This week's PubMed 30th April – 6th May 2023: articles of interest n = 40

CPR AND COVID-19

1. Resuscitation. 2023 May;186:109780. doi: 10.1016/j.resuscitation.2023.109780. Epub 2023 Mar 27.
COVID-19 lockdown and bystander cardiopulmonary resuscitation: All associations are local.
April MD(1).
NO ABSTRACT AVAILABLE

CPR/MECHANICAL CHEST COMPRESSION

No articles identified.

REGISTRIES, REVIEWS AND EDITORIALS

1. J Clin Invest. 2023 May 1;133(9):e169217. doi: 10.1172/JCI169217.
CPR: cardiac phosphatase in resuscitation.
Deb A(1)(2)(3)(4)(5)(6).
Comment on A cell-penetrating PHLPP peptide improves cardiac arrest survival in murine and swine models.
ABSTRACT
Out-of-hospital cardiac arrest is associated with a dismal mortality rate and low long-term survival. A large pharmacological knowledge gap exists in identifying drugs that preserve neurological function and increase long-term survival after cardiac arrest. In this issue of the JCI, Li, Zhu, and colleagues report on their engineering of a 20-amino acid cell-permeable peptide (TAT-PHLPP9c) that antagonized the phosphatase PHLPP1 and prevented PHLPP1-mediated dephosphorylation and AKT inactivation. TAT-PHLPP9c administration maintained activated AKT after arrest and led to AKT-mediated beneficial effects on the heart, brain, and metabolism, resulting in increased cardiac output and cerebral blood flow and rescue of ATP levels in affected tissues. TAT-PHLPP9c improved neurological outcomes and increased survival after cardiac arrest in murine and porcine models of cardiac arrest. These findings provide proof of concept that pharmacological targeting of PHLPP1 may be a promising approach to augmenting long-term survival after cardiac arrest.

2. Resusc Plus. 2023 Apr 19;14:100390. doi: 10.1016/j.resplu.2023.100390. eCollection 2023 Jun.
A narrative review of European public awareness initiatives for cardiac arrest.
Horriar L(1), Rott N(1)(2), Semeraro F(3)(4), Böttiger BW(1)(2).
ABSTRACT
A high resuscitation rate can lead to better overall survival after cardiac arrest. In Europe, various campaigns in the field of lay resuscitation are achieving up to a threefold increase in survival. As part of the new Systems Saving Lives (SSL) chapter, the European Resuscitation Council (ERC) guidelines recommend cardiac awareness campaigns to engage the broader community. It has been noted that countries with high survival rates after an out-of-hospital cardiac arrest (OHCA) start education in resuscitation techniques at school age. The ERC 2021 guidelines recommend that all schoolchildren should routinely receive CPR training each year. Since 2015, the KIDS SAVE LIVES statement recommended for two hours of instruction per year in all schools worldwide by age of 12. Cardiac

awareness campaigns like World Restart a Heart Day (WRAH) are aimed to raise awareness about resuscitation and to train as many people as possible.

3. Crit Care. 2023 May 4;27(1):169. doi: 10.1186/s13054-023-04458-x.
Publisher Correction: The effect of blood pressure on mortality following out-of-hospital cardiac arrest: a retrospective cohort study of the United Kingdom Intensive Care National Audit and Research Centre database.
McGuigan PJ(1)(2), Giallongo E(3), Blackwood B(4), Doidge J(3), Harrison DA(3), Nichol AD(5)(6)(7), Rowan KM(3), Shankar-Hari M(8)(9), Skrifvars MB(10)(11), Thomas K(3), McAuley DF(12)(4).
NO ABSTRACT AVAILABLE

4. J Am Coll Emerg Physicians Open. 2023 Apr 29;4(3):e12943. doi: 10.1002/emp2.12943. eCollection 2023 Jun.
Association between sex and survival after out-of-hospital cardiac arrest: A systematic review and meta-analysis.
Bijman LAE(1), Alotaibi R(1), Jackson CA(1), Clegg G(1)(2), Halbesma N(1)(2).
ABSTRACT
The current literature on sex differences in 30-day survival following out-of-hospital cardiac arrest (OHCA) is conflicting, with 3 recent systematic reviews reporting opposing results. To address these contradictions, this systematic literature review and meta-analysis aimed to synthesize the literature on sex differences in survival after OHCA by including only population-based studies and through separate meta-analyses of crude and adjusted effect estimates. MEDLINE and Embase databases were systematically searched from inception to March 23, 2022 to identify observational studies reporting sex-specific 30-day survival or survival until hospital discharge after OHCA. Two meta-analyses were conducted. The first included unadjusted effect estimates of the association between sex and survival (comparing males vs females), whereas the second included effect estimates adjusted for possible mediating and/or confounding variables. The PROSPERO registration number was CRD42021237887, and the search identified 6712 articles. After the screening, 164 potentially relevant articles were identified, of which 26 were included. The pooled estimate for crude effect estimates (odds ratio [OR], 1.42; 95% confidence interval [CI], 1.22-1.66) indicated that males have a higher chance of survival after OHCA than females. However, the pooled estimate for adjusted effect estimates shows no difference in survival after OHCA between males and females (OR, 0.93; 95% CI, 0.84-1.03). Both meta-analyses involved high statistical heterogeneity between studies: crude pooled estimate I2 = 95.7%, adjusted pooled estimate I2 = 91.3%. There does not appear to be a difference in survival between males and females when effect estimates are adjusted for possible confounding and/or mediating variables in non-selected populations.

5. CJC Open. 2023 Feb 26;5(4):268-284. doi: 10.1016/j.cjco.2023.02.006. eCollection 2023 Apr.
Management of Inherited Arrhythmia Syndromes: A HiRO Consensus Handbook on Process of Care.
Janzen ML(1), Davies B(1), Laksman ZWM(1), Roberts JD(2), Sanatani S(3), Steinberg C(4), Tadros R(5), Cadrin-Tourigny J(5), MacIntyre C(6), Atallah J(7), Fournier A(8), Green MS(9), Hamilton R(10), Khan HR(11), Kimber S(12), White S(13), Joza J(14), Makanjee B(15), Ilhan E(16), Lee D(17), Hansom S(9), Hadjis A(18), Arbour L(19), Leather R(19), Seifer C(20), Angaran P(21), Simpson CS(22), Healey JS(2), Gardner M(17), Talajic M(5), Krahn AD(1).
ABSTRACT
Inherited arrhythmia syndromes are rare genetic conditions that predispose seemingly healthy individuals to sudden cardiac arrest and death. The Hearts in Rhythm Organization is a

multidisciplinary Canadian network of clinicians, researchers, patients, and families that aims to improve care for patients and families with inherited cardiac conditions, focused on those that confer predisposition to arrhythmia and sudden cardiac arrest and/or death. The field is rapidly evolving as research discoveries increase. A streamlined, practical guide for providers to diagnose and follow pediatric and adult patients with inherited cardiac conditions represents a useful tool to improve health system utilization, clinical management, and research related to these conditions. This review provides consensus care pathways for 7 conditions, including the 4 most common inherited cardiac conditions that confer predisposition to arrhythmia, with scenarios to guide investigation, diagnosis, risk stratification, and management. These conditions include Brugada syndrome, long QT syndrome, arrhythmogenic right ventricular cardiomyopathy and related arrhythmogenic cardiomyopathies, and catecholaminergic polymorphic ventricular tachycardia. In addition, an approach to investigating and managing sudden cardiac arrest, sudden unexpected death, and first-degree family members of affected individuals is provided. Referral to specialized cardiogenetic clinics should be considered in most cases. The intention of this review is to offer a framework for the process of care that is useful for both experts and nonexperts, and related allied disciplines such as hospital management, diagnostic services, coroners, and pathologists, in order to provide high-quality, multidisciplinary, standardized care.

