeland IBM(3)(7)(11), Gräsner JT(7)(8).
NO ABSTRACT AVAILABLE

3. Prehosp Emerg Care. 2023;27(6):718-727. doi: 10.1080/10903127.2022.2096159. Epub 2022 Jul 22.

Pediatric Out-of-Hospital Cardiac Arrests: An Epidemiological Study.

Irvine R(1), Doan T(2), Bosley E(2), Colbeck M(3), Bowles KA(1).

ABSTRACT

OBJECTIVE: To identify the epidemiological patterns of pediatric out-of-hospital cardiac arrests (OHCA) in Queensland, Australia and to investigate associations between patient variables and prehospital outcome. METHODS: Included were pediatric (>4 days-18 years) OHCA patients attended by paramedics in the state of Queensland (Australia) between January 2009 and December 2019. Patient and arrest characteristics were described. Factors associated with return of spontaneous circulation (ROSC) on hospital arrival were investigated. RESULTS: A total of 1,612 pediatric patients were included; 611 were deceased prior to paramedic arrival and 1,001 received resuscitation attempts by paramedics. Approximately one quarter (26.8%) of resuscitation-attempted patients achieved ROSC on hospital arrival. Most arrests (49.7%) were due to medical causes. Arrests due to trauma had the lowest rate of ROSC on hospital arrival (9.6%), whereas those due to drug overdose had the highest rate (40%). Patients in rural areas had a lower rate of ROSC on hospital arrival than those in metropolitan areas (20.7% vs 32.5%, $p < 0.001$). The median response interval to all OHCA patients was 8 minutes. Trauma was considerably more prevalent in rural areas than in metropolitan areas, while all other etiologies were comparable. Older pediatric age groups had higher rates of ROSC on hospital arrival than infants, particularly early adolescents (39.4% vs. 14.9%, $p = 0.001$). Etiology, age, bystander witness, shockable initial rhythm, and geographic locality factors were independently associated with ROSC on hospital arrival. CONCLUSIONS: Approximately a quarter of pediatric prehospital OHCA achieved ROSC on hospital arrival. Prehospital outcome differs according to patient cohort and is associated with diverse patient demographic variables.

4. Resuscitation. 2023 Aug 2:109918. doi: 10.1016/j.resuscitation.2023.109918. Online ahead of print.

Pulmonary hypertension in pediatric cardiac arrest: A pressure point for a personalized approach.

Ross CE(1).

NO ABSTRACT AVAILABLE

5. JAMA Netw Open. 2023 Aug 1;6(8):e2327272. doi: 10.1001/jamanetworkopen.2023.27272.

Effectiveness of a Novel Tablet Application in Reducing Guideline Deviations During Pediatric Cardiac Arrest: A Randomized Clinical Trial.

Corazza F(1), Arpone M(2), Tardini G(2), Stritoni V(3), Mormando G(4), Graziano A(5), Navalesi P(5), Fiorese E(2), Portalone S(2), De Luca M(6), Binotti M(7), Tortorolo L(8), Salvadei S(9), Nucci A(9), Monzani A(10), Genoni G(7), Bazo M(2), Cheng A(11)(12), Frigo AC(13), Da Dalt L(2), Bressan S(2).

ABSTRACT

IMPORTANCE: Deviations from international resuscitation guidelines during the management of pediatric cardiac arrest are frequent and affect clinical outcomes. An interactive tablet application (app), PediAppRREST, was developed to reduce guideline deviations during pediatric cardiac arrest. OBJECTIVE: To assess the effectiveness of PediAppRREST in improving the management of simulated in-hospital pediatric cardiac arrest. DESIGN, SETTING, AND PARTICIPANTS: This multicenter 3-group simulation-based randomized clinical trial was conducted from September 2020 to December 2021 at 4 Italian university hospitals (Padua, Florence, Rome, Novara). Participants included residents in pediatrics, emergency medicine, and anesthesiology. Analyses were conducted as intention-to-treat. Data were analyzed from January to June 2022. INTERVENTIONS: Teams were randomized to 1 of 3 study groups: an intervention group that used the PediAppRREST app; a control group that used a

