This week's PubMed 11th – 17th June 2023: articles of interest n = 52

CPR AND COVID-19

No articles identified.

CPR/MECHANICAL CHEST COMPRESSION

1. Zhonghua Wei Zhong Bing Ji Jiu Yi Xue. 2023 Apr;35(4):362-366. doi: 10.3760/cma.j.cn121430-20230221-00160.

[Effects of mechanical cardiopulmonary resuscitation during vertical spatial pre-hospital transport in patients with cardiac arrest: a historical cohort study]. [Article in Chinese]

Hu J(1), Xu X, Hu C, Xia S, Xu L.

ABSTRACT

OBJECTIVE: To analyze the effect of mechanical cardiopulmonary resuscitation (CPR) on patients with cardiac arrest with the vertical spatial pre-hospital emergency transport. METHODS: A retrospective cohort study was conducted. The clinical data of 102 patients with out-of-hospital cardiac arrest (OHCA) who were transferred to the emergency medicine department of Huzhou Central Hospital from the Huzhou Emergency Center from July 2019 to June 2021 were collected. Among them, the patients who performed artificial chest compression during the pre-hospital transfer from July 2019 to June 2020 served as the control group, and the patients who performed artificial-mechanical chest compression (implemented artificial chest compression first, and implemented mechanical chest compression immediately after the mechanical chest compression device was ready) during pre-hospital transfer from July 2020 to June 2021 served as the observation group. The clinical data of patients of the two groups were collected, including basic data (gender, age, etc.), pre-hospital emergency process evaluation indicators [chest compression fraction (CCF), total CPR pause time, pre-hospital transfer time, vertical spatial transfer time], and in-hospital advanced resuscitation effect evaluation indicators [initial end-expiratory partial pressure of carbon dioxide (PETCO2), rate of restoration of spontaneous circulation (ROSC), time of ROSC]. RESULTS: Finally, a total of 84 patients were enrolled, including 46 patients in the control group and 38 in the observation group. There was no significant difference in gender, age, whether to accept bystander resuscitation or not, initial cardiac rhythm, time-consuming pre-hospital emergency response, floor location at the time of onset, estimated vertical height, and whether there was any vertical transfer elevator/escalator, etc. between the two groups. In the evaluation of the pre-hospital emergency process, the CCF during the pre-hospital emergency treatment of patients in the observation group was significantly higher than that in the control group [69.05% (67.35%, 71.73%) vs. 61.88% (58.18%, 65.04%), $P < 0.01$], the total pause time of CPR was significantly shorter than that in the control group [s: 266 (214, 307) vs. 332 (257, 374), $P < 0.05$]. However, there was no significant difference in the pre-hospital transfer time and vertical spatial transfer time between the observation group and the control group [pre-hospital transfer time (minutes): 14.50 (12.00, 16.75) vs. 14.00 (11.00, 16.00), vertical spatial transfer time (s): 32.15±17.43 vs. 27.96±18.67, both $P >0.05$]. It indicated that mechanical CPR could improve the CPR quality in the process of pre-hospital first aid, and did not affect the transfer of patients by pre-hospital emergency medical personnel. In the evaluation of the in-hospital advanced resuscitation effect, the initial PETCO2 of the patients in the observation group was significantly higher than that of the patients in the control group [mmHg (1 mmHg ≈ 0.133 kPa): 15.00 (13.25, 16.00) vs. 12.00 (11.00, 13.00), $P < 0.01$], the time of ROSC was significantly shorter than that in the control group (minutes: 11.00±3.25 vs. 16.64±2.54, $P < 0.01$), and the rate of ROSC was slightly higher than that in the control group (31.58% vs. 23.91%, $P > 0.05$). It indicated that continuous mechanical compression during pre-hospital transfer helped to ensure

continuous high-quality CPR. CONCLUSIONS: Mechanical chest compression can improve the quality of continuous CPR during the pre-hospital transfer of patients with OHCA, and improve the initial resuscitation outcome of patients.

REGISTRIES, REVIEWS AND EDITORIALS

1. Resuscitation. 2023 Jun 14:109871. doi: 10.1016/j.resuscitation.2023.109871. Online ahead of print.

Resuscitation of older adults in Norway; a comparison of survival and outcome after out-of-hospital cardiac arrest in healthcare institutions and at home.

Karina V Harring A(1), Kramer-Johansen J(2), Tjelmeland IBM(2).

ABSTRACT

BACKGROUND: Perceptions about expected outcome after out-of-hospital cardiac arrest (OHCA) influence treatment decisions, and there is a need for updated evidence about outcomes for the elderly. METHOD: We conducted a cross-sectional study of cases reported to the Norwegian Cardiac Arrest Registry from 2015 through 2021 of patients 60 years and older, suffering cardiac arrest in healthcare institutions or at home. We examined reasons for emergency medical service (EMS) withholding or withdrawing resuscitation. We compared survival and neurological outcome for EMS-treated patients and explored factors associated with survival using multivariate logistic regression. RESULT: We included 12,191 cases and the EMS started resuscitation in 10,340 (85%). The incidence per capita of OHCA the EMS were alerted to was 267/100,000 in healthcare institutions and 134/100,000 at home. Resuscitation was most frequently withdrawn due to medical history (n= 1251). In healthcare institutions, 72 of 1503 (4.8%) patients survived to 30 days compared to 752 of 8837 (8.5%) at home (P<.001). We found survivors in all age cohorts both in healthcare institutions and at home, and most of the 824 survivors had a good neurological outcome with a Cerebral Performance Category ≤2 (88%). CONCLUSION: Medical history was the most frequent reason for EMS not to start or continue resuscitation, indicating a need for a discussion about, and documentation of, advance directives in this age group. When EMS attempted resuscitation, most survivors had a good neurological outcome, both in healthcare institutions and at home.

2. Resuscitation. 2023 Jun 14:109872. doi: 10.1016/j.resuscitation.2023.109872. Online ahead of print.

Outcomes after Out-of-Hospital Cardiac Arrest in Immigrants vs Natives in Denmark.

Rajan D(1), Garcia R(2), Barcella CA(3), Svane J(4), Warming PE(4), Jabbari R(4), Gislason GH(5), Torp-Pedersen C(6), Folke F(7), Tfelt-Hansen J(8).

ABSTRACT

AIMS: Ethnic disparities subsist in out-of-hospital cardiac arrest (OHCA) outcomes in the US, yet it is unresolved whether similar inequalities exist in European countries. This study compared survival after OHCA and its determinants in immigrants and non-immigrants in Denmark. METHODS: Using the nationwide Danish Cardiac Arrest Register, 37,622 OHCAs of presumed cardiac cause between 2001 and 2019 were included, 95% in non-immigrants and 5% in immigrants. Univariate and multiple logistic regression was used to assess disparities in treatments, return of spontaneous circulation (ROSC) at hospital arrival, and 30-day survival. RESULTS: Immigrants were younger at OHCA (median 64 [IQR 53-72] vs 68 [59-74] years; p<0.05), had more prior myocardial infarction (15% vs 12%, p<0.05), more diabetes (27% vs 19%, p<0.05), and were more often witnessed (56% vs 53%; p<0.05). Immigrants received similar bystander cardiopulmonary resuscitation and defibrillation rates to non-immigrants, but more coronary angiographies (15% vs 13%; p<0.05) and percutaneous coronary

interventions (10% vs 8%, p<0.05), although this was insignificant after age-adjustment. Immigrants had higher ROSC at hospital arrival (28% vs 26%; p<0.05) and 30-day survival (18% vs 16%; p<0.05) compared to non-immigrants, but adjusting for age, sex, witness status, first observed rhythm, diabetes, and heart failure rendered the difference non-significant (odds ratios (OR) 1.03, 95% confidence interval (CI) 0.92-1.16 and OR 1.05, 95% CI 0.91-1.20, respectively). CONCLUSIONS: OHCA management was similar between immigrants and non-immigrants, resulting in similar ROSC at hospital arrival and 30-day survival after adjustments.

3. Resuscitation. 2023 Jun 12:109865. doi: 10.1016/j.resuscitation.2023.109865. Online ahead of print.
Cardiac arrest centres: what do they add?
Wilcox J(1), Redwood S(2), Patterson T(3).
ABSTRACT
There are wide regional variations in outcome following resuscitated out of hospital cardiac arrest. These geographical differences appear to be due to hospital infrastructure and provider experience rather than baseline characteristics. It is proposed that post-arrest care be delivered in a systematic fashion by concentrating services in Cardiac Arrest Centres, with greater provider experience, 24-hour access to diagnostics, and specialist treatment to minimise the impact of ischaemia-reperfusion injury and treat the causative pathology. These cardiac arrest centres would provide access to targeted critical care, acute cardiac care, radiology services and appropriate neuro-prognostication. However implementation of cardiac arrest networks with specialist receiving hospitals is complex and requires alignment of pre-hospital care services with those delivered in hospital. Furthermore there are no randomised trial data currently supporting pre-hospital delivery to a Cardiac Arrest Centre and definitions are heterogeneous. In this review article, we propose a universal definition of a Cardiac Arrest Centre and review the current observational data evidence and the potential impact of the ARREST trial.

4. Zhonghua Xin Xue Guan Bing Za Zhi. 2023 Jun 24;51(6):684-690. doi: 10.3760/cma.j.cn112148-20230407-00201.
[Application and implication of Utstein-style registry for out-of-hospital cardiac arrest: what to do in China?]. [Article in Chinese; Abstract available in Chinese from the publisher]
NO ABSTRACT AVAILABLE

5. Circulation. 2023 Jun 13;147(24):1852-1853. doi: 10.1161/CIRCULATIONAHA.123.064051. Epub 2023 Jun 12.
Response by Roedl et al to Letter Regarding Article, "Temperature Control After In-Hospital Cardiac Arrest: A Randomized Clinical Trial".
Roedl K(1), Wolfrum S(2), Kluge S(1).
NO ABSTRACT AVAILABLE

6. Circulation. 2023 Jun 13;147(24):1851. doi: 10.1161/CIRCULATIONAHA.122.063485. Epub 2023 Jun 12.
Letter by Zhu et al Regarding Article, "Temperature Control After In-Hospital Cardiac Arrest: A Randomized Clinical Trial".
Zhu Md J(1), Zheng Md Z(1), Peng X(1).
NO ABSTRACT AVAILABLE

7. J Crit Care. 2023 Jun 9:154347. doi: 10.1016/j.jcrc.2023.154347. Online ahead of print.

Letter to the Editor: "Association between metformin and survival outcomes in in-hospital cardiac arrest patients with diabetes".
Honore PM(1), Bousbiat I(2), Perriens E(2), Blackman S(2).
NO ABSTRACT AVAILABLE

IN-HOSPITAL CARDIAC ARREST

1. J Hosp Med. 2023 Jun 12. doi: 10.1002/jhm.13149. Online ahead of print.
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 OUTCOMES 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. Emerg Med Australas. 2023 Jun 16. doi: 10.1111/1742-6723.14257. Online ahead of print.
Definitive management of near-hanging at major versus non-major trauma centres.
Mitra B(1)(2), Maiden MJ(3)(4)(5)(6), Read D(6)(7), Nehme Z(2)(8), Bernard S(2)(8), Cameron PA(1)(2).
ABSTRACT
OBJECTIVES: The Victorian State Trauma System recommends that all major trauma patients receive definitive care at a major trauma service (MTS). The aim of the present study was to assess the outcomes of patients with major trauma after near-hangings who received definitive management at an MTS compared to a non-MTS. METHODS: This was a registry-based cohort study of all adult (age ≥16 years) patients with near-hanging included in the Victorian State Trauma Registry from 1 July 2010 to 30 June 2019. Outcomes of interest were death at hospital discharge, time to death and

extended Glasgow Outcome Scale (GOSE) score of 5-8 (favourable) at 6 months. RESULTS: There were 243 patients included and 134 (55.1%) in-hospital deaths. Among patients presenting to a non-MTS, 24 (16.8%) were transferred to an MTS. There were 59 (47.6%) deaths at an MTS and 75 (63.0%) at a non-MTS (odds ratio [OR] 0.53; 95% confidence interval [CI] 0.32-0.89). However, more patients were managed at a non-MTS after out-of-hospital cardiac arrest (58.8% vs 50.8%) and less patients had serious neck injury (0.8% vs 11.3%). After adjustment for out-of-hospital cardiac arrests and serious neck injury, management at an MTS was not associated with mortality (adjusted OR [aOR] 0.61; 95% CI 0.23-1.65) or favourable GOSE at 6 months (aOR 1.09; 95% CI 0.40-3.03). CONCLUSIONS: After major trauma sustained from near-hanging, definitive management at an MTS did not offer a mortality benefit or better functional outcomes. Consistent with current practice, these findings suggest that most near-hanging related major trauma patients could be managed safely at a non-MTS.