6. Curr Opin Crit Care. 2023 Jun 1;29(3):155-161. doi: 10.1097/MCC.0000000000001037. Epub 2023 Mar 20.

Head-up cardiopulmonary resuscitation.

Moore JC(1)(2).

ABSTRACT

PURPOSE OF REVIEW: The purpose of this review was to provide an overview of head-up (HUP) CPR physiology, relevant preclinical findings, and recent clinical literature. RECENT FINDINGS: Recent preclinical findings have demonstrated optimal hemodynamics and improved neurologically intact survival in animals receiving controlled head and thorax elevation with circulatory adjuncts. These findings are compared with animals in the supine position and/or receiving conventional CPR with the HUP position. There are few clinical studies of HUP CPR. However, recent studies have shown safety and feasibility of HUP CPR and improved near-infrared spectroscopy changes in patients with head and neck elevation. Additional observational studies have shown that HUP CPR performed with head and thorax elevation and circulatory adjuncts has a time-dependent association with survival to hospital discharge, survival with good neurological function, and return of spontaneous circulation. SUMMARY: HUP CPR is a new and novel therapy increasingly used in the prehospital setting and discussed in the resuscitation community. This review provides a relevant review of HUP CPR physiology and preclinical work, and recent clinical findings. Further clinical studies are needed to further explore the potential of HUP CPR.

7. Resuscitation. 2023 May;186:109781. doi: 10.1016/j.resuscitation.2023.109781. Epub 2023 Mar 27.

A night at the hospital- is it circadian rhythm or process of care that increase cardiac arrests?

Djärv T.

NO ABSTRACT AVAILABLE

8. Resuscitation. 2023 May;186:109767. doi: 10.1016/j.resuscitation.2023.109767. Epub 2023 Mar 15.

Our 17-year record against an ever-imposing foe: Outcomes of in-hospital cardiac arrests during ST elevation myocardial infarction.

Shanafelt CD(1), Lloyd MS(2).
NO ABSTRACT AVAILABLE

IN-HOSPITAL CARDIAC ARREST

1. MDM Policy Pract. 2023 Apr 26;8(1):23814683231168589. doi: 10.1177/23814683231168589. eCollection 2023 Jan-Jun.
"To Be or Not to Be"-Cardiopulmonary Resuscitation for Hospitalized People Who Have a Low Probability of Benefit: Qualitative Analysis of Semi-structured Interviews.
Kobewka D(1), Lalani Y(2), Shaffer V(3), Adewole T(4), Lypka K(5), Wegier P(4)(6)(7).
ABSTRACT
PURPOSE: Our aim was to understand the decision making of patients in hospital who wanted cardiopulmonary resuscitation despite low probability of benefit. METHODS: We included patients admitted to general medical wards who had a low chance of surviving in-hospital cardiopulmonary resuscitation (CPR) and had an order in the chart to administer CPR. We developed an interview guide to explore participants' decision-making process, sources of information, and emotions associated with this decision. RESULTS: We developed 3 themes from the data. 1) "Life is worth living . . . for now": Participants describe their enjoyment of life and desire to carry on in their current state. 2) "Making sense of CPR outcomes": Participants saw CPR outcomes as binary, either they live, or they die; deciding not to receive CPR means choosing death. Participants were optimistic they would survive CPR and cited personal experience and TV as information sources. 3) "Decision process": Participants did not engage in shared decision making. Instead, they were asked a binary yes/no question with no reflection on their values or discussion about harms or benefits. LIMITATIONS: The probability of successful CPR in our sample is unknown. Findings may be different in a population who is imminently dying but still requesting CPR. CONCLUSIONS: Participants chose CPR because they perceived life as worth living and CPR as a chance worth taking. Participants did not want to be left in a severely debilitated state but did not have accurate information about this risk. IMPLICATIONS: Decision making about CPR in-hospital can be improved if it is grounded in accurate risk understanding and the patient's values and wishes.

2. Resuscitation. 2023 May;186:109750. doi: 10.1016/j.resuscitation.2023.109750. Epub 2023 Feb 25.
The association between time of in hospital cardiac arrest and mortality; a retrospective analysis of two UK databases.
McGuigan PJ(1), Edwards J(2), Blackwood B(3), Dark P(4), Doidge JC(2), Harrison DA(2), Kitchen G(5), Lawson I(2), Nichol AD(6), Rowan KM(2), Shankar-Hari M(7), McAuley DF(8).
ABSTRACT
AIMS: The incidence of in hospital cardiac arrest (IHCA) varies throughout the day. This study aimed to report the variation in incidence of IHCA, presenting rhythm and outcome based on the hour in which IHCA occurred. METHODS: We conducted a retrospective analysis of the National Cardiac Arrest Audit (NCAA) including patients who suffered an IHCA from 1st April 2011 to 31st December 2019. We then linked the NCAA and intensive care Case Mix Programme databases to explore the effect of time of IHCA on hospital survival in the subgroup of patients admitted to intensive care following IHCA. RESULTS: We identified 115,690 eligible patients in the NCAA database. Pulseless electrical activity was the commonest presenting rhythm (54.8%). 66,885 patients died in the immediate post resuscitation period. Overall, hospital survival in the NCAA cohort was 21.3%. We identified 13,858 patients with linked ICU admissions in the Case Mix Programme database; 37.0% survived to hospital discharge. The incidence of IHCA peaked at 06.00. Rates of return of spontaneous circulation, survival to hospital discharge and good neurological outcome were lowest between 05.00 and 07.00. Among those admitted to ICU, no clear diurnal variation in hospital survival was seen in the unadjusted or adjusted analysis. This pattern was consistent across all

presenting rhythms. CONCLUSIONS: We observed higher rates of IHCA, and poorer outcomes at night. However, in those admitted to ICU, this variation was absent. This suggests patient factors and processes of care issues contribute to the variation in IHCA seen throughout the day.

3. Resusc Plus. 2023 Apr 14;14:100389. doi: 10.1016/j.resplu.2023.100389. eCollection 2023 Jun.
Impact of accredited advanced life support course participation on in-hospital cardiac arrest patient outcomes: A systematic review.
Patocka C(1), Lockey A(2)(3), Lauridsen KG(4)(5)(6), Greif R(7)(8).
ABSTRACT
AIM: Advanced life support courses have a clear educational impact; however, it is important to determine whether participation of one or more members of the resuscitation team in an accredited advanced life support course improves in-hospital cardiac arrest patient survival outcomes. METHODS: We searched EMBASE.com, Medline, Cochrane and CINAHL from inception to 1 November 2022. Included studies were randomised or non-randomised interventional studies assessing the impact of attendance at accredited life support courses on patient outcomes. Accredited life support courses were classified into 3 contexts: Advanced Life Support (ALS), Neonatal Resuscitation Training (NRT), and Helping Babies Breathe (HBB). Existing systematic reviews were identified for each of the contexts and an adolopment process was pursued. Appropriate risk of bias assessment tools were used across all outcomes. When meta-analysis was appropriate a random-effects model was used to produce a summary of effect sizes for each outcome. RESULTS: Of 2714 citations screened, 19 studies (1 ALS; 7 NRT; 11 HBB) were eligible for inclusion. Three systematic reviews which satisfied AMSTAR-2 criteria for methodological quality, included 16 of the studies we identified in our search. Among adult patients all outcomes including return of spontaneous circulation, survival to discharge and survival to 30 days were consistently better with accredited ALS training. Among neonatal patients there were reductions in stillbirths and early neonatal mortality. CONCLUSION: These results support the recommendation that accredited advanced life support courses, specifically Advanced Life Support, Neonatal Resuscitation Training, and Helping Babies Breathe improve patient outcomes.

4. Resuscitation. 2023 Apr 28:109814. doi: 10.1016/j.resuscitation.2023.109814. Online ahead of print.
The chain of survival for in-hospital cardiac arrest: improving systems of care.
Schloss D(1), Steinberg A(2).
NO ABSTRACT AVAILABLE

INJURIES AND CPR

No articles identified.

