This week's PubMed 18th – 24th June 2023: articles of interest n = 39

CPR AND COVID-19

No articles identified.

CPR/MECHANICAL CHEST COMPRESSION

No articles identified.

REGISTRIES, REVIEWS AND EDITORIALS

1. Resusc Plus. 2023 Jun 6;14:100408. doi: 10.1016/j.resplu.2023.100408. eCollection 2023 Jun.
Unrealistic expectations or hopeless actions: The importance of a comprehensive survival strategy to improve cardiac arrest outcomes.
Suppan L(1)(2), Burkart R(1)(3); Swiss Resuscitation Council.
NO ABSTRACT AVAILABLE

2. Cardiol J. 2023;30(3):497-498. doi: 10.5603/CJ.a2023.0034. Epub 2023 May 29.
The head-up cardiopulmonary resuscitation method: Improving neurological outcomes.
Bondarenko A(1), Navolokina A(2), Kozyk M(1).
NO ABSTRACT AVAILABLE

IN-HOSPITAL CARDIAC ARREST

1. JACC Clin Electrophysiol. 2023 May 19:S2405-500X(23)00264-5. doi: 10.1016/ j.jacep.2023.04.012. Online ahead of print.
Seasonal Variation in the Incidence of In-Hospital Cardiac Arrest.
Ashraf M(1), Sulaiman S(2), Alyami B(2), Bhatia A(3), Jahangir A(4).
ABSTRACT
BACKGROUND: Seasonal variation in cardiovascular outcomes, including out-of-hospital cardiac arrest, has been described. OBJECTIVES: This study aimed to investigate seasonal differences in the incidence of in-hospital cardiac arrest (IHCA) and associated mortality. METHODS: Using National Inpatient Sample data from 2005 to 2019, we determined the incidence of IHCA in 4 seasons. The primary objective was to evaluate overall seasonal trends in the incidence of IHCA and trends stratified by sex, age, and region. The secondary aim was to determine common causes of admission that led to IHCA, differences in those with shockable vs nonshockable IHCA, independent predictors of IHCA, and seasonal variation in IHCA-related in-hospital mortality and length of stay. RESULTS: A consistent winter peak was observed in the incidence of IHCA in both male and female patients over the years in all age groups except young (<45 years) and in all regions. In 2019, both unadjusted and risk-adjusted odds of IHCA were higher (OR: 1.13; P < 0.001; adjusted OR: 1.08; P = 0.033) in winter than in summer. Patients with shockable IHCA were mainly admitted for cardiac and those with nonshockable IHCA for noncardiac conditions. No seasonal variation was observed in in-hospital mortality after IHCA. Therefore, seasonal variation exists, with a higher IHCA event rate in winter than summer. CONCLUSIONS: Improving insights into factors that influence the higher IHCA event rate during winter may help with proper resource allocation, development of strategies for early

recognition of patients vulnerable to IHCA, and closer monitoring and optimization of care to prevent IHCA and improve outcomes.

INJURIES AND CPR

No articles identified.

CAUSE OF THE ARREST

1. Can J Anaesth. 2023 Jun 21. doi: 10.1007/s12630-023-02505-3. Online ahead of print.
Resuscitation outcomes in patients with cancer: experience in a large urban cancer centre.
Yeung SHM(#)(1), Boles R(#)(1), Munshi L(2), Moore M(2), Seedon S(2), Shah S(2), Thyagu S(3)(4), Mehta S(5).

ABSTRACT
PURPOSE: Hospitalized patients with cancer who experience cardiopulmonary arrest have historically low survival rates. This retrospective cohort study describes outcomes of patients at a large Canadian cancer centre who had a "code medical emergency" activated, and the use of pragmatic criteria to identify patients with poor survival following resuscitation. METHODS: We included hospitalized patients with cancer who had a "code blue" activated between January 2007 and December 2018. Our primary outcome was intensive care unit (ICU) mortality. We developed pragmatic criteria to identify patients with "poor prognosis" for survival from cardiopulmonary resuscitation (CPR) based on disease status and candidacy for further cancer treatment. We used descriptive statistics to analyze the outcomes of poor prognosis patients. RESULTS: Two hundred and twenty-five patients had a code blue activated. The median age was 61 yr, 52% were male, and 48% had a solid tumour. Overall, 173/225 (77%) patients survived the code blue; 164 were admitted to the ICU, where 49% (81/164) died; 31% survived to hospital discharge; and 16% (n = 27) were alive at one year. One hundred and twenty out of 225 (53%) required chest compressions; spontaneous circulation returned in 61% (73/120), and 12% (14/120) survived to hospital discharge. Patients meeting "poor prognosis" criteria (114, 51%) were more likely to die in the ICU (64% vs 35%; $P < 0.001$) or in hospital (86% vs 59%; $P < 0.001$), and more often had goals-of-care discussions prior to the code blue (46% vs 7%; $P < 0.001$). At one year, only 2% of poor prognosis patients were alive, compared with 24% of patients who did not meet any poor prognosis criteria. CONCLUSION: Hospitalized patients with cancer requiring CPR have poor hospital and long-term outcomes. The proposed set of pragmatic criteria may be useful to identify patients unlikely to benefit from CPR and life support, to trigger early goals of care discussions, and to avoid potentially goal-discordant interventions.

2. Pediatr Emerg Care. 2023 Jun 19. doi: 10.1097/PEC.0000000000002987. Online ahead of print.
Drowning in Children and Predictive Parameters: A 15-Year Multicenter Retrospective Analysis.
Peri F(1), De Nardi L(1), Canuto A(1), Gaiero A(2), Noli S(3), Ferretti M(3), Vergine G(4), Falcioni A(4), Copponi E(4), Tagliabue B(5), Massart F(6), Fabiani E(7), Stringhi C(8), Rubini M(9), Zamagni G(10), Amaddeo A(11), Genovese MR(1), Norbedo S(11).

ABSTRACT
BACKGROUND: Drowning is a serious and underestimated public health problem, with the highest morbidity and mortality reported among children. Data regarding pediatric outcomes of drowning are often inadequate, and data collection is poorly standardized among centers. This study aims to provide an overview of a drowning pediatric population in pediatric emergency department,

focusing on its main characteristics and management and evaluating prognostic factors. METHODS: This is a retrospective multicenter study involving eight Italian Pediatric Emergency Departments. Data about patients between 0 to 16 years of age who drowned between 2006 and 2021 were collected and analyzed according to the Utstein-style guidelines for drowning. RESULTS: One hundred thirty-five patients (60.9% males, median age at the event 5; interquartile range, 3-10) were recruited and only those with known outcome were retained for the analysis (133). Nearly 10% had a preexisting medical conditions with epilepsy being the most common comorbidity. One third were hospitalized in the intensive care unit (ICU) and younger males had a higher rate of ICU admission than female peers. Thirty-five patients (26.3%) were hospitalized in a medical ward while 19 (14.3%) were discharged from the emergency department and 11 (8.3%) were discharged after a brief medical observation less than 24 hours. Six patients died (4.5%). Medium stay in the ED was approximately 40 hours. No difference in terms of ICU admission was found between cardio-pulmonary resuscitation performed by bystanders or trained medical personnel (P = 0.388 vs 0.390). CONCLUSIONS: This study offers several perspectives on ED victims who drowned. One of the major finding is that no difference in outcomes was seen in patients who received cardiopulmonary resuscitation performed by bystanders or medical services, highlighting the importance of a prompt intervention.

3. Curr Probl Cardiol. 2023 Jun 16:101875. doi: 10.1016/j.cpcardiol.2023.101875. Online ahead of print.

Validation of the risk stratification for sudden cardiac death in Chinese patients with Hypertrophic Cardiomyopathy.

Qi W(1), Pu L(1), Zhang J(2), Chen H(2), Tang Z(2), Wang J(1), Han Y(3), Chen Y(4).