2. J Hazard Mater. 2023 Jun 10;457:131829. doi: 10.1016/j.jhazmat.2023.131829. Online ahead of print.

Fine and coarse particulate air pollution and out-of-hospital cardiac arrest onset: a nationwide case-crossover study in China.

Pan C(1), Xu C(2), Zheng J(1), Song R(1), Lv C(3), Zhang G(4), Tan H(5), Ma Y(6), Zhu Y(7), Han X(7), Li C(8), Yan S(4), Zheng W(1), Wang C(1), Zhang J(1), Bian Y(1), Ma J(1), Cheng K(1), Liu R(1), Hou Y(1), Chen Q(1), Zhao X(1), McNally B(9), Chen R(2), Kan H(2), Meng X(10), Chen Y(11), Xu F(12).

ABSTRACT

Out-of-hospital cardiac arrest (OHCA) is a global public health concern. Nationwide studies on the effects of short-term exposure to particulate matter (PM) on OHCA risk are rare in regions with high PM levels, and evidence for coarse PM (PM2.5-10) is limited and inconsistent. To evaluate the associations between fine PM (PM2.5) and PM2.5-10 and OHCA onset, a time-stratified case-crossover study was conducted on 77,261 patients with cardiac OHCA in 26 cities across China in 2020. Daily PM2.5 and PM2.5-10 concentrations were assessed with high-resolution and full-coverage PM estimations. Conditional logistic regression models were applied in analyses. Each interquartile range of PM increase in 3-day moving average was associated with an increased risk of cardiac OHCA onset of 2.37% (95% CI, 1.20-3.56%) for PM2.5 and 2.12% (95% CI, 0.70-3.56%) for PM2.5-10. Stratified analyses showed higher susceptibility in patients over 75 years for PM2.5 exposure and with diabetes for PM2.5-10. This first nationwide study in region with high PM levels and great PM variability found not only PM2.5 but also PM2.5-10 were associated with a higher risk of OHCA onset, which could add powerful epidemiological evidence to this field and provide new evidence for the formulation of air quality guidelines.

3. Zhonghua Wei Zhong Bing Ji Jiu Yi Xue. 2023 Apr;35(4):367-370. doi: 10.3760/cma.j.cn121430-20220620-00588.

[Analysis of relevant factors influencing the 30-day survival rate of patients with cardiac arrest and cardiopulmonary resuscitation: research based on 8-year data of a class III hospital].

[Article in Chinese]

Ma X(1), Guo B, Wang Y, Li N, Shen L, Xi W, Hai K.

ABSTRACT

OBJECTIVE: To investigate the survival of patients with cardiac arrest and cardiopulmonary resuscitation (CA-CPR), and to analyze the factors influencing survival at 30 days after restoration of spontaneous circulation (ROSC). METHODS: A retrospective cohort study was conducted. Clinical data of 538 patients with CA-CPR admitted to the People's Hospital of Ningxia Hui Autonomous

Region from January 2013 to September 2020 were enrolled. The gender, age, underlying disease, cause of CA, type of CA, initial rhythm, presence or absence of endotracheal intubation, defibrillation, use of epinephrine, and 30-day survival rate of patients were collected. The etiology of CA and 30-day survival rate among patients with different ages were compared, as well as the clinical data between patients who survived and died at 30 days after ROSC were also compared. Multivariate Logistic regression was used to analyze the relevant factors affecting the 30-day survival rate of patients. RESULTS: Among 538 patients with CA-CPR, 67 patients with incomplete information were excluded, and 471 patients were enrolled. Among 471 patients, 299 were males and 172 were females. Aged from 0 to 96 years old, 23 patients (4.9%) were < 18 years old, 205 patients (43.5%) were 18 to 64 years old, and 243 patients (51.6%) were ≥ 65 years old. 302 cases (64.1%) achieved ROSC, and 46 patients (9.8%) survived for more than 30 days. The 30-day survival rate of patients aged < 18 years old, 18-64 years old and ≥ 65 years old was 8.7% (2/23), 12.7% (26/205) and 7.4% (18/243), respectively. The main causes of CA in patients younger than 18 years were severe pneumonia (13.1%, 3/23), respiratory failure (13.1%, 3/23), and trauma (13.1%, 3/23). The main causes were acute myocardial infarction (AMI; 24.9%, 51/205), respiratory failure (9.8%, 20/205), and hypoxic brain injury (9.8%, 20/205) in patients aged 18-64 years old, and AMI (24.3%, 59/243) and respiratory failure (13.6%, 33/243) in patients aged ≥ 65 years old. Univariate analysis results revealed that the 30-day survival rate of patients with CA-CPR may be related to the the cause of CA was AMI, initial rhythm was ventricular tachycardia/ventricular fibrillation, endotracheal intubation and epinephrine. Multivariate Logistic regression analysis results showed that CA was caused by AMI [odds ratio (OR) = 0.395, 95% confidence interval (95%CI) was 0.194-0.808, P = 0.011] and endotracheal intubation (OR = 0.423, 95%CI was 0.204-0.877, P = 0.021) was a protective factor for 30 days of survival after ROSC in patients with CA-CPR. CONCLUSIONS: The 30-day survival rate of CA-CPR patients was 9.8%. The 30-day survival rate of CA-CPR patients with AMI after ROSC is higher than that of patients with other CA causes, and early endotracheal intubation can improve the prognosis of patients.

4. Prehosp Disaster Med. 2023 Jun;38(3):326-331. doi: 10.1017/S1049023X23000353. Epub 2023 Mar 20.

Characteristics and Outcomes of Emergency Transferred Patients with Foreign Body Airway Obstruction in Tokyo, Japan.

Suga R(1), Igarashi Y(2), Norii T(3), Kogure T(4), Kamimura H(2), Yoshino Y(2), Suzuki K(1), Yokobori S(2), Ogawa S(1), Yokota H(1).

ABSTRACT

INTRODUCTION: Foreign body airway obstruction (FBAO) is a life-threatening emergency, and the prognosis of patients with FBAO is greatly affected by the prehospital process. There are only a few large-scale studies analyzing prehospital process databases of the fire department. STUDY OBJECTIVE: The aim of this study was to investigate whether characteristics of patients with FBAO were associated with prehospital factors and outcomes. METHODS: In this retrospective observational study, patients transferred to the hospital by the Tokyo, Japan Fire Department for FBAO from 2017 through 2019 were included. The association between neurologically favorable survival among the characteristics of patients with FBAO and prehospital factors affecting the outcomes was evaluated. RESULTS: Of the 2,429,175 patients, 3,807 (0.2%) patients had FBAO. The highest number of FBAO cases was 99 (2.6%), which occurred on January 1 (New Year's Day), followed by 40 cases (1.1%) on January 2, and 28 cases (0.7%) on January 3. The number of patients who experienced out-of-hospital cardiac arrest (OHCA) caused by FBAO was 1,644 (43.2%). Comparing the OHCA and non-OHCA groups, there were significant differences in age, sex, time spent at the site, and distance between the site and hospital. Cardiac arrest was significantly lower

in infants after FBAO (P < .001). In total, 98.2% of patients who did not have return of spontaneous circulation (ROSC) before hospital arrival died within 30 days, a significantly higher mortality rate than that in patients who had ROSC (98.2% versus 65.8%; P < .001). CONCLUSIONS: Among patients who did not have ROSC following FBAO upon arrival at the hospital, 98.2% died within 30 days. Thus, it is important to remove foreign bodies promptly and provide sufficient ventilation to the patient at the scene to increase the potential for ROSC. Further, more precautions should be exercised to prevent FBAO at the beginning of the year.

END-TIDAL CO_2

No articles identified.

ORGAN DONATION

1. Resuscitation. 2023 Jun 9:109863. doi: 10.1016/j.resuscitation.2023.109863. Online ahead of print.

Influence of donor capnometry on renal graft evolution in uncontrolled donation after circulatory death.

Rubio-Chacón C(1), Mateos-Rodríguez A(2), Neria-Serrano F(3), Del Rio-Gallegos F(4), Andrés-Belmonte A(5).

ABSTRACT

AIM: To analyse the association between donor capnometry data and the short-term evolution of kidney grafts in cases of uncontrolled donation after circulatory death (uDCD). METHOD: We used an ambispective observational study design, conducted in the Community of Madrid between January and December 2019, inclusive. Patients who suffered out-of-hospital cardiac arrest (CA) with no response to advanced cardiopulmonary resuscitation (CPR) were selected as potential donors. Donor capnometry levels were measured at the start, midpoint and transfer to hospital then compared with indicators of renal graft evolution. RESULTS: The initial selection included 34 possible donors, of which 12 (35.2%) were viable donors from whom 22 (32.3%)kidneys were recovered. There was a correlation between the highest capnometry values and less need for post-transplant dialysis (≥24 mmHg, p< 0.017), fewer dialysis sessions and fewer days to recover correct renal function (Rho -0.47, p< 0.044). There was a significant inverse correlation between the capnometry values at transfer and 1-month post-transplant creatinine levels (Rho -0.62, p< 0.033). There were no significant differences between the capnometry values at transfer and primary nonfunction (PNF) or warm ischaemia time. One-year patient survival was 100% for patient receiving organ donation, while graft survival was 95%. CONCLUSIONS: Capnometry levels at transfer are a useful predictor of the short-term function and viability of kidney transplants from uncontrolled donations after circulatory death.

FEEDBACK

No articles identified.

DRUGS

1. Crit Care Med. 2023 Jul 1;51(7):903-912. doi: 10.1097/CCM.0000000000005846. Epub 2023 Apr 4.

The Effect of Time to Treatment With Antiarrhythmic Drugs on Survival and Neurological Outcomes in Shock Refractory Out-of-Hospital Cardiac Arrest.

Rahimi M(1), Dorian P(1), Cheskes S(1)(2)(3)(4), Lebovic G(5)(6), Lin S(1)(7).