paper-based cognitive aid, the Pediatric Advanced Life Support (PALS) pocket card; and a control group that used no cognitive aids. All the teams managed the same standardized simulated scenario of nonshockable pediatric cardiac arrest. MAIN OUTCOMES AND MEASURES: The primary outcome was the number of deviations from guidelines, measured by a 15-item checklist based on guideline recommendations. The main secondary outcomes were quality of chest compressions, team clinical performance (measured by the Clinical Performance Tool), and perceived team leader's workload. Study outcomes were assessed via video reviews of the scenarios. RESULTS: Overall 100 teams of 300 participants (mean [SD] age, 29.0 [2.2] years; 195 [65%] female) were analyzed by intention-to-treat, including 32 teams randomized to the PediAppRREST group, 35 teams randomized to the PALS control group, and 33 teams randomized to the null control group. Participant characteristics (210 pediatric residents [70%]; 48 anesthesiology residents [16%]; 42 emergency medicine residents [14%]) were not statistically different among the study groups. The number of deviations from guidelines was significantly lower in the PediAppRREST group than in the control groups (mean difference vs PALS control, -3.0; 95% CI, -4.0 to -1.9; P < .001; mean difference vs null control, -2.6; 95% CI, -3.6 to -1.5; P < .001). Clinical Performance Tool scores were significantly higher in the PediAppRREST group than control groups (mean difference vs PALS control, 1.4; 95% CI, 0.4 to 2.3; P = .002; mean difference vs null control, 1.1; 95% CI, 0.2 to 2.1; P = .01). The other secondary outcomes did not significantly differ among the study groups. CONCLUSIONS AND RELEVANCE: In this randomized clinical trial, the use of the PediAppRREST app resulted in fewer deviations from guidelines and a better team clinical performance during the management of pediatric cardiac arrest.

EXTRACORPOREAL LIFE SUPPORT

1. Chest. 2023 Aug 1:S0012-3692(23)01068-1. doi: 10.1016/j.chest.2023.07.030. Online ahead of print.
Effect of Intra-arrest Transport, Extracorporeal Cardiopulmonary Resuscitation, and Invasive Treatment: a post-hoc Bayesian re-analysis of a randomized clinical trial.
Rob D(1), Komárek A(2), Šmalcová J(1), Bělohlávek J(3).
NO ABSTRACT AVAILABLE

EXPERIMENTAL RESEARCH

1. Resusc Plus. 2023 Jul 17;15:100427. doi: 10.1016/j.resplu.2023.100427. eCollection 2023 Sep.
Vasopressin versus epinephrine during neonatal cardiopulmonary resuscitation of asphyxiated post-transitional piglets.
O'Reilly M(1)(2), Lee TF(1)(2), Cheung PY(1)(2), Schmölzer GM(1)(2).
ABSTRACT
BACKGROUND: Epinephrine is currently the only recommended cardio-resuscitative medication for use in neonatal cardiopulmonary resuscitation (CPR), as per the consensus of science and treatment recommendations. An alternative medication, vasopressin, might be beneficial in neonatal CPR due to its combined pulmonary vasodilation and systemic vasoconstriction properties. AIM: We aimed to compare the time to return of spontaneous circulation (ROSC) with administration of vasopressin or epinephrine during CPR of asphyxiated post-transitional piglets. METHODS: Newborn piglets (n = 8/group) were anesthetized, tracheotomized and intubated, instrumented, and exposed to 50 min normocapnic hypoxia followed by asphyxia and cardiac arrest. Piglets were randomly allocated to receive vasopressin (Vaso, 0.4 U/kg) or epinephrine (Epi, 0.02 mg/kg) during CPR. Piglets were resuscitated with chest compressions superimposed with sustained inflations, and were