ABSTRACT

Accurate identification of hypertrophic cardiomyopathy (HCM) patients at high risk of sudden cardiac death (SCD) event is challenging. The objective of this study was to validate the three SCD risk stratifications recommended by the 2014 European Society of Cardiology (ESC) guideline, the 2020 American Heart Association /American College of Cardiology (AHA/ACC) guideline, and the 2022 ECS guideline in Chinese patients with HCM. Our study population are made up of a cohort of 856 HCM patients without prior SCD events. The endpoint was defined as SCD or equivalent events (successful resuscitation after cardiac arrest or appropriate ICD shock for ventricular tachycardia or ventricular fibrillation). During a median follow-up of 43 months, SCD endpoints occurred in 44 (5.1%) patients. A total of 34 (77.3%) patients suffering from SCD events were classified correctly into high-risk groups by the 2020 AHA/ACC guideline, 27(61.4%) by the 2022 ECS guideline, and 13 (29.6%) by the 2014 ESC guideline. The C-statistic of the 2020 AHA/ACC guideline was 0.68 (95% CI, 0.60-0.76), which performed better than the 2022 ECS guideline (0.65: 95% CI, 0.56-0.73), and the 2014 ESC guideline (0.58: 95% CI, 0.48-0.67). The 2020 AHA/ACC guideline displayed better discrimination for SCD risk stratification in Chinese HCM patients than the other two guidelines, with a higher sensitivity but lower specificity.

END-TIDAL CO_2

No articles identified.

ORGAN DONATION

1. Resuscitation. 2023 Jun 22:109883. doi: 10.1016/j.resuscitation.2023.109883. Online ahead of print.

Kidneys recovered from brain dead cardiac arrest patients resuscitated with ECPR show similar one-year graft survival compared to other donors.

Raphalen JH(1), Soumagnac T(1), Blanot S(2), Bougouin W(3), Bourdiault A(1), Vimpere D(1), Ammar H(1), Dagron C(1), An K(1), Mungur A(1), Carli P(4), Hutin A(5), Lamhaut L(6).

ABSTRACT

INTRODUCTION: Among patients treated with extracorporeal cardiopulmonary resuscitation (ECPR) as a second line of treatment for refractory out-of-hospital cardiac arrest (OHCA), some may develop brain death and become eligible for organ donation. The objective of this study was to evaluate long-term outcomes of kidney grafts recovered from these patients. MATERIAL AND METHODS: We conducted a retrospective monocentric observational study between January 1, 2011, and December 31, 2017. We exclusively included patients eligible for planned donation after brainstem death and from whom at least one organ graft was retrieved and transplanted. We compared two groups of brain dead patients: those treated with ECPR for refractory OHCA (ECPR group) and a diverse group of patients who did not receive ECPR, from which only 5/23 (22%) had OHCA (control group). The primary outcome was one-year kidney graft survival. RESULTS: We included 45 patients, 23 in the control group and 22 in the ECPR group. Although patients in the ECPR group were younger and had a lower prevalence of chronic renal disease (p = 0.01), their kidney function was more severely impaired upon admission in the ICU. A total of 68 kidney grafts were retrieved, transplanted, and studied, 34 in each study group. There was no significant difference between the two groups in terms of one-year kidney graft survival (p = 0.52). CONCLUSION: Organ transplantation from patients treated with ECPR after refractory OHCA showed one-year kidney graft survival rates comparable to those of patients not treated with ECPR.

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. Front Neurol. 2023 Jun 2;14:1136046. doi: 10.3389/fneur.2023.1136046. eCollection 2023.
Neuroprotection after cardiac arrest with 2-iminobiotin: a single center phase IIa study on safety, tolerability, and pharmacokinetics.
Admiraal MM(1)(2), Velseboer DC(2)(3), Tjabbes H(4), Vis P(5), Peeters-Scholte C(4), Horn J(2)(3).
ABSTRACT
BACKGROUND: Brain injury is a serious problem in patients who survive out-of-hospital cardiac arrest (OHCA). Neuroprotective drugs could reduce hypoxic-ischemic reperfusion injury. The aim of this study was to investigate the safety, tolerability, and pharmacokinetics (PK) of 2-iminobiotin (2-IB), a selective inhibitor of neuronal nitric oxide synthase. METHODS: Single-center, open-label dose-escalation study in adult OHCA patients, investigating three 2-IB dosing schedules (targeting an AUC0-24h of 600-1,200 ng*h/m in cohort A, of 2,100-3,300 ng*h/mL in cohort B, and 7,200-8,400 of ng*h/mL in cohort C). Safety was investigated by monitoring vital signs until 15 min after study drug administration and adverse events up to 30 days after admission. Blood sampling for PK analysis was performed. Brain biomarkers and patient outcomes were collected 30 days after OHCA. RESULTS: A total of 21 patients was included, eight in cohort A and B and five in cohort C. No changes in vital signs were observed, and no adverse events related to 2-IB were reported. A two-compartment PK model described data the best. Exposure in group A (dosed on bodyweight) was three times higher than targeted (median AUC0-24h 2,398 ng*h/mL). Renal function was an important covariate; therefore, in cohort B, dosing was performed on eGFR on admission. In cohort B and C, the targeted exposure was met (median AUC0-24h 2,917 and 7,323 ng*h/mL, respectively). CONCLUSION: The administration of 2-IB to adults after OHCA is feasible and safe. PK can be well predicted with correction for renal function on admission. Efficacy studies with 2-IB after OHCA are needed.

TRAUMA

1. BMC Emerg Med. 2023 Jun 20;23(1):69. doi: 10.1186/s12873-023-00839-1.
Traumatic cardiac arrest - a nationwide Danish study.
Wolthers SA(1)(2), Jensen TW(3), Breindahl N(3)(4)(5), Milling L(6)(7), Blomberg SN(3), Andersen LB(3), Mikkelsen S(6)(7), Torp-Pedersen C(8)(9)(10), Christensen HC(3)(4)(11).
ABSTRACT
BACKGROUND: Cardiac arrest following trauma is a leading cause of death, mandating urgent treatment. This study aimed to investigate and compare the incidence, prognostic factors, and survival between patients suffering from traumatic cardiac arrest (TCA) and non-traumatic cardiac arrest (non-TCA). METHODS: This cohort study included all patients suffering from out-of-hospital

cardiac arrest in Denmark between 2016 and 2021. TCAs were identified in the prehospital medical record and linked to the out-of-hospital cardiac arrest registry. Descriptive and multivariable analyses were performed with 30-day survival as the primary outcome. RESULTS: A total of 30,215 patients with out-of-hospital cardiac arrests were included. Among those, 984 (3.3%) were TCA. TCA patients were younger and predominantly male (77.5% vs 63.6%, p = < 0.01) compared to non-TCA patients. Return of spontaneous circulation occurred in 27.3% of cases vs 32.3% in non-TCA patients, p < 0.01, and 30-day survival was 7.3% vs 14.2%, p < 0.01. An initial shockable rhythm was associated with increased survival (aOR = 11.45, 95% CI [6.24 - 21.24] in TCA patients. When comparing TCA with non-TCA other trauma and penetrating trauma were associated with lower survival (aOR: 0.2, 95% CI [0.02-0.54] and aOR: 0.1, 95% CI [0.03 - 0.31], respectively. Non-TCA was associated with an aOR: 3.47, 95% CI [2.53 - 4,91]. CONCLUSION: Survival from TCA is lower than in non-TCA. TCA has different predictors of outcome compared to non-TCA, illustrating the differences regarding the aetiologies of cardiac arrest. Presenting with an initial shockable cardiac rhythm might be associated with a favourable outcome in TCA.