ABSTRACT

OBJECTIVES: Examining the association of time to treatment (drug or placebo) with survival to hospital discharge and neurologic outcome. DESIGN: Post hoc analysis of the Resuscitation Outcomes Consortium Amiodarone, Lidocaine, Placebo randomized controlled trial. SETTING: Emergency medical services enrolled patients with out-of-hospital cardiac arrest (OHCA) at multiple North American sites. PATIENTS: Adults with nontraumatic OHCA and an initial rhythm of ventricular fibrillation or pulseless ventricular tachycardia refractory to at least one defibrillation attempt were included. INTERVENTIONS: None. MEASUREMENTS AND MAIN RESULTS: We used logistic regression to examine the association of time to treatment with survival to hospital discharge and favorable neurologic status at discharge (modified Rankin Scale ≤ 3) for the three treatment groups including an interaction term between treatment and time to treatment to determine the effect of time on treatment effects. Time to treatment data were available for 2,994 out of 3,026 patients (99%). The proportion of patients who survived to hospital discharge decreased as time to drug administration increased, in amiodarone (odds ratio [OR], 0.91; 95% CI, 0.90-0.93 per min), lidocaine (OR, 0.93; 95% CI, 0.91-0.96), and placebo (OR, 0.91; 95% CI, 0.90-0.93). Comparing amiodarone to placebo, there was improved survival at all times of drug administration (OR, 1.32; 95% CI, 1.05-1.65). Comparing lidocaine to placebo, survival was not different with shorter times to drug administration (< 11 min), whereas survival was higher with lidocaine at longer times to drug administration with an interaction between treatment effect and time to treatment (p = 0.048). Survival with good neurologic outcome showed similar results for all analyses. CONCLUSIONS: Survival and favorable neurologic outcomes decreased with longer times to drug administration. Amiodarone improved survival at all time points whereas lidocaine improved survival only at later time points, compared with placebo.

2. Resusc Plus. 2023 Jun 7;14:100405. doi: 10.1016/j.resplu.2023.100405. eCollection 2023 Jun.

The impact of time to amiodarone administration on survival from out-of-hospital cardiac arrest.

Perry E(1)(2), Nehme E(1)(3), Stub D(1)(3)(4), Anderson D(1)(2)(3)(4), Nehme Z(1)(2)(3).

ABSTRACT

AIM: To examine the impact of time to amiodarone administration on survival from shock-refractory Ventricular Fibrillation/pulseless Ventricular Tachycardia (VF/pVT) following out-of-hospital cardiac arrest (OHCA). METHODS: A retrospective cohort study of adult (≥16 years) OHCA patients in shock-refractory VF/pVT (after 3 consecutive defibrillation attempts) of medical aetiology who arrested between January 2010 and December 2019. Time-dependent propensity score matching was used to sequentially match patients who received amiodarone at any given minute of resuscitation with patients eligible to receive amiodarone during the same minute. Log-binomial regression models were used to assess the association between time of amiodarone administration (by quartiles of time-to-matching) and survival outcomes. RESULTS: A total of 2,026 patients were included, 1,393 (68.8%) of whom received amiodarone with a median (interquartile range) time to administration of 22.0 (18.0-27.0) minutes. Propensity score matching yielded 1,360 matched pairs. Amiodarone administration within 28 minutes of the emergency call was associated with a higher likelihood of return of spontaneous circulation (ROSC) (≤18minutes: RR = 1.03 (95%CI 1.02, 1.04); 19-22minutes: RR = 1.02 (95%CI 1.01, 1.03); 23-27minutes: RR = 1.01 (95%CI 1.00, 1.02)) and event survival (pulse on hospital arrival) (≤18 minutes: RR = 1.05 (95%CI 1.03, 1.07); 19-22 minutes: RR = 1.03 (95%CI 1.01, 1.05); 23-27 minutes: RR = 1.02 (95%CI 1.00, 1.03). Amiodarone administration within 23 minutes of the emergency call was associated with a higher likelihood of survival to hospital discharge (≤18minutes: RR = 1.17 (95%CI 1.09, 1.24; 19-22 minutes: RR = 1.10 (95%CI 1.04, 1.17).

CONCLUSION: Amiodarone administered within 23 minutes of the emergency call is associated with improved survival outcomes in shock-refractory VF/pVT, although prospective trials are required to confirm these findings.

3. ACS Omega. 2023 May 25;8(22):19425-19432. doi: 10.1021/acsomega.3c00555. eCollection 2023 Jun 6.

Determination of Exogenous Adrenaline Levels in Patients Undergoing Cardiopulmonary Resuscitation.

Altuntaş M(1), Altuntaş DB(2), Aslan S(3), Yılmaz E(4), Nalbant E(1).

ABSTRACT

Core-shell quantum dot ZnS/CdSe screen-printed electrodes were used to electrochemically measure human blood plasma levels of exogenous adrenaline administered to cardiac arrest patients. The electrochemical behavior of adrenaline on the modified electrode surface was investigated using differential pulse voltammetry (DPV), cyclic voltammetry, and electrochemical impedance spectroscopy (EIS). Under optimal conditions, the linear working ranges of the modified electrode were 0.001-3 μM (DPV) and 0.001-300 μM (EIS). The best limit of detection for this concentration range was 2.79 × 10-8 μM (DPV). The modified electrodes showed good reproducibility, stability, and sensitivity and successfully detected adrenaline levels.

TRAUMA

No articles identified.

VENTILATION

1. Resusc Plus. 2023 Jun 2;14:100404. doi: 10.1016/j.resplu.2023.100404. eCollection 2023 Jun.

The impact of a ventilation timing light on CPR Quality: A randomized crossover study.

Jones B(1), Aiello S(1), Govender K(1), Shaw B(1), Tseng B(1), Dawad Z(1), McAulay M(1), Wilkinson N(1).

ABSTRACT

A ventilation timing light (VTL) is a small commercially available single-use device that is programmed to light up at six-second intervals prompting rescuers to provide a single controlled breath during manual ventilation. The device also indicates the duration of the breath by remaining illuminated for the duration of the inspiratory time. The aim of this study was to evaluate the impact of the VTL on a selection of CPR quality metrics. METHODS: A total of 71 paramedic students who were already proficient in performing high-performance CPR (HPCPR) were required to perform HPCPR with and without a VTL. The quality of the HPCPR delivered, reflected by the selected quality metrics; chest compression fraction (CCF), chest compression rate (CCR), and ventilation rate (VR), was then evaluated. RESULTS: While HPCPR with and without a VTL were both able to achieve guideline-based performance targets of CCF, CCR, and VR, the group who had used the VTL to deliver HPCPR were able to consistently provide 10 ventilations for every minute of asynchronous compressions (10 breath/min vs 8.7 breath/min $p < 0.001$). CONCLUSION: The use of a VTL allows for a VR target of 10 ventilations per minute to be consistently achieved without compromising guideline-based compression fraction targets (>80%), and chest compression rates when used during the delivery of HPCPR in a simulated OHCA event.

CERERBRAL MONITORING

No articles identified.

ULTRASOUND AND CPR

1. Am J Emerg Med. 2023 Jun 7;70:157-162. doi: 10.1016/j.ajem.2023.05.045. Online ahead of print.
Comparison of carotid artery ultrasound and manual method for pulse check in cardiopulmonary resuscitation.
Özlü S(1), Bilgin S(1), Yamanoglu A(2), Kayalı A(1), Efgan MG(1), Çınaroğlu OS(1), Tekyol D(3).
ABSTRACT
OBJECTIVES: The success of the manual pulse check method frequently employed during cardiopulmonary resuscitation (CPR) is controversial due to its subjective, patient- and operator-dependent, and time-consuming nature. Carotid ultrasound (c-USG) has recently emerged as an alternative, although there are still insufficient studies on the subject. The purpose of the present study was to compare the success of the manual and c-USG pulse check methods during CPR. METHODS: This prospective observational study was conducted in the critical care area of a university hospital emergency medicine clinic. Pulse checks in patients with non-traumatic cardiopulmonary arrest (CPA) undergoing CPR were performed using the c-USG method from one carotid artery and the manual method from the other. The gold standard in the decision regarding return of spontaneous circulation (ROSC) was the clinical judgment made using the rhythm on the monitor, manual femoral pulse check, end tidal carbon dioxide (ETCO2), and cardiac USG instruments. The success in predicting ROSC and measurement times of the manual and c-USG methods were compared. The success of both methods was calculated as sensitivity and specificity, and the clinical significance of the difference between the methods' sensitivity and specificity was evaluated Newcombe's method. RESULTS: A total of 568 pulse measurements were performed on 49 CPA cases using both c-USG and the manual method. The manual method exhibited 80% sensitivity and 91% specificity in predicting ROSC (+PV: 35%, -PV: 64%), while c-USG exhibited 100% sensitivity and 98% specificity (+PV: 84%, -PV: 100%). The difference in sensitivities between the c-USG and manual methods was -0.0704 (95% CI: -0.0965; -0.0466), and the difference between their specificities was 0.0106 (95% CI: 0.0006; 0.0222). The difference between the specificities and sensitivities was statistically significant at analysis performed adopting the clinical judgment of the team leader using multiple instruments as the gold standard. The manual method yielded an ROSC decision in 3 ± 0.17 s and c-USG in 2.8 ± 0.15 s, the difference being statistically significant. CONCLUSION: According to the results of this study, the pulse check method with c-USG may be superior to the manual method in terms of fast and accurate decision making in CPR.

2. Pediatr Crit Care Med. 2023 Jun 15. doi: 10.1097/PCC.0000000000003307. Online ahead of print.
Death and Ultrasound Evidence of the Akinetic Heart in Pediatric Cardiac Arrest.
Su E(1), Dutko A(1), Ginsburg S(2), Lasa JJ(3), Nakagawa TA(4).
ABSTRACT
Point-of-care ultrasound (POCUS) is an expanding noninvasive diagnostic modality used for the management of patients in multiple intensive care and pediatric specialties. POCUS is used to assess cardiac activity and pathology, pulmonary disease, intravascular volume status, intra-abdominal processes, procedural guidance including vascular access, lumbar puncture, thoracentesis, paracentesis, and pericardiocentesis. POCUS has also been used to determine anterograde flow following circulatory arrest when organ donation after circulatory death is being considered. Published guidelines exist from multiple medical societies including the recent guidelines for the use of POCUS in neonatology for diagnostic and procedural purposes.

ORGANISATION AND TRAINING

1. Resuscitation. 2023 Jun 14:109873. doi: 10.1016/j.resuscitation.2023.109873. Online ahead of print.

Does witness type affect the chance of receiving bystander CPR in out-of-hospital cardiac arrest?

Yz Lo C(1), Fook-Chong S(2), Shahidah N(3), White AE(4), Tan CK(5), Yng Ng Y(6), Tiah L(7), Yc Chia M(8), Sh Leong B(9), Mao DR(10), Ming Ng W(11), Doctor NE(12), Eh Ong M(13), Siddiqui FJ(2).