CAUSE OF THE ARREST

1. Medicine (Baltimore). 2023 Apr 25;102(17):e33618. doi: 10.1097/MD.0000000000033618.
Associations between prehospital defibrillation and outcomes of out-of-hospital cardiac arrests presumed to be caused by hypothermia: A nationwide observational study with epidemiological analysis.
Ushimoto T(1), Murasaka K(1), Wato Y(1), Inaba H(1)(2)(3).
ABSTRACT
This study aimed to clarify the epidemiology of out of-hospital cardiac arrest (OHCA) cases caused by hypothermia. The associations between the presence/absence of shockable initial electro-

cardiography rhythm, prehospital defibrillation and the outcomes of OHCA were also investigated. This study involved the retrospective analysis of prospectively collected, nationwide, population-based data for OHCA cases caused by hypothermia. One thousand five hundred seventy-five emergency medical service (EMS)-confirmed OHCA cases with hypothermia, recorded between 2013 and 2019, were extracted from the Japanese nationwide database. The primary outcome was neurologically favorable 1-month survival, defined as cerebral performance category 1 or 2. The secondary outcome was 1-month survival. OHCA cases with hypothermia occurred more frequently in the winter. In approximately half (837) of the hypothermic OHCA cases, EMS was activated in the morning (6:00 am to 11:59 am). Shockable initial electrocardiogram rhythms were recorded in 30.8% (483/1570) of cases. prehospital defibrillation was attempted in 96.1% (464/483) of cases with shockable rhythms and 25.8% (280/1087) of cases with non-shockable initial rhythms. EMS-witnessed cases, prolonged transportation time intervals and prehospital epinephrine administration were associated with rhythm conversion in cases with non-shockable initial rhythms. Binominal logit test followed by multivariable logistic regression revealed that shockable initial rhythms were associated with better outcomes. prehospital defibrillation was not significantly associated with better outcomes, regardless of the type of initial rhythm (shockable or non-shockable). Transportation to high-level emergency hospitals was associated with better outcomes (adjusted odds ratio: 2.94, 95% confidence interval: 1.66-5.21). In hypothermic OHCA, shockable initial rhythm but not prehospital defibrillation is likely to be associated with better neurologically favorable outcomes. In addition, transport to a high-level acute care hospital may be appropriately considered despite prolonged transport. Further investigation, including core temperature data in analyses, is necessary to determine the benefit of prehospital defibrillation in hypothermic OHCA.

2. Int J Cardiovasc Imaging. 2023 May 5. doi: 10.1007/s10554-023-02864-4. Online ahead of print.
Parametric mapping by cardiovascular magnetic resonance imaging in sudden cardiac arrest survivors.
Gil KE(1)(2), Truong VT(3), Zareba KM(4)(5), Varghese J(5), Simonetti OP(5), Rajpal S(4)(5).
ABSTRACT
Etiology of sudden cardiac arrest (SCA) is identified in less than 30% of survivors without coronary artery disease. We sought to assess the diagnostic role of myocardial parametric mapping using cardiovascular magnetic resonance (CMR) in identifying SCA etiology. Consecutive SCA survivors undergoing CMR with myocardial parametric mapping were included in the study. The determination if CMR was decisive or contributory in identifying SCA etiology was made if the diagnosis was unclear prior to CMR, and the discharge diagnosis was consistent with the CMR result. Parametric mapping was considered essential for establishing probable SCA etiology by CMR if the SCA cause could not have been determined without its utilization. If the CMR diagnosis could have been potentially based on the combination of cine and LGE imaging, parametric mapping was considered contributory. Of the 35 patients (mean age 46.9 ± 14.1 years; 57% males) included, SCA diagnosis was based on CMR in 23 (66%) patients. Of those, parametric mapping was essential for the diagnosis of myocarditis and tako-tsubo cardiomyopathy (11/48%) and contributed to the diagnosis in 10 (43%) additional cases. Inclusion of quantitative T1 and T2 parametric mapping in the SCA CMR protocol has the potential to increase diagnostic yield of CMR and further specify SCA etiology, especially myocarditis.

3. Open Heart. 2023 May;10(1):e002223. doi: 10.1136/openhrt-2022-002223.
Long-term stress conditions and out-of-hospital cardiac arrest risk: a nested case-control study.
Eroglu TE(1)(2), Coronel R(3), Halili A(4)(5), Kessing LV(6), Arulmurugananthavadivel A(7), Parveen S(7), Folke F(8), Torp-Pedersen C(4)(9), Gislason GH(7).

ABSTRACT

OBJECTIVE: Patients with stress-related disorders and anxiety are at increased risk of developing cardiovascular disease. However, the risk of out-of-hospital cardiac arrest (OHCA) is scarcely investigated. We aimed to establish whether long-term stress (post-traumatic stress disorder, adjustment disorder) or anxiety is associated with OHCA in the general population. METHODS: We conducted a nested case-control study in a nationwide cohort of individuals between 1 June 2001 and 31 December 2015 in Denmark. Cases were OHCA patients with presumed cardiac causes. Each case was matched by age, sex and date of OHCA with 10 non-OHCA controls from the general population. HRs for OHCA were derived from Cox models after controlling for common OHCA risk factors. Stratified analyses were performed according to sex, age and pre-existing cardiovascular disease. RESULTS: We included 35 195 OHCAs and 351 950 matched controls (median age 72 years; 66.8% male). Long-term stress conditions were diagnosed in 324 (0.92%) OHCA cases and 1577 (0.45%) non-OHCA controls, and were associated with higher rate of OHCA (HR 1.44, 95% CI 1.27 to 1.64). Anxiety was diagnosed in 299 (0.85%) OHCA cases and 1298 (0.37%) controls, and was associated with increased rate of OHCA (HR 1.56, 95% CI1.37 to 1.79). We found no interaction with sex, age or history of cardiovascular diseases. CONCLUSION: Patients with stress-related disorders or anxiety have an increased rate of OHCA. This association applies equally to men and women and is independent from the presence of cardiovascular disease. Awareness of the higher risks of OHCA in patients with stress-related disorders and anxiety is important when treating these patients.

4. Eur Heart J. 2023 May 1;44(17):1519-1521. doi: 10.1093/eurheartj/ehad122.
Do apical aneurysms predict sudden cardiac death in hypertrophic cardiomyopathy?
Lorenzini M(1)(2), Elliott PM(1)(2).
NO ABSTRACT AVAILABLE

END-TIDAL CO_2

No articles identified.

ORGAN DONATION

1. Can J Anaesth. 2023 May 2. doi: 10.1007/s12630-023-02411-8. Online ahead of print.
Autoresuscitation after circulatory arrest: an updated systematic review.
Zorko DJ(#)(1), Shemie J(#)(2), Hornby L(3), Singh G(4), Matheson S(5), Sandarage R(6), Wollny K(7)(8), Kongkiattikul L(9), Dhanani S(10).