VENTILATION

1. BMC Emerg Med. 2023 Jun 23;23(1):70. doi: 10.1186/s12873-023-00845-3.
A pilot, prospective trial of IntuBrite® versus Macintosh direct laryngoscopy for paramedic endotracheal intubation in out of hospital cardiac arrest.
Kluj P(1), Fedorczak M(1), Gaszyński T(2), Ratajczyk P(1).
ABSTRACT
BACKGROUND: Intubation in the case of out-of-hospital cardiac arrest (OHCA) is one of the most difficult procedures for Emergency Medical Services (EMS). The use of a laryngoscope with a dual light source is an interesting alternative to classic laryngoscopes. However, there are as yet no prospective data concerning the use of double light direct laryngoscopy (DL) by paramedics in traditional ground ambulance agencies in OHCA. METHODS: We performed a non-blinded trial in a single EMS in Poland within ambulances crews, comparing time and first pass success (FPS) for endotracheal intubation (ETI) in DL using the IntuBrite® (INT) and Macintosh laryngoscope (MCL) during cardiopulmonary resuscitation (CPR). We collected both patient and provider demographic information along with intubation details. The time and success rates were compared using an intention-to-treat analysis. RESULTS: Over a period of 40 months, a total of 86 intubations were performed using 42 INT and 44 MCL based on an intention-to-treat analysis. The FPS time of the ETI attempt (13.49 vs. 15.55 s) using an INT which was shorter than MCL was used (p < 0.05). First attempt success (34/42, 80.9% vs. 29/44, 64.4%) was comparable for INT and MCL with no statistical significance. CONCLUSIONS: We found a statistically significant difference in intubation attempt time when the INT laryngoscope was used. Intubation first attempt success rates with INT and MCL were comparable with no statistical significance during CPR performed by paramedics.

CERERBRAL MONITORING

No articles identified.

ULTRASOUND AND CPR

No articles identified.

ORGANISATION AND TRAINING

1. J Interv Card Electrophysiol. 2023 Jun 22. doi: 10.1007/s10840-023-01579-9. Online ahead of print.

Current landscape in US schools for bystander CPR training and AED requirements.

Tamirisa K(1), Patel H(2), Karim S(3), Mehta NK(4).

ABSTRACT

BACKGROUND: Out-of-hospital cardiac arrest is a public health crisis affecting about 356,000 adults and 23,000 children annually in the US with 90% fatality. Early bystander CPR and AED application improve survival. Less than 3% of the US population is CPR trained annually. Since 20% of the US population is at school daily, these represent ideal places to target CPR training. Having standardized state school CPR and AED laws will help with training. METHODS: We performed a systemic search of the state-specific laws for school AED and CPR requirements within the US. We used PubMed and Google search using keywords: school CPR mandates, US laws for CPR in schools, US state laws for AED implementation, and gaps in US school CPR and AED. We searched for mandates for schools in other countries for comparison. RESULTS: The state laws for CPR training for high school graduation and AED requirements in US. schools are highly variable, and funding for AEDs is inadequate, especially in schools in lower socio-economic zip codes. Recent AED legislative efforts focus mainly on athletic areas and don't adequately address school size, number of buildings, non-athletic areas, and engagement of student-led advocacy efforts. CONCLUSION: To improve OHCA survival, we identified potential solutions to consolidate efforts and overcome the barriers-standardize state laws, involve student bodies, increase funding, and allocate appropriate resources. The CPR/AED education needs to start earlier in schools and be part of the standard curriculum rather than implemented as a stopgap check-box mandate.

2. Heart Lung Circ. 2023 Jun;32(6):e42-e43. doi: 10.1016/j.hlc.2023.03.011.

Staying Alive: Promoting Bystander CPR and Defibrillation With Public Messaging.

Kovoor JG(1), Bacchi S(2), Gupta AK(3), Elliott R(4), Page GJ(5), Kovoor P(6).

NO ABSTRACT AVAILABLE

3. Cureus. 2023 May 20;15(5):e39268. doi: 10.7759/cureus.39268. eCollection 2023 May.

Outcomes of Cardiopulmonary Resuscitation and Predictors of Its Outcomes in the Emergency Department in King Saud Medical City, Saudi Arabia.

Alhaj Zeen M(1), Aburisheh J(1), Alshehri SS(2), Alshehri SA(1), Smaisem FS(1), Hijazi H(1), Alamri MM(3), Hegazy A(3).

ABSTRACT

BACKGROUND: Cardiac arrest is a medical emergency marked by the cessation of cardiac mechanical activity and insufficient blood flow. CPR (cardiopulmonary resuscitation) is a life-saving method that involves restoring the essential functions of two vital organs: the heart and lungs. This study was conducted to identify the outcome of CPR in cardiac arrest patients presented to the emergency department (ED) and to identify predictors of CPR outcomes. METHODOLOGY: This was a retrospective, descriptive study. All in-hospital cardiac arrest patients who underwent CPR in the King Saud Medical City (KSMC) ED between January 2017 and January 2020 were analyzed, with a sample size of 351 patients. RESULTS: Overall return of spontaneous circulation (ROSC) and survival to discharge (STD) were achieved in 106 (30.2%) and 40 (11.39%) patients, respectively. When assessing the predictors of ROSC, the analyses showed that patient age, pre-arrest intubation, the method used to deliver oxygen, and CPR duration were all statistically significant predictors for ROSC. Similarly, when assessing predictors associated with STD, the analyses showed that patient age, pre-arrest intubation, the method used to deliver oxygen, and CPR duration were positively

associated with STD. CONCLUSION: Comparing the study's findings to those of similar studies, it shows a CPR outcome rate within the range of similar studies. It also highlights that CPR outcomes are highly associated with CPR duration (a maximum of 30 minutes), younger age, and endotracheal intubation.

4. Open Access Emerg Med. 2023 Jun 15;15:241-252. doi: 10.2147/OAEM.S405397. eCollection 2023.

Geographical Association Between Basic Life Support Courses and Bystander Cardiopulmonary Resuscitation and Survival from OHCA in Denmark.

Jensen TW(1)(2)(3), Ersbøll AK(3)(4), Folke F(2)(3)(5), Andersen MP(6), Blomberg SN(1)(2)(3), Holgersen MG(2)(7), Andersen LB(1), Lippert F(2)(3), Torp-Pedersen C(6)(8), Christensen HC(1)(2)(9).

ABSTRACT

INTRODUCTION: Annually, approximately 4% of the entire adult population of Denmark participate in certified basic life support (BLS) courses. It is still unknown whether increases in BLS course participation in a geographical area increase bystander cardiopulmonary resuscitation (CPR) or survival from out-of-hospital cardiac arrest (OHCA). The aim of the study was to examine the geographical association between BLS course participation, bystander CPR, and 30-day survival from OHCA. METHODS: This nationwide register-based cohort study includes all OHCAs from the Danish Cardiac Arrest Register. Data concerning BLS course participation were supplied by the major Danish BLS course providers. A total of 704,234 individuals with BLS course certificates and 15,097 OHCA were included from the period 2016-2019. Associations were examined using logistic regression and Bayesian conditional autoregressive analyses conducted at municipality level. RESULTS: A 5% increase in BLS course certificates at municipality level was significantly associated with an increased likelihood of bystander CPR prior to ambulance arrival with an adjusted odds ratio (OR) of 1.34 (credible intervals: 1.02;1.76). The same trends were observed for OHCAs in out-of-office hours (4pm-08am) with a significant OR of 1.43 (credible intervals: 1.09;1.89). Local clusters with low rate of BLS course participation and bystander CPR were identified. CONCLUSION: This study found a positive effect of mass education in BLS on bystander CPR rates. Even a 5% increase in BLS course participation at municipal level significantly increased the likelihood of bystander CPR. The effect was even more profound in out-of-office hours with an increase in bystander CPR rate at OHCA.

5. Sci Rep. 2023 Jun 23;13(1):10231. doi: 10.1038/s41598-023-35735-y.

Impact of community-based interventions on out-of-hospital cardiac arrest outcomes: a systematic review and meta-analysis.