ABSTRACT

OBJECTIVES: The relationship between the bystander witness type and receipt of bystander CPR (BCPR) is not well understood. Herein we compared BCPR administration between family and non-family witnessed out-of-hospital cardiac arrest (OHCA). BACKGROUND: In many communities, interventions in the past decade have contributed to an increased receipt of BCPR, for example in Singapore from 15% to 60%. However, BCPR rates have plateaued despite sustained and ongoing community-based interventions, which may be related to gaps in education or training for various witness types. The purpose of this study was to investigate the association between witness type and BCPR administration. METHODS: Singapore data from 2010 - 2020 was extracted from the Pan-Asian Resuscitation Outcomes Study (PAROS) network registry (n = 25,024). All adult, layperson witnessed, non-traumatic OHCAs were included in this study. RESULTS: Of 10,016 eligible OHCA cases, 6,895 were family witnessed and 3,121 were non-family witnessed. After adjustment for potential confounders, BCPR administration was less likely for non-family witnessed OHCA (OR 0.83, 95% CI 0.75, 0.93). After location stratification, non-family witnessed OHCAs were less likely to receive BCPR in residential settings (OR 0.75, 95% CI 0.66, 0.85). In non-residential settings, there was no statistically significant association between witness type and BCPR administration (OR 1.11, 95% CI 0.88, 1.39). Details regarding witness type and bystander CPR were limited. CONCLUSION: This study found differences in BCPR administration between family and non-family witnessed OHCA cases. Elucidation of witness characteristics may be useful to determine populations that would benefit most from CPR education and training.

2. Prehosp Emerg Care. 2023 Jun 15:1-18. doi: 10.1080/10903127.2023.2224876. Online ahead of print.

Prehospital Pediatric Emergency Training Using Augmented Reality Simulation: A Prospective, Mixed Methods Study.

Friedman N(1), Zuniga-Hernandez M(1), Titzler J(1), Suen MY(1), Wang E(2), Rosales O(1), Graham J(3), D'Souza P(4), Menendez M(1), Caruso TJ(2).

ABSTRACT

Objective Pediatric emergencies are high-stakes yet low-volume clinical encounters for emergency medical services (EMS) clinicians, necessitating innovative approaches to training. We sought to explore the acceptability, usability, and ergonomics of a novel augmented reality (AR) software for EMS crisis management training.MethodsThis was a prospective, mixed-methods study employing qualitative and quantitative analyses. We enrolled emergency medical technicians (EMTs) and paramedics at a municipal fire service in Northern California. We ran the Chariot Augmented Reality Medical simulation software (#details_redacted_for_peer_review) on the ML1 headset (Magic Leap, Inc., Plantation, FL), which enabled participants to view an AR image of a patient overlaid with real-world training objects. Participants completed a simulation of a pediatric hypoglycemia-induced seizure and cardiac arrest. Participants subsequently engaged in structured focus group interviews assessing acceptability, which we coded and thematically analyzed. We evaluated the usability of the AR system and ergonomics of the ML1 headset using previously validated scales, and we analyzed findings with descriptive statistics. Results Twenty-two EMS clinicians participated. We categorized focus group interview statements into seven domains after an iterative thematic analysis: general

appraisal, realism, learning efficacy, mixed reality feasibility, technology acceptance, software optimization, and alternate use cases. Participants valued the realism and the mixed reality functionality of the training simulation. They reported that AR could be effective for practicing pediatric clinical algorithms and task prioritization, building verbal communication skills, and promoting stress indoctrination. However, participants also noted challenges with integrating AR images with real-world objects, the learning curve required to adapt to the technology, and areas for software improvement. Participants favorably evaluated the ease of use of the technology and comfortability of wearing the hardware; however, most participants reported that they would need technical support. Conclusion Participants positively evaluated the acceptability, usability, and ergonomics of an AR simulator for pediatric emergency management training, and participants identified current technological limitations and areas for improvement. AR simulation may serve as an effective training adjunct for prehospital clinicians.

3. Am J Emerg Med. 2023 Jun 7;71:1-6. doi: 10.1016/j.ajem.2023.06.001. Online ahead of print.
Delayed arrival of advanced life support adversely affects the neurological outcome in a multi-tier emergency response system.
Yang HC(1), Park SM(2), Lee KJ(3), Jo YH(2), Kim YJ(2), Lee DK(4), Jang DH(5).
ABSTRACT
AIM: Prehospital management of out-of-hospital cardiac arrest (OHCA) is based on basic life support, with the addition of advanced life support (ALS) if possible. This study aimed to investigate the effect of delayed arrival of ALS on neurological outcomes of patients with OHCA at hospital discharge. METHODS: This was a retrospective study of a registry of patients with OHCA. A multi-tier emergency response system was established in the study area. ALS was initiated when the second-arrival team arrived at the scene. A restricted cubic spline curve was used to investigate the relationship between the response time interval of the second-arrival team and neurological outcomes at hospital discharge. Multivariable logistic regression analysis was performed to assess the independent association between the response time interval of the second-arrival team and neurological outcomes of patients at hospital discharge. RESULTS: A total of 3186 adult OHCA patients who received ALS at the scene were included in the final analysis. A restricted cubic spline curve showed that a long response time interval of the second-arrival team was correlated with a high likelihood of poor neurological outcomes. Meanwhile, multivariable logistic regression analysis showed that a long response time interval of the second-arrival team was independently associated with poor neurological outcomes (odds ratio, 1.10; 95% confidence interval, 1.03-1.17). CONCLUSION: In a multi-tiered prehospital emergency response system, the delayed arrival of ALS was associated with poor neurological outcomes at hospital discharge.

4. BMC Cardiovasc Disord. 2023 Jun 13;23(1):299. doi: 10.1186/s12872-023-03320-w.
Association between cardiopulmonary resuscitation audit results with in-situ simulation and in-hospital cardiac arrest outcomes and key performance indicators.
Ruangsomboon O(1), Surabenjawongse U(1), Jantataeme P(1), Chawaruechai T(2), Wangtawesap K(2)(3), Chakorn T(4)(5).
ABSTRACT
INTRODUCTION: In-situ simulation (ISS) is a method to evaluate the performance of hospital units in performing cardiopulmonary resuscitation (CPR). It is conducted by placing a high-fidelity mannequin at hospital units with simulated scenarios and having each unit's performance evaluated. However, little is known about its impact on actual patient outcomes. Therefore, we aimed to evaluate the association between the ISS results and actual outcomes of patients with in-hospital cardiac arrest (IHCA). METHODS: This retrospective study was conducted by reviewing Siriraj

Hospital's CPR ISS results in association with the data of IHCA patients between January 2012 and January 2019. Actual outcomes were determined by patients' outcomes (sustained return of spontaneous circulation (ROSC) and survival to hospital discharge) and arrest performance indicators (time-to-first-epinephrine and time-to-defibrillation). These outcomes were investigated for association with the ISS scores in multilevel regression models with hospital units as clusters. RESULTS: There were 2146 cardiac arrests included with sustained ROSC rate of 65.3% and survival to hospital discharge rate of 12.9%. Higher ISS scores were significantly associated with improved sustained ROSC rate (adjusted odds ratio 1.32 (95%CI 1.04, 1.67); p = 0.01) and a decrease in time-to-defibrillation (-0.42 (95%CI -0.73, -0.11); p = 0.009). Although higher scores were also associated with better survival to hospital discharge and a decrease in time-to-first-epinephrine, most models for these outcomes failed to reach statistical significance. CONCLUSION: CPR ISS results were associated with some important patient outcomes and arrest performance indicators. Therefore, it may be an appropriate performance evaluation method that can guide the direction of improvement.

5. Eur J Emerg Med. 2023 Jun 13. doi: 10.1097/MEJ.0000000000001052. Online ahead of print.
The decision-making process in out-of-hospital cardiac arrest: from complexity to opportunities.
Lazzeri C(1), Bonizzoli M, Peris A.
NO ABSTRACT AVAILABLE

6. Med Lav. 2023 Jun 12;114(3):e2023010. doi: 10.23749/mdl.v114i3.13995.
Effectiveness of Cardiopulmonary Resuscitation at the Workplace.
Bellini L(1), Fagoni N(2), Andreassi A(3), Sechi GM(4), Bonora R(5), Stirparo G(6).
ABSTRACT
BACKGROUND: Out-of-Hospital Cardiac Arrest (OHCA) is a medical emergency whose chances of survival can be increased by rapid Cardiopulmonary Resuscitation (CPR) and early use of Public Access Defibrillators (PAD). Basic Life Support (BLS) training became mandatory in Italy to spread knowledge of resuscitation maneuvers in the workplace. Basic Life Support (BLS) training became mandatory according to the DL 81/2008 law. To improve the level of cardioprotection in the workplace, the national law DL 116/2021 increased the number of places required to be provided with PADs. The study highlights the possibility of a Return to spontaneous circulation in OHCA in the workplace. METHODS: A multivariate logistic regression model was fitted to the data to extrapolate associations between ROSC and the dependent variables. The associations' robustness was evaluated through sensitivity analysis. RESULTS: The chance to receive CPR (OR 2.3; 95% CI:1.8-2.9), PAD (OR 7.2; 95% CI:4.9 - 10.7), and achieve Return to spontaneous circulation (ROSC) (crude OR 2.2; 95% CI:1.7-3.0, adjusted OR 1.6; 95% CI:1.2-2.2) is higher in the workplace compared to all other places. CONCLUSION: The workplace could be considered cardioprotective, although further research is necessary to understand the causes of missed CPRs and identify the best places to increase BLS and defibrillation training to help policymakers implement correct programming on the activation of PAD projects.

7. Am Heart J. 2023 Aug;262:55-65. doi: 10.1016/j.ahj.2023.03.018. Epub 2023 Apr 20.
Validation of the ARIC prediction model for sudden cardiac death in the European population: The ESCAPE-NET project.
Welten SJGC(1), Remmelzwaal S(2), Blom MT(3), van der Heijden AA(3), Nijpels G(3), Tan HL(4), van Valkengoed I(5), Empana JP(6), Jouven X(6), Ågesen FN(7), Warming PE(7), Tfelt-Hansen J(8), Prescott E(9), Jabbari R(7), Elders PJM(3); for ESCAPE-NET investigators,.
ABSTRACT

BACKGROUND: Sudden cardiac death is responsible for 10% to 20% of all deaths in Europe. The current study investigates how well the risk of sudden cardiac death can be predicted. To this end, we validated a previously developed prediction model for sudden cardiac death from the Atherosclerosis Risk in Communities study (USA). METHODS: Data from participants of the Copenhagen City Heart Study (CCHS) (n=9988) was used to externally validate the previously developed prediction model for sudden cardiac death. The model's performance was assessed through discrimination (C-statistic) and calibration by the Hosmer-Lemeshow goodness-of-fit (HL) statistics suited for censored data and visual inspection of calibration plots. Additional validation was performed using data from the Hoorn Study (N=2045), employing the same methods. RESULTS: During ten years of follow-up of CCHS participants (mean age: 58.7 years, 56.2% women), 425 experienced SCD (4.2%). The prediction model showed good discrimination for sudden cardiac death risk (C-statistic: 0.81, 95% CI: 0.79-0.83). Calibration was robust (HL statistic: P=0.8). Visual inspection of the calibration plot showed that the calibration could be improved. Sensitivity was 89.8%, and specificity was 60.6%. The positive and negative predictive values were 10.1% and 99.2%. Model performance was similar in the Hoorn Study (C-statistic: 0.81, 95% CI: 0.77-0.85 and the HL statistic: 1.00). CONCLUSION: Our study showed that the previously developed prediction model in North American adults performs equally well in identifying those at risk for sudden cardiac death in a general North-West European population. However, the positive predictive value is low.

POST-CARDIAC ARREST TREATMENTS

1. Eur Heart J Acute Cardiovasc Care. 2023 Jun 17:zuad067. doi: 10.1093/ehjacc/zuad067. Online ahead of print.

State of the Art Post-Cardiac Arrest Care: Evolution and future of post cardiac arrest care.

Grand J(1), Hassager C(1)(2).