ABSTRACT

PURPOSE: Current practice in organ donation after death determination by circulatory criteria (DCD) advises a five-minute observation period following circulatory arrest, monitoring for unassisted resumption of spontaneous circulation (i.e., autoresuscitation). In light of newer data, the objective of this updated systematic review was to determine whether a five-minute observation time was still adequate for death determination by circulatory criteria. SOURCE: We searched four electronic databases from inception to 28 August 2021, for studies evaluating or describing autoresuscitation events after circulatory arrest. Citation screening and data abstraction were conducted independently and in duplicate. We assessed certainty in evidence using the GRADE framework. PRINCIPAL FINDINGS: Eighteen new studies on autoresuscitation were identified, consisting of 14 case reports and four observational studies. Most studies evaluated adults (n = 15, 83%) and patients with unsuccessful resuscitation following cardiac arrest (n = 11, 61%). Overall,

autoresuscitation was reported to occur between one and 20 min after circulatory arrest. Among all eligible studies identified by our reviews (n = 73), seven observational studies were identified. In observational studies of controlled withdrawal of life-sustaining measures with or without DCD (n = 6), 19 autoresuscitation events were reported in 1,049 patients (incidence 1.8%; 95% confidence interval, 1.1 to 2.8). All resumptions occurred within five minutes of circulatory arrest and all patients with autoresuscitation died. CONCLUSION: A five-minute observation time is sufficient for controlled DCD (moderate certainty). An observation time greater than five minutes may be needed for uncontrolled DCD (low certainty). The findings of this systematic review will be incorporated into a Canadian guideline on death determination.

2. Can J Anaesth. 2023 May 2. doi: 10.1007/s12630-023-02431-4. Online ahead of print.
A brain-based definition of death and criteria for its determination after arrest of circulation or neurologic function in Canada: a 2023 clinical practice guideline.
Shemie SD(1)(2)(3)(4), Wilson LC(5), Hornby L(5) et al
ABSTRACT
This 2023 Clinical Practice Guideline provides the biomedical definition of death based on permanent cessation of brain function that applies to all persons, as well as recommendations for death determination by circulatory criteria for potential organ donors and death determination by neurologic criteria for all mechanically ventilated patients regardless of organ donation potential. This Guideline is endorsed by the Canadian Critical Care Society, the Canadian Medical Association, the Canadian Association of Critical Care Nurses, Canadian Anesthesiologists' Society, the Canadian Neurological Sciences Federation (representing the Canadian Neurological Society, Canadian Neurosurgical Society, Canadian Society of Clinical Neurophysiologists, Canadian Association of Child Neurology, Canadian Society of Neuroradiology, and Canadian Stroke Consortium), Canadian Blood Services, the Canadian Donation and Transplantation Research Program, the Canadian Association of Emergency Physicians, the Nurse Practitioners Association of Canada, and the Canadian Cardiovascular Critical Care Society.

FEEDBACK

No articles identified.

DRUGS

No articles identified.

TRAUMA

No articles identified.

VENTILATION

1. Curr Opin Crit Care. 2023 Jun 1;29(3):175-180. doi: 10.1097/MCC.0000000000001033. Epub 2023 Mar 28.
Airway management during cardiac arrest.
Penketh J(1), Nolan JP(1)(2).

ABSTRACT
PURPOSE OF REVIEW: Despite improvements over time, cardiac arrest continues to be associated with high rates of mortality and morbidity. Several methods can be used to achieve airway patency during cardiac arrest, and the optimal strategy continues to be debated. This review will explore and summarize the latest published evidence for airway management during cardiac arrest. RECENT FINDINGS: A large meta-analysis of out-of-hospital cardiac arrest (OHCA) patients found no difference in survival between those receiving tracheal intubation and those treated with a supraglottic airway (SGA). Observational studies of registry data have reported higher survival to hospital discharge in patients receiving tracheal intubation or an SGA but another showed no difference. Rates of intubation during in-hospital cardiac arrest have decreased in the United States, and different airway strategies appear to be used in different centres. SUMMARY: Observational studies continue to dominate the evidence base relating to cardiac arrest airway management. Cardiac arrest registries enable these observational studies to include many patients; however, the design of such studies introduces considerable bias. Further randomized clinical trials are underway. The current evidence does not indicate a substantial improvement in outcome from any single airway strategy.

2. Sci Rep. 2023 May 2;13(1):7121. doi: 10.1038/s41598-023-34152-5.
Learning curve of i-gel insertion in novices using a cumulative sum analysis.
Nakanishi T(1)(2)(3), Sakamoto S(4), Yoshimura M(4)(5), Fujiwara K(6), Toriumi T(4)(7).
ABSTRACT
The i-gel, a popular second-generation supraglottic airway device, has been used in a variety of airway management situations, including as an alternative to tracheal intubation for general anesthesia, rescue in difficult airway settings, and out-of-hospital cardiac arrest resuscitation. We aimed to investigate the number of experiences needed to achieve a rapid, highly successful first attempt i-gel insertion in novices with a cumulative sum analysis. We also looked at how learning affected success rates, insertion time, and bleeding and reflex (limb movement, frowning face, or coughing) incidences. This prospective observational study included 15 novice residents from March 2017 to February 2018 in a tertiary teaching hospital. Finally, 13 residents with 35 [30-42] (median [interquartile range]) cases of i-gel insertion were analyzed. The cumulative sum analysis showed that 11 of 13 participants had an acceptable failure rate after 15 [8-20] cases. With increasing experience, success rate ($P = 0.004$), insertion time ($P < 0.001$), and incidence of bleeding ($P = 0.006$) all improved. However, the incidence of reflex did not change ($P = 0.43$). Based on our results, we suggest that 20 cases are preferable for novices to develop skills in using the i-gel in airway management.

CERERBRAL MONITORING

No articles identified.

ULTRASOUND AND CPR

No articles identified.

ORGANISATION AND TRAINING

1. Biotechnol Genet Eng Rev. 2023 May 2:1-10. doi: 10.1080/02648725.2023.2202516. Online ahead of print.

The success rate of cardiopulmonary resuscitation and its correlated factors in patients with emergency prehospital cardiac arrest.

Bai Z, Wang L, Yu B, Xing D, Su J, Qin H(1).

ABSTRACT

To assess the initial success rate and its correlated factors on cardiopulmonary resuscitation (CPR) in emergency prehospital cardiac arrest patients. The clinical information of 429 patients with cardiac arrest who underwent prehospital CPR in the fourth hospital of Hebei Medical University from Jan 2020 to Apr 2022 were evaluated. The patients were divided into the successful group (ROSC, n = 25) and the unsuccessful group (non-ROSC, n = 404) according to whether the autonomous circulation (ROSC) was resumed. The univariate analysis was performed to evaluate the differences in age, the start time of CPR, the application of electric defibrillation, and other related data between the two groups. The multivariate analysis evaluated protective factors affecting CPR's success in prehospital cardiac arrest patients. Patients with cardiogenic causes had the highest success rate of cardiopulmonary resuscitation. The causes of traffic accidents and drowning account for a low proportion. Furthermore, the median CPR length was 25.0 min, alternating from 1.5 to 64 mi. The univariate analysis revealed that age, the start time of CPR, application of electric defibrillation, and adrenaline dosage were correlated with CPR attempts ($p < 0.05$). Multivariate logistic regression analysis showed that the age of patients with prehospital CA, the location of prehospital CA, etiology, bystander CPR, CPR start time, defibrillation start time, tracheal intubation time, type of rhythm before resuscitation, adrenaline dosage <5 mg, and adrenaline administration time were all the influencing factors of prehospital CPR success ($p < 0.01$). The factors affecting CPR's success rate in prehospital CA patients are complicated. Establishing a few procedures to diminish the incidence of these risk factors is crucial.

2. AMIA Annu Symp Proc. 2023 Apr 29;2022:1217-1226. eCollection 2022.

An Analysis of Speech during Life Saving Interventions to Inform the Design of a Computerized System for Delay Detection.

Zellner K(1), Villegas LJ(1), Neff C(1), Getrich-Thompson W(2), Burd R(2), Marsic I(3), Sarcevic A(1).

ABSTRACT

We describe an analysis of speech during time-critical, team-based medical work and its potential to indicate process delays. We analyzed speech intention and sentence types during 39 trauma resuscitations with delays in one of three major lifesaving interventions: intravenous/intraosseous (IV/IO) line insertion, cardiopulmonary and resuscitation (CPR), and intubation. We found a significant difference in patterns of speech during delays vs. speech during non-delayed work. The speech intention during CPR delays, however, differed from the other LSIs, suggesting that context of speech must be considered. These findings will inform the design of a clinical decision support system (CDSS) that will use multiple sensor modalities to alert medical teams to delays in real time. We conclude with design implications and challenges associated with speech-based activity recognition in complex medical processes.

