This week's PubMed 9th – 15th April 2023: articles of interest n = 36

CPR AND COVID-19

No articles identified.

CPR/MECHANICAL CHEST COMPRESSION

No articles identified.

REGISTRIES, REVIEWS AND EDITORIALS

1. Am J Emerg Med. 2023 Apr 11:S0735-6757(23)00199-7. doi: 10.1016/j.ajem.2023.04.011. Online ahead of print.
Comment on: Association between prehospital airway type and oxygenation and ventilation in out-of-hospital cardiac arrest.
Jouffroy R(1), Vivien B(2).
NO ABSTRACT AVAILABLE

2. Emerg Med Australas. 2023 Apr 13. doi: 10.1111/1742-6723.14222. Online ahead of print.
Response to Re: Outcomes in traumatic cardiac arrest patients who underwent advanced life support.
Lawton CF(1), Williamson F(1).
NO ABSTRACT AVAILABLE

3. Eur J Cardiothorac Surg. 2023 Apr 3;63(4):ezad056. doi: 10.1093/ejcts/ezad056.
Outcomes of type A acute aortic dissection with cardiopulmonary arrest: Tokyo Acute Aortic Super-network Registry.
Yamasaki M(1)(2), Yoshino H(1), Kunihara T(1), Akutsu K(1), Shimokawa T(1), Ogino H(1), Kawata M(1), Takahashi T(1), Usui M(1), Watanabe K(1), Fujii T(1), Yamamoto T(1), Nagao K(1), Takayama M(1).
ABSTRACT
OBJECTIVES: Preventing loss of life in patients with type A acute aortic dissection (AAD) who present with cardiopulmonary arrest (CPA) can be extremely difficult. Thus, we investigated the early outcomes in these patients. METHODS: Patients with type A AAD who were transported to hospitals belonging to the Tokyo Acute Aortic Super-network between January 2015 and December 2019 were considered for this study. We assessed the early mortality of these patients presenting with CPA and also investigated the differences in outcomes between patients with out-of-hospital and in-hospital CPA. RESULTS: A total of 3307 patients with type A AAD were transported, 434 (13.1%) of whom presented with CPA. The overall mortality of patients presenting with CPA was 88.2% (383/434), of which 94.5% (240/254) experienced out-of-hospital CPA and 79.4% (143/180) experienced in-hospital CPA (P < 0.001). Multivariable analysis revealed that aortic surgery [odds ratio (OR), 0.022; 95% confidence interval (CI), 0.008-0.060; P < 0.001] and patient age over 80 years (OR, 2.946; 95% CI, 1.012-8.572; P = 0.047) were related with mortality in patients with type A AAD and CPA. Between in-hospital and out-of-hospital CPA, the proportions of DeBakey type 1 (OR, 2.32; 95% CI, 1.065-5.054; P = 0.034), cerebral malperfusion (OR, 0.188; 95% CI, 0.056-0.629; P = 0.007),

aortic surgery (OR, 0.111; 95% CI, 0.045-0.271; P = 0.001), age (OR, 0.969; 95% CI, 0.940-0.998; P = 0.039) and the time from symptom onset to hospital admission (OR, 1.122; 95% CI, 1.025-1.228; P = 0.012) were significantly different. CONCLUSIONS: Patients with type A AAD presenting with CPA exhibited extremely high rates of death. Patient outcomes following in-hospital CPA tended to be better than those following out-of-hospital CPA; however, this difference was not significantly different. To prevent deaths, aortic surgery, when possible, should be considered in patients with type A AAD who sustained CPA.

IN-HOSPITAL CARDIAC ARREST

1. Aust Crit Care. 2023 Apr 12:S1036-7314(23)00026-7. doi: 10.1016/j.aucc.2023.01.011. Online ahead of print.

Antecedents to and outcomes for in-hospital cardiac arrests in Australian hospitals with mature medical emergency teams: A multicentre prospective observational study.

ANZ-CODE Investigators(7).

ABSTRACT

BACKGROUND: The epidemiology and predictability of in-hospital cardiac arrests (IHCAs) in hospitals with established medical emergency teams (METs) is underinvestigated. OBJECTIVES: We categorised IHCAs into three categories: "possible suboptimal end-of-life planning" (possible SELP), "potentially predictable", or "sudden and unexpected" using age, Charlson Comorbidity Index, place of residence, functional independence, along with documented vital signs, K+ and HCO3 in the period prior to the IHCA. We also described the differences in characteristics and outcomes amongst these three categories of IHCAs. METHODS: This was a prospective observational study (1st July 2017 to 9th August 2018) of adult (18 years) IHCA patients in wards of seven Australian hospitals with well-established METs. RESULTS: Amongst 152 IHCA patients, 145 had complete data. The number (%) classified as possible SELP, potentially predictable, and sudden and unexpected IHCA was 50 (34.5%), 52 (35.8%), and 43 (29.7%), respectively. Amongst the 52 potentially predictable patients, six (11.5%) had missing vital signs in the preceding 6 hr, 18 (34.6%) breached MET criteria in the prior 24 hr but received no MET call, and 6 (11.5%) had a MET call but remained on the ward. Abnormal K+ and HCO3 was present in 15 of 51 (29.5%) and 13 of 51 (25.5%) of such patients, respectively. The 43 sudden and unexpected IHCA patients were mostly (97.6%) functionally independent and had the lowest median Charlson Comorbidity Index. In-hospital mortality for IHCAs classified as possible SELP, potentially predictable, and sudden and unexpected was 76.0%, 61.5%, and 44.2%, respectively (p = 0.007). Only four of 12 (33.3%) possible SELP survivors had a good functional outcome. CONCLUSIONS: In seven Australian hospitals with mature METs, only one-third of IHCAs were sudden and unexpected. Improving end-of-life care in elderly comorbid patients and enhancing the response to objective signs of deterioration may further reduce IHCAs in the Australian context.

2. Front Cardiovasc Med. 2023 Mar 23;10:1099003. doi: 10.3389/fcvm.2023.1099003. eCollection 2023.

Elevated albumin corrected anion gap is associated with poor in-hospital prognosis in patients with cardiac arrest: A retrospective study based on MIMIC-IV database.

Hu B(1), Zhong L(1), Yuan M(1), Min J(1), Ye L(1), Lu J(1), Ji X(1).

ABSTRACT

BACKGROUND: Cardiac arrest(CA) is one of the most leading causes of death. Most of the indicators which used to predict the prognosis of patients with CA are not recognized. Previous studies have suggested that albumin corrected anion gap (ACAG) is associated with recovery of spontaneous circulation in patients with CA, but the predictive value of ACAG for prognosis has not been investigated. This study aims to explore the relationship between ACAG and prognosis during

hospitalization in patients with CA. METHODS: The baseline data of adult patients with CA hospitalized in the intensive care unit (ICU) from 2008 to 2019 in the American Intensive Care Database (MIMIC-IV, version v2.0) were collected. According to the in-hospital prognosis, patients were divided into survival and non-survival group. Based on the criteria of ACAG level in the previous literature, patients enrolled were divided into normal ACAG (12-20 mmol/L) and high ACAG (>20 mmol/L) group. The basic information of patients during hospitalization were compared and analyzed between the two groups with propensity score matching (PSM). The Kaplan-Meier method was used to compare the cumulative survival rates of normal ACAG and high ACAG groups before and after matching. Restricted cubic spline (RCS) method and multivariate COX proportional hazards regressions were used to analyze whether elevated ACAG was associated with all-cause mortality during hospitalization. RESULTS: A total of 764 patients were included. A matched cohort (n = 310) was obtained after PSM analysis. The mortality rate before and after matching in the high ACAG group was higher than that in the normal ACAG group (χ 2 = 25.798; P < 0.001; χ 2 = 6.258; P = 0.012) The Kaplan-Meier survival analysis before and after matching showed that the cumulative survival rate of the high ACAG group was lower (P < 0.05). RCS analysis showed that ACAG had a non-linear relationship with the risk of in-hospital all-cause mortality (χ 2 = 6.060, P < 0.001). Multivariate COX regression analysis before and after PSM suggested that elevated ACAG was an independent risk factor for all-cause mortality in patients with CA during hospitalization (P < 0.01). CONCLUSIONS: Elevated ACAG is associated with increased all-cause mortality in patients with CA during hospitalization, it can be an independent risk factor for poor prognosis in patients with CA and remind clinicians to pay more attention to these patients.