administered either Vaso or Epi intravenously every 3 min until ROSC (max. 3 doses). Hemodynamic and cardiac function parameters were collected. MAIN RESULTS: The median (IQR) time to ROSC was 106 (93-140) s with Vaso and 128 (100-198) s with Epi ($p = 0.28$). The number of piglets that achieved ROSC was 8 (100%) with Vaso and 7 (88%) with Epi ($p = 1.00$). Vaso-treated piglets had a significantly longer post-resuscitation survival time (240 (240-240) min) than Epi-treated piglets (65 (30-240) min, $p = 0.02$). Vaso-treated piglets had significantly improved carotid blood flow immediately after ROSC ($p < 0.05$), had longer duration of post-resuscitation hypertension ($p = 0.05$), and had significantly improved heart rate, arterial pressure, and cerebral blood oxygen saturation 4 h after ROSC ($p < 0.05$). CONCLUSIONS: Vasopressin improved post-resuscitation survival and hemodynamics, and might be an alternative cardio-resuscitative medication during neonatal CPR, but further studies are warranted.

2. Sci Rep. 2023 Jul 28;13(1):12247. doi: 10.1038/s41598-023-37827-1.

Volumetric capnography and return of spontaneous circulation in an experimental model of pediatric asphyxial cardiac arrest.

de la Mata Navazo S(1)(2)(3), Manrique G(4)(5)(6), Fernández SN(1)(2)(3), Pérez G(1)(2)(3), Butragueño-Laiseca L(1)(2)(3), García M(1)(2)(3), Slöcker M(1)(2)(3), González R(1)(2)(3)(7), Herrera L(1)(2)(3), Mencía S(1)(2)(3)(7), Del Castillo J(1)(2)(3), Solana MJ(1)(2)(3)(7), Sanz D(1)(2)(3), Cieza R(1)(2)(3), López J(1)(2)(3), Rodríguez Martínez A(1)(2)(3), Santiago MJ(1)(2)(3)(7), Urbano J(1)(2)(3), López-Herce J(1)(2)(3)(7).

ABSTRACT

A secondary analysis of a randomized study was performed to study the relationship between volumetric capnography (VCAP) and arterial CO2 partial pressure (PCO2) during cardiopulmonary resuscitation (CPR) and to analyze the ability of these parameters to predict the return of spontaneous circulation (ROSC) in a pediatric animal model of asphyxial cardiac arrest (CA). Asphyxial CA was induced by sedation, muscle relaxation and extubation. CPR was started 2 min after CA occurred. Airway management was performed with early endotracheal intubation or bag-mask ventilation, according to randomization group. CPR was continued until ROSC or 24 min of resuscitation. End-tidal carbon dioxide (EtCO2), CO2 production (VCO2), and EtCO2/VCO2/kg ratio were continuously recorded. Seventy-nine piglets were included, 26 (32.9%) of whom achieved ROSC. EtCO2 was the best predictor of ROSC (AUC 0.72, $p < 0.01$ and optimal cutoff point of 21.6 mmHg). No statistical differences were obtained regarding VCO2, VCO2/kg and EtCO2/VCO2/kg ratios. VCO2 and VCO2/kg showed an inverse correlation with PCO2, with a higher correlation coefficient as resuscitation progressed. EtCO2 also had an inverse correlation with PCO2 from minute 18 to 24 of resuscitation. Our findings suggest that EtCO2 is the best VCAP-derived parameter for predicting ROSC. EtCO2 and VCO2 showed an inverse correlation with PCO2. Therefore, these parameters are not adequate to measure ventilation during CPR.

3. Resusc Plus. 2023 Jul 14;15:100426. doi: 10.1016/j.resplu.2023.100426. eCollection 2023 Sep.

Current animal models of extracorporeal cardiopulmonary resuscitation: A scoping review.

Ijuin S(1)(2)(3), Liu K(1)(2), Gill D(2)(4), Kyun Ro S(2)(3)(5), Vukovic J(6), Ishihara S(3), Belohlavek J(7), Li Bassi G(1)(2)(8), Suen JY(1)(2), Fraser JF(1)(2)(4)(8)(9).