Simmons KM(1), McIsaac SM(2), Ohle R(3).

ABSTRACT

Survival following out-of-hospital cardiac arrest (OHCA) remains low, typically less than 10%. Bystander cardiopulmonary resuscitation (CPR) and bystander-AED use have been shown to improve survival by up to fourfold in individual studies. Numerous community-based interventions have been implemented worldwide in an effort to enhance rates of bystander-CPR, bystander-AED use, and improve OHCA survival. This systematic review and meta-analysis aims to evaluate the effect of such interventions on OHCA outcomes. Medline and Embase were systematically searched from inception through July 2021 for studies describing the implementation and effect of one or more community-based interventions targeting OHCA outcomes. Two reviewers screened articles, extracted data, and evaluated study quality using the Newcastle-Ottawa Scale. For each outcome, data were pooled using random-effects meta-analysis. Of the 2481 studies identified, 16 met inclusion criteria. All included studies were observational. They reported a total of 1,081,040 OHCAs across 11 countries. The most common interventions included community-based CPR training (n = 12), community-based

AED training (n = 9), and dispatcher-assisted CPR (n = 8). Health system interventions (hospital or paramedical services) were also described in 11 of the included studies. Evidence certainty among all outcomes was low or very low according to GRADE criteria. On meta-analysis, community-based interventions with and without health system interventions were consistently associated with improved OCHA outcomes: rates of bystander-CPR, bystander-AED use, survival, and survival with a favorable neurological outcome. Bystander CPR-14 studies showed a significant increase in post-intervention bystander-CPR rates (n = 285 752; OR 2.26 [1.74, 2.94]; I2 = 99%, and bystander AED use (n = 37 882; OR 2.08 [1.44, 3.01]; I2 = 54%) and durvival-10 studies, pooling survival to hospital discharge and survival to 30 days (n = 79 206; OR 1.59 [1.20, 2.10]; I2 = 95%. The results provide foundational support for the efficacy of community-based interventions in enhancing OHCA outcomes. These findings inform our recommendation that communities, regions, and countries should implement community-based interventions in their pre-hospital strategy for OHCA. Further research is needed to identify which specific intervention types are most effective.

6. Sci Rep. 2023 Jun 19;13(1):9950. doi: 10.1038/s41598-023-36270-6.
Machine learning algorithms for predicting days of high incidence for out-of-hospital cardiac arrest.
Shimada-Sammori K(1), Shimada T(1), Miura RE(1)(2), Kawaguchi R(1), Yamao Y(1)(2), Oshima T(1), Oami T(1), Tomita K(1), Shinozaki K(1)(3), Nakada TA(4)(5).
ABSTRACT
Predicting out-of-hospital cardiac arrest (OHCA) events might improve outcomes of OHCA patients. We hypothesized that machine learning algorithms using meteorological information would predict OHCA incidences. We used the Japanese population-based repository database of OHCA and weather information. The Tokyo data (2005-2012) was used as the training cohort and datasets of the top six populated prefectures (2013-2015) as the test. Eight various algorithms were evaluated to predict the high-incidence OHCA days, defined as the daily events exceeding 75% tile of our dataset, using meteorological and chronological values: temperature, humidity, air pressure, months, days, national holidays, the day before the holidays, the day after the holidays, and New Year's holidays. Additionally, we evaluated the contribution of each feature by Shapley Additive exPlanations (SHAP) values. The training cohort included 96,597 OHCA patients. The eXtreme Gradient Boosting (XGBoost) had the highest area under the receiver operating curve (AUROC) of 0.906 (95% confidence interval; 0.868-0.944). In the test cohorts, the XGBoost algorithms also had high AUROC (0.862-0.923). The SHAP values indicated that the "mean temperature on the previous day" impacted the most on the model. Algorithms using machine learning with meteorological and chronological information could predict OHCA events accurately.

7. JAMA Netw Open. 2023 Jun 1;6(6):e2319720. doi: 10.1001/jamanetworkopen.2023.19720.
Sentiment Analysis of Social Media Users' Emotional Response to Sudden Cardiac Arrest During a Football Broadcast.
Fijacko N(1)(2), Greif R(2)(3)(4), Štiglic G(1)(5)(6), Kocbek P(1)(7), Abella BS(8).
ABSTRACT
Plain Language Summary: This case series analyzes social media users’ sentiments after successful cardiopulmonary resuscitation of Damar Hamlin following his sudden cardiac arrest on national television.

POST-CARDIAC ARREST TREATMENTS

1. Medicine (Baltimore). 2023 Jun 9;102(23):e33914. doi: 10.1097/MD.0000000000033914.

MLC901 in hypoxic-ischemic brain injury patients: A double-blind, randomized placebo-controlled pilot study.

Pakdaman H(1), Gharagozli K, Karamiani F, Shamsi Goushki M, Moini S, Sobhanian A, Maghsoudlu F, Esfandani A, Hosseini MH, Amini Harandi A.

ABSTRACT

BACKGROUND: Hypoxic-ischemic brain injury (HIBI) is a disabling consequence of cardiopulmonary resuscitation, which has no direct treatment except supportive care. Many studies have used pharmacological agents to reduce or stop this disability. MLC901 is a traditional Chinese medicine showing neuroprotective and regenerative effects on focal and global ischemia in previous animal and human studies. We designed an experimental, randomized, double-blind, placebo-controlled study to analyze MLC901 efficacy in HIBI patients. METHODS: In a randomized, placebo-controlled trial, 35 patients with HIBI were randomly designated to receive either MLC901 or placebo capsules 3 times per day over 6 months. We assessed the 2 groups by modified Rankin Scale and Glasgow Outcome Scale at baseline, and follow-up visits in 3rd month, and 6th-month after injury. RESULTS: Thirty-one patients completed this study. There was no significant difference in baseline characteristics between the 2 groups as regards age, gender, time of resuscitation, the interval between injury and start of the intervention, and the length of intensive care unit stay. Both the placebo and intervention groups improved during the investigation. However, the Glasgow Outcome Scale and modified Rankin Scale scales were significantly improved in the MLC901 group compared to the placebo after 6 months ($P < .05$) with close to no adverse effects. No major side effect was reported. CONCLUSION: MLC901 has shown, compared to placebo, a statistically better improvement at 6 months in neurological functions of patients with HIBI.

2. Am J Emerg Med. 2023 Jun 17;71:86-94. doi: 10.1016/j.ajem.2023.06.022. Online ahead of print.

Using point-of-care testing for adult patients with out-of-hospital cardiac arrest resuscitated at the emergency department to predict return of spontaneous circulation: Development and external validation of POC-ED-ROSC model.

Huang CY(1), Lu TC(2), Tsai CL(3), Wu CY(4), Chou E(5), Wang CH(6), Tsai MS(7), Chang WT(8), Huang CH(9), Chen WJ(10).

ABSTRACT

BACKGROUND AND IMPORTANCE: Most prediction models, like return of spontaneous circulation (ROSC) after cardiac arrest (RACA) or Utstein-based (UB)-ROSC score, were developed for prehospital settings to predict the probability of ROSC in patients with out-of-hospital cardiac arrest (OHCA). A prediction model has been lacking for the probability of ROSC in patients with OHCA at emergency departments (EDs). OBJECTIVE: In the present study, a point-of-care (POC) testing-based model, POC-ED-ROSC, was developed and validated for predicting ROSC of OHCA at EDs. DESIGN, SETTINGS AND PARTICIPANTS: Prospectively collected data for adult OHCA patients between 2015 and 2020 were analysed. POC blood gas analysis obtained within 5 min of ED arrival was used. OUTCOMES MEASURE AND ANALYSIS: The primary outcome was ROSC. In the derivation cohort, multivariable logistic regression was used to develop the POC-ED-ROSC model. In the temporally split validation cohort, the discriminative performance of the POC-ED-ROSC model was assessed using the area under the receiver operating characteristic (ROC) curve (AUC) and compared with RACA or UB-ROSC score using DeLong test. MAIN RESULTS: The study included 606 and 270 patients in the derivation and validation cohorts, respectively. In the total cohort, 471 patients achieved ROSC. Age, initial cardiac rhythm at ED, pre-hospital resuscitation duration, and POC testing-measured blood levels of lactate, potassium and glucose were significant predictors included in the POC-ED-ROSC model. The model was validated with fair discriminative performance (AUC: 0.75, 95% confidence interval [CI]: 0.69-0.81) with no significant differences from RACA (AUC: 0.68, 95% CI: 0.62-0.74) or UB-ROSC score (AUC: 0.74, 95% CI: 0.68-0.79). CONCLUSION: Using only six easily accessible variables, the POC-ED-ROSC model can predict ROSC for OHCA resuscitated at ED with fair accuracy.