INJURIES AND CPR

No articles identified.

CAUSE OF THE ARREST

1. Leg Med (Tokyo). 2023 May;62:102245. doi: 10.1016/j.legalmed.2023.102245. Epub 2023 Mar 20.
Whole-exome sequencing and electrophysiological study reveal a novel loss-of-function mutation of KCNA10 in epinephrine provoked long QT syndrome with familial history of sudden cardiac death.
Huang S(1), Chen J(1), Song M(2), Yu Y(1), Geng J(3), Lin D(1), Yang J(1), Wu J(1), Li K(1), Yu Y(1), Wang J(1), Hu L(1), Shan Q(3), Wang J(4), Chen P(5), Chen F(6).

ABSTRACT

Congenital long QT syndrome (LQTS) is one type of inherited fatal cardiac arrhythmia that may lead to sudden cardiac death (SCD). Mutations in more than 16 genes have been reported to be associated with LQTS, whereas the genetic causes of about 20% of cases remain unknown. In the present study, we investigated a four-generation pedigree with familial history of syncope and SCD. The proband was a 33-year-old young woman who experienced 3 episodes of syncope when walking at night. The electrocardiogram revealed a markedly epinephrine-provoked prolonged QT interval (QT = 468 ms, QTc = 651 ms) but no obvious arrhythmia in the resting state. Three family members have died of suspected SCD. Whole-exome sequencing and bioinformatic analysis based on pedigree revealed that a novel missense mutation KCNA10 (c.1397G＞A/Arg466Gln) was the potential genetic lesion. Sanger sequencing was performed to confirm the whole-exome sequencing results. This mutation resulted in the KV1.8 channel amino acid residue 466 changing from arginine to glutamine, and the electrophysiological experiments verified it as a loss-of-function mutation of KV1.8, which reduced the K+ currents of KV1.8 and might result in the prolonged QT interval. These findings

suggested that KCNA10 (c.1397G＞A) mutation was possibly pathogenic in this enrolled LQTS family, and may provide a new potential genetic target for diagnosis and counseling of stress-related LQTS families as well as the postmortem diagnosis of SCD.

2. Scand J Trauma Resusc Emerg Med. 2023 Apr 11;31(1):19. doi: 10.1186/s13049-023-01080-2.
Differential diagnosis and cause-specific treatment during out-of-hospital cardiac arrest: a retrospective descriptive study.
Heikkilä E(1), Jousi M(1), Nurmi J(2).
ABSTRACT
BACKGROUND: The cardiopulmonary resuscitation (CPR) guidelines recommend identifying and correcting the underlying reversible causes of out-of-hospital cardiac arrest (OHCA). However, it is uncertain how often these causes can be identified and treated. Our aim was to estimate the frequency of point of care ultrasound examinations, blood sample analyses and cause-specific treatments during OHCA. METHODS: We performed a retrospective study in a physician-staffed helicopter emergency medical service (HEMS) unit. Data on 549 non-traumatic OHCA patients who were undergoing CPR at the arrival of the HEMS unit from 2016 to 2019 were collected from the HEMS database and patient records. We also recorded the frequency of ultrasound examinations, blood sample analyses and specific therapies provided during OHCA, such as procedures or medications other than chest compressions, airway management, ventilation, defibrillation, adrenaline or amiodarone. RESULTS: Of the 549 patients, ultrasound was used in 331 (60%) and blood sample analyses in 136 (24%) patients during CPR. A total of 85 (15%) patients received cause-specific treatment, the most common ones being transportation to extracorporeal CPR and percutaneous coronary intervention (PCI) (n = 30), thrombolysis (n = 23), sodium bicarbonate (n = 17), calcium gluconate administration (n = 11) and fluid resuscitation (n = 10). CONCLUSION: In our study, HEMS physicians deployed ultrasound or blood sample analyses in 84% of the encountered OHCA cases. Cause-specific treatment was administered in 15% of the cases. Our study demonstrates the frequent use of differential diagnostic tools and relatively infrequent use of cause-specific treatment during OHCA. Effect on protocol for differential diagnostics should be evaluated for more efficient cause specific treatment during OHCA.

3. Curr Cardiol Rev. 2023;19(3):86-100. doi: 10.2174/1573403X19666221220163431.
Mitral Valve Prolapse and Sudden Cardiac Death in Athletes at High Risk.
Vriz O(1), Landi I(2), Eltayeb A(1), Limongelli G(3), Mos L(4), Delise P(5), Bossone E(6), D Andrea A(7).
ABSTRACT
Mitral valve prolapse (MVP) is the most frequent valvulopathy in the general population, with usually a favourable prognosis. Although it can be associated with some complications, ventricular arrhythmias (VA) and sudden cardiac death (SCD) are the most worrying. The estimated risk of SCD in MVP is between 0.2% to 1.9% per year, including MVP patients with and without severe mitral regurgitation (MR). The association between SCD and MVP is expressed by a phenotype called "malignant MVP" characterized by transthoracic echocardiography (TTE) findings such as bileaflet myxomatous prolapse and mitral annulus disjunction (MAD), ECG findings such as repolarization abnormalities, complex ventricular arrhythmias (c-VAs) and LV fibrosis of papillary muscles (PMs) and inferobasal wall visualized by late gadolinium enhancement cardiac magnetic resonance (LGE-CMR). Therefore, attention is raised for patients with "arrhythmic MVP" characterized from an ECG point of view by frequent premature ventricular contractions (PVCs) arising from one or both PMs as well as by T-wave inversion in the inferolateral leads. In athletes, SCD is the most frequent medical cause of death and in young subjects (< 35 years) usually is due to electrical mechanism affecting who has a silent cardiovascular disease and are not considered per se a cause of increased mortality.

In MVP, SCD was reported to happen during sports activity or immediately after and valve prolapse was the only pathological aspect detected. The aim of the present paper is to explore the association between SCD and MVP in athletes, focusing attention on ECG, TTE in particular, and CMR findings that could help to identify subjects at high risk for complex arrhythmias and eventually SCD. In addition, it is also examined if sports activity might predispose patients with MVP to develop major arrhythmias.

END-TIDAL CO_2

No articles identified.

ORGAN DONATION

No articles identified.

FEEDBACK

No articles identified.

DRUGS

1. PLoS One. 2023 Apr 12;18(4):e0284429. doi: 10.1371/journal.pone.0284429. eCollection 2023.
Evaluation of the effectiveness of potassium chloride in the management of out-of hospital cardiac arrest by refractory ventricular fibrillation: Study protocol of the POTACREH study.
Jouffroy R(1), Ecollan P(2), Chollet-Xemard C(3), Prunet B(4), Elie C(5), Treluyer JM(5), Vivien B(1).
ABSTRACT
PURPOSE: Out-of-hospital cardiac arrest (OHCA) has a poor prognosis, with an overall survival rate of about 5% at discharge. Shockable rhythm cardiac arrests (ventricular fibrillation (VF) and pulseless ventricular tachycardia (VT)) have a better prognosis. In case of shockable rhythm, treatment is based on defibrillation, and thereafter, in case of failure of 3 external electric shocks (EES), on direct intravenous administration of 300 mg amiodarone, or lidocaine when amiodarone is unavailable or inefficient. During surgical procedures under extracorporeal circulation, a high potassium cardioplegia solution is administered to interrupt cardiac activity and facilitate surgical procedure. By extension, direct intravenous administration of potassium chloride (KCl) has been shown to convert VF, resulting in return to a hemodynamically efficient organized heart rate within a few minutes. The aim of this study is to provide clinical evidence that direct intravenous injection of KCl, into a patient presenting with OHCA due to refractory VF although 3 EES, should interrupt this VF and then allow rapid restauration of an organized heart rhythm, and thus return of spontaneous circulation (ROSC). METHODS: A multicenter, prospective, single group, phase 2 study will be conducted on 81 patients presenting with refractory VF. After failure of 3 EES, each patient will receive direct intravenous injection of 20 mmol KCl instead of amiodarone. The primary outcome will be survival rate at hospital admission. Major secondary outcomes will include ROSC and time to ROSC in the prehospital setting, number of VF recidivism after KCl injection, survival rate at hospital discharge with a good neurologic prognostic, and survival rate 3 months after hospital discharge with a good neurologic prognostic. RESULTS: No patient is currently included in the study. DISCUSSION: Conventional guideline strategy based on antiarrhythmic drug administration, i.e. amiodarone or

lidocaine, for OHCA due to shockable rhythm, has not yet demonstrated an increase in survival at hospital admission or at hospital discharge. This may be related to the major cardiodepressant effect of those drugs.