ABSTRACT

Out-of-hospital cardiac arrest is a leading cause of mortality. In the prehospital setting, bystander response with cardiopulmonary resuscitation and use of publicly available automated external defibrillators have been associated with improved survival. Early in-hospital treatment still focuses on emergency coronary angiography for selected patients. For patients remaining comatose, temperature control to avoid fever is still recommended, but former hypothermic targets have been abandoned. For patients without spontaneous awakening, the use of a multimodal prognostication model is key. After discharge, follow-up with screening for cognitive and emotional disabilities is recommended. There has been an incredible evolution of research within cardiac arrest. Two decades ago, the largest trials include a few hundred patients. Today, undergoing studies are planning to include 10-20 times as many patients, with improved methodology. This article describes the evolution and perspectives for the future in post-cardiac arrest care.

2. Indian Heart J. 2023 Jun 14:S0019-4832(23)00105-0. doi: 10.1016/j.ihj.2023.06.005. Online ahead of print.

Higher versus lower blood pressure targets after cardiac arrest: a meta-analysis of randomized controlled trials.

Cheema HA(1), Shafiee A(2), Athar MMT(3), Akhondi A(4), Shahid A(5), Ghafoor MS(6), Yasmin F(7), Nashwan AJ(8), Titus A(9).

ABSTRACT

A few mostly underpowered randomized controlled trials (RCTs) have been used to study the impact of blood pressure (BP) targets in out-of-hospital cardiac arrest (OHCA) patients. We aimed to perform an updated meta-analysis to compare the outcomes between the higher BP target and the lower BP target groups following OHCA. A systematic search was conducted on PubMed, Embase

and the Cochrane Library until December 2022. We pooled odds ratios (ORs) and mean differences (MDs) with 95% confidence intervals (CIs) using RevMan 5.4. Our search yielded four RCTs with a total of 1114 patients. Regarding our primary outcome of all-cause mortality, there was no significant difference between higher versus lower BP target goals in post-OHCA patients (OR 1.12, 95% CI: 0.86 to 1.45). Furthermore, there were no significant differences between the two groups in good neurological outcome, the incidence of arrhythmia, need for renal replacement therapy, and the levels of neuron-specific enolase at 48 hours. The length of ICU stay of patients treated with the higher BP target was significantly lower but by a small margin. These findings do not support the use of a higher BP target but are subject to confirmation by large-scale RCTs investigating homogenous BP goals.

3. N Engl J Med. 2023 Jun 15. doi: 10.1056/NEJMoa2214552. Online ahead of print.
Mild Hypercapnia or Normocapnia after Out-of-Hospital Cardiac Arrest.
Eastwood G(1), Nichol AD(1), Hodgson C(1), Parke RL(1), McGuinness S(1), Nielsen N(1), Bernard S(1), Skrifvars MB(1), Stub D(1), Taccone FS(1), Archer J(1), Kutsogiannis D(1), Dankiewicz J(1), Lilja G(1), Cronberg T(1), Kirkegaard H(1), Capellier G(1), Landoni G(1), Horn J(1), Olasveengen T(1), Arabi Y(1), Chia YW(1), Markota A(1), Hænggi M(1), Wise MP(1), Grejs AM(1), Christensen S(1), Munk-Andersen H(1), Granfeldt A(1), Andersen GØ(1), Qvigstad E(1), Flaa A(1), Thomas M(1), Sweet K(1), Bewley J(1), Bäcklund M(1), Tiainen M(1), Iten M(1), Levis A(1), Peck L(1), Walsham J(1), Deane A(1), Ghosh A(1), Annoni F(1), Chen Y(1), Knight D(1), Lesona E(1), Tlayjeh H(1), Svenšek F(1), McGuigan PJ(1), Cole J(1), Pogson D(1), Hilty MP(1), Düring JP(1), Bailey MJ(1), Paul E(1), Ady B(1), Ainscough K(1), Hunt A(1), Monahan S(1), Trapani T(1), Fahey C(1), Bellomo R(1); TAME Study Investigators.
ABSTRACT
BACKGROUND: Guidelines recommend normocapnia for adults with coma who are resuscitated after out-of-hospital cardiac arrest. However, mild hypercapnia increases cerebral blood flow and may improve neurologic outcomes. METHODS: We randomly assigned adults with coma who had been resuscitated after out-of-hospital cardiac arrest of presumed cardiac or unknown cause and admitted to the intensive care unit (ICU) in a 1:1 ratio to either 24 hours of mild hypercapnia (target partial pressure of arterial carbon dioxide [Paco2], 50 to 55 mm Hg) or normocapnia (target Paco2, 35 to 45 mm Hg). The primary outcome was a favorable neurologic outcome, defined as a score of 5 (indicating lower moderate disability) or higher, as assessed with the use of the Glasgow Outcome Scale-Extended (range, 1 [death] to 8, with higher scores indicating better neurologic outcome) at 6 months. Secondary outcomes included death within 6 months. RESULTS: A total of 1700 patients from 63 ICUs in 17 countries were recruited, with 847 patients assigned to targeted mild hypercapnia and 853 to targeted normocapnia. A favorable neurologic outcome at 6 months occurred in 332 of 764 patients (43.5%) in the mild hypercapnia group and in 350 of 784 (44.6%) in the normocapnia group (relative risk, 0.98; 95% confidence interval [CI], 0.87 to 1.11; P = 0.76). Death within 6 months after randomization occurred in 393 of 816 patients (48.2%) in the mild hypercapnia group and in 382 of 832 (45.9%) in the normocapnia group (relative risk, 1.05; 95% CI, 0.94 to 1.16). The incidence of adverse events did not differ significantly between groups. CONCLUSIONS: In patients with coma who were resuscitated after out-of-hospital cardiac arrest, targeted mild hypercapnia did not lead to better neurologic outcomes at 6 months than targeted normocapnia.

4. Acta Anaesthesiol Scand. 2023 Jun 14. doi: 10.1111/aas.14298. Online ahead of print.
Post-cardiac arrest intensive care in Sweden: A survey of current clinical practice.
Järpestam S(1), Martinell L(2), Rylander C(3), Lilja L(2)(4).
ABSTRACT
BACKGROUND: European guidelines recommend targeted temperature management (TTM) in post-cardiac arrest care. A large multicentre clinical trial, however, showed no difference in mortality and

neurological outcome when comparing hypothermia to normothermia with early treatment of fever. The study results were valid given a strict protocol for the assessment of prognosis using defined neurological examinations. With the current range of recommended TTM temperatures, and applicable neurological examinations, procedures may differ between hospitals and the variation of clinical practice in Sweden is not known. AIM: The aim of this study was to investigate current practice in post-resuscitation care after cardiac arrest as to temperature targets and assessment of neurological prognosis in Swedish intensive care units (ICUs). METHODS: A structured survey was conducted by telephone or e-mail in all Levels 2 and 3 (= 53) Swedish ICUs during the spring of 2022 with a secondary survey in April 2023. RESULTS: Five units were not providing post-cardiac arrest care and were excluded. The response rate was 43/48 (90%) of the eligible units. Among the responding ICUs, normothermia (36-37.7°C) was applied in all centres (2023). There was a detailed routine for the assessment of neurological prognosis in 38/43 (88%) ICUs. Neurological assessment was applied 72-96 h after return of spontaneous circulation in 32/38 (84%) units. Electroencephalogram and computed tomography and/or magnetic resonance imaging were the most common technical methods available. CONCLUSION: Swedish ICUs use normothermia including early treatment of fever in post-resuscitation care after cardiac arrest and almost all apply a detailed routine for the assessment of neurological prognosis. However, available methods for prognostic evaluation varies between hospitals.

5. Resuscitation. 2023 Jun 9:109869. doi: 10.1016/j.resuscitation.2023.109869. Online ahead of print.

Coronary angiography findings in resuscitated and refractory out-of-hospital cardiac arrest: a systematic review and meta-analysis.

Scquizzato T(1), Sofia R(2), Gazzato A(2), Sudano A(2), Altizio S(2), Biondi-Zoccai G(3), Ajello S(2), Mara Scandroglio A(2), Landoni G(4), Zangrillo A(4).

ABSTRACT

INTRODUCTION: Coronary angiography (CAG) frequently reveals coronary artery disease (CAD) after out-of-hospital cardiac arrest (OHCA), but its use is not standardized and often reported in different subpopulations. This systematic review and meta-analysis accurately describes angiographic features in resuscitated and refractory OHCA. METHODS: PubMed, Embase, and Cochrane Central Register of Controlled Trials were searched up to October 31, 2022. Studies reporting coronary angiography findings after out-of-hospital cardiac arrest were considered eligible. The primary outcome was location and rate of coronary lesions. Coronary angiography findings with 95% confidence intervals were pooled with a meta-analysis of proportion. RESULTS: 128 studies (62,845 patients) were included. CAG, performed in 69% (63-75%) of patients, found a significant CAD in 75% (70-79%), a culprit lesion in 63% (59%-66%), and a multivessel disease in 46% (41%-51%). Compared to patients with return of spontaneous circulation, refractory OHCA was associated with more severe CAD due to a higher rate of left main involvement (17% [12-24%] vs 5.7% [3.1-10%]; p=0.002) and acute occlusion of left anterior descending artery (27% [17-39%] vs 15% [13-18%]; p=0.02). Nonshockable patients without ST-elevation were those receiving CAG less frequently, despite significant disease in 54% (31-76%). Left anterior descending artery was the most frequently involved (34% [30-39%]). CONCLUSIONS: Patients with OHCA have a high prevalence of significant CAD caused by acute and treatable coronary lesions. Refractory OHCA was associated with more severe coronary lesions. CAD was also present in patients with nonshockable rhythm and without ST elevation. However, heterogeneity of studies and selection of patients undergoing CAG limit the certainty of findings.

TARGETED TEMPERATURE MANAGEMENT

1. CJEM. 2023 Jun 16. doi: 10.1007/s43678-023-00537-8. Online ahead of print.

Just the Facts: Management of return of spontaneous circulation after out-of-hospital cardiac arrest.

Kareemi H(1), Hendin A(2)(3), Vaillancourt C(2)(4).
NO ABSTRACT AVAILABLE

2. Am J Emerg Med. 2023 Jun 8;71:14-17. doi: 10.1016/j.ajem.2023.06.004. Online ahead of print.
Target temperature in post-arrest comatous patients. Is something changed in the postpandemic era?
Garcia-Rubira JC(1), Olivares-Martínez B(2), Rivadeneira-Ruiz M(2), Fernández-Valenzuela I(2), Recio-Mayoral A(2), Almendro-Delia M(2), Hidalgo-Urbano R(3).
ABSTRACT
INTRODUCTION: The recommended target temperature in the treatment of comatous patients after cardiac arrest has recently changed. We analyzed the impact on the neurological outcome of a change in the target temperature from July 2021. MATERIAL AND METHODS: This was a retrospective analysis comparing the discharge status of 78 patients with a target temperature of 33 °C (group 1) with that of 24 patients with a target temperature of 36.5 °C (group 2). Pearson chi-square and Mann-Whitney U tests were used. RESULTS: The initial rhythm was defibrillable in 65% of group 1 and 71% of group 2, and cardiac arrest was witnessed in 93% of group 1 and 96% of group 2. There was an adverse outcome (death or vegetative state) in 37 patients in group 1 (47%) compared to 18 in group 2 (74%) (Pearson chi-square 5.612, p = 0.018). CONCLUSIONS: In our series of patients, the temperature control target temperature change from 33 °C to 36.5 °C was associated with worse neurological outcome. Further studies are needed to evaluate the outcome of a generalized modification of temperature control targets in comatose patients after cardiac arrest in our postpandemic era.