3. Resuscitation. 2023 May 3:109816. doi: 10.1016/j.resuscitation.2023.109816. Online ahead of print.

Association Between Bystander Physical Limitations, Delays in Chest Compression During Telecommunicator-Assisted Cardiopulmonary Resuscitation, and Outcome After Out-of-Hospital Cardiac Arrest.

Missel AL(1), Drucker CJ(2), Kume K(2), Shin J(2), Hergert L(2), Neumar RW(3), Kudenchuk PJ(4), Rea T(5).

ABSTRACT

BACKGROUND: Promptly initiated bystander cardiopulmonary resuscitation (CPR) improves survival from out-of-hospital cardiac arrest (OHCA). Many OHCA patients require repositioning to a firm surface. We examined the association between repositioning, chest compression (CC) delay, and patient outcomes. METHODS: We used a quality improvement registry from review of 9-1-1 dispatch audio recordings of OHCA among adults eligible for telecommunicator-assisted CPR (T-CPR) between 2013 and 2021. OHCA was categorized into 3 groups: CC not delayed, CC delayed due to bystander physical limitations to reposition the patient, or CC delayed for other (non-physical) reasons. The primary outcome was the repositioning interval, defined as the interval between the start of positioning instructions and CC onset. We used logistic regression to assess the odds ratio of survival according to CPR group, adjusting for potential confounders. RESULTS: Of the 3,482 OHCA patients eligible for T-CPR, CPR was not delayed in 1,223 (35%), delayed due to repositioning in 1,413 (41%), and delayed for other reasons in 846 (24%). The repositioning interval was longest for the physical limitation delay group (137 secs, IQR-148) compared to the other delay group (81 secs, IQR-70) and the no delay group (51 secs, IQR-32) ($p<0.001$). Unadjusted survival was lowest in the physical limitation delay group (11%) versus the no delay (17%) and other delay (19%) groups and persisted after adjustment ($p =0.009$). CONCLUSION: Bystander physical limitations are a common barrier to repositioning patients to begin CPR and are associated with lower likelihood of receiving CPR, longer times to begin CC, and lower survival.

4. Front Public Health. 2023 Apr 12;11:1164744. doi: 10.3389/fpubh.2023.1164744. eCollection 2023.

"Needed but lacked": Exploring demand- and supply-side determinants of access to cardiopulmonary resuscitation training for the lay public in China.

Dong X(1), Kong SYJ(2), Xu H(3), Ho AFW(4)(5)(6), Blewer AL(7)(8), Birkenes TS(2), Myklebust H(2), Zheng X(9), Li M(9), Zheng ZJ(1), Zhang Z(9), Zhang L(3)(10).

ABSTRACT

BACKGROUND: Despite years of public cardiopulmonary resuscitation (CPR) training efforts, the training rate and survival following out-of-hospital cardiac arrest (OHCA) have increased modestly in China. Access is imperative to increase the public CPR training rate, which is determined by both demand- (e.g., the lay public) and supply-side (e.g., CPR trainers) factors. We aimed to explore the demand and supply determinants of access to CPR training for the lay public in China. METHODS: Qualitative semi-structured interviews were conducted with 77 laypeople (demand side) and eight key stakeholders from CPR training institutions (supply side) in Shanghai, China. The interview guide was informed by Levesque et al. healthcare access framework. Data were transcribed, quantified, described, and analyzed through thematic content analysis. RESULTS: On the demand side, the laypeople's ability to perceive their need and willingness for CPR training was strong. However, they failed to access CPR training mainly due to the lack of information on where to get trained. Overestimation of skills, optimism bias, and misconceptions impeded laypeople from attending training. On the supply side, trainers were able to meet the needs of the trainees with existing resources, but they relied on participants who actively sought out and registered for training and lacked an understanding of the needs of the public for marketing and encouraging participation in the training. CONCLUSION: Insufficient information and lack of initiative on the demand side, lack of motivation, and understanding of public needs on the supply side all contributed to the persistently low CPR training rate in China. Suppliers should integrate resources, take the initiative to increase the CPR training rate, innovate training modes, expand correct publicity, and establish whole-process management of training programs.

5. J Robot Surg. 2023 May 1. doi: 10.1007/s11701-023-01612-z. Online ahead of print.

Development of a high fidelity, multidisciplinary, crisis simulation model for robotic surgical teams.

Patki S(1), Nathan A(2)(3), Lyness C(3), Nadarajah P(3), Sevastru S(3), Mahrous A(3), De-Silva P(3), Shoniwa A(3), Undre S(4), Patki P(5)(6).

ABSTRACT

Immediate access to the patient in crisis situations, such as cardiac arrest during robotic surgery, can be challenging. We aimed to present a full immersion simulation module to train robotic surgical teams to manage a crisis scenario, enhance teamwork, establish clear lines of communication, improve coordination and speed of response. Start time of cardiopulmonary resuscitation (CPR), first defibrillator shock and robotic de-docking time from the first 'cardiac arrest call' were recorded. Observational Teamwork Assessment for Surgery (OTAS) scores were used in control and test simulations to assess performance along with a participant survey. Repeat scenarios and assessment were conducted at a 6-month interval for the same team to validate knowledge retention and an additional scenario was run with a new anaesthetic team to validate modular design. OTAS scores improved across all specialty teams after training with emergency algorithm and at retention validity re-test ($p = 0.0181$; $p = 0.0063$). There was an overall reduction in time to CPR (101-48 s), first defibrillator shock (> 302 s to 86 s) and robot de dock time (86-25 s) Improvement remained constant at retention validity re-test. Replacing the anaesthetic team showed improvement in time to CPR, first shock and robotic de-dock times and did not affect OTAS scores ($p = 0.1588$). The module was rated highly for realism and crisis training by all teams. This high-fidelity simulation training module is realistic and feasible to deliver. Its modular design allows for efficient assessment and feedback, optimising staff training time and making it a valuable addition to robotic team training.

6. Turk J Anaesthesiol Reanim. 2023 Apr;51(2):105-111. doi: 10.5152/TJAR.2023.22965.

Evaluation of Code Blue Notifications and Their Results: A University Hospital Example.

Bişkin Çetin S(1), Sezgin MG(2), Coşkun M(3), Sarı F(4), Boztuğ N(5).

ABSTRACT

OBJECTIVE: Code blue is one of the important practices for preventing mortality and morbidity and increasing the quality of care in hospitals. The aim of this study was to evaluate the blue code notifications and their results, emphasise their importance, and determine the effectiveness and deficiencies of the application. METHODS: In this study, all code blue notification forms recorded between January 1 and December 31, 2019, were examined retrospectively. RESULTS: It was determined that code blue calls were made for 108 cases, including 61 females and 47 males, and the mean age of the patients was 56.47 ± 20.73. The accuracy rate of the code blue calls was determined as 42.6%, and 57.4% of them were made during non-working hours. Also, 15.2% of the correct code blue calls were made from dialysis and radiology units. The mean time for the teams to reach the scene was 2.83 ± 1.30 minutes, and the mean time to respond to correctly made code blue calls was 33.97 ± 17.95 minutes. It was found that 15.7% of the patients in correctly made code blue calls were exitus after the intervention. CONCLUSION: Early diagnosis of cardiac or respiratory arrest cases and quick and correct intervention are very important in achieving patient and employee safety. For this reason, it is necessary to continuously evaluate code blue practices, educate the staff, and organise improvement activities constantly.

7. Resusc Plus. 2023 Apr 18;14:100391. doi: 10.1016/j.resplu.2023.100391. eCollection 2023 Jun.

Augmented reality training in basic life support with the help of smart glasses. A pilot study.