2. Medicine (Baltimore). 2023 Apr 14;102(15):e33195. doi: 10.1097/MD.0000000000033195.
Comparison the efficacy of amiodarone and lidocaine for cardiac arrest: A network meta-analysis.
Wang Q(1), Lin Z(2), Chen H(1), Pan B(1).

ABSTRACT

BACKGROUND: There is no evidence that antiarrhythmic drugs can improve long-term survival or survival with favorable neurological outcomes in cardiac arrest patients. We did this network meta-analysis to comprehensively compare the efficacy of various antiarrhythmic drugs for cardiac arrest patients. METHODS: We searched studies from inception until Nov 11, 2022 through PubMed, Embase, Cochrane Library, China National Knowledge Infrastructure (CNKI), VIP Database, and Wanfang database. All studies comparing different antiarrhythmic drugs for cardiac arrest were included in this meta-analysis. Outcomes were survival to hospital discharge in cardiac arrest, survival to hospital admission/24 h and favorable neurological outcome. This network meta-analysis was performed by R software. RESULTS: Finally, a total of 9 studies (10,980 patients) were finally included in this network meta-analysis. Amiodarone (odd ratio [OR] 2.28, 95% credibility interval [CrI] 1.61-3.27) and lidocaine (OR 1.53, 95% CrI 1.05-2.25) was superior than placebo in terms of the survival to hospital admission/24 h with statistically significant. Amiodarone (OR 2.19, 95% CrI 1.54-3.14) and lidocaine (OR 1.58, 95% CrI 1.09-2.32) was superior than placebo in terms of the survival to hospital discharge with statistically significant. Amiodarone (OR 2.43, 95% CrI 1.61-3.68) and lidocaine (OR 1.62, 95% CrI 1.04-2.53) was superior than placebo in terms of the favorable neurological outcome with statistically significant. The surface under the cumulative ranking (SUCRA) shows that amiodarone ranked first (SUCRA, 99.6%), lidocaine ranked second (SUCRA, 49.6%), placebo ranked the last (SUCRA, 0.86%). Inverted funnel plot is essentially symmetrical, it is possible that this study has a small sample effect or a small publication bias. CONCLUSIONS: Amiodarone had the best effect on both survival to hospital admission, discharge and more favorable neurological outcome. Thus, amiodarone should be listed as first line drug for cardiac arrest. However, the quality of available evidence limits the formation of powerful conclusions regarding the comparative efficacy or safety of amiodarone or lidocaine used to treat cardiac arrest. Higher-quality randomized controlled trials are required for further research in future.

TRAUMA

No articles identified.

VENTILATION

No articles identified.

CERERBRAL MONITORING

1. J Clin Monit Comput. 2023 Apr 12:1-7. doi: 10.1007/s10877-023-01002-8. Online ahead of print.
The importance of monitoring cerebral oxygenation in non brain injured patients.
Robba C(1)(2), Battaglini D(3), Rasulo F(4), Lobo FA(5), Matta B(6).

ABSTRACT

Over the past few years, the use of non-invasive neuromonitoring in non-brain injured patients has increased, as a result of the recognition that many of these patients are at risk of brain injury in a wide number of clinical scenarios and therefore may benefit from its application which allows interventions to prevent injury and improve outcome. Among these, are post cardiac arrest syndrome, sepsis, liver failure, acute respiratory failure, and the perioperative settings where in the absence of a primary brain injury, certain groups of patients have high risk of neurological complications. While there are many neuromonitoring modalities utilized in brain injured patients, the majority of those are either invasive such as intracranial pressure monitoring, require special skill such as transcranial Doppler ultrasonography, or intermittent such as pupillometry and therefore unable to provide continuous monitoring. Cerebral oximetry using Near infrared Spectroscopy, is a simple non invasive continuous measure of cerebral oxygenation that has been shown to be useful in preventing cerebral hypoxemia both within the intensive care unit and the perioperative settings. At present, current recommendations for standard monitoring during anesthesia or in the general intensive care concentrate mainly on hemodynamic and respiratory monitoring without specific indications regarding the brain, and in particular, brain oximetry. The aim of this manuscript is to provide an up-to-date overview of the pathophysiology and applications of cerebral oxygenation in non brain injured patients as part of non-invasive multimodal neuromonitoring in the early identification and treatment of neurological complications in this population.

2. JAMA Netw Open. 2023 Apr 3;6(4):e237809. doi: 10.1001/jamanetworkopen.2023.7809.
Analysis of Anxiety or Depression and Long-term Mortality Among Survivors of Out-of-Hospital Cardiac Arrest.
Lee J(1), Cho Y(1), Oh J(1), Kang H(1), Lim TH(1), Ko BS(1), Yoo KH(1), Lee SH(1).
ABSTRACT
IMPORTANCE: The recent American Heart Association guidelines added a sixth link in the chain of survival highlighting recovery and emphasized the importance of psychiatric outcome and recovery for survivors of out-of-hospital cardiac arrest (OHCA). The prevalence of psychiatric disorders among this population was higher than that in the general population. OBJECTIVE: To examine the prevalence of depression or anxiety and the association of these conditions with long-term mortality among individuals who survive OHCA. DESIGN, SETTING, AND PARTICIPANTS: A longitudinal population-based cohort study was conducted to analyze long-term prognosis in patients hospitalized for OHCA between January 1, 2005, and December 31, 2015, who survived for 1 year or longer. Patients with cardiac arrest due to traumatic or nonmedical causes, such as injuries, poisoning, asphyxiation, burns, or anaphylaxis, were excluded. Data were extracted on depression or anxiety diagnoses in this population within 1 year from the database of the Korean National Health Insurance Service and analyzed April 7, 2022, and reanalyzed January 19 to 20, 2023. MAIN OUTCOMES AND MEASURES: Follow-up data were obtained for up to 14 years, and the primary outcome was long-term cumulative mortality. Long-term mortality among patients with and without a diagnosis of depression or anxiety were evaluated. RESULTS: The analysis included 2373 patients; 1860 (78.4%) were male, and the median age was 53.0 (IQR, 44.0-62.0) years . A total of 397 (16.7%) patients were diagnosed with depression or anxiety, 251 (10.6%) were diagnosed with depression, and 227 (9.6%) were diagnosed with anxiety. The incidence of long-term mortality was significantly higher in the group diagnosed with depression or anxiety than in the group without depression or anxiety (141 of 397 [35.5%] vs 534 of 1976 [27.0%]; P = .001). With multivariate Cox proportional hazards regression analysis, the adjusted hazard ratio of long-term mortality for total patients with depression or anxiety was 1.41 (95% CI, 1.17-1.70); depression, 1.44 (95% CI, 1.16-1.79); and anxiety, 1.20 (95% CI, 0.94-1.53). CONCLUSIONS AND RELEVANCE: In this study, among the patients who experienced OHCA, those diagnosed with depression or anxiety had higher long-term mortality rates

than those without depression or anxiety. These findings suggest that psychological and neurologic rehabilitation intervention for survivors of OHCA may be needed to improve long-term survival.

3. BMC Cardiovasc Disord. 2023 Apr 15;23(1):193. doi: 10.1186/s12872-023-03220-z.
Serum neurofilament light chain as a predictive marker of neurologic outcome after cardiac arrest: a meta-analysis.
Wang SL(1), Li N(1), Feng SY(1), Li Y(2).
ABSTRACT
OBJECTIVE: Recently, an increasing number of studies have suggested using serum neurofilament light (NfL) chain to predict the neurologic outcome after cardiac arrest. However, the predictive ability of this approach remains inconclusive. Meta-analysis was performed on related studies to assess the ability of serum NfL to predict the neurologic outcome after cardiac arrest. MATERIALS AND METHODS: PubMed, ScienceDirect and Embase were systematically searched from the date of their inception until June 2022. Data were extracted to calculate the area under the receiver operating characteristic curve (AUC), the sensitivity, the specificity and the publication bias to evaluate the predictive power of serum NfL using Stata 14.0. RESULTS: Nine studies were included in the present meta-analysis. Seven studies involving 1296 participants reported serum NfL 24 h post arrest for predicting the neurological outcome, and the AUC was 0.92 (77% sensitivity and 96% specificity). Seven studies involving 1020 participants reported serum NfL 48 h post arrest for predicting the neurological outcome, and the AUC was 0.94 (78% sensitivity and 98% specificity). Four studies involving 804 participants reported serum NfL 72 h post arrest for predicting the neurological outcome, and the AUC was 0.96 (90% sensitivity and 98% specificity). No significant publication bias was observed among the included studies. CONCLUSION: The present meta-analysis results support the potential use of serum NfL as an early biomarker of neurologic outcome, especially 72 h post arrest.