ABSTRACT

AIM: Animal models of Extracorporeal Cardiopulmonary Resuscitation (ECPR) focusing on neurological outcomes are required to further the development of this potentially life-saving technology. The aim of this review is to summarize current animal models of ECPR. METHODS: A comprehensive database search of PubMed, EMBASE, and Web of Science was undertaken. Full-text publications describing animal models of ECPR between January 1, 2000, and June 30, 2022, were

identified and included in the review. Data describing the conduct of the animal models of ECPR, measured variables, and outcomes were extracted according to pre-defined definitions. RESULTS: The search strategy yielded 805 unique reports of which 37 studies were included in the final analysis. Most studies (95%) described using a pig model of ECPR with the remainder (5%) describing a rat model. The most common method for induction of cardiac arrest was a fatal ventricular arrhythmia through electrical stimulation (70%). 10 studies reported neurological assessment of animals using physical examination, serum biomarkers, or electrophysiological findings, however, only two studies described a multimodal assessment. No studies reported the use of brain imaging as part of the neurological assessment. Return of spontaneous circulation was the most reported primary outcome, and no studies described the neurological status of the animal as the primary outcome. CONCLUSION: Current animal models of ECPR do not describe clinically relevant neurological outcomes after cardiac arrest. Further work is needed to develop models that more accurately mimic clinical scenarios and can test innovations that can be translated to the application of ECPR in clinical medicine.

4. Shock. 2023 Jul 1;60(1):51-55. doi: 10.1097/SHK.0000000000002132. Epub 2023 Apr 26.
EFFECTS OF M101-AN EXTRACELLULAR HEMOGLOBIN-APPLIED DURING CARDIOPULMONARY RESUSCITATION: AN EXPERIMENTAL RODENT STUDY.
Iten M(1), Glas M, Kindler M, Ostini A, Nansoz S, Haenggi M.
ABSTRACT
During and immediately after cardiac arrest, cerebral oxygen delivery is impaired mainly by microthrombi and cerebral vasoconstriction. This may narrow capillaries so much that it might impede the flow of red blood cells and thus oxygen transport. The aim of this proof-of-concept study was to evaluate the effect of M101, an extracellular hemoglobin-based oxygen carrier (Hemarina SA, Morlaix, France) derived from Arenicola marina , applied during cardiac arrest in a rodent model, on markers of brain inflammation, brain damage, and regional cerebral oxygen saturation. Twenty-seven Wistar rats subjected to 6 min of asystolic cardiac arrest were infused M101 (300 mg/kg) or placebo (NaCl 0.9%) concomitantly with start of cardiopulmonary resuscitation. Brain oxygenation and five biomarkers of inflammation and brain damage (from blood, cerebrospinal fluid, and homogenates from four brain regions) were measured 8 h after return of spontaneous circulation. In these 21 different measurements, M101-treated animals were not significantly different from controls except for phospho-tau only in single cerebellum regions ($P = 0.048$; ANOVA of all brain regions: $P = 0.004$). Arterial blood pressure increased significantly only at 4 to 8 min after return of spontaneous circulation ($P < 0.001$) and acidosis decreased ($P = 0.009$). While M101 applied during cardiac arrest did not significantly change inflammation or brain oxygenation, the data suggest cerebral damage reduction due to hypoxic brain injury, measured by phospho-tau. Global burden of ischemia appeared reduced because acidosis was less severe. Whether postcardiac arrest infusion of M101 improves brain oxygenation is unknown and needs to be investigated.