3. Acta Anaesthesiol Scand. 2023 Jun 20. doi: 10.1111/aas.14291. Online ahead of print.
Inflammatory response after out-of-hospital cardiac arrest-Impact on outcome and organ failure development.
Seppä AMJ(1), Skrifvars MB(2), Pekkarinen PT(1).
ABSTRACT
BACKGROUND: Post-cardiac arrest syndrome that occurs in out-of-hospital cardiac arrest (OHCA) patients is characterized by inflammatory response. We conducted a scoping review of current evidence regarding several inflammatory markers' usefulness for assessment of patient outcome and illness severity. We also discuss the proposed underlying mechanisms leading to inflammatory response after OHCA. METHODS: We searched the MEDLINE, PubMed Central, Cochrane CENTRAL and Web of Science Core Collection databases with the following search terms: ("inflammation" OR "cytokines") AND "out-of-hospital cardiac arrest." Each inflammatory marker found was combined with "out-of-hospital cardiac arrest" using "AND" to find further relevant studies. We included original studies measuring inflammatory markers in adult OHCA patients that assessed their prognostic capabilities for mortality, neurological outcome, or organ failure severity. RESULTS: Fifty-nine studies met the inclusion criteria, covering in total 65 different markers. Interleukin-6 (IL-6), procalcitonin (PCT) and C-reactive protein (CRP) were the most studied markers, and they were associated with poor outcomes in 13/15, 13/14 and 11/17 studies, respectively. Based on area under the receiver operating characteristic curve (AUC) value, the time point of best discriminatory capacity for poor outcome was ICU admission for IL-6 (median AUC 0.78, range 0.71-0.98) and day one after OHCA for PCT (median AUC 0.84, range 0.61-0.98). Seven studies reported AUCs for CRP (range 0.52-0.76) with no measurement time point being superior to others. The association of IL-6 and PCT with outcome appeared stronger in studies with more severely ill patients. Studies reported conflicting results regarding each marker's association with organ failure severity. CONCLUSION: Inflammatory markers are potentially useful for early risk stratification after OHCA. PCT and IL-6 have moderate prognostic value during the first 24 h of the ICU stay. Predictive accuracy appears to be associated with the study overall event rate.

TARGETED TEMPERATURE MANAGEMENT

1. BMC Cardiovasc Disord. 2023 Jun 20;23(1):311. doi: 10.1186/s12872-023-03334-4.
External validation of the CREST model to predict early circulatory-etiology death after out-of-hospital cardiac arrest without initial ST-segment elevation myocardial infarction.
Haxhija Z(1)(2), Seder DB(3), May TL(3), Hassager C(4), Friberg H(5), Lilja G(6), Ceric A(5), Nielsen N(7), Dankiewicz J(8).
ABSTRACT
BACKGROUND: The CREST model is a prediction model, quantitating the risk of circulatory-etiology death (CED) after cardiac arrest based on variables available at hospital admission, and intend to guide the triage of comatose patients without ST-segment-elevation myocardial infarction after successful cardiopulmonary resuscitation. This study assessed performance of the CREST model in the Target Temperature Management (TTM) trial cohort. METHODS: We retrospectively analyzed data from resuscitated out-of-hospital cardiac arrest (OHCA) patients in the TTM-trial. Demographics, clinical characteristics, and CREST variables (history of coronary artery disease, initial heart rhythm, initial ejection fraction, shock at admission and ischemic time > 25 min) were assessed in univariate and multivariable analysis. The primary outcome was CED. The discriminatory power of the logistic regression model was assessed using the C-statistic and goodness of fit was tested according to Hosmer-Lemeshow. RESULTS: Among 329 patients eligible for final analysis, 71 (22%) had CED. History of ischemic heart disease, previous arrhythmia, older age, initial non-shockable rhythm, shock at admission, ischemic time > 25 min and severe left ventricular dysfunction were

variables associated with CED in univariate analysis. CREST variables were entered into a logistic regression model and the area under the curve for the model was 0.73 with adequate calibration according to Hosmer-Lemeshow test (p = 0.602). CONCLUSIONS: The CREST model had good validity and a discrimination capability for predicting circulatory-etiology death after resuscitation from cardiac arrest without ST-segment elevation myocardial infarction. Application of this model could help to triage high-risk patients for transfer to specialized cardiac centers.

2. Am J Respir Crit Care Med. 2023 Jun 15;207(12):1558-1564. doi: 10.1164/rccm.202211-2142CP.
Changes in Practice of Controlled Hypothermia after Cardiac Arrest in the Past 20 Years: A Critical Care Perspective.
Nielsen N(1)(2), Friberg H(1)(3).
ABSTRACT
For 20 years, induced hypothermia and targeted temperature management have been recommended to mitigate brain injury and increase survival after cardiac arrest. On the basis of animal research and small clinical trials, the International Liaison Committee on Resuscitation strongly advocated hypothermia at 32-34 °C for 12-24 hours for comatose patients with out-of-hospital cardiac arrest with initial rhythm of ventricular fibrillation or nonperfusing ventricular tachycardia. The intervention was implemented worldwide. In the past decade, hypothermia and targeted temperature management have been investigated in larger clinical randomized trials focusing on target temperature depth, target temperature duration, prehospital versus in-hospital initiation, nonshockable rhythms, and in-hospital cardiac arrest. Systematic reviews suggest little or no effect of delivering the intervention on the basis of the summary of evidence, and the International Liaison Committee on Resuscitation today recommends only to treat fever and keep body temperature below 37.5 °C (weak recommendation, low-certainty evidence). Here we describe the evolution of temperature management for patients with cardiac arrest during the past 20 years and how the accrued evidence has influenced not only the recommendations but also the guideline process. We also discuss possible paths forward in this field, bringing up both whether fever management is at all beneficial for patients with cardiac arrest and which knowledge gaps future clinical trials in temperature management should address.

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

Hispanic ethnicity (OR 0.74, p <0.001) were all associated with decreased odds of receiving TTM. Patients with Medicare (OR 0.75, p <0.001) and Medicaid (OR 0.89, p = 0.027) were less likely than patients with private insurance to receive TTM. Part of these differences was driven by inequitable access to TTM-capable hospitals. In conclusion, TTM is rarely used after cardiac arrest. Hospital use of TTM is predominately limited to a subset of academic hospitals with substantial regional variation. Older age, female gender, Hispanic ethnicity, and Medicare or Medicaid insurance are all associated with a decreased likelihood of receiving TTM.

ELECTROPHYSIOLOGY AND DEFIBRILLATION

1. Front Cardiovasc Med. 2023 Jun 2;10:1178148. doi: 10.3389/fcvm.2023.1178148. eCollection 2023.

Public attitudes towards automated external defibrillators: results of a survey in the Australian general population.

Kovoor JG(1)(2)(3), Marschner S(4), Amarasekera A(4), Nageswaran M(4), Page GJ(2), Chow CK(4), Thiagalingam A(4), Kovoor P(2)(3)(4).