3. Resuscitation. 2023 Jun 9:109867. doi: 10.1016/j.resuscitation.2023.109867. Online ahead of print.
Time-course relationship between cerebrospinal fluid and serum concentrations of midazolam and albumin in patients with cardiac arrest undergoing targeted temperature management.
Park JI(1), Kang C(2), Jeong W(3), Soo Park J(2), You Y(4), Joon Ahn H(2), Cho Y(4), Young Jeon S(4), Hong Min J(5), Nam In Y(5).
ABSTRACT
AIM: To understand the serum and cerebrospinal fluid (CSF) distribution of midazolam is important for proper timing of neurological prognostication of targeted temperature management(TTM) patients. Midazolam binds extensively to albumin in serum although non protein bound form exist in CSF. We investigated the time-course of CSF, serum concentrations of midazolam and albumin in patients with cardiac arrest who underwent TTM. METHODS: This prospective, single-center, observational study was conducted between May 2020 and April 2022. Midazolam and albumin concentrations in CSF and serum were quantified 0, 24, 48, and 72 h after the return of spontaneous circulation for comparison between the good (Cerebral Performance Category (CPC) 1 and 2) and poor (CPC 3, 4, and 5) neurologic outcome groups. The CSF/serum (C/S) ratios of midazolam and albumin concentrations were determined, along with their correlation coefficients. RESULTS: Of the 19 enrolled patients, 13 experienced poor outcomes. At 0 h, serum midazolam concentrations were the lowest, whereas serum albumin levels were the highest; in the CSF, the concentrations of both peaked at 24 h. There were no significant inter-group differences in midazolam concentrations in CSF or serum. The C/S ratios of midazolam and albumin significantly differed between the groups. Moderate to strong positive correlations were observed between the midazolam and albumin C/S ratios. CONCLUSION: In CSF, midazolam and albumin concentrations peaked 24 h post-cardiac arrest. Midazolam and albumin C/S ratios were significantly higher in the poor outcome group and

positively correlated with each other, suggesting blood-brain barrier disruption 24 h post-cardiac arrest.

4. Anaesth Rep. 2023 Jun 14;11(1):e12234. doi: 10.1002/anr3.12234. eCollection 2023 Jan-Jun.
Neurological injury after cardiac arrest - setting a case of prolonged re-warming into a developing research context.
Tyrrell-Marsh I(1), Stanley S(2).
NO ABSTRACT AVAILABLE

ELECTROPHYSIOLOGY AND DEFIBRILLATION

1. J Electrocardiol. 2023 Jun 7;80:106-110. doi: 10.1016/j.jelectrocard.2023.05.011. Online ahead of print.
Markov model for detection of ECG instability prior to cardiac arrest in single-ventricle patients.
Savorgnan F(1), Crouthamel DI(2), Heroy A(2), Santerre J(2), Acosta S(3).
ABSTRACT
OBJECTIVES: Assess the degree of instability in the electrocardiogram (ECG) waveform in patients with single-ventricle physiology before a cardiac arrest and compare them with similar patients who did not experience a cardiac arrest. METHODS: Retrospective control study in patients with single-ventricle physiology who underwent Norwood, Blalock-Taussig shunt, pulmonary artery band, and aortic arch repair from 2013 to 2018. Electronic medical records were obtained for all included patients. For each subject, 6 h of ECG data were analyzed. In the arrest group, the end of the sixth hour coincides with the cardiac arrest. In the control group, the 6-h windows were randomly selected. We used a Markov chain framework and the likelihood ratio test to measure the degree of ECG instability and to classify the arrest and control groups. RESULTS: The study dataset consists of 38 cardiac arrest events and 67 control events. Our Markov model was able to classify the arrest and control groups based on the ECG instability with an ROC AUC of 82% at the hour preceding the cardiac arrests. CONCLUSION: We designed a method using the Markov chain framework to measure the level of instability in the beat-to-beat ECG morphology. Furthermore, we were able to show that the Markov model performed well to distinguish patients in the arrest group compared to the control group.

PEDIATRICS AND CHILDREN

1. Resuscitation. 2023 Jun 14:109875. doi: 10.1016/j.resuscitation.2023.109875. Online ahead of print.
High-Risk Criteria for the Physiologically Difficult Paediatric Airway: a Multicenter, Observational Study to Generate Validity Evidence.
Dean P(1), Geis G(2), Hoehn EF(3), Lautz A(4), Edmunds K(5), Shah A(6), Zhang Y(7), Frey M(8), Boyd S(9), Nagler J(10), Miller KA(11), Neubrand TL(12), Cabrera N(13), Kopp TM(14), Wadih E(15), Kannikeswaran N(16), VanDeWall A(17), Hewett Brumberg EK(18), Donoghue A(19), Palladino L(20), O'Connell KJ(21), Mazzawi M(22), Chi Fung Tam D(23), Murray M(24), Kerrey B(25).
ABSTRACT
BACKGROUND: Single-center studies have identified risk factors for peri-intubation cardiac arrest in the emergency department (ED). The study objective was to generate validity evidence from a more diverse, multicenter cohort of patients. METHODS: We completed a retrospective cohort study of 1200 paediatric patients who underwent tracheal intubation in eight academic paediatric EDs (150

per ED). The exposure variables were 6 previously studied high-risk criteria for peri-intubation arrest: (1) persistent hypoxemia despite supplemental oxygen, (2) persistent hypotension, (3) concern for cardiac dysfunction, (4) post-return of spontaneous circulation (ROSC), (5) severe metabolic acidosis (pH<7.1), and (6) status asthmaticus. The primary outcome was peri-intubation cardiac arrest. Secondary outcomes included extracorporeal membrane oxygenation (ECMO) cannulation and in-hospital mortality. We compared all outcomes between patients that met one or more versus no high-risk criteria, using generalized linear mixed models. RESULTS: Of the 1,200 paediatric patients, 332 (27.7%) met at least one of 6 high-risk criteria. Of these, 29 (8.7%) suffered peri-intubation arrest compared to zero arrests in patients meeting none of the criteria. On adjusted analysis, meeting at least one high-risk criterion was associated with all 3 outcomes - peri-intubation arrest (AOR 75.7, 95% CI 9.7-592.6), ECMO (AOR 7.1, 95% CI 2.3-22.3) and mortality (AOR 3.4, 95% 1.9-6.2). Four of 6 criteria were independently associated with peri-intubation arrest: persistent hypoxemia despite supplemental oxygen, persistent hypotension, concern for cardiac dysfunction, and post-ROSC. CONCLUSIONS: In a multicenter study, we confirmed that meeting at least one high-risk criterion was associated with paediatric peri-intubation cardiac arrest and patient mortality.

EXTRACORPOREAL LIFE SUPPORT

1. Resuscitation. 2023 Jun 14:109874. doi: 10.1016/j.resuscitation.2023.109874. Online ahead of print.

CPR Quality and Outcomes After Extracorporeal Life Support for Pediatric In-Hospital Cardiac Arrest.

Brown SR(1), Frazier M(2), Roberts J(3), Wolfe H(4), Tegtmeyer K(5), Sutton R(4), Dewan M(6); PediRES-Q Collaborative Investigators(7).

ABSTRACT

AIM: of Study: To determine outcomes in pediatric patients who had an in-hospital cardiac arrest and subsequently received extracorporeal cardiopulmonary resuscitation (ECPR). Our secondary objective was to identify cardiopulmonary resuscitation (CPR) event characteristics and CPR quality metrics associated with survival after ECPR. METHODS: Multicenter retrospective cohort study of pediatric patients in the pediRES-Q database who received ECPR after in-hospital cardiac arrest between July 1, 2015 and June 2, 2021. Primary outcome was survival to ICU discharge. Secondary outcomes were survival to hospital discharge and favorable neurologic outcome at ICU and hospital discharge. RESULTS: Among 124 patients included in this study, median age was 0.9 years (IQR 0.2-5) and the majority of patients had primarily cardiac disease (92 patients, 75%). Survival to ICU discharge occurred in 61/120 (51%) patients, 36/61 (59%) of whom had favorable neurologic outcome. No demographic or clinical variables were associated with survival after ECPR. CONCLUSION: In this multicenter retrospective cohort study of pediatric patients who received ECPR for IHCA we found a high rate of survival to ICU discharge with good neurologic outcome.

2. Am J Emerg Med. 2023 May 26;70:163-170. doi: 10.1016/j.ajem.2023.05.027. Online ahead of print.

Hypothermia may reduce mortality and improve neurologic outcomes in adult patients treated with VA-ECMO: A systematic review and meta-analysis.

Bian W(1), Bian W(2), Li Y(3), Feng X(3), Song M(3), Zhou P(4).

ABSTRACT

BACKGROUND: VA-ECMO can greatly reduce mortality in critically ill patients, and hypothermia attenuates the deleterious effects of ischemia-reperfusion injury. We aimed to study the effects of hypothermia on mortality and neurological outcomes in VA-ECMO patients. METHODS: A systematic search of the PubMed, Embase, Web of Science, and Cochrane Library databases was performed from the earliest available date to 31 December 2022. The primary outcome was discharge or 28-day

mortality and favorable neurological outcomes in VA-ECMO patients, and the secondary outcome was bleeding risk in VA-ECMO patients. The results are presented as odds ratios (ORs) and 95% confidence intervals (CIs). Based on the heterogeneity assessed by the I2 statistic, meta-analyses were performed using random or fixed-effects models. GRADE methodology was used to rate the certainty in the findings. RESULTS: A total of 27 articles (3782 patients) were included. Hypothermia (33-35 °C) lasting at least 24 h can significantly reduce discharge or 28-day mortality (OR, 0.45; 95% CI, 0.33-0.63; I2 = 41%) and significantly improve favorable neurological outcomes (OR, 2.08; 95% CI, 1.66-2.61; I2 = 3%) in VA-ECMO patients. Additionally, there was no risk associated with bleeding (OR, 1.15; 95% CI, 0.86-1.53; I2 = 12%). In our subgroup analysis according to in-hospital or out-of-hospital cardiac arrest, hypothermia reduced short-term mortality in both VA-ECMO-assisted in-hospital (OR, 0.30; 95% CI, 0.11-0.86; I2 = 0.0%) and out-of-hospital cardiac arrest (OR, 0.41; 95% CI, 0.25-0.69; I2 = 52.3%). Out-of-hospital cardiac arrest patients assisted by VA-ECMO for favorable neurological outcomes were consistent with the conclusions of this paper (OR, 2.10; 95% CI, 1.63-2.72; I2 = 0.5%). CONCLUSIONS: Our results show that mild hypothermia (33-35 °C) lasting at least 24 h can greatly reduce short-term mortality and significantly improve favorable short-term neurologic outcomes in VA-ECMO-assisted patients without bleeding-related risks. As the grade assessment indicated that the certainty of the evidence was relatively low, hypothermia as a strategy for VA-ECMO-assisted patient care may need to be treated with caution.