Aranda-García S(1)(2), Otero-Agra M(3)(4), Fernández-Méndez F(2)(3)(4), Herrera-Pedroviejo E(5), Darné M(1), Barcala-Furelos R(2)(3), Rodríguez-Núñez A(2)(6)(7)(8).

ABSTRACT
INTRODUCTION: Laypeople should be trained in basic life support and traditional and innovative methodologies may help to obtain this goal. However, there is a knowledge gap about the ideal basic life support training methods. Smart glasses could have a role facilitating laypeople learning of basic life support. AIM: To analyze the potential impact on basic life support learning of a very brief training supported by smart glasses video communication. METHODS: Twelve laypeople were basic life support tele-trained by means of smart glasses by an instructor in this pilot study. During training (assisted trough smart glasses) and after the training (unassisted) participants' performance and quality of basic life support and automated external defibrillation procedure were assessed on a standardized simulated scenario. RESULTS: After the training all participants were able to deliver good quality basic life support, with results comparable to those obtained when real time remotely guided by the instructor through the smart glasses. Mean chest compression rate was significantly higher when not guided (113 /min vs. 103 /min, p = 0.001). When not assisted, the participants spent less time delivering the sequential basic life support steps than when assisted while training. CONCLUSIONS: A very brief remote training supported by instructor and smart glasses seems to be an effective educational method that could facilitate basic life support learning by laypeople. This technology could be considered in cases where instructors are not locally available or in general in remote areas, providing basic internet connection is available. Smart glasses could also be useful for laypeople rolling-refreshers.

8. Resusc Plus. 2023 Apr 15;14:100388. doi: 10.1016/j.resplu.2023.100388. eCollection 2023 Jun.
The effect of ethnicity and socioeconomic status on outcomes after resuscitated out-of-hospital cardiac arrest - Findings from a tertiary centre in South London.
Roy R(1)(2), Kanyal R(1)(2), Abd Razak M(1)(2), To-Dang B(1), Chotai S(1), Abu-Own H(1)(2), Cannata A(1)(2), Dworakowski R(1)(2), Webb I(1)(2), Pareek M(3)(4), Shah AM(1)(2), MacCarthy P(1)(2), Byrne J(1)(2), Melikian N(1)(2), Pareek N(1)(2).
ABSTRACT
BACKGROUND: Out-of-hospital cardiac arrest is a common cause of morbidity and mortality, and ethnic variation in outcomes is recognised. We investigated ethnic and socioeconomic differences in arrest circumstances, rates of coronary artery disease, treatment, and outcomes in resuscitated OOHCA. METHODS: Patients with resuscitated OOHCA of suspected cardiac aetiology were included in the King's Out-of-Hospital Cardiac Arrest Registry between 1-May-2012 and 31-December-2020. RESULTS: Of 526 patients (median age 62.0 years, IQR 21.1, 74.1% male), 414 patients (78.7%) were White, 35 (6.7%) were Asian, and 77 (14.6%) were Black. Black patients had more co-existent hypertension (p = 0.007) and cardiomyopathy (p = 0.003), but less prior coronary revascularisation (p = 0.026) compared with White/Asian patients. There were no ethnic differences in location, witnesses, or bystander CPR, but Black patients had more non-shockable rhythms (p < 0.001). Black patients received less immediate coronary angiography (p < 0.001) and percutaneous coronary intervention (p < 0.001) but had lower rates of CAD (p = 0.004) than White/Asian patients. All-cause mortality at 12 months was highest amongst Black patients, followed by Asian and then White patients (57.1% vs 48.6% vs 41.3%, p = 0.032). In Black patients, excess mortality was driven by higher rates of multi-organ dysfunction but lower cardiac death than White/Asian patients, with cardiac death highest amongst Asian patients (p = 0.009). Socioeconomic status had no effect on mortality, and in a multivariable logistic regression, age, location, witnesses, and Black compared to White ethnicity were independent predictors of mortality, whilst social deprivation was not. CONCLUSION: In this single-centre study, Black patients had higher mortality after resuscitated OOHCA than White/Asian patients. This may be in part due to differing underlying aetiology rather than differences in arrest circumstances or social deprivation.

POST-CARDIAC ARREST TREATMENTS

No articles identified.

TARGETED TEMPERATURE MANAGEMENT

1. Aust Crit Care. 2023 May;36(3):313-319. doi: 10.1016/j.aucc.2022.03.005. Epub 2022 Apr 26.
Factors affecting the occurrence of pressure injuries among patients receiving targeted temperature management after cardiac arrest.
Ahn S(1), An M(2), Yoo SH(3), Park H(4).
ABSTRACT
BACKGROUND: Pressure injuries (PIs) are a well-known complication of critically ill patients admitted to the intensive care unit with targeted temperature management (TTM) after cardiac arrest (CA). However, little is known about the factors that impact the occurrence of PIs among these patients. OBJECTIVES: This study aimed to examine factors related to the occurrence of PIs among patients after CA treated with TTM. METHODS: This retrospective observational study collected data from 126 patients after CA aged 18 years or older from a single tertiary hospital admitted between January 2017 and December 2019. Demographic, clinical, and medical device-related characteristics were collected by patient chart review. Multivariable logistic regression analysis was performed to identify factors related to the occurrence of PIs. RESULTS: The study showed that the incidence of PIs was 31.8%. Patients who were male (odds ratio [OR], 4.80; 95% confidence interval [CI], 1.21-19.08), developed diarrhoea (OR, 4.90, 95% CI, 1.31-18.41), or were subjected to physical restraint (OR, 6.03; 95% CI, 1.52-23.96) were at a higher risk of developing PIs. A lower risk of developing PIs was associated with the Glasgow Coma Scale score greater than 13 on the third day of admission (OR, 0.08; 95% CI, 0.01-0.52), higher haemoglobin level (OR, 0.65; 95% CI, 0.49-0.86), or low nutritional risk index (≤100) (OR, 0.10; 95% CI, 0.02-0.57). CONCLUSIONS: Nurses should be aware that patients treated with TTM after CA are at a high risk of developing PIs from the moment of admission and should be closely monitored.

ELECTROPHYSIOLOGY AND DEFIBRILLATION

1. Resuscitation. 2023 May;186:109779. doi: 10.1016/j.resuscitation.2023.109779. Epub 2023 Mar 22.
Impact of number of defibrillation attempts on neurologically favourable survival rate in patients with Out-of-Hospital cardiac arrest.
Tateishi K(1), Saito Y(2), Kitahara H(2), Shiko Y(3), Kawasaki Y(4), Nonogi H(5), Tahara Y(6), Yonemoto N(7), Nagao K(8), Ikeda T(9), Sato N(10), Kobayashi Y(2); Japanese Circulation Society Resuscitation Science Study JCS-ReSS Group.
ABSTRACT
AIM OF THE STUDY: Defibrillation plays a crucial role in early return of spontaneous circulation (ROSC) and survival of patients with out-of-hospital cardiac arrest (OHCA) and shockable rhythm. Prehospital adrenaline administration increases the probability of prehospital ROSC. However, little is known about the relationship between number of prehospital defibrillation attempts and neurologically favourable survival in patients treated with and without adrenaline. METHODS: Using a nationwide Japanese OHCA registry database from 2006 to 2020, 1,802,084 patients with OHCA were retrospectively analysed, among whom 81,056 with witnessed OHCA and initial shockable

rhythm were included. The relationship between the number of defibrillation attempts before hospital admission and neurologically favourable survival rate (cerebral performance category score of 1 or 2) at 1 month was evaluated with subgroup analysis for patients treated with and without adrenaline. RESULTS: At 1 month, 18,080 (22.3%) patients had a cerebral performance category score of 1 or 2. In the study population, the probability of prehospital ROSC and favourable neurological survival rate were inversely associated with number of defibrillation attempts. Similar trends were observed in patients treated without adrenaline, whereas a greater number of defibrillation attempts was counterintuitively associated with favourable neurological survival rate in patients treated with prehospital adrenaline. CONCLUSIONS: Overall, a greater number of prehospital defibrillation attempts was associated with lower neurologically favourable survival at 1 month in patients with OHCA and shockable rhythm. However, an increasing number of shocks (up to the 4th shock) was associated with better neurological outcomes when considering only patients treated with adrenaline.