ABSTRACT

BACKGROUND: Swift defibrillation by lay responders using automated external defibrillators (AEDs) increases survival in out-of-hospital cardiac arrest (OHCA). This study evaluated newly designed yellow-red vs. commonly used green-white signage for AEDs and cabinets and assessed public attitudes to using AEDs during OHCA. METHODS: New yellow-red signage was designed to enable easy identification of AEDs and cabinets. A prospective, cross-sectional study of the Australian public was conducted using an electronic, anonymised questionnaire between November 2021 and June 2022. The validated net promoter score investigated public engagement with the signage. Likert scales and binary comparisons evaluated preference, comfort and likelihood of using AEDs for OHCA. RESULTS: The yellow-red signage for AED and cabinet was preferred by 73.0% and 88%, respectively, over the green-white counterparts. Only 32% were uncomfortable with using AEDs, and only 19% indicated a low likelihood of using AEDs in OHCA. CONCLUSION: The majority of the Australian public surveyed preferred yellow-red over green-white signage for AED and cabinet and indicated comfort and likelihood of using AEDs in OHCA. Steps are necessary to standardise yellow-red signage of AED and cabinet and enable widespread availability of AEDs for public access defibrillation.

PEDIATRICS AND CHILDREN

1. Sci Rep. 2023 Jun 21;13(1):10092. doi: 10.1038/s41598-023-37201-1.

Changes in pre- and in-hospital management and outcomes among children with out-of-hospital cardiac arrest between 2012 and 2017 in Kanto, Japan.

Ishihara T(1), Sasaki R(2), Enomoto Y(3), Amagasa S(2), Yasuda M(4), Ohnishi S(2).

ABSTRACT

Previously, the SOS-KANTO 2012 studies, conducted in the Kanto area of Japan, reported a summary of outcomes in patients with out-of-hospital cardiac arrest (OHCA). This sub-analysis of the SOS-KANTO study 2017 aimed to evaluate the neurological outcomes of paediatric OHCA patients, by comparing the SOS-KANTO 2012 and 2017 studies. All OHCA patients, aged < 18 years, who were transported to the participating hospitals by EMS personnel were included in both SOS-KANTO studies (2012 and 2017). The number of survival patients with favourable neurological outcomes (paediatric cerebral performance category 1 or 2) at 1 month did not improve between 2012 and 2017. There was no significant difference in achievement of pre-hospital return of spontaneous

circulation (ROSC) [odds ratio (OR): 2.00, 95% confidence interval (95% CI): 0.50-7.99, p = 0.50] and favourable outcome at 1 month [OR: 0.67, 95% CI: 0.11-3.99, p = 1] between the two studies, matched by age, witnessed arrest, bystander CPR, aetiology of OHCA, and time from call to EMS arrival. Multivariable logistic regression showed no significant difference in the achievement of pre-hospital ROSC and favourable outcomes at 1 month between the two studies.

2. Eur J Pediatr. 2023 Jun 19. doi: 10.1007/s00431-023-05055-4. Online ahead of print.
Cardiac arrest and cardiopulmonary resuscitation in pediatric patients with cardiac disease: a narrative review.
Sperotto F(1), Gearhart A(2), Hoskote A(3), Alexander PMA(2), Barreto JA(2), Habet V(2), Valencia E(#)(2), Thiagarajan RR(#)(2).
ABSTRACT
Children with cardiac disease are at a higher risk of cardiac arrest as compared to healthy children. Delivering adequate cardiopulmonary resuscitation (CPR) can be challenging due to anatomic characteristics, risk profiles, and physiologies. We aimed to review the physiological aspects of resuscitation in different cardiac physiologies, summarize the current recommendations, provide un update of current literature, and highlight knowledge gaps to guide research efforts. We specifically reviewed current knowledge on resuscitation strategies for high-risk categories of patients including patients with single-ventricle physiology, right-sided lesions, right ventricle restrictive physiology, left-sided lesions, myocarditis, cardiomyopathy, pulmonary arterial hypertension, and arrhythmias. Cardiac arrest occurs in about 1% of hospitalized children with cardiac disease, and in 5% of those admitted to an intensive care unit. Mortality after cardiac arrest in this population remains high, ranging from 30 to 65%. The neurologic outcome varies widely among studies, with a favorable neurologic outcome at discharge observed in 64%-95% of the survivors. Risk factors for cardiac arrest and associated mortality include younger age, lower weight, prematurity, genetic syndrome, single-ventricle physiology, arrhythmias, pulmonary arterial hypertension, comorbidities, mechanical ventilation preceding cardiac arrest, surgical complexity, higher vasoactive-inotropic score, and factors related to resources and institutional characteristics. Recent data suggest that Extracorporeal membrane oxygenation CPR (ECPR) may be a valid strategy in centers with expertise. Overall, knowledge on resuscitation strategies based on physiology remains limited, with a crucial need for further research in this field. Collaborative and interprofessional studies are highly needed to improve care and outcomes for this high-risk population. What is Known: • Children with cardiac disease are at high risk of cardiac arrest, and cardiopulmonary resuscitation may be challenging due to unique characteristics and different physiologies. • Mortality after cardiac arrest remains high and neurologic outcomes suboptimal. What is New: • We reviewed the unique resuscitation challenges, current knowledge, and recommendations for different cardiac physiologies. • We highlighted knowledge gaps to guide research efforts aimed to improve care and outcomes in this high-risk population.

3. Heart Rhythm. 2023 Jun 16:S1547-5271(23)02352-4. doi: 10.1016/j.hrthm.2023.06.010. Online ahead of print.
Epidemiology of pediatric out-of-hospital cardiac arrest compared with adults.
Somma V(1), Pflaumer A(2), Connell V(3), Rowe S(4), Fahy L(4), Zentner D(5), James P(5), Ingles J(6), Semsarian C(7), Stub D(8), Nehme Z(9), La Gerche A(10), Paratz ED(11).
ABSTRACT
BACKGROUND: Out-of-hospital cardiac arrest (OHCA) is associated with approximately 90% mortality rate. In the pediatric population, this would equate to a large number of years of life lost, posing a

heavy medical and economic burden to society. OBJECTIVES: Outline characteristics and causes of pediatric OHCA (pOHCA) and associations with survival until discharge in patients enrolled in the End Unexplained Cardiac Death (EndUCD) registry. METHODS: A prospective state-wide multi-source registry identified all pOHCA in patients aged 1-18 years old in Victoria, Australia (population 6.5 million), from April 2019 to April 2021. Cases were adjudicated using ambulance, hospital and forensic records, clinic assessments and interviews of survivors and family members. RESULTS: The analysis included 106 cases after adjudication (58.5% male), 45 (42.5%) of which were cardiac causes of OHCA, with unascertained (n = 33, 31.1%) being the most common cardiac cause reported. Respiratory events (n = 28, 26.4%) were the most common non-cardiac cause of pOHCA. Non-cardiac causes were more likely to present with asystole or pulseless electrical activity (p=0.007). The overall survival to hospital discharge rate was 11.3% and associated with increasing age, witnessed cardiac arrest and initial ventricular arrhythmias (p<0.05). CONCLUSIONS: The incidence of pOHCA in the study population was 3.69 per 100 000 child-years. In contrast to young adults with OHCA, the most common aetiology was non-cardiac. Prognostic factors associated with survival to discharge included increasing age, witnessed arrest and initial ventricular arrhythmias. Rates of cardiopulmonary resuscitation and defibrillation were sub-optimal.