ULTRASOUND AND CPR

No articles identified.

ORGANISATION AND TRAINING

1. Resusc Plus. 2023 Apr 5;14:100383. doi: 10.1016/j.resplu.2023.100383. eCollection 2023 Jun.
"Do-not-resuscitate" preferences of the general Swiss population: Results from a national survey.
Gross S(1), Amacher SA(1)(2)(3), Rochowski A(4), Reiser S(4), Becker C(1)(3), Beck K(1), Blatter R(1), Emsden C(2)(5), Nkoulou C(6), Sutter R(2)(7), Tisljar K(2), Pargger H(2)(7), Marsch S(2)(7), Hunziker S(1)(7).
ABSTRACT
AIMS: To assess the do-not-resuscitate preferences of the general Swiss population and to identify predictors influencing decision-making. METHODS: A nationwide web-based survey was conducted in Switzerland on a representative sample of the adult population. The primary endpoint was the preference for a "Do Not Resuscitate" order (DNR Code Status) vs. cardiopulmonary resuscitation (CPR Code Status) in a clinical case vignette of an out-of-hospital cardiac arrest. Secondary endpoint were participants' own personal preferences for DNR. RESULTS: 1138 subjects participated in the web-based survey, 1044 were included in the final analysis. Preference for DNR code status was found in 40.5% (n = 423) in the case vignette and in 20.3% (n = 209) when making a personal decision for themselves. Independent predictors for DNR Code Status for the case vignette were:

Personal preferences for their own DNR Code Status (adjusted OR 2.44, 95%CI 1.67 to 3.55; p < 0.001), intubation following respiratory failure (adjusted OR 1.95, 95%CI 1.20 to 3.18; p = 0.007), time-period after which resuscitation should not be attempted (adjusted OR 0.91, 95%CI 0.89 to 0.93); p < 0.001), and estimated chance of survival in case of a cardiac arrest (adjusted OR per decile 0.91, 95%CI 0.84 to 0.99, p = 0.02; which was overestimated by all participants. CONCLUSIONS: Main predictors for a DNR Code Status were personal preferences and the overestimation of good neurological outcome after cardiac arrest. Overestimation of positive outcomes after cardiac arrest seems to influence patient opinion and should thus be addressed during code status discussions.

2. Adv Simul (Lond). 2023 Apr 16;8(1):12. doi: 10.1186/s41077-023-00251-6.
Data-driven resuscitation training using pose estimation.
Weiss KE(1), Kolbe M(2), Nef A(2), Grande B(2)(3), Kalirajan B(4), Meboldt M(4), Lohmeyer Q(4).
ABSTRACT
BACKGROUND: Cardiopulmonary resuscitation (CPR) training improves CPR skills while heavily relying on feedback. The quality of feedback can vary between experts, indicating a need for data-driven feedback to support experts. The goal of this study was to investigate pose estimation, a motion detection technology, to assess individual and team CPR quality with the arm angle and chest-to-chest distance metrics. METHODS: After mandatory basic life support training, 91 healthcare providers performed a simulated CPR scenario in teams. Their behaviour was simultaneously rated based on pose estimation and by experts. It was assessed if the arm was straight at the elbow, by calculating the mean arm angle, and how close the distance between the team members was during chest compressions, by calculating the chest-to-chest distance. Both pose estimation metrics were compared with the expert ratings. RESULTS: The data-driven and expert-based ratings for the arm angle differed by 77.3%, and based on pose estimation, 13.2% of participants kept the arm straight. The chest-to-chest distance ratings by expert and by pose estimation differed by 20.7% and based on pose estimation 63.2% of participants were closer than 1 m to the team member performing compressions. CONCLUSIONS: Pose estimation-based metrics assessed learners' arm angles in more detail and their chest-to-chest distance comparably to expert ratings. Pose estimation metrics can complement educators with additional objective detail and allow them to focus on other aspects of the simulated CPR training, increasing the training's success and the participants' CPR quality.

3. Resusc Plus. 2023 Mar 28;14:100380. doi: 10.1016/j.resplu.2023.100380. eCollection 2023 Jun.
Under pressure: What individual characteristics lead to performance of high-quality chest compressions during CPR practice sessions?
Marks S(1), Shaffer L(2), Zehnder D(3), Aeh D(3), Prall DM(4).
ABSTRACT
AIM: Despite well-established protocols for cardiopulmonary resuscitation training, performance during real-life cardiac arrests can be suboptimal. Understanding personal characteristics which could influence performance of high-quality chest compressions could provide insight into the practice-performance gap. This study examined chest compression performance, while employing feedback and introducing code team sounds as an anxiety-inducing factor in registered nurses using a cardiopulmonary resuscitation training manikin. METHODS: Participants included 120 registered nurses with basic life support certification randomized to one of the following groups: no feedback and no code team sounds, feedback without code team sounds, or feedback with code team sounds. Chest compression sessions occurred at baseline, 30-days and 60-days. Demographic variables and anxiety level were also collected. The primary outcome was chest compression performance, defined as average percent of time with correct rate and percent with correct depth as captured by

the defibrillator. Statistical analysis included linear mixed effects analysis. RESULTS: The effect of feedback on chest compression performance depended on the value of other parameters. The benefit of feedback on the primary outcome depended on: age, with feedback less beneficial among older participants ($p = 0.0413$); and time, with feedback more beneficial with repetition ($p = 0.011$). These interactions also affected the outcome percent of time with correct compression depth. Increased anxiety was associated with decreased percent correct compression depth ($p < 0.001$). CONCLUSION: Feedback emerged as important in determining chest compression performance. Chest compression quality was limited by the performer's age and anxiety level. Future research should focus on identifying factors related to individual characteristics which may influence chest compression performance.

4. Resuscitation. 2023 Apr 12:109794. doi: 10.1016/j.resuscitation.2023.109794. Online ahead of print.

Determinants of health-related quality of life after out-of-hospital cardiac arrest (OHCA): A systematic review.

Pin Pek P(1), Cheng Fan K(2), Eng Hock Ong M(3), Luo N(4), Østbye T(5), Lynn Lim S(6), Fuwah Ho A(7).

ABSTRACT

OBJECTIVE: With a growing number of out-of-hospital cardiac arrest (OHCA) survivors globally, the focus of OHCA management has now broadened to survivorship. An outcome central to survivorship is health-related quality of life (HRQoL). This systematic review aimed to synthesise evidence related to the determinants of HRQoL of OHCA survivors. METHODS: We systematically searched MEDLINE, Embase, and Scopus from inception to 15 August 2022 to identify studies investigating the association of at least one determinant and HRQoL in adult OHCA survivors. All articles were independently reviewed by two investigators. We abstracted data pertaining to determinants and classified them using a well-established HRQoL theoretical framework - the Wilson and Cleary (revised) model. RESULTS: 31 articles assessing a total of 35 determinants were included. Determinants were classified into the five domains in the HRQoL model. 26 studies assessed determinants related to individual characteristics (n=3), 12 studied biological function (n=7), nine studied symptoms (n=3), 16 studied functioning (n=5), and 35 studied characteristics of the environment (n=17). In studies that included multivariable analyses, most reported that individual characteristics (older age, female sex), symptoms (anxiety, depression), and functioning (impaired neurocognitive function) were significantly associated with poorer HRQoL. CONCLUSIONS: Individual characteristics, symptoms, and functioning played significant roles in explaining the variability in HRQoL. Significant non-modifiable determinants such as age and sex could be used to identify populations at risk of poorer HRQoL, while significant modifiable determinants such as psychological health and neurocognitive functioning could serve as targets for post-discharge screening and rehabilitation plans.

5. Resusc Plus. 2023 Apr 5;14:100386. doi: 10.1016/j.resplu.2023.100386. eCollection 2023 Jun.

A retrospective review of out of hospital cardiac arrest at Gillette Stadium: 10 years of experience at a large sports venue.

