This week's PubMed 29th May – 4th June 2022: articles of interest n = 36

CPR AND COVID-19

No articles identified.

CPR/MECHANICAL CHEST COMPRESSION

No articles identified.

REGISTRIES, REVIEWS AND EDITORIALS

1. Acad Emerg Med. 2022 May;29(5):581-588. doi: 10.1111/acem.14443. Epub 2022 Feb 10.
Prehospital airway management for out-of-hospital cardiac arrest: A nationwide multicenter study from the KoCARC registry.
Chang H(1)(2), Jeong D(1), Park JE(1), Kim T(1), Lee GT(1), Yoon H(1), Hwang SY(1), Cha WC(1)(2), Shin TG(1), Sim MS(1), Jo IJ(1), Lee SH(3), Shin SD(4), Choi JH(1)(2).

ABSTRACT
AIM: This study investigated whether prehospital advanced airway management (AAM) is associated with improved survival of out-of-hospital cardiac arrest (OHCA) compared with conventional bag-valve-mask (BVM) ventilation. METHODS: We investigated the neurologically favorable survival of adult patients with OHCA who underwent BVM or AAM using the Korean Cardiac Arrest Research Consortium (KoCARC), a multicenter OHCA registry of Korea. The differences in clinical characteristics were adjusted by matching or weighting the clinical propensity for use of AAM or by least absolute shrinkage and selection operator (LASSO). The primary outcome was 30-day survival with neurologically favorable status defined by cerebral performance category 1 or 2. RESULTS: Of the 9,616 patients enrolled (median age = 71 years; 65% male), there were 6,243 AAM and 3,354 BVM patients. In unadjusted analysis, the 30-day neurologically favorable survival was lower in the AAM group compared with the BVM group (5.5% vs. 10.0%; hazard ratio [HR] = 1.21, 95% confidence interval [CI] = 1.16 to 1.27; all $p < 0.001$). In propensity score matching-adjusted analysis, these differences were not found (9.6% vs. 10.0%; HR = 0.98, 95% CI = 0.93 to 1.03, $p > 0.05$). Inverse probability of treatment weighting- and LASSO-adjusted analyses replicated these results. CONCLUSIONS: In this nationwide real-world data analysis of OHCA, the 30-day neurologically favorable survival did not differ between prehospital AAM and BVM after adjustment for clinical characteristics.

2. Heart Vessels. 2022 Jul;37(7):1255-1264. doi: 10.1007/s00380-022-02020-3. Epub 2022 Jan 19.
Early prognostic impact of serum sodium level among out-of-hospital cardiac arrest patients: a nationwide multicentre observational study in Japan (the JAAM-OHCA registry).
Shida H(1)(2), Matsuyama T(3), Komukai S(4), Irisawa T(5), Yamada T(6), Yoshiya K(7), Park C(8), Nishimura T(9), Ishibe T(10), Yagi Y(11), Kiguchi T(12), Kishimoto M(13), Kim SH(14), Hayashi Y(15), Sogabe T(16), Morooka T(17), Sakamoto H(18), Suzuki K(19), Nakamura F(20), Nishioka N(1), Okada Y(1), Matsui S(21), Yoshimura S(1), Kimata S(1), Kawai S(1), Makino Y(1), Iwami T(22), Kitamura T(21); CRITICAL Study Group Investigators.

ABSTRACT
Dysnatremia is an electrolytic disorder commonly associated with mortality in various diseases. However, little is known about dysnatremia in out-of-hospital cardiac arrest (OHCA) cases. Here, we

investigated the association between serum sodium level on hospital arrival and neurological outcomes after OHCA. This nationwide hospital-based observational study (The Japanese Association for Acute Medicine Out-of-Hospital Cardiac Arrest registry) enrolled patients with OHCA between 2014 and 2017. We included adult patients aged ≥ 18 years with non-traumatic OHCA who achieved return of spontaneous circulation (ROSC) and whose serum sodium level on hospital arrival was available. Based on the serum sodium level, patients were divided into three levels: hyponatremia (Na < 135 mEq/L), normal sodium level (Na ≥ 135 or ≤ 145 mEq/L), and hypernatremia (Na > 145 mEq/L). The primary outcome was 1-month survival with favourable neurological outcomes. Altogether, 34 754 patients with OHCA were documented, and 5160 patients with non-traumatic OHCA and who achieved ROSC were eligible for our analyses. The proportion of favourable neurological outcomes was highest in patients with normal sodium levels at 17.6% (677/3854), followed by patients with hyponatremia at 8.2% (57/696) and patients with hypernatremia at 5.7% (35/610). Moreover, hyponatremia and hypernatremia were associated with a decreased probability of favourable neurological outcomes compared with normal sodium level (vs. hyponatremia, adjusted odds ratio [AOR] 0.97, 95% confidence interval [CI] 0.95-0.99; vs. hypernatremia, AOR 0.96, 95% CI 0.94-0.98). Hypo- and hypernatremia on hospital arrival were associated with a decreased probability of favourable neurological outcomes in patients with non-traumatic OHCA who achieved ROSC.