4. Auris Nasus Larynx. 2023 Aug;50(4):607-613. doi: 10.1016/j.anl.2022.10.003. Epub 2022 Oct 26.
Pediatric respiratory tract foreign bodies in children: A systematic review.
Ngamsanga S(1), Vathanophas V(2), Ungkanont K(3), Tanphaichitr A(3), Wannarong T(3).
ABSTRACT
OBJECTIVE: Pediatric respiratory emergencies of airway foreign body (FB) are a common cause of visits to the emergency department (ED) and respiratory failure is a major cause of cardiopulmonary arrest. The purpose of this study is to evaluate the literature and update our current understanding of pediatric respiratory tract FBs in children by clearly considering the aspect of the complications and related factors. METHODS: A systematic search of PubMed and Embase yielded a total of 2035 studies related to the respiratory tract FB in children. After screening the abstracts, 118 articles were included for analysis. However, 56 articles were excluded due to the published data more than 10 years. Meanwhile, 6 articles were duplicated and 3 articles were the secondary data. Thus, 53 full text articles were assessed for eligibility. Then, 46 full text articles were excluded due to irrelevant contents. Finally, there were 7 qualitative articles in this systematic review. RESULTS: Most children with FBs in the aerodigestive tract are 1-3 years of age. Most FBs are organic, especially seeds. The most commonly obstructed airway is the right primary bronchus. The most common and severe complications are pneumonia, pulmonary atelectasis, lung consolidation, pneumothorax, bronchiectasis, and death. The main device for the removal of FBs from the airways is a rigid bronchoscope. Duration of diagnosis is major factors that related with severe complication. CONCLUSION: FBs obstructive conditions in respiratory tract of children are serious and life-threatening conditions. The likelihood of death depends on the location of the obstruction, the nature of FB, time to removal, and initial resuscitation. Moreover, even after a FB has been removed, complications can lead to death. Educating parents and immediate treatment is very important. Rapid diagnosis is important factor to prevent complication.

EXTRACORPOREAL LIFE SUPPORT

1. Resuscitation. 2023 Jul;188:109827. doi: 10.1016/j.resuscitation.2023.109827.
Extracorporeal cardiopulmonary resuscitation success - System or selection?
van de Koolwijk AF(1), Ubben JFH(2), Suverein MM(1), Lorusso R(3), van de Poll MCG(4).
NO ABSTRACT AVAILABLE

2. JACC Cardiovasc Interv. 2023 Jun 7:S1936-8798(23)00856-7. doi: 10.1016/j.jcin.2023.05.025. Online ahead of print.
Extracorporeal Cardiopulmonary Resuscitation for Refractory Out-of-Hospital Cardiac Arrest: A Meta-Analysis of Randomized Trials.
Ali A, Dang AT, Cameron SJ, Banerjee S, Mamas M, Kumbhani DJ, Elgendy IY, Elbadawi A.
NO ABSTRACT AVAILABLE

EXPERIMENTAL RESEARCH

1. Shock. 2023 Jun 22. doi: 10.1097/SHK.0000000000002171. Online ahead of print.
Extracorporeal cardiopulmonary resuscitation with therapeutic hypothermia mitigates kidney injury following cardiac arrest in rats.
Chen S(1), Yu J(2), Xue P(3), Hei F, Guan Y(1).
ABSTRACT
Many patients with cardiac arrest (CA) experience severe kidney injury following the return of spontaneous circulation (ROSC). This study aimed to compare the renal protective effect of conventional cardiopulmonary resuscitation (CCPR), extracorporeal cardiopulmonary resuscitation (ECPR), and ECPR with therapeutic hypothermia (ECPR+T) in a CA rat model. Twenty-four adult male Sprague-Dawley rats were randomly and equally allocated into the SHAM, CCPR, ECPR, and ECPR+T groups. The SHAM group underwent basic surgical procedures without asphyxia-induced CA. The other three groups were treated with asphyxiation to establish the CA model. Subsequently, they were rescued using three different therapeutic methods. The endpoints were 1 h after ROSC or death. Renal injury was evaluated by histopathology. Oxidative stress, endoplasmic reticulum stress, necroptosis, inflammatory, and apoptosis-related genes, and proteins were detected using western blotting, ELISA, and assay kit. Compared with CCPR, ECPR and ECPR+T alleviated oxidative stress by upregulating nuclear factor erythroid 2-related factor 2, superoxide dismutase, glutathione and downregulating heme oxygenase-1, and malondialdehyde. Expression of endoplasmic reticulum stress-related proteins, glucose-regulated protein 78, and CCAAT/enhancer-binding protein homologous protein was lower in ECPR and ECPR+T groups than that in the CCPR group, along with levels of tumor necrosis factor-alpha, interleukin 6, and interleukin 1-beta, and necroptosis proteins (receptor-interacting serine/threonine kinase [RIP]1 and RIP3). Further, the ECPR and ECPR+T groups had significantly increased B-cell lymphoma 2 (bcl-2) and decreased bcl-2-associated X levels compared with the CCPR group. ECPR and ECPR+T alleviate kidney damage following CA in rats compared with CCPR. Furthermore, ECPR+T had a better renal protective effect.

2. Neurocrit Care. 2023 Jun 23. doi: 10.1007/s12028-023-01776-4. Online ahead of print.
Feasibility of Magnetic Resonance-Based Conductivity Imaging as a Tool to Estimate the Severity of Hypoxic-Ischemic Brain Injury in the First Hours After Cardiac Arrest.
Jung YH(1)(2), Lee HY(3), Lee BK(1)(2), Choi BK(4), Kim TH(5), Kim JW(6), Kim HC(6), Kim HJ(4), Jeung KW(7)(8).
ABSTRACT
BACKGROUND: Early identification of the severity of hypoxic-ischemic brain injury (HIBI) after cardiac arrest can be used to help plan appropriate subsequent therapy. We evaluated whether conductivity of cerebral tissue measured using magnetic resonance-based conductivity imaging (MRCI), which provides contrast derived from the concentration and mobility of ions within the imaged tissue, can reflect the severity of HIBI in the early hours after cardiac arrest. METHODS: Fourteen minipigs were resuscitated after 5 min or 12 min of untreated cardiac arrest. MRCI was

performed at baseline and at 1 h and 3.5 h after return of spontaneous circulation (ROSC). RESULTS: In both groups, the conductivity of cerebral tissue significantly increased at 1 h after ROSC compared with that at baseline (P = 0.031 and 0.016 in the 5-min and 12-min groups, respectively). The increase was greater in the 12-min group, resulting in significantly higher conductivity values in the 12-min group (P = 0.030). At 3.5 h after ROSC, the conductivity of cerebral tissue in the 12-min group remained increased (P = 0.022), whereas that in the 5-min group returned to its baseline level. CONCLUSIONS: The conductivity of cerebral tissue was increased in the first hours after ROSC, and the increase was more prominent and lasted longer in the 12-min group than in the 5-min group. Our findings suggest the promising potential of MRCI as a tool to estimate the severity of HIBI in the early hours after cardiac arrest.

3. Neuroscience. 2023 Jun 21:S0306-4522(23)00255-5. doi: 10.1016/j.neuroscience.2023.06.001. Online ahead of print.

GABA(B) receptor activation attenuates neuronal pyroptosis in post-cardiac arrest brain injury.

Sun Y(1), Li J(1), Wu H(1), Zhao Z(2), Cong T(1), Li L(1), Zhang X(3), Yin S(4), Xiao Z(1).

ABSTRACT

Brain injury is a major cause of death and disability after cardiac arrest (CA). Previous studies have shown that activating GABAB receptors significantly improves neurological function after CA, but the mechanism of this neuronal protection of damaged neurons remains unclear. Thus, the present study aimed to investigate whether GABAB receptor activation protects against neuronal injury and to reveal the underlying protective mechanisms. In this study, rats underwent 10 minutes of asphyxia to induce CA, and SH-SY5Y cells were subjected to oxygen and glucose deprivation/ reoxygenation (OGD/R) to establish in vivo and in vitro models of hypoxic neuronal injury. Differential gene expression between CA rats and sham-operated rats was identified using RNA-seq. TUNEL and Nissl staining were used to evaluate cortical neuron damage, while Western blotting, qRT-PCR, and immunofluorescence assays were conducted to measure pyroptosis-related indicators. Furthermore, cellular models with high expression of caspase-11 were established to reveal the novel molecular mechanisms by which GABAB receptor activation exerts neuroprotective effects. Intriguingly, our results showed that caspase-11 and GSDMD were highly expressed in rats experiencing cardiac arrest. Specifically, GSDMD was expressed in neurons in the M1 area of the cerebral cortex. Moreover, activation of the GABAB receptor exerted a protective effect on neurons both in vivo and in vitro. Baclofen attenuated caspase-11 activation and neuronal pyroptosis after CA, and the anti-neuronal pyroptosis effect of baclofen was abolished by overexpression of caspase-11 in neuronal cells. In conclusion, GABAB receptor activation may play a neuroprotective role by alleviating neuronal pyroptosis through a mechanism involving caspase-11.