CASE REPORTS

1. Qatar Med J. 2023 Jul 28;2023(1):13. doi: 10.5339/qmj.2023.13. eCollection 2023.
Amniotic fluid embolism causing multiorgan embolisms and reinforces the need for point-of-care ultrasound.
Shaikh N(1), Alhammad MF(1), Nahid S(1), Umm E A(2), Fatima I(3), Ummunnisa F(4), Yaqoub SA(5).
ABSTRACT
INTRODUCTION: Pregnant patients are at risk of several possible complications during the peripartum period. Amniotic fluid embolism (AFE) is a peripartum complication with high mortality

and morbidity. The sudden entry of amniotic fluid into the maternal circulation causes a rapid and dramatic sequence of clinical events called AFE. The reported incidence of AFE after a cesarean section is around 19%, and after a normal delivery, it is 11%. AFE causing multiple embolisms is not reported in the literature, nor is the use of point-of-care ultrasound (POCUS) in the diagnosis of AFE. We report a case of AFE causing pulmonary and ovarian embolisms. CASE: A 34-year-old pregnant lady had an elective lower section cesarean section (LSCS) for transverse lying and placenta previa under combined spinal and epidural anesthesia. She was gravida 3 para 2 and had regular antenatal check-ups, and she presented for her LSCS at 36 weeks of gestation. Immediately after delivery of the fetus, the patient had convulsions, cardiac arrest, and disseminated intravascular coagulopathy (DIC). Immediately, cardiopulmonary resuscitation started, and the team achieved a return of spontaneous circulation (ROSC) in 3 minutes. DIC was corrected with blood and blood products during this maneuver, and POCUS of the inferior vena cava and heart showed multiple small particles floating, thus confirming the diagnosis of AFE in this patient. The patient was transferred to the intensive care unit (ICU), intubated, and ventilated, necessitating a vasopressor infusion. Computed tomographic pulmonary angiography (CTPA) showed pulmonary embolism and ovarian vein embolism, which were managed with heparin infusion. She was hemodynamically stable and weaned from vasopressors, and the ventilator was then extubated on day 13 of ICU admission. She remained awake and in stable condition. The patient was transferred to the ward and subsequently discharged to go home on the 20th-day post-delivery. CONCLUSION: AFE can be quickly diagnosed using clinical manifestations and POCUS, and it can be managed early for better patient outcomes. POCUS will show multiple smaller and a few larger amniotic fluid emboli in the heart and vena cava. These larger AFE emboli can migrate and cause multiple embolisms, requiring systemic anticoagulation.

2. Eur Heart J Case Rep. 2023 Jul 14;7(8):ytad323. doi: 10.1093/ehjcr/ytad323. eCollection 2023 Aug.
Look before you leap: the importance of ECG in management of out-of-hospital cardiac arrest.
Macherey-Meyer S(1), Adler C(1), Mauri V(1).
NO ABSTRACT AVAILABLE

3. Int J Surg Case Rep. 2023 Jul 21;109:108556. doi: 10.1016/j.ijscr.2023.108556. Online ahead of print.
Surgical treatment and anticoagulant therapy for liver injury due to cardiopulmonary resuscitation with lethal pulmonary embolization: A case report.
Morita C(1), Matsumoto N(2), Yamauchi H(3), Hayashi N(4), Sakahira H(3), Takaoka M(4), Sakai T(3).
ABSTRACT
INTRODUCTION: Cardiopulmonary resuscitation (CPR) can sometimes induce organ injury, however, such an occurrence is rare. We herein report a case of liver injury due to CPR with life-threatening pulmonary embolization (PE) that required the patient to undergo surgical hemostasis and antithrombotic therapy. PRESENTATION OF CASE: A woman in her 70s fell off her bicycle. She suffered cardiopulmonary arrest and underwent CPR. She was diagnosed with PE and underwent catheter treatment and anticoagulant therapy; however, her blood pressure did not increase. Contrast-enhanced computed tomography revealed injury to the liver and inferior phrenic artery. Hemostasis could not be completely achieved by transcatheter arterial embolization alone. She was therefore transferred to our hospital and underwent damage control surgery (DCS). Definitive surgery (DS) performed 33 h after DCS showed right hepatic subcapsular hematoma and left hepatic subcapsular hematoma. We cut away the capsules and removed the hematomas. There were lacerations and oozing under the capsule in the left lobe. We sutured the laceration. At 72 h after undergoing DS, antithrombotic therapy was started. On day 19, the patient was discharged home by