2. Curr Opin Crit Care. 2023 Jun 1;29(3):168-174. doi: 10.1097/MCC.0000000000001051. Epub 2023 Apr 24.

Public access defibrillation: challenges and new solutions.

Folke F(1)(2)(3), Shahriari P(1)(2), Hansen CM(1)(4), Gregers MCT(1)(2).

ABSTRACT

PURPOSE OF REVIEW: The purpose of this article is to review the current status of public access defibrillation and the various utility modalities of early defibrillation. RECENT FINDINGS: Defibrillation with on-site automated external defibrillators (AEDs) has been the conventional approach for public access defibrillation. This strategy is highly effective in cardiac arrests occurring in close proximity to on-site AEDs; however, only a few cardiac arrests will be covered by this strategy. During the last decades, additional strategies for public access defibrillation have developed, including volunteer responder programmes and drone assisted AED-delivery. These programs have increased chances of early defibrillation within a greater radius, which remains an important factor for survival after out-of-hospital cardiac arrest. SUMMARY: Recent advances in the use of public access defibrillation show great potential for optimizing early defibrillation. With new technological solutions, AEDs can be transported to the cardiac arrest location reaching OHCAs in both public and private locations. Furthermore, new technological innovations could potentially identify and automatically alert the emergency medical services in nonwitnessed OHCA previously left untreated.

3. PNAS Nexus. 2023 Apr 6;2(5):pgad119. doi: 10.1093/pnasnexus/pgad119. eCollection 2023 May.

Preservation of thalamocortical circuitry is essential for good recovery after cardiac arrest.

Tewarie PKB(1)(2), Tjepkema-Cloostermans MC(1)(3), Abeysuriya RG(4), Hofmeijer J(1)(5), van Putten MJAM(1)(3).

ABSTRACT

Continuous electroencephalographam (EEG) monitoring contributes to prediction of neurological outcome in comatose cardiac arrest survivors. While the phenomenology of EEG abnormalities in postanoxic encephalopathy is well known, the pathophysiology, especially the presumed role of selective synaptic failure, is less understood. To further this understanding, we estimate biophysical model parameters from the EEG power spectra from individual patients with a good or poor recovery from a postanoxic encephalopathy. This biophysical model includes intracortical, intrathalamic, and corticothalamic synaptic strengths, as well as synaptic time constants and axonal conduction delays. We used continuous EEG measurements from hundred comatose patients recorded during the first 48 h postcardiac arrest, 50 with a poor neurological outcome [cerebral

performance category (CPC = 5)] and 50 with a good neurological outcome (CPC = 1). We only included patients that developed (dis-)continuous EEG activity within 48 h postcardiac arrest. For patients with a good outcome, we observed an initial relative excitation in the corticothalamic loop and corticothalamic propagation that subsequently evolved towards values observed in healthy controls. For patients with a poor outcome, we observed an initial increase in the cortical excitation-inhibition ratio, increased relative inhibition in the corticothalamic loop, delayed corticothalamic propagation of neuronal activity, and severely prolonged synaptic time constants that did not return to physiological values. We conclude that the abnormal EEG evolution in patients with a poor neurological recovery after cardiac arrest may result from persistent and selective synaptic failure that includes corticothalamic circuitry and also delayed corticothalamic propagation.

PEDIATRICS AND CHILDREN

1. Eur J Emerg Med. 2023 Jun 1;30(3):186-192. doi: 10.1097/MEJ.0000000000001024. Epub 2023 Apr 5.

Association between out-of-hospital cardiac arrest and survival in paediatric traumatic population: results from the French national registry.

Lockhart-Bouron M(1), Baert V(1)(2), Leteurtre S(1), Hubert H(1)(2), Recher M(1).

ABSTRACT

BACKGROUND AND IMPORTANCE: Trauma is an important cause of paediatric out-of-hospital cardiac arrest (OHCA) with a high mortality rate. OBJECTIVES: The first aim of this study was to compare the survival rate at day 30 and at hospital discharge following paediatric traumatic and medical OHCA. The second aim was to compare the rates of return of spontaneous circulation and survival rates at hospital admission (Day 0). SETTING AND PARTICIPANTS: This multicentre comparative post-hoc study was conducted between July 2011 and February 2022 based on the French National Cardiac Arrest Registry data. All patients aged <18 years with OHCA were included in the study. OUTCOME MEASURES AND ANALYSIS: Patients with traumatic aetiology were matched with those with medical aetiology using propensity score matching. Endpoint was the survival rate at day 30. MAIN RESULTS: There were 398 traumatic and 1061 medical OHCAs. Matching yielded 227 pairs. In non-adjusted comparisons, days 0 and 30 survival rates were lower in the traumatic aetiology group than in the medical aetiology group [19.1% vs. 24.0%, odds ratio (OR) 0.75, 95% confidence interval (CI) 0.56-0.99, and 2.0% vs. 4.5%, OR 0.43, 95% CI, 0.20-0.92, respectively]. In adjusted comparisons, day 30 survival rate was lower in the traumatic aetiology group than in the medical aetiology group (2.2% vs. 6.2%, OR 0.36, 95% CI, 0.13-0.99). CONCLUSION: In this post-hoc analysis, paediatric traumatic OHCA was associated with a lower survival rate than medical cardiac arrest.

EXTRACORPOREAL LIFE SUPPORT

1. Pediatr Crit Care Med. 2023 May 3. doi: 10.1097/PCC.0000000000003254. Online ahead of print.

Rewarming Young Children After Drowning-Associated Hypothermia and Out-of-Hospital Cardiac Arrest: Analysis Using the CAse REport Guideline.

Andre MC(1), Vuille-Dit-Bille RN(2), Berset A(3), Hammer J(1).

ABSTRACT

OBJECTIVES: Extracorporeal membrane oxygenation (ECMO) is recommended in adults with drowning-associated hypothermia and out-of-hospital cardiac arrest (OHCA). Our experience of managing a drowned 2-year-old girl with hypothermia (23°C) and cardiac arrest (58 min) prompted this summary using the CAse REport (CARE) guideline to address the question of optimal rewarming

procedure in such patients. DESIGN/PATIENTS: Following the CARE guideline, we identified 24 reports in the "PubMed database" describing children less than or equal to 6 years old with a temperature less than or equal to 28°C who had been rewarmed using conventional intensive care ± ECMO. Adding our patient, we were able to analyze a total of 57 cases. MAIN RESULTS: The two groups (ECMO vs non-ECMO) differed with respect to submersion time, pH and potassium but not age, temperature or duration of cardiac arrest. However, 44 of 44 in the ECMO group were pulseless on arrival versus eight of 13 in the non-ECMO group. Regarding survival, 12 of 13 children (92%) undergoing conventional rewarming survived compared with 18 of 44 children (41%) undergoing ECMO. Among survivors, 11 of 12 children (91%) in the conventional group and 14 of 18 (77%) in the ECMO group had favorable outcome. We failed to identify any correlation between "rewarming rate" and "outcome." CONCLUSIONS: In this summary analysis, we conclude that conventional therapy should be initiated for drowned children with OHCA. However, if this therapy does not result in return of spontaneous circulation, a discussion of withdrawal of intensive care might be prudent when core temperature has reached 34°C. We suggest further work is needed using an international registry.