4. Neurochem Res. 2023 Jun 20. doi: 10.1007/s11064-023-03957-1. Online ahead of print.

Targeted Activation of HNF4α by AMPK Inhibits Apoptosis and Ameliorates Neurological Injury Caused by Cardiac Arrest in Rats.

Zhan H(#)(1)(2), Zhang Q(#)(3)(2), Zhang C(1)(4)(2), Cheng J(3), Yang Y(1), Liu C(3)(4), Li S(1), Wang C(3), Yang J(1), Ge H(1), Zhou D(3), Li B(3), Wei H(5), Hu C(6).

ABSTRACT

Previous studies have shown that AMPK plays an important role in cerebral ischemia-reperfusion injury by participating in apoptosis, but the exact mechanism and target of action remains unclear. This study aimed to investigate the protective mechanism of AMPK activation on brain injury secondary to cardiac arrest. HE, Nills and TUNEL assays were used to evaluate neuronal damage and apoptosis. The relationships between AMPK, HNF4α and apoptotic genes were verified by ChIP-seq, dual-luciferase and WB assays. The results showed that AMPK improved the 7-day memory function

of rats, and reduced neuronal cell injury and apoptosis in the hippocampal CA1 region after ROSC, while the use of HNF4α inhibitor weakened the protective effect of AMPK. Further research found that AMPK positively regulated the expression of HNF4α, and AMPK could promote the expression of Bcl-2 and inhibit the expression of Bax and Cleaved-Caspase 3. In vitro experiments showed that AMPK ameliorated neuronal injury by inhibiting apoptosis through the activation of HNF4α. Combined with ChIP-seq, JASPAR analysis and Dual-luciferase assay, the binding site of HNF4α to the upstream promoter of Bcl-2 was found. Taken together, AMPK attenuates brain injury after CA by activating HNF4α to target Bcl-2 to inhibit apoptosis.

CASE REPORTS

1. Front Pediatr. 2023 Jun 7;11:1188098. doi: 10.3389/fped.2023.1188098. eCollection 2023.
Sudden cardiac arrest in a child with Gitelman syndrome: a case report and literature review.
Zieg J(1), Tavačová T(2), Balaščáková M(3), Peldová P(3), Fencl F(1), Kubuš P(2).
ABSTRACT
Salt-losing tubulopathies are well-recognised diseases predisposing to metabolic disturbances in affected patients. One of the most severe complications can be life-threatening arrhythmias causing sudden cardiac arrest. We present here the first case of a pediatric patient with Gitelman syndrome associated sudden cardiac arrest without precipitating event. A 10-year-old boy collapsed due to ventricular fibrillation in the Prague tram. Lay cardiopulmonary resuscitation was initiated and external defibrillation restored sinus rhythm within minutes. Initial laboratory examination revealed severe hypokalemia requiring large amounts of electrolyte supplementation. Genetic testing focused to tubulopathies was performed and the diagnosis of Gitelman syndrome was made following the identification of two pathogenic variants in SLC12A3 gene (c.2633 + 1G>A and c.2221G>A). Implantable cardioverter-defibrillator was implanted to prevent sudden cardiac death. The patient was in a good clinical condition with satisfactory electrolyte serum levels at the last follow-up. Causes of electrolyte abnormalities in children should be identified early to prevent the development of rare but potentially fatal complications.

2. Cureus. 2023 Jun 21;15(6):e40755. doi: 10.7759/cureus.40755. eCollection 2023 Jun.
Recognition of Pulseless Ventricular Tachycardia Through the Second Analysis of Automated External Defibrillators, Leading to Successful Shock Delivery in a Patient With Dilated Cardiomyopathy: A Case Report.
Teragawa Y(1), Teragawa H(2), Orita Y(2), Oshita C(2), Ochi M(3).
ABSTRACT
The use of a defibrillator with a monitor is recommended for the shock indication algorithm for in-hospital cardiac arrest; however, it is likely that many medical facilities are still equipped only with automated external defibrillators (AEDs). We experienced a case of dilated cardiomyopathy (DCM) complicated by pulseless ventricular tachycardia (pVT) in which an AED was used, but shock was deemed unnecessary after the first analysis. We believe that this case is suggestive of resuscitating cardiac arrest, for which defibrillation is indicated and reported here. A 65-year-old man who had DCM and diabetic nephropathy was admitted to our institution because of worsening heart failure. In the hospital, he suddenly had syncope and was diagnosed with cardiac arrest. Thereafter, cardiopulmonary resuscitation (CPR) was performed using an AED, and the monitor on the AED showed pVT. The first analysis of the AED announced unnecessary shock delivery. The pads of the AED were pressed firmly against the chest wall while continuous high-quality CPR was administered for two minutes. The second analysis of the AED revealed the necessity of providing shock for shockable rhythm. The patient experienced the return of spontaneous circulation after shock

delivery. We were reminded that there are some clinical cases in which AED shock is not indicated for pVT and that even in such cases, it is important to continue high-quality CPR without panicking

3. Neth Heart J. 2023 Jun 22. doi: 10.1007/s12471-023-01789-w. Online ahead of print.
Importance of exercise stress testing in evaluation of unexplained cardiac arrest survivor.
Bergeman AT(1)(2)(3), Robyns T(2)(4), Amin AS(1)(2)(3), Wilde AAM(1)(2)(3), van der Werf C(5)(6)(7).
ABSTRACT
BACKGROUND: In sudden cardiac arrest survivors without an immediately identifiable cause, additional extensive yet individualised testing is required. METHODS: We describe 3 survivors of sudden cardiac arrest in whom exercise stress testing was not performed during the initial hospital admission. RESULTS: All 3 patients were incorrectly diagnosed with long QT syndrome based on temporary sudden cardiac arrest-related heart rate-corrected QT interval prolongation, and exercise stress testing was not performed during the initial work-up. When they were subjected to exercise stress testing during follow-up, a delayed diagnosis of catecholaminergic polymorphic ventricular tachycardia (CPVT) was made. As a result, these patients were initially managed inappropriately, and their family members were initially not screened for CPVT. CONCLUSION: In sudden cardiac arrest survivors without an immediately identifiable cause, omission of exercise stress testing or erroneous interpretation of the results can lead to a delayed or missed diagnosis of CPVT, which may have considerable implications for survivors and their family.

4. Cureus. 2023 May 18;15(5):e39177. doi: 10.7759/cureus.39177. eCollection 2023 May.
Right Ventricular Perforation Leading to Sudden Death Due to Extracorporeal Membrane Oxygenation (ECMO) Canula Dislodgement.
Sebastian F(1), Khan AA(1), Dhillon D(2), Kaki A(2).
ABSTRACT
ECMO has been playing an increasingly important role in the management of coronavirus disease (COVID-19)-related acute respiratory distress syndrome (ARDS). However, despite its potential benefits, high mortality rates are still being reported worldwide. Herein, we report the case of a 32-year-old male who presented with worsening shortness of breath secondary to COVID-19. Unfortunately, he experienced a sentinel event when the cannula became dislodged due to coughing, which led to a right ventricular perforation and sudden pulseless electrical activity (PEA) cardiac arrest.