Goldberg SA(1), Battistini V(2), Cash RE(3), Kelleher M(4), Laporte C(1)(4), Peters G(1), Goralnick E(1).

ABSTRACT

INTRODUCTION: Rates of out-of-hospital cardiac arrest (OHCA) at major sporting events are as high as 0.7 per 100,000 attendees. However, factors contributing to OHCA at mass gatherings have not been well-described. We describe our experience with ten years of medical oversight and OHCA care

at a professional football stadium. METHODS: We performed a retrospective review of OHCA events between August 2010 and January 2020 at a 65,878-seat football stadium, with a single transporting EMS agency and a single receiving hospital. We analyzed EMS incident reports and matched patients to hospital records for outcome data. RESULTS: A total of 7,767,345 people attended 115 football games during the study period. There were 21 OHCAs (0.27 per 100,000 attendees). Ninety-five percent of OHCAs were witnessed and 71.4% had an initial shockable rhythm, with bystander AED use in 47.6%. Median EMS response time was 2 minutes (IQR 1-6). For 7 patients defibrillated by EMS, time to defibrillation was 4 minutes (IQR 4-11). Return of spontaneous circulation (ROSC) occurred in 71%, with 47% having good 30-day neurologic survival. All patients with an initial rhythm of asystole died. CONCLUSION: The ROSC rate at our stadium exceeded 70% with almost half surviving with good neurologic outcomes, substantially higher than that reported for the general public. We hope that our experience will provide valuable lessons to other similarly sized stadiums.

6. Sci Rep. 2023 Apr 13;13(1):6033. doi: 10.1038/s41598-023-33129-8.
Association between the Cardiac Arrest Hospital Prognosis (CAHP) score and reason for death after successfully resuscitated cardiac arrest.
Paul M(1)(2), Legriel S(3)(4)(5), Benghanem S(4)(6), Abbad S(3), Ferré A(3), Lacave G(3), Richard O(7), Dumas F(4)(8)(9)(10)(11), Cariou A(4)(6)(8)(9)(10).
ABSTRACT
Individualize treatment after cardiac arrest could potentiate future clinical trials selecting patients most likely to benefit from interventions. We assessed the Cardiac Arrest Hospital Prognosis (CAHP) score for predicting reason for death to improve patient selection. Consecutive patients in two cardiac arrest databases were studied between 2007 and 2017. Reasons for death were categorised as refractory post-resuscitation shock (RPRS), hypoxic-ischaemic brain injury (HIBI) and other. We computed the CAHP score, which relies on age, location at OHCA, initial cardiac rhythm, no-flow and low-flow times, arterial pH, and epinephrine dose. We performed survival analyses using the Kaplan-Meier failure function and competing-risks regression. Of 1543 included patients, 987 (64%) died in the ICU, 447 (45%) from HIBI, 291 (30%) from RPRS, and 247 (25%) from other reasons. The proportion of deaths from RPRS increased with CAHP score deciles; the sub-hazard ratio for the tenth decile was 30.8 (9.8-96.5; $p < 0.0001$). The sub-hazard ratio of the CAHP score for predicting death from HIBI was below 5. Higher CAHP score values were associated with a higher proportion of deaths due to RPRS. This score may help to constitute uniform patient populations likely to benefit from interventions assessed in future randomised controlled trials.

7. Cureus. 2023 Mar 7;15(3):e35869. doi: 10.7759/cureus.35869. eCollection 2023 Mar.
The Reliability of the Resuscitation Assessment Tool (RAT) in Assessing Emergency Medicine Resident Competence in Pediatric Resuscitation Scenarios: A Prospective Observational Pilot Study.
Mackenzie MJ(1), Hagel C(1), Lin Y(2)(3), Hall AK(4), Grant VJ(5), Doshi S(5).
ABSTRACT
Introduction Emergency medicine (EM) postgraduate medical education in Canada has transitioned from traditional time-based training to competency-based medical education (CBME). In order to promote residents through stages of training, simulated assessments are needed to evaluate residents in high-stakes but low-frequency medical emergencies. There remains a gap in the literature pertaining to the use of evaluative tools in simulation, such as the Resuscitation Assessment Tool (RAT) in the new CBME curriculum design. Methods We completed a pilot study of resident physicians in one Canadian EM training program to evaluate the effectiveness and reliability of a simulation-based RAT for pediatric resuscitation. We recorded 10 EM trainees completing

simulated scenarios and had nine EM physicians use the RAT tool to evaluate their performances. Generalizability theory was used to evaluate the reliability of the RAT tool. Results The mean RAT score for the management of pediatric myocarditis, cardiac arrest, and septic shock (appendicitis) across raters was 3.70, 3.73, and 4.50, respectively. The overall generalizability coefficient for testing simulated pediatric performance competency was 0.77 for internal consistency and 0.75 for absolute agreement. The performance of senior participants was superior to that of junior participants in the management of pediatric myocarditis ($p = 0.01$) but not statistically significant in the management of pediatric septic shock ($p=0.77$) or cardiac arrest ($p =0.61$). Conclusion Overall, our findings suggest that with an appropriately chosen simulated scenario, the RAT tool can be used effectively for the simulation of high-stakes and low-frequency scenarios for practice to enhance the new CBME curriculum in emergency medicine training programs.

8. J Rural Med. 2023 Apr;18(2):119-125. doi: 10.2185/jrm.2022-041. Epub 2023 Apr 5.
A study of factors associated with the prognosis of cardiac arrest patients in a depopulated area with a high elderly population transported by Shimoda Fire Department.
Takeuchi I(1), Nagasawa H(1), Hamada M(1), Ota S(1), Muramatsu KI(1), Fujita W(1), Yanagawa Y(1).
ABSTRACT
Objective: To investigate the etiology of cardiac arrest in patients living in depopulated rural areas with a high elderly population in the Kamo region. Patients and Methods: We investigated patients with cardiac arrest who were transported by the Shimoda Fire Department between January 2019 and December 2021. The following patients' details were collected: circumstance, age, sex, cause of cardiac arrest, witnessed collapse, chest compression performed by bystanders, oral instruction, use of an automated external defibrillator (AED), initial rhythm, advanced cardiac life support provided by emergency medical technicians, and neurological outcomes. The patients were divided into two groups based on the return of consciousness (RC). We compared the variables above between the two groups. Results: A total of 281 patients with cardiac arrest were included in this study. The participants were predominantly men (59.7%), and the average age was 76 years. AED was applied to eight patients at the scene; however, all eight did not have an initial shockable rhythm. RC was achieved in eight (2.8%) patients. The precise cause of cardiac arrest among the participants who achieved RC was cardiogenic, drowning, and suffocation in three, three, and two cases, respectively. The patients were significantly younger, and the ratio of securing a venous route and airway was significantly lower in the RC (+) group than in the RC (-) group. The ratio of helicopter emergency medical services (HEMS) in the RC (+) group was significantly greater than that in the RC (-) group. Conclusion: This study reported the etiology of cardiac arrest in patients living in a depopulated rural area of Japan with a high elderly population. The usefulness of an AED could not be proven; the cardiogenic cardiac arrest was not dominant among patients who achieved RC, and HEMS transport might be useful for obtaining RC.

POST-CARDIAC ARREST TREATMENTS

No articles identified.

TARGETED TEMPERATURE MANAGEMENT

1. Resuscitation. 2023 Apr 12:109796. doi: 10.1016/j.resuscitation.2023.109796. Online ahead of print.

Change of target temperature from 36°C to strict fever avoidance only in comatose cardiac arrest survivors - A before and after study.

Tirkkonen J(1), Skrifvars MB(2).