IN-HOSPITAL CARDIAC ARREST

1. Resusc Plus. 2022 May 26;10:100252. doi: 10.1016/j.resplu.2022.100252. eCollection 2022 Jun.
Physiologic effects of stress dose corticosteroids in in-hospital cardiac arrest (CORTICA): A randomized clinical trial.
Mentzelopoulos SD(1), Pappa E(1), Malachias S(1), Vrettou CS(1), Giannopoulos A(1), Karlis G(1), Adamos G(1), Pantazopoulos I(1), Megalou A(1), Louvaris Z(2)(3), Karavana V(1), Aggelopoulos E(1), Agaliotis G(1), Papadaki M(1), Baladima A(1), Lasithiotaki I(4), Lagiou F(1), Temperikidis P(1), Louka A(4), Asimakos A(1), Kougias M(1), Makris D(5), Zakynthinos E(5), Xintara M(5), Papadonta ME(6), Koutsothymiou A(6), Zakynthinos SG(1), Ischaki E(1).
ABSTRACT
AIM: Postresuscitation hemodynamics are associated with hospital mortality/functional outcome. We sought to determine whether low-dose steroids started during and continued after cardiopulmonary resuscitation (CPR) affect postresuscitation hemodynamics and other physiological variables in vasopressor-requiring, in-hospital cardiac arrest. METHODS: We conducted a two-center, randomized, double-blind trial of patients with adrenaline (epinephrine)-requiring cardiac arrest. Patients were randomized to receive either methylprednisolone 40 mg (steroids group) or normal saline-placebo (control group) during the first CPR cycle post-enrollment. Postresuscitation shock was treated with hydrocortisone 240 mg daily for 7 days maximum and gradual taper (steroids group), or saline-placebo (control group). Primary outcomes were arterial pressure and central-venous oxygen saturation (ScvO2) within 72 hours post-ROSC. RESULTS: Eighty nine of 98 controls and 80 of 86 steroids group patients with ROSC were treated as randomized. Primary outcome data were collected from 100 patients with ROSC (control, n = 54; steroids, n = 46). In intention-to-treat mixed-model analyses, there was no significant effect of group on arterial pressure, marginal mean (95% confidence interval) for mean arterial pressure, steroids vs. control: 74 (68-80) vs. 72 (66-79) mmHg] and ScvO2 [71 (68-75)% vs. 69 (65-73)%], cardiac index [2.8 (2.5-3.1) vs. 2.9 (2.5-3.2) L/min/m2], and serum cytokine concentrations [e.g. interleukin-6, 89.1 (42.8-133.9) vs. 75.7 (52.1-152.3) pg/mL] determined within 72 hours post-ROSC (P = 0.12-0.86). There was no between-group difference in body temperature, echocardiographic variables, prefrontal blood flow index/cerebral autoregulation, organ failure-free days, and hazard for poor in-hospital/functional outcome, and

adverse events (P = 0.08->0.99). CONCLUSIONS: Our results do not support the use of low-dose corticosteroids in in-hospital cardiac arrest.

INJURIES AND CPR

No articles identified.

CAUSE OF THE ARREST

1. Heart Rhythm. 2022 Jun;19(6):937-944. doi: 10.1016/j.hrthm.2022.01.035. Epub 2022 Feb 4.
Predictors and outcomes of in-hospital referrals for forensic investigation after young sudden cardiac death.
Paratz ED(1), van Heusden A(2), Zentner D(3), Morgan N(4), Smith K(5), Ball J(6), Thompson T(7), James P(7), Connell V(8), Pflaumer A(9), Semsarian C(10), Ingles J(11), Stub D(12), Parsons S(13), La Gerche A(14).