3. Acute Crit Care. 2023 May;38(2):242-243. doi: 10.4266/acc.2023.00731. Epub 2023 May 31.
Extracorporeal cardiopulmonary resuscitation for out-of-hospital cardiac arrest and in-hospital cardiac arrest with return of spontaneous circulation: be careful when comparing apples to oranges.
Cho HJ(1)(2), Jeong IS(2)(3), Bělohlávek J(4).
NO ABSTRACT AVAILABLE

4. Acute Crit Care. 2023 May;38(2):190-199. doi: 10.4266/acc.2022.01438. Epub 2023 May 25.
Prognostic significance of respiratory quotient in patients undergoing extracorporeal cardiopulmonary resuscitation in Korea.
Lee YI(1), Ko RE(2), Na SJ(2), Ryu JA(2)(3), Cho YH(4), Yang JH(2)(5), Chung CR(2), Suh GY(2)(6).
ABSTRACT
BACKGROUND: Respiratory quotient (RQ) may be used as a tissue hypoxia marker in various clinical settings but its prognostic significance in patients undergoing extracorporeal cardiopulmonary resuscitation (ECPR) is not known. METHODS: Medical records of adult patients admitted to the intensive care units after ECPR in whom RQ could be calculated from May 2004 to April 2020 were retrospectively reviewed. Patients were divided into good neurologic outcome and poor neurologic outcome groups. Prognostic significance of RQ was compared to other clinical characteristics and markers of tissue hypoxia. RESULTS: During the study period, 155 patients were eligible for analysis. Of them, 90 (58.1%) had a poor neurologic outcome. The group with poor neurologic outcome had a higher incidence of out-of-hospital cardiac arrest (25.6% vs. 9.2%, P=0.010) and longer cardio-pulmonary resuscitation to pump-on time (33.0 vs. 25.2 minutes, P=0.001) than the group with good neurologic outcome. For tissue hypoxia markers, the group with poor neurologic outcome had higher RQ (2.2 vs. 1.7, P=0.021) and lactate levels (8.2 vs. 5.4 mmol/L, P=0.004) than the group with good neurologic outcome. On multivariable analysis, age, cardiopulmonary resuscitation to pump-on time, and lactate levels above 7.1 mmol/L were significant predictors for a poor neurologic outcome but not RQ. CONCLUSIONS: In patients who received ECPR, RQ was not independently associated with poor neurologic outcome.

5. Zhonghua Wei Zhong Bing Ji Jiu Yi Xue. 2023 May;35(5):554-557. doi: 10.3760/cma.j.cn121430-20210823-01237.

[Research progress of extracorporeal cardiopulmonary resuscitation combined with therapeutic hypothermia on brain protection]. [Article in Chinese]
Yao M(1), Zhai K(2)(3), Li M(1), Li Y(2)(3), Ge Z(1).

ABSTRACT
Compared with conventional cardiopulmonary resuscitation (CCPR), extracorporeal cardiopulmonary resuscitation (ECPR) can improve the survival rate of patients with cardiac arrest, and reduce the risk of reperfusion injury. However, it is still difficult to avoid the risk of secondary brain damage. Low temperature management has good neuroprotective potential for ECPR patients, which minimizes brain damage. However, unlike CCPR, ECPR has no clear prognostic indicator. The relationship between ECPR combined with hypothermia management-related treatment measure and neurological prognosis is not clear. This article reviews the effect of ECPR combined with different therapeutic hypothermia on brain protection and provides a reference for the prevention and treatment of neurological injury in patients with ECPR.

6. Zhonghua Wei Zhong Bing Ji Jiu Yi Xue. 2023 May;35(5):498-502. doi: 10.3760/cma.j.cn121430-20221213-01093.

[Pulse pressure loss after extracorporeal cardiopulmonary resuscitation is an independent predictor of ECMO weaning failure]. [Article in Chinese]
Xu J(1), Gao M(1), Wang L(1), Cao H(1), Zhang X(1), Zhu Y(2), Fan M(1), Xiao H(1), Li S(1), Liu S(1), Han X(1).

ABSTRACT
OBJECTIVE: To analyze the predictors of successful weaning off extracorporeal membrane oxygenation (ECMO) after extracorporeal cardiopulmonary resuscitation (ECPR). METHODS: The clinical data of 56 patients with cardiac arrest who underwent ECPR in Hunan Provincial People's Hospital (the First Affiliated Hospital of Hunan Normal University) from July 2018 to September 2022 were retrospectively analyzed. According to whether ECMO was successfully weaning off, patients were divided into the successful weaning off group and the failed weaning off group. The basic data, duration of conventional cardiopulmonary resuscitation (CCPR, the time from cardiopulmonary resuscitation to ECMO), duration of ECMO, pulse pressure loss, complications, and the use of distal perfusion tube and intra-aortic balloon pump (IABP) were compared between the two groups. Univariate and multivariate Logistic regression analyses were performed to identify the risk factors for weaning failure of ECMO. RESULTS: Twenty-three patients (41.07%) were successfully weaned from ECMO. Compared with the successful weaning off group, patients in the failed weaning off group were older (years old: 46.7±15.6 vs. 37.8±16.8, $P < 0.05$), higher incidence of pulse pressure loss and ECMO complications [81.8% (27/33) vs. 21.7% (5/23), 84.8% (28/33) vs. 39.1% (9/23), both $P < 0.01$], and longer CCPR time (minutes: 72.3±19.5 vs. 54.4±24.6, $P < 0.01$), shorter duration of ECMO support (hours: 87.3±81.1 vs. 147.7±50.8, $P < 0.01$), and worse improvement in arterial blood pH and lactic acid (Lac) levels after ECPR support [pH: 7.1±0.1 vs. 7.3±0.1, Lac (mmol/L): 12.6±2.4 vs. 8.9±2.1, both $P < 0.01$]. There were no significant differences in the utilization rate of distal perfusion tube and IABP between the two groups. Univariate Logistic regression analysis showed that the factors affecting the weaning off ECMO of ECPR patients were pulse pressure loss, ECMO complications, arterial blood pH and Lac after installation [pulse pressure loss: odds ratio (OR) = 3.37, 95% confidence interval (95%CI) was 1.39-8.17, $P = 0.007$; ECMO complications: OR = 2.88, 95%CI was 1.11-7.45, $P = 0.030$; pH after installation: OR = 0.01, 95%CI was 0.00-0.16, $P = 0.002$; Lac after installation: OR = 1.21, 95%CI was 1.06-1.37, $P = 0.003$]. After adjusting for the effects of age, gender, ECMO complications, arterial blood pH and Lac after installation, and CCPR time, showed that pulse pressure loss was an independent predictor of weaning failure in ECPR patients (OR = 1.27, 95%CI was 1.01-1.61, $P = 0.049$). CONCLUSIONS: Early loss of pulse pressure after ECPR is an independent predictor of failed weaning off ECMO in ECPR patients. Strengthening hemodynamic monitoring and management after ECPR is very important for the successful weaning off ECMO in ECPR.

7. Prehosp Disaster Med. 2023 Jun;38(3):423. doi: 10.1017/S1049023X2300033X. Epub 2023 Mar 21.
Prolonged Low-Flow Time Before E-CPR.
Özlüer YE(1), Canakci ME(2).
NO ABSTRACT AVAILABLE

EXPERIMENTAL RESEARCH

1. Zhonghua Wei Zhong Bing Ji Jiu Yi Xue. 2023 Apr;35(4):398-403. doi: 10.3760/cma.j.cn121430-20220907-00825.
[Protective role and mechanism of tubastatin A on renal and intestinal injuries after cardiopulmonary resuscitation in swine]. [Article in Chinese]
Wu X(1), Zhao X(2), Chen Q(3), Liu Y(4), Xu J(1), Zhou G(1), Zhang M(1).
ABSTRACT
OBJECTIVE: To investigate the protective effect and potential mechanism of tubastatin A (TubA), a specific inhibitor of histone deacetylase 6 (HDAC6), on renal and intestinal injuries after cardio-pulmonary resuscitation (CPR) in swine. METHODS: Twenty-five healthy male white swine were divided into Sham group (n = 6), CPR model group (n = 10) and TubA intervention group (n = 9) using a random number table. The porcine model of CPR was reproduced by 9-minute cardiac arrest induced by electrical stimulation via right ventricle followed by 6-minute CPR. The animals in the Sham group only underwent the regular operation including endotracheal intubation, catheterization, and anesthetic monitoring. At 5 minutes after successful resuscitation, a dose of 4.5 mg/kg of TubA was infused via the femoral vein within 1 hour in the TubA intervention group. The same volume of normal saline was infused in the Sham and CPR model groups. Venous samples were collected before modeling and 1, 2, 4, 24 hours after resuscitation, and the levels of serum creatinine (SCr), blood urea nitrogen (BUN), intestinal fatty acid binding protein (I-FABP) and diamine oxidase (DAO) in serum were determined by enzyme-linked immunoadsordent assay (ELISA). At 24 hours after resuscitation, the upper pole of left kidney and terminal ileum were harvested to detect cell apoptosis by TdT-mediated dUTP-biotin nick end labeling (TUNEL), and the expression levels of receptor-interacting protein 3 (RIP3) and mixed lineage kinase domain-like protein (MLKL) were detected by Western blotting. RESULTS: After resuscitation, renal dysfunction and intestinal mucous injury were observed in the CPR model and TubA intervention groups when compared with the Sham group, which was indicated by significantly increased levels of SCr, BUN, I-FABP and DAO in serum. However, the serum levels of SCr and DAO starting 1 hour after resuscitation, the serum levels of BUN starting 2 hours after resuscitation, and the serum levels of I-FABP starting 4 hours after resuscitation were significantly decreased in the TubA intervention group when compared with the CPR model group [1-hour SCr (μmol/L): 87±6 vs. 122±7, 1-hour DAO (kU/L): 8.1±1.2 vs. 10.3±0.8, 2-hour BUN (mmol/L): 12.3±1.2 vs. 14.7±1.3, 4-hour I-FABP (ng/L): 661±39 vs. 751±38, all $P < 0.05$]. The detection of tissue samples indicated that cell apoptosis and necroptosis in the kidney and intestine at 24 hours after resuscitation were significantly greater in the CPR model and TubA intervention groups when compared with the Sham group, which were indicated by significantly increased apoptotic index and markedly elevated expression levels of RIP3 and MLKL. Nevertheless, compared with the CPR model group, renal and intestinal apoptotic indexes at 24 hours after resuscitation in the TubA intervention group were significantly decreased [renal apoptosis index: (21.4±4.6)% vs. (55.2±9.5)%, intestinal apoptosis index: (21.3±4.5)% vs. (50.9±7.0)%, both $P < 0.05$], and the expression levels of RIP3 and MLKL were significantly reduced [renal tissue: RIP3 protein

(RIP3/GAPDH) was 1.11±0.07 vs. 1.39±0.17, MLKL protein (MLKL/GAPDH) was 1.20±0.14 vs. 1.51±0.26; intestinal tissue: RIP3 protein (RIP3/GAPDH) was 1.24±0.18 vs. 1.69±0.28, MLKL protein (MLKL/GAPDH) was 1.38±0.15 vs. 1.80±0.26, all P < 0.05]. CONCLUSIONS: TubA has the protective effect on alleviating post-resuscitation renal dysfunction and intestinal mucous injury, and its mechanism may be related to inhibition of cell apoptosis and necroptosis.

2. Zhonghua Wei Zhong Bing Ji Jiu Yi Xue. 2023 Apr;35(4):376-380. doi: 10.3760/cma.j.cn121430-20220930-00871.

[Alda-1 alleviates brain injury after cardiopulmonary resuscitation by regulating acyl-CoA synthetase long-chain family member 4/glutathione peroxidase 4 pathway-mediated ferroptosis in swine]. [Article in Chinese]

Chen C(1), Ma S, Liao L, Xiao Y, Dai H.