ABSTRACT

AIM: The guidelines on temperature control for comatose cardiac arrest survivors were recently changed from recommending targeted temperature management (32-36°C) to fever control (≤37.7℃). We investigated the effect of implementing a strict fever control strategy on prevalence of fever, protocol adherence, and patient outcome in a Finnish tertiary academic hospital. METHODS: Comatose cardiac arrest survivors treated with either mild device-controlled therapeutic hypothermia (≤36℃, years 2020-2021) or strict fever control (≤37℃, year 2022) for the first 36h were included in this before-after cohort study. Good neurological outcome was defined as a cerebral performance category score of 1-2. RESULTS: The cohort consisted of 120 patients (≤36℃ group n=77, ≤37℃ group n=43). Cardiac arrest characteristics, severity of illness scores, and intensive care management including oxygenation, ventilation, blood pressure management and lactate remained similar between the groups. The median highest temperatures for the 36h sedation period were 36.3℃ (≤36℃ group) vs. 37.2℃ (≤37℃ group) (p<0.001). Time of the 36h sedation period spent >37.7℃ was 0.90% vs. 1.1% (p=0.496). External cooling devices were used in 90% vs. 44% of the patients (p<0.001). Good neurological outcome at 30 days was similar between the groups (47% vs. 44%, p=0.787). In multivariable model the ≤37℃ strategy was not associated with any change in outcome (OR 0.88, 95% CI 0.33-2.3). CONCLUSIONS: The implementation strict fever control strategy was feasible and did not result in increased prevalence of fever, poorer protocol adherence, or worse patient outcomes. Most patients in the fever control group did not require external cooling.

2. Perfusion. 2023 May;38(4):666-680. doi: 10.1177/02676591221076286. Epub 2022 May 7.

Contemporary targeted temperature management: Clinical evidence and controversies.

Hillerson DB(1), Laine ME(2), Bissell BD(2), Mefford B(2).

ABSTRACT

Advancements in cardiac arrest and post-cardiac arrest care have led to improved survival to hospital discharge. While survival to hospital discharge is an important clinical outcome, neurologic recovery is also a priority. With the advancement of targeted temperature management (TTM), the American Heart Association guidelines for post-cardiac arrest care recommend TTM in patients who remain comatose after return of spontaneous circulation (ROSC). Recently, the TTM2 randomized controlled trial found no significant difference in neurologic function and mortality at 6-months between traditional hypothermia to 33°C versus 37.5°C. While TTM has been evaluated for decades, current literature suggests that the use of TTM to 33° when compared to a protocol of targeted normothermia does not result in improved outcomes. Instead, perhaps active avoidance of fever may be most beneficial. Extracorporeal cardiopulmonary resuscitation and membrane oxygenation can provide a means of both hemodynamic support and TTM after ROSC. This review aims to describe the pathophysiology, physiologic aspects, clinical trial evidence, changes in post-cardiac arrest care, potential risks, as well as controversies of TTM.

3. Can J Cardiol. 2023 Apr;39(4):385-393. doi: 10.1016/j.cjca.2022.12.026. Epub 2023 Jan 4.

Targeted Temperature Management After Out-of-Hospital Cardiac Arrest: Integrating Evidence Into Real World Practice.

Barker M(1), Sekhon M(2), Krychtiuk KA(3), van Diepen S(4), Alviar CL(5), Granger CB(3), Fordyce CB(6).

ABSTRACT

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

4. J Clin Med. 2023 Mar 31;12(7):2628. doi: 10.3390/jcm12072628.
Optimal Timing of Targeted Temperature Management for Post-Cardiac Arrest Syndrome: Is Sooner Better?
Wang IT(1)(2)(3), Wang CJ(1)(3), Chen CH(1)(3), Yang SH(1)(4), Chen CY(5), Huang YC(6)(7), Lin CY(1)(3), Wu CL(1).
ABSTRACT
Targeted temperature management (TTM) is often considered to improve post-cardiac arrest patients' outcomes. However, the optimal timing to initiate cooling remained uncertain. This retrospective analysis enrolled all non-traumatic post-cardiac arrest adult patients with either out-of-hospital cardiac arrest (OHCA) or in-hospital cardiac arrest (IHCA) who received TTM from July 2015 to July 2021 at our hospital. The values of time delay before TTM and time to target temperature were divided into three periods according to optimal cut-off values identified using receiver operating characteristic curve analysis. A total of 177 patients were enrolled. A shorter time delay before TTM (pre-induction time) was associated with a lower survival chance at 28 days (32.00% vs. 54.00%, p = 0.0279). Patients with a longer cooling induction time (>440 minis) had better neurological outcomes (1.58% vs. 1.05%; p = 0.001) and survival at 28 days (58.06% vs. 29.25%; p = 0.006). After COX regression analysis, the influence of pre-induction time on survival became insignificant, but patients who cooled slowest still had a better chance of survival at 28 days. In conclusion, a shorter delay before TTM was not associated with better clinical outcomes. However, patients who took longer to reach the target temperature had better hospital survival and neurological outcomes than those who were cooled more rapidly. A further prospective study was warranted to evaluate the appropriate time window of TTM.

ELECTROPHYSIOLOGY AND DEFIBRILLATION

1. Acta Inform Med. 2023 Mar;31(1):68-72. doi: 10.5455/aim.2023.31.68-72.
On Occasion of Seventy-five Years of Cardiac Defibrillation in Humans.
Naser N(1)(2).
ABSTRACT
BACKGROUND: Heart attack, or cardiac arrest, became a leading cause of death after the turn of the century. Defibrillation is one of the most important medical advances of the twentieth century. Defibrillation is a critical step in the treatment of cardiac arrest as it can be the only way to restore a normal heart rhythm and save the life of the individual. However, it is important to note that defibrillation is only effective if it is performed quickly and in conjunction with other life-saving measures such as cardiopulmonary resuscitation (CPR). The history of cardiac defibrillation therapy

is long and fascinating, spanning several centuries, many countries and continents. OBJECTIVE: The aim of this article was to provide historical information about technical and scientific advances in cardiac devices and the development of today defibrillators. METHODS: Review of the available literature, historical data, personal contacts, others and personal experience in this field. DISCUSSION: In 1947, Beck published the first paper describing open chest defibrillation of the human heart. Ten years later, Kouwenhoven demonstrated that the heart could be defibrillated through a closed chest. The first external defibrillator weighed 120 kg and delivered 500 v of alternating current (AC) potential. The mere size of the defibrillator restricted its use to surgical suites or other areas hospital locations. In many cases, cardiac arrhythmias recurred. This was thought to be related to the amount of energy used to defibrillate the heart which it was believed caused myocardial damage. These factors limited the practical application of defibrillators. By 1956, a unit was built that could be wheeled into the emergency room, plugged into a wall outlet, and deliver 1000 volts. By 1962, Lown realized that AC current resulted in a high frequency of cardiac arrhythmias and cardiac damage. A direct current (DC) defibrillator, consisting of a battery, a capacitor to store energy, and a transformer was developed. The therapy spread from operating rooms to coronary care units and emergency departments and in the late 1960s left the hospital and started appearing on mobile intensive care units. The first portable EMS defibrillators (used by paramedics) emerged in the early 1970s. In 1980 the automatic implantable cardioverter-defibrillator was invented. Automated external defibrillators began appearing in the late 1980s allowing the therapy to be delivered by EMTs and lay people. The 'father' of the modern automated external defibrillator (AED), Professor James Francis (1916-2004) was a physician and cardiologist from Northern Ireland who transformed emergency medicine and paramedic services with the invention of the portable defibrillator. CONCLUSION: Defibrillators are critical resuscitation devices. The use of reliable defibrillators has led to more effective treatments and improved patient safety through better control and management of complications during Cardiopulmonary Resuscitation (CPR). The 75th anniversary of the world's first successful human cardiac defibrillation represents the landmark event that defined the future of cardiovascular medicine and ushered in a new era of advanced cardiac life support.

PEDIATRICS AND CHILDREN

1. J Clin Med. 2023 Apr 6;12(7):2728. doi: 10.3390/jcm12072728.

Predicting Cardiac Arrest in Children with Heart Disease: A Novel Machine Learning Algorithm.

Yu P(1), Skinner M(2)(3), Esangbedo I(4), Lasa JJ(1)(5), Li X(6), Natarajan S(2), Raman L(1).