herself without any neurological damage. DISCUSSION: For a case of liver injury due to CPR with life-threatening PE, treatment with both hemostasis and antithrombotic therapy should be performed. Antithrombotic therapy was started appropriately in this case by accurately identifying the liver laceration and suturing it. CONCLUSION: Hemostasis following both DCS and DS with appropriate anticoagulant therapy was effective for the management of liver injury due to CPR with life-threatening PE.

4. Zhonghua Lao Dong Wei Sheng Zhi Ye Bing Za Zhi. 2023 Jul 20;41(7):549-551. doi: 10.3760/cma.j.cn121094-20211228-00635.
[One case of myocardial damage caused by carbamate pesticide poisoning].
[Article in Chinese; Abstract available in Chinese from the publisher]
Huang ZY(1), Liu Y(2), Lin SR(2), Zhou CY(2).
ABSTRACT
The data of a patient with carbamate pesticide poisoning were analyzed. Cardiac arrest, oliguria, acute renal injury and pulmonary infection occurred during treatment. After cardiopulmonary resuscitation, tracheal intubation, CRRT, anti-infection and other symptomatic support treatment, the patient recovered and discharged. The myocardial damage caused by carbamate pesticide poisoning is easy to be ignored, and it often causes cardiac manifestations such as arrhythmia and cardiac insufficiency, and the related markers of cardiac injury, electrocardiogram and echocardiogram are also changed. Therefore, the awareness of cardiac damage caused by carbamate pesticide poisoning should be improved.

5. Cureus. 2023 Jun 27;15(6):e41027. doi: 10.7759/cureus.41027. eCollection 2023 Jun.
Thoracic Aortic Rupture Post Cardiopulmonary Resuscitation in a Patient With Previous Thoracic Aneurysm Repair.
Etuk AS(1), Adeniran OF(2), Nkwocha BI(3), Asangmbeng N(4), Jacob M(5).
ABSTRACT
Aortic dissection is characterized by a tear or rupture in the intimal layer of the aorta causing blood to flow between the layers of the arterial wall, thus separating them. While cardiopulmonary resuscitation (CPR) is a life-saving intervention, it can unintentionally contribute to the development or worsening of aortic dissection. The forceful chest compressions involved in CPR can put significant pressure on the fragile aortic wall, potentially leading to a tear or rupture. This highlights the delicate balance between life-saving measures and the potential risks they carry. Though studies have been done on the effects of CPR on the thoracic wall, few reports have studied the effects on the structures that lie in the thoracic cavity. The authors present a 63-year-old with a history of thoracic aneurysm repair who experienced a cardiac arrest while choking on food at home. The patient received CPR and a CT scan done thereafter revealed thoracic dissection and rupture. The patient received medical management in the Intensive Care Unit but eventually expired due to irreversible neurological damage. This highlights the importance of recognizing that CPR can pose a risk for aortic dissection and rupture, particularly in individuals with prior aortic repairs. It emphasizes the need for developing protocols to monitor patients who have undergone aneurysmal repair and adjusting CPR techniques to suit their specific needs. Additionally, further studies are needed to understand how often aortic complications occur after CPR and to provide guidance for follow-up care in patients who have had aortic repairs. By implementing these measures, we can improve outcomes and safety during resuscitation.

6. Clin Case Rep. 2023 Jul 30;11(8):e7722. doi: 10.1002/ccr3.7722. eCollection 2023 Aug.
A case of fulminant myocarditis with full recovery after a 38-h sustained asystole.

Akutsu T(1)(2), Endo A(1)(3), Sonobe H(2), Suzuki K(1), Murata K(2), Otomo Y(3).