ABSTRACT

OBJECTIVE: To investigate whether the acetaldehyde dehydrogenase 2 specific activator, Alda-1, can alleviate brain injury after cardiopulmonary resuscitation (CPR) by inhibiting cell ferroptosis mediated by acyl-CoA synthetase long-chain family member 4/glutathione peroxidase 4 (ACSL4/GPx4) pathway in swine. METHODS: Twenty-two conventional healthy male white swine were divided into Sham group (n = 6), CPR model group (n = 8), and Alda-1 intervention group (CPR+Alda-1 group, n = 8) using a random number table. The swine model of CPR was reproduced by 8 minutes of cardiac arrest induced by ventricular fibrillation through electrical stimulation in the right ventricle followed by 8 minutes of CPR. The Sham group only experienced general preparation. A dose of 0.88 mg/kg of Alda-1 was intravenously injected at 5 minutes after resuscitation in the CPR+Alda-1 group. The same volume of saline was infused in the Sham and CPR model groups. Blood samples were collected from the femoral vein before modeling and 1, 2, 4, 24 hours after resuscitation, and the serum levels of neuron specific enolase (NSE) and S100 β protein were determined by enzyme-linked immunosorbent assay (ELISA). At 24 hours after resuscitation, the status of neurologic function was evaluated by neurological deficit score (NDS). Thereafter, the animals were sacrificed, and brain cortex was harvested to measure iron deposition by Prussian blue staining, malondialdehyde (MDA) and glutathione (GSH) contents by colorimetry, and ACSL4 and GPx4 protein expressions by Western blotting. RESULTS: Compared with the Sham group, the serum levels of NSE and S100β after resuscitation were gradually increased over time, and the NDS score was significantly increased, brain cortical iron deposition and MDA content were significantly increased, GSH content and GPx4 protein expression in brain cortical were significantly decreased, and ACSL4 protein expression was significantly increased at 24 hours after resuscitation in the CPR model and CPR+Alda-1 groups, which indicated that cell ferroptosis occurred in the brain cortex, and the ACSL4/GPx4 pathway participated in this process of cell ferroptosis. Compared with the CPR model group, the serum levels of NSE and S100 β starting 2 hours after resuscitation were significantly decreased in the CPR+Alda-1 group [NSE (μg/L): 24.1±2.4 vs. 28.2±2.1, S100 β (ng/L): 2 279±169 vs. 2 620±241, both P < 0.05]; at 24 hours after resuscitation, the NDS score and brain cortical iron deposition and MDA content were significantly decreased [NDS score: 120±44 vs. 207±68, iron deposition: (2.61±0.36)% vs. (6.31±1.66)%, MDA (μmol/g): 2.93±0.30 vs. 3.68±0.29, all P < 0.05], brain cortical GSH content and GPx4 expression in brain cortical was significantly increased [GSH (mg/g): 4.59±0.63 vs. 3.51±0.56, GPx4 protein (GPx4/GAPDH): 0.54±0.14 vs. 0.21±0.08, both P < 0.05], and ACSL4 protein expression was significantly decreased (ACSL4/GAPDH: 0.46±0.08 vs. 0.85±0.13, P < 0.05), which indicated that Alda-1 might alleviate brain cortical cell ferroptosis

through regulating ACSL4/GPx4 pathway. CONCLUSIONS: Alda-1 can reduce brain injury after CPR in swine, which may be related to the inhibition of ACSL4/GPx4 pathway mediated ferroptosis.

3. J Neurosurg Anesthesiol. 2023 Jul 1;35(3):341-346. doi: 10.1097/ANA.0000000000000838. Epub 2022 Mar 10.

Cardiopulmonary Resuscitation May Not Stop Glutamate Release in the Cerebral Cortex.

Fushimi M(1), Takeda Y(2), Mizoue R(1), Sato S(1), Kawase H(1), Takasugi Y(3), Murai S(3), Morimatsu H(1).

ABSTRACT

BACKGROUND: Cardiopulmonary resuscitation (CPR) may not be sufficient to halt the progression of brain damage. Using extracellular glutamate concentration as a marker for neuronal damage, we quantitatively evaluated the degree of brain damage during resuscitation without return of spontaneous circulation. MATERIALS AND METHODS: Extracellular cerebral glutamate concentration was measured with a microdialysis probe every 2 minutes for 40 minutes after electrical stimulation-induced cardiac arrest without return of spontaneous circulation in Sprague-Dawley rats. The rats were divided into 3 groups (7 per group) according to the treatment received during the 40 minutes observation period: mechanical ventilation without chest compression (group V); mechanical ventilation and chest compression (group VC) and; ventilation, chest compression and brain hypothermia (group VCH). Chest compression (20 min) and hypothermia (40 min) were initiated 6 minutes after the onset of cardiac arrest. RESULTS: Glutamate concentration increased in all groups after cardiac arrest. Although after the onset of chest compression, glutamate concentration showed a significant difference at 2 min and reached the maximum at 6 min (VC group; 284±48 μmol/L vs. V group 398±126 μmol/L, P =0.003), there was no difference toward the end of chest compression (513±61 μmol/L vs. 588±103 μmol/L, P =0.051). In the VCH group, the initial increase in glutamate concentration was suddenly suppressed 2 minutes after the onset of brain hypothermia. CONCLUSIONS: CPR alone reduced the progression of brain damage for a limited period but CPR in combination with brain cooling strongly suppressed increases in glutamate levels.

CASE REPORTS

1. Clin Case Rep. 2023 Jun 13;11(6):e7554. doi: 10.1002/ccr3.7554. eCollection 2023 Jun.

A case of cardiac arrest due to postpartum hemorrhage treated with hysterectomy and extracorporeal membrane oxygenation.

Tsuchiya N(1), Obata S(1), Kasai M(1), Miyagi E(2), Aoki S(1).

ABSTRACT

Although extracorporeal membrane oxygenation is relatively contraindicated in patients with severe disseminated intravascular coagulation (DIC), it can be safely introduced by providing adequate anti-DIC therapy.

2. Scand J Trauma Resusc Emerg Med. 2023 Jun 15;31(1):29. doi: 10.1186/s13049-023-01092-y.

Critically buried avalanche victims can develop severe hypothermia in less than 60 min.

Rauch S(1)(2)(3), Kompatscher J(4), Clara A(5)(6), Öttl I(4), Strapazzon G(7)(6), Kaufmann M(4).

ABSTRACT

BACKGROUND: A major challenge in the management of avalanche victims in cardiac arrest is differentiating hypothermic from non-hypothermic cardiac arrest, as management and prognosis differ. Duration of burial with a cutoff of 60 min is currently recommended by the resuscitation guidelines as a parameter to aid in this differentiation However, the fastest cooling rate under the snow reported so far is 9.4 °C per hour, suggesting that it would take 45 min to cool below 30 °C,

which is the temperature threshold below which a hypothermic cardiac arrest can occur. CASE PRESENTATION: We describe a case with a cooling rate of 14 °C per hour, assessed on site with an oesophageal temperature probe. This is by far the most rapid cooling rate after critical avalanche burial reported in the literature and further challenges the recommended 60 min threshold for triage decisions. The patient was transported under continuous mechanical CPR to an ECLS facility and rewarmed with VA-ECMO, although his HOPE score was 3% only. After three days he developed brain death and became an organ donor. CONCLUSIONS: With this case we would like to underline three important aspects: first, whenever possible, core body temperature should be used instead of burial duration to make triage decisions. Second, the HOPE score, which is not well validated for avalanche victims, had a good discriminatory ability in our case. Third, although extracorporeal rewarming was futile for the patient, he donated his organs. Thus, even if the probability of survival of a hypothermic avalanche patient is low based on the HOPE score, ECLS should not be withheld by default and the possibility of organ donation should be considered.

3. Future Cardiol. 2023 Jun 15. doi: 10.2217/fca-2023-0018. Online ahead of print.

How many clues make an evidence? An unusual case of aborted cardiac arrest due to mitral valve prolapse.

Piscitelli L(1), Robles AG(2)(3), Costantino R(1), Forte V(4), Zingaro M(2), Rosa I(2), Guaricci AI(5), Romano S(3), Sciarra L(3), Bartolomucci F(2), Rosario Chieppa DR(2).

ABSTRACT

There is an increasing awareness on the association between mitral valve prolapse (MVP) and sudden cardiac death. Mitral annular disjunction (MAD) is a phenotypic risk feature that can help in risk stratification. We present a case of a 58-year-old woman who experienced an out-of-hospital cardiac arrest caused by ventricular fibrillation interrupted by a direct current-shock. No coronary lesions were documented. Echocardiogram showed myxomatous MVP. Nonsustained ventricular tachycardia have been registered during hospital stay. Interestingly, cardiac magnetic resonance revealed MAD and a late gadolinium enhancement area in inferior wall. Finally, a defibrillator has been implanted. For arrhythmic risk stratification of MVP with MAD, multimodality imaging is the diagnostic tool to find out the disease behind many cardiac arrests of unknown cause.

4. Eur J Case Rep Intern Med. 2023 May 9;10(6):003869. doi: 10.12890/2023_003869. eCollection 2023.

Cardiac Arrest Due to out-of-Hospital Pulmonary Embolism During Pregnancy: Successful Thrombolysis.

Söderberg M(1)(2), Smedberg E(3)(2), Lindqvist PG(3)(2).

ABSTRACT

INTRODUCTION: Pulmonary embolism (PE) is a rare, severe complication in pregnancy, in which case thrombolysis can be lifesaving but has risks. We aim to highlight actions specific to pregnant women. CASE DESCRIPTION: A 24-week pregnant woman developed shortness of breath and experienced sudden cardiac arrest. Cardiopulmonary resuscitation (CPR) was begun immediately in the ambulance and a perimortem caesarean section was performed upon arrival at hospital, but the new-born died. After 55 minutes of CPR, bedside echocardiography revealed right ventricular strain and thrombolysis was given. The uterus was bandaged to minimize blood loss. After massive transfusions and correction of haemostasis, a hysterectomy was performed due to inability of the uterus to contract. After 3 weeks, the patient was discharged in good health and placed on continuous anticoagulant treatment with warfarin. DISCUSSION: Approximately 3% of all out-of-hospital cardiac arrest cases are due to PE. Among the few patients who survive at the scene, thrombolysis can be lifesaving and should be considered in pregnant women with unstable PE.

Prompt collaborative diagnostic work-up in the emergency room is necessary. In a pregnant woman with cardiac arrest, a perimortem caesarean section improves the chances of both maternal and fetal survival. CONCLUSION: Thrombolysis should be considered for patients with PE in pregnancy with the same indications as in a non-pregnant woman. In case of survival, there is profuse bleeding with need for massive transfusions and haemostasis correction. Despite being in very poor condition, the above patient survived and was fully restored to health. LEARNING POINTS: In a young person with a non-shockable rhythm, pulmonary embolism should be kept in mind, especially if they have risk factors for thromboembolism, and pregnant women should be thrombolysed on the same indication as non-pregnant women.In cardiac arrest, a perimortem caesarean section improves the chances of both maternal and fetal survival, but after major surgery one should be prepared for the need for massive transfusions after thrombolysis. Bandaging the uterus might minimize bleeding. Despite 1-hour cardiac arrest with CPR, the patient survived and made a complete recovery. Lifestyle advice with exercise and sun exposure might help avoid rethrombosis and depression in both the short and long term.