ABSTRACT

BACKGROUND: Children with congenital and acquired heart disease are at a higher risk of cardiac arrest compared to those without heart disease. Although the monitoring of cardiopulmonary resuscitation quality and extracorporeal resuscitation technologies have advanced, survival after cardiac arrest in this population has not improved. Cardiac arrest prevention, using predictive algorithms with machine learning, has the potential to reduce cardiac arrest rates. However, few studies have evaluated the use of these algorithms in predicting cardiac arrest in children with heart disease. METHODS: We collected demographic, laboratory, and vital sign information from the electronic health records (EHR) of all the patients that were admitted to a single-center pediatric cardiac intensive care unit (CICU), between 2010 and 2019, who had a cardiac arrest during their CICU admission, as well as a comparator group of randomly selected non-cardiac-arrest controls. We compared traditional logistic regression modeling against a novel adaptation of a machine learning algorithm (functional gradient boosting), using time series data to predict the risk of cardiac arrest. RESULTS: A total of 160 unique cardiac arrest events were matched to non-cardiac-arrest time

periods. Using 11 different variables (vital signs and laboratory values) from the EHR, our algorithm's peak performance for the prediction of cardiac arrest was at one hour prior to the cardiac arrest (AUROC of 0.85 [0.79,0.90]), a performance that was similar to our previously published multivariable logistic regression model. CONCLUSIONS: Our novel machine learning predictive algorithm, which was developed using retrospective data that were collected from the EHR and predicted cardiac arrest in the children that were admitted to a single-center pediatric cardiac intensive care unit, demonstrated a performance that was similar to that of a traditional logistic regression model. While these results are encouraging, future research, including prospective validations with multicenter data, is warranted prior to the implementation of this algorithm as a real-time clinical decision support tool.

2. Eur J Emerg Med. 2023 Apr 5. doi: 10.1097/MEJ.0000000000001024. Online ahead of print.
Association between out-of-hospital cardiac arrest and survival in paediatric traumatic population: results from the French national registry.
Lockhart-Bouron M(1), Baert V(1)(2), Leteurtre S(1), Hubert H(1)(2), Recher M(1).
ABSTRACT
Trauma is an important cause of paediatric out-of-hospital cardiac arrest (OHCA) with a high mortality rate. The first aim of this study was to compare the survival rate at day 30 and at hospital discharge following paediatric traumatic and medical OHCA. The second aim was to compare the rates of return of spontaneous circulation and survival rates at hospital admission (Day 0). This multicentre comparative post-hoc study was conducted between July 2011 and February 2022 based on the French National Cardiac Arrest Registry data. All patients aged <18 years with OHCA were included in the study. Patients with traumatic aetiology were matched with those with medical aetiology using propensity score matching. Endpoint was the survival rate at day 30. There were 398 traumatic and 1061 medical OHCAs. Matching yielded 227 pairs. In non-adjusted comparisons, days 0 and 30 survival rates were lower in the traumatic aetiology group than in the medical aetiology group [19.1% vs. 24.0%, odds ratio (OR) 0.75, 95% confidence interval (CI) 0.56-0.99, and 2.0% vs. 4.5%, OR 0.43, 95% CI, 0.20-0.92, respectively]. In adjusted comparisons, day 30 survival rate was lower in the traumatic aetiology group than in the medical aetiology group (2.2% vs. 6.2%, OR 0.36, 95% CI, 0.13-0.99). In this post-hoc analysis, paediatric traumatic OHCA was associated with a lower survival rate than medical cardiac arrest.

EXTRACORPOREAL LIFE SUPPORT

1. Artif Organs. 2023 Apr 9. doi: 10.1111/aor.14540. Online ahead of print.
The Impact of Levosimendan on Survival and Weaning from ECMO after Extracorporeal Cardiopulmonary Resuscitation.
Gaisendrees C(1), Schlachtenberger G(1), Gefer S(1), Karsivskyi I(1), Djordjevic I(1), Sabashnikov A(1), Kosmopoulos M(2), Jaeger D(3), Luehr M(1), Kuhn E(1), Deppe AC(#)(1), Wahlers T(#)(1).
ABSTRACT
OBJECTIVES: Extracorporeal cardiopulmonary resuscitation (eCPR) is increasingly used due to its beneficial outcomes and results compared to conventional CPR. After cardiac arrest, the overall ejection fraction is severely impaired; thus, weaning from ECMO is often prolonged or impossible. We hypothesized that early application of levosimendan in these patients facilitates ECMO weaning and survival. METHODS: From 2016 until 2020, patients who underwent eCPR after cardiac arrest at our institution were analyzed retrospectively and divided into two groups: patients who received levosimendan during ICU stay (n=24) and those who did not receive levosimendan (n=84) and analyzed for outcome parameters. Furthermore, we used propensity-score matching and multinomial regression analysis to show the effect of levosimendan on outcome parameters.

RESULTS: Overall, in-hospital mortality was significantly lower in the group which received levosimendan (28% vs. 88%, p=<0.01), and ECMO weaning was more feasible in patients that received levosimendan (88% vs. 20%, p=<0.01). CPR duration until ECMO cannulation was significantly shorter in the levosimendan group (44+26 vs. 65+28, p=0.002); interestingly, the rate of mechanical chest compressions before ECMO cannulation was lower in the levosimendan group (50% vs. 69%, p=0.005). CONCLUSION: In patients after cardiac arrest treated with eCPR, Levosimendan seems to contribute to higher success rates of ECMO weaning, potentially due to a short to mid-term increase in inotropy. Also, the survival after Levosimendan application was higher than patients who did not receive levosimendan.

2. Resusc Plus. 2023 Apr 5;14:100387. doi: 10.1016/j.resplu.2023.100387. eCollection 2023 Jun.
Long-term survival, functional capacity and quality of life after refractory out-of-hospital cardiac arrest treated with mechanical circulatory support.
Rasalingam Mørk S(1)(2), Qvist Kristensen L(2)(3), Christensen S(4)(5), Tang M(6), Juhl Terkelsen C(1)(2)(7), Eiskjær H(1)(2).
ABSTRACT
INTRODUCTION: Studies on long-term outcomes after refractory out-of-hospital cardiac arrest (OHCA) treated with mechanical circulatory support (MCS) are limited. This study aimed to evaluate long-term neurologically intact survival, functional capacity and quality of life after refractory OHCA treated with MCS. METHODS: This was a follow-up study of survivors after refractory OHCA treated with MCS. Follow-up examinations comprised clinical assessment with transthoracic echocardiography and cardiopulmonary exercise test (CPX). Neurological and cognitive screening was evaluated with the Cerebral Performance Category (CPC) and Montreal Cognitive Assessment (MoCA test). A good neurological outcome was defined as CPC 1 or CPC 2. Health-related quality of life was measured by questionnaires (Short Form-36 (SF-36)). RESULTS: A total of 101 patients with refractory OHCA were treated with MCS at Aarhus University Hospital between 2015 and 2019. The total low-flow time was median 105 min [IQR, 94-123] minutes. The hospital discharge rate was 27%. At a mean follow-up time of 4.8 years ± 1.6 (range 2.8-6.1 years), 21 patients remained alive of whom 15 consented to participate in the present study. Good neurological outcome with CPC 1-2 was found in 93% (14/15) patients. No severe cognitive function was discovered; mean MoCA score of 26.4 ± 3.1. Functional capacity examined by CPX showed acceptable VO2 max values (23.9 ± 6.3 mL/kg/min). Mean SF-36 scores revealed an overall high level of quality of life in long-term survivors. CONCLUSIONS: Long-term survival with a good neurological outcome with functional recovery was high in patients with refractory OHCA treated with MCS. These patients may expect a reasonable quality of life after discharge despite prolonged resuscitation.

3. Artif Organs. 2023 Apr 12. doi: 10.1111/aor.14548. Online ahead of print.
Higher mean cerebral oxygen saturation shortly after extracorporeal cardiopulmonary resuscitation in patients who regain consciousness.
Mandigers L(1)(2), den Uil CA(1)(2)(3), Belliato M(4), Raemen H(5), Rossi E(6), van Rosmalen J(7)(8), Rietdijk WJR(9), Melis JR(10), Gommers D(1), van Thiel RJ(1), Dos Reis Miranda D(1).
ABSTRACT
INTRODUCTION: In cardiac arrest, cerebral ischaemia and reperfusion injury mainly determine the neurological outcome. The aim of this study was to investigate the relation between the course of cerebral oxygenation and regain of consciousness in patients treated with extracorporeal cardiopulmonary resuscitation (ECPR). We hypothesized that rapid cerebral oxygenation increase causes unfavourable outcomes. METHODS: This prospective observational study was conducted in three European hospitals. We included adult ECPR patients between October 2018 and March 2020, in whom cerebral regional oxygen saturation (rSO2) measurements were started minutes before ECPR initiation until three hours after. The primary outcome was regain of consciousness, defined as following commands, analyzed using binary logistic regression. RESULTS: The sample consisted of 26

ECPR patients (23% women, Agemean 46 years).We found no significant differences in rSO2 values at baseline (49.1% versus 49.3% for regain versus no regain of consciousness). Mean cerebral rSO2 values in the first 30 minutes after ECPR initiation were higher in patients who regained consciousness (38%) than in patients who did not regain consciousness (62%, odds ratio 1.23, 95% confidence interval 1.01-1.50). CONCLUSION: Higher mean cerebral rSO2 values in the first 30 minutes after initiation of ECPR were found in patients who regained consciousness.