EXPERIMENTAL RESEARCH

1. Resuscitation. 2023 May;186:109735. doi: 10.1016/j.resuscitation.2023.109735. Epub 2023 Feb 16.

Preclinical evaluation of triiodothyronine nanoparticles as a novel therapeutic intervention for resuscitation from cardiac arrest.

Weil BR(1), Allen SE(2), Barbaccia T(2), Wong K(2), Beaver AM(2), Slabinski EA(2), Mellott JG(2), Taylor Dickinson PC(2), Mousa SA(3).

ABSTRACT

BACKGROUND: Given emerging evidence of rapid non-genomic cytoprotective effects of triiodothyronine (T3), we evaluated the resuscitative efficacy of two nanoparticle formulations of T3 (T3np) designed to prolong cell membrane receptor-mediated signaling. METHODS: Swine (n = 40) were randomized to intravenous vehicle (empty np), EPI (0.015 mg/kg), T3np (0.125 mg/kg), or T3np loaded with phosphocreatine (T3np + PCr; 0.125 mg/kg) during CPR following 7-min cardiac arrest (n = 10/group). Hemodynamics and biomarkers of heart (cardiac troponin I; cTnI) and brain (neuron-specific enolase; NSE) injury were assessed for up to 4-hours post-ROSC, at which time the heart and brain were collected for post-mortem analysis. RESULTS: Compared with vehicle (4/10), the rate of ROSC was higher in swine receiving T3np (10/10; $p < 0.01$), T3np + PCr (8/10; $p = 0.08$) or EPI (10/10; $p < 0.01$) during CPR. Although time to ROSC and survival duration were comparable between groups, EPI was associated with a ∼2-fold higher post-ROSC concentration of cTnI vs T3np and T3np + PCr and the early post-ROSC rise in NSE and neuronal injury were attenuated in T3np-treated vs EPI-treated animals. Analysis of hippocampal ultrastructure revealed deterioration of mitochondrial integrity, reduced active zone length, and increased axonal vacuolization in EPI-treated animals vs controls. However, the frequency of these abnormalities was diminished in animals resuscitated with T3np. CONCLUSIONS: T3np achieved a ROSC rate and post-ROSC survival that was superior to vehicle and comparable to EPI. The attenuation of selected biomarkers of cardiac and neurologic injury at individual early post-ROSC timepoints in T3np-treated vs EPI-treated

animals suggests that T3np administration during CPR may lead to more favorable outcomes in cardiac arrest.

2. J Vis Exp. 2023 Apr 14;(194). doi: 10.3791/65340.
Mouse Cardiac Arrest Model for Brain Imaging and Brain Physiology Monitoring During Ischemia and Resuscitation.
Li R(1), Duan W(1), Zhang D(2), Hoffmann U(3), Yao J(2), Yang W(4), Sheng H(5).
ABSTRACT
Most cardiac arrest (CA) survivors experience varying degrees of neurologic deficits. To understand the mechanisms that underpin CA-induced brain injury and, subsequently, develop effective treatments, experimental CA research is essential. To this end, a few mouse CA models have been established. In most of these models, the mice are placed in the supine position in order to perform chest compression for cardiopulmonary resuscitation (CPR). However, this resuscitation procedure makes the real-time imaging/monitoring of brain physiology during CA and resuscitation challenging. To obtain such critical knowledge, the present protocol presents a mouse asphyxia CA model that does not require the chest compression CPR step. This model allows for the study of dynamic changes in blood flow, vascular structure, electrical potentials, and brain tissue oxygen from the pre-CA baseline to early post-CA reperfusion. Importantly, this model applies to aged mice. Thus, this mouse CA model is expected to be a critical tool for deciphering the impact of CA on brain physiology.

CASE REPORTS

1. Cureus. 2023 Mar 27;15(3):e36771. doi: 10.7759/cureus.36771. eCollection 2023 Mar.
Cardiac Arrest and Resuscitation in Pregnancy: A Case Report.
Singh P(1), Bhalerao A(1).
ABSTRACT
Maternal mortality is a major public health issue globally. The exact incidence of maternal cardiac arrest (CA) is uncertain in developing countries like India as there is a paucity of reliable maternal registries. CA in pregnancy is rare and requires a multidisciplinary team well versed in the cascade of steps during cardiopulmonary resuscitation (CPR) in managing such patients. Here we report a case of a 29-year-old primigravida at 29 weeks antenatal woman in cardiac arrest in which CPR with advanced care life support was initiated and resuscitative hysterotomy was performed within 4 minutes of no return of spontaneous circulation, which helped in the revival of the patient. It serves as an important basis for maternal health and the delivery of healthy neonates, as seen in our case. Because of this, it is crucial to have a comprehensive understanding of pregnancy physiology as well as basic and advanced cardiac life support techniques with a focus on CA in pregnancy. Frequent simulation learning and training on the treatment of CA in pregnancy should therefore be encouraged.

2. Eur Heart J Case Rep. 2023 Apr 18;7(4):ytad196. doi: 10.1093/ehjcr/ytad196. eCollection 2023 Apr.
Sudden cardiac arrest in a patient with malignant mitral valve prolapse with CACNB2 gene mutation: a simple coincidence or coexistence?-a case report.
Parthiban N(1), Sani H(2)(3)(4).
ABSTRACT
BACKGROUND: Despite recent advances in cardiology, sudden cardiac death remains to be a significant challenge, and the precise cause for a large proportion of sudden cardiac arrests remains

unclear. CASE SUMMARY: A 48-year-old fit and healthy medical personnel with no previous medical illness suffered from ventricular fibrillation at his workplace and was successfully resuscitated. Although the basal electrocardiogram did not show a Brugada pattern, we identified mutations in the CACNB2 genes (Chr10: 18150879 and Chr10: 18539538 variants), which are pathogenic variants linked to the Brugada syndrome. A transthoracic echocardiogram and cardiac magnetic resonance revealed mitral valve prolapse (MVP) with characteristics of Barlow's disease, as well as malignant MVP features such as the presence of bileaflet prolapse, mitral annular disjunction, and inferior and inferolateral left ventricular wall fibrosis. DISCUSSION: To the best of our knowledge, this is the first case report on sudden cardiac arrest in a patient with malignant MVP with a CACNB2 gene mutation. This study highlights the merit for further research to establish standardized criteria for the diagnosis of malignant MVP, for the primary prevention of sudden cardiac death. Cardiac MR should also be part of the diagnostic evaluation of MVP to allow for the early detection of arrhythmogenic features, especially left ventricular fibrosis. We also suggest that the utility of genetic testing should be complementary to the current diagnostic tools for unexplained cardiac arrest and patients with MVP. This would help to better understand the genetic basis between these two conditions for better risk stratification and early cardiac intervention.

3. Intern Med. 2023 Apr 28. doi: 10.2169/internalmedicine.1487-22. Online ahead of print.
Obstructive Shock due to a Crushed Left Atrium and Pulmonary Vein by Pulmonary Artery Intimal Sarcoma Successfully Treated with Pulmonary Vein Stenting.
Furukawa S(1), Inanaga K(1), Osaki T(2), Yasuda M(3), Ohga Y(1), Ohishi Y(4), Matsumoto T(5), Uchida T(5), Inoue S(1).
ABSTRACT
A 46-year-old patient who had undergone right pneumonectomy for pulmonary artery intimal sarcoma presented with hypoxemia. The recurrent sarcoma in the mediastinum revealed external compression to the left pulmonary veins (PVs), leading to obstructive shock and cardiac arrest. Venous artery extracorporeal membrane oxygenation (VA-ECMO) was initiated; however, withdrawal was difficult, and the patient's survival seemed hopeless. However, the patient's condition improved with stenting for the compressed PV; therefore, VA-ECMO was discontinued, and he was discharged on foot. This is the first case report of obstructive shock due to critical PV stenosis caused by compression of a malignant tumor that responded to PV stenting.