ABSTRACT

KEY CLINICAL MESSAGE: Even if cardiac rhythm deteriorated to asystole in the clinical course of fulminant myocarditis, cardiac function may recover, and the patient may be discharged without brain damage, if circulation could be maintained by appropriate mechanical cardiac supports.

ABSTRACT: A 69-year-old man was diagnosed with fulminant myocarditis with circulatory collapse. His cardiac rhythm deteriorated to asystole on the second day; however, circulatory status was maintained through extracorporeal membrane oxygenation and intra-aortic balloon pumping. After 38 h-lasting asystole, his heart resumed beating. He was discharged without neurological deficits on Day 25.

7. Ugeskr Laeger. 2023 Jul 10;185(28):V01230045.

Cardiac arrest during hyperacute caesarean section due to peripartum cardiomyopathy.

[Article in Danish]

Strange GF(1), Sundtoft I(2), Mohamad NF(1).

ABSTRACT

Peripartum cardiomyopathy is a rare and potentially dangerous form of heart failure presenting in women in the last month of pregnancy until five months post partum. The pathogenesis is believed to be multifactorial. This case report describes a young woman with adiposity and preeclampsia who was admitted to hospital and whose clinical condition quickly deteriorated. During the emergency caesarian section, the woman suffered a cardiac arrest and was successfully resuscitated. Echocardiography showed heart failure with an ejection fraction less-than 45% confirming the diagnosis of peripartum cardiomyopathy.

8. Medicina (Kaunas). 2023 Jul 7;59(7):1257. doi: 10.3390/medicina59071257.

Pregnancy-Associated Spontaneous Coronary Acute Dissection as a Cause of Sudden Cardiac Death-Autopsy Findings and Literature Review: Is COVID-19 Related?

Hogea T(1)(2)(3), Suciu BA(4), Chinezu L(2)(5), Brinzaniuc K(4), Arbănași EM(3)(4)(6)(7), Ungureanu A(8), Kaller R(3)(6), Carașca C(1)(2), Arbănași EM(9), Vunvulea V(4)(10), Hălmaciu I(2)(10), Mureșan AV(6)(7), Russu E(6)(7), Ciucanu CC(6), Radu CM(11), Radu CC(1).

ABSTRACT

Sudden cardiac death (SCD) is the leading cause of mortality globally (violent or non-violent), with few to no feasible remedies. The etiopathogenesis of SCD involves a complex and multilayered substrate in which dynamic factors interact with a preexistent cardiovascular pathology, which is often undiagnosed and untreated, leading to the rapid development of cardiac rhythm disorders and cardiac arrest. Cardiovascular disease is a rare but emerging factor in maternal mortality that can be justified by an upward trend in the mean age of pregnant individuals. Spontaneous coronary artery dissection (SCAD) is defined as a non-traumatic and non-iatrogenic separation of the coronary arterial wall by intramural hemorrhage with or without an intimal tear. The resulting intramural hematoma compresses the coronary arteries, reducing blood flow and causing myocardial ischemia. SCAD continues to be misdiagnosed, underdiagnosed, and managed as an atherosclerotic acute coronary syndrome, which may harm patients with SCAD. The latest research shows that individuals who have or have had coronavirus disease 2019 (COVID-19) may also present coagulation abnormalities, so infection with COVID-19 during pregnancy can increase this hypercoagulable condition, thus increasing the risk of SCAD and SCD. This present study reports two cases over 35 years, one being infected with SARS-COV2 one month before the event and the other being tested positive during admission, both asymptomatic, who were declared healthy on periodic clinical

evaluations, with pregnancies over 35 weeks, with normal fetal development, which suddenly caused chest pain, dyspnea, and loss of consciousness, required emergency c-sections, and died suddenly after they were performed. In both cases, the cause of death was SCAD on the anterior-descending artery. In both cases, emergency percutaneous coronary intervention was performed. The second part of the study represents a literature overview of SCAD during COVID-19. In addition to pregnancy hormonal changes, other potential hormone-mediated SCAD triggers are still under discussion.