4. Can J Cardiol. 2023 Apr;39(4):381-384. doi: 10.1016/j.cjca.2022.12.006. Epub 2022 Dec 13.
A Second Chance for Survival: Clinical Trial Evidence, Eligibility, and Barriers to Implementation of ECPR for Out-of-Hospital Cardiac Arrest.
Grunau B(1), Singh G(2), Bělohlávek J(3), Yannopoulos D(4), Tonna JE(5), Hutin A(6), Nagpal D(7), Cournoyer A(8), van Diepen S(9).
NO ABSTRACT AVAILABLE

5. Am J Emerg Med. 2023 Mar 31;69:58-64. doi: 10.1016/j.ajem.2023.03.047. Online ahead of print.
Are serial neuron-specific enolase levels associated with neurologic outcome of ECPR patients: A retrospective multicenter observational study.
Kim HB(1), Yang JH(2), Lee YH(3).
ABSTRACT
AIM OF THE STUDY: This study aims to evaluate whether neuron-specific enolase (NSE) level at 48 h after extracorporeal cardiopulmonary resuscitation (ECPR) is associated with neurologic outcomes at 6 months after hospital discharge. METHODS: This was a retrospective, multicenter, observational study of adult patients who received ECPR between May 2010 and December 2016. In the two hospitals involved in this study, NSE measurements were a routine part of the protocol for patients who received ECPR. Serial NSE levels were measured in all patients with ECPR. NSE levels were measured 24, 48, and 72 h after ECPR. The primary outcome was Cerebral Performance Categories (CPC) scale at 6 months after hospital discharge according to NSE levels at 48 h after ECPR. RESULTS: At follow-up 6 months after hospital discharge, favorable neurologic outcomes of CPC 1 or 2 were observed in 9 (36.0%) of the 25 patients, and poor neurologic outcomes of CPC 3, 4, or 5 were observed in 16 (64%) patients. NSE levels at 24 h in the favorable and poor neurologic outcome groups were 58.3 (52.5-73.2) μg/L and 64.2 (37.9-89.8) μg/L, respectively ($p = 0.95$). NSE levels at 48 h in the favorable and poor neurologic outcome groups were 52.1 (22.3-64.9) μg/L and 302.0 (62.8-360.2) μg/L, respectively ($p = 0.01$). NSE levels at 72 h were 37.2 (12.5-53.2) μg/L and 240.9 (75.3-370.0) μg/L, respectively ($p < 0.01$). In receiver operating characteristic (ROC) curve analysis, as the predictor of poor outcome, the optimal cut-off value for NSE level at 48 h was 140.5 μg/L, and the area under the curve (AUC) was 0.844 ($p < 0.01$). The optimal cut-off NSE level at 72 h was 53.2 μg/L, and the AUC was 0.897 ($p < 0.01$). CONCLUSIONS: NSE level at 72 h displayed the highest association with neurologic outcome after ECPR, and NSE level at 48 h was also associated with neurologic outcome after ECPR.

6. ASAIO J. 2023 Apr 11. doi: 10.1097/MAT.0000000000001935. Online ahead of print.
Extracorporeal Rewarming Is Associated With Increased Survival Rate in Severely Hypothermic Patients With Preserved Spontaneous Circulation.
Podsiadło P(1), Smoleń A(2), Brożek T(3), Kosiński S(4), Balik M(3), Hymczak H(5), Cools E(6), Walpoth B(7), Nowak E(8), Dąbrowski W(9), Miazgowski B(10), Witt-Majchrzak A(11), Jędrzejczak T(12), Reszka K(13), Segond N(14), Debaty G(14), Dudek M(15), Górski S(16), Darocha T(17).
ABSTRACT
Treatment recommendations for rewarming patients in severe accidental hypothermia with preserved spontaneous circulation have a weak evidence due to the absence of randomized clinical trials. We aimed to compare the outcomes of extracorporeal versus less-invasive rewarming of severely hypothermic patients with preserved spontaneous circulation. We conducted a multicenter

retrospective study. The patient population was compiled based on data from the HELP Registry, the International Hypothermia Registry, and a literature review. Adult patients with a core temperature <28°C and preserved spontaneous circulation were included. Patients who underwent extracorporeal rewarming were compared with patients rewarmed with less-invasive methods, using a matched-pair analysis. The study population consisted of 50 patients rewarmed extracorporeally and 85 patients rewarmed with other, less-invasive methods. Variables significantly associated with survival included: lower age; outdoor cooling circumstances; higher blood pressure; higher PaCO2; higher BE; higher HCO3; and the absence of comorbidities. The survival rate was higher in patients rewarmed extracorporeally ($p = 0.049$). The relative risk of death was twice as high in patients rewarmed less invasively. Based on our data, we conclude that patients in severe accidental hypothermia with circulatory instability can benefit from extracorporeal rewarming without an increased risk of complications.

EXPERIMENTAL RESEARCH

1. IEEE Trans Ultrason Ferroelectr Freq Control. 2023 Apr 12;PP. doi: 10.1109/TUFFC.2023.3265800. Online ahead of print.

Neurovascular hypoxia trajectories assessed by photoacoustic imaging in a murine model of cardiac arrest and resuscitation.

Salvas JP, Leyba KA, Schepers LE, Paiyabhroma N, Goergen CJ, Sicard P.

ABSTRACT

Cardiac arrest is a common cause of death annually mainly due to post cardiac arrest syndrome that leads to multiple organ global hypoxia and dysfunction after resuscitation. The ability to quantify vasculature changes and tissue oxygenation is crucial to adapt patient treatment in order to minimize major outcomes after resuscitation. For the first time, we applied high resolution ultrasound associated with photoacoustic imaging to track neurovascular oxygenation and cardiac function trajectories in a murine model of cardiac arrest and resuscitation. We report preservation of brain oxygenation is greater compared to that in peripheral tissues during arrest. Furthermore, distinct patterns of cerebral oxygen decay may relate to the support of vital brain functions. Additionally, we followed trajectories of cerebral perfusion and cardiac function longitudinally after induced cardiac arrest and resuscitation. Volumetric cerebral oxygen saturation decreased 24 hours post arrest, but these levels rebounded at one week. However, systolic and diastolic cardiac dysfunction persisted throughout and correlated with cerebral hypoxia. Pathophysiologic biomarker trends, identified via cerebral photoacoustic imaging in preclinical models, could provide new insights in understanding the physiopathology of cardiac arrest and resuscitation.

CASE REPORTS

1. J Emerg Med. 2023 Mar 14:S0736-4679(23)00152-X. doi: 10.1016/j.jemermed.2023.03.051. Online ahead of print.

Intra-Cardiac Arrest Use of Stellate Ganglion Block for Refractory Ventricular Tachycardia.

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ABSTRACT

BACKGROUND: Refractory ventricular dysrhythmia, or electrical storm, is a cardiac condition consisting of three or more episodes of ventricular dysrhythmia resistant to treatment within a 24-hour period. These dysrhythmias carry high morbidity and mortality if not diagnosed and abated promptly. When traditional resuscitative algorithms fail to return a patient to a perfusing rhythm, providers need to consider other, more novel techniques to terminate these dangerous

dysrhythmias. One approach is the use of a stellate ganglion block, which has been documented in the literature only a handful of times for its resuscitative use in cardiac arrest. CASE SERIES: This case series details two cases from an urban emergency department (ED) in a large metropolitan city, where the use of ultrasound-guided stellate ganglion blocks during cardiac arrest provided successful ablation of the tachydysrhythmia. The first case involves a patient who went into cardiac arrest while in the ED and was found to be in refractory pulseless ventricular tachycardiawhile. The second case describes a patient who went into a witnessed out-of-hospital cardiac arrest while with emergency medical services. WHY SHOULD AN EMERGENCY PHYSICIAN BE AWARE OF THIS?: The stellate ganglion block is a procedure currently being used as a treatment modality for a variety of neurologic, psychological, and cardiac conditions. This intervention may provide a viable and lifesaving option for emergency physicians to adopt when traditional resuscitative algorithms fail to break resistant ventricular tachydysrhythmias.