ABSTRACT

BACKGROUND: Forensic investigations are recommended following sudden cardiac death (SCD) to determine cause of death and identify living relatives at potential risk. Not all young SCD patients are referred to coronial services. OBJECTIVE: The purpose of this study was to identify referral rates, predictors, and outcomes of young SCD patients who die in-hospital following out-of-hospital cardiac arrest (OHCA). METHODS: A prospective 2-year analysis of in-hospital deaths following OHCA in Victoria, Australia, was conducted using a statewide registry combining data from ambulance, hospital, and forensic resources. RESULTS: OHCA caused 26.3% of all deaths (n = 1301) in Victorians aged 1-50 years. Rates of prehospital and in-hospital referral to coronial services were 95.0% and 59.5%, respectively. Factors independently predicting in-hospital coronial referral were age <40 years, death in the emergency department, and rural status (odds ratios 4.07, 8.91, and 3.43, respectively). Establishing a diagnosis of coronary disease in-hospital substantially reduced odds of coronial referral (odds ratio 0.07). Of 107 SCD patients referred to the coroner from hospitals, 25 (23.3%) had illicit substances identified on toxicologic analysis. Eighty-one patients (75.7%) underwent autopsy, with cause of death determined in 65 cases (80.2%). Sixteen deaths (19.8%) remained unascertained after autopsy and ancillary investigations. CONCLUSION: More than one-fourth of young Victorian deaths result from OHCA. Approximately half of patients dying in-hospital following OHCA are referred to the coroner. Patients referred are younger, more likely to die in the emergency department, and reside rurally. Forensic assessment identifies high rates of illicit drug use in young SCD patients and provides a definitive cause of death for most patients.

END-TIDAL CO_2

No articles identified.

ORGAN DONATION

1. Indian J Crit Care Med. 2022 Summer;26(4):421-438. doi: 10.5005/jp-journals-10071-24198.
Organ Donation after Circulatory Determination of Death in India: A Joint Position Paper.

Seth AK(1), Mohanka R(2), Navin S(3), Gokhale AG(4), Sharma A(5), Kumar A(6), Ramachandran B(7), Balakrishnan KR(8), Mirza D(9), Mehta D(10), Zirpe KG(11), Dhital K(12), Sahay M(13), Simha S(14), Sundaram R(15), Pandit R(16), Mani RK(17), Gursahani R(18), Gupta S(19), Kute VB(20), Shroff S(21).

ABSTRACT

Organ donation following circulatory determination of death (DCDD) has contributed significantly to the donor pool in several countries. In India, majority of deceased donations happen following brain death (BD). While existing legislation allows for DCDD, there have been only few reports of kidney transplantation following DCDD from India. This document, prepared by a multidisciplinary group of experts, reviews international best practices in DCDD and outlines the path for DCDD in India. Ethical, medical, legal, economic, procedural, and logistic challenges unique to India have been addressed. The practice of withdrawal of life-sustaining treatment (WLST) in India, laid down by the Supreme Court of India, is time-consuming, possible only in patients in a permanent vegetative state, and too cumbersome for day-to-day practice. In patients where continued medical care is futile, the procedure for WLST is described. In controlled DCDD (category-III), decision for WLST is independent of and delinked from the subsequent possibility of organ donation. Families that are inclined toward organ donation are explained the procedure including the timing and location of WLST, consent for antemortem measures, no-touch period, and the possibility of stand-down and return to the intensive care unit (ICU) without donation. In donation following neurologic determination of death (DNDD), if cardiac arrest occurs during the process of BD declaration, the protocol for DCDD category-IV has been described in detail. In DCDD category-V, organ donation may be possible following unsuccessful cardiopulmonary resuscitation of cardiac arrest in the ICU. An outline of organ-specific requisites for kidney, liver, heart, and lung transplantation following DCDD and techniques, such as normothermic regional perfusion (nRP) and ex vivo machine perfusion, has been provided. The outcomes of transplantation following DCDD are comparable to those following DBDD or living donor transplantation. Documents and checklists necessary for successful execution of DCDD in India are described.

FEEDBACK

No articles identified.

DRUGS

No articles identified.

TRAUMA

No articles identified.

VENTILATION

No articles identified.

CERERBRAL MONITORING

1. JAMA Netw Open. 2022 May 2;5(5):e2213546. doi: 10.1001/jamanetworkopen.2022.13546.

Evaluation of Neurologic and Psychiatric Outcomes After Hospital Discharge Among Adult Survivors of Cardiac Arrest.

Secher N(1)(2)(3), Adelborg K(1)(4), Szentkúti P(1), Christiansen CF(1), Granfeldt A(3), Henderson VW(1)(5)(6), Sørensen HT(1)(7).

ABSTRACT

IMPORTANCE: Long-term risks of neurologic and psychiatric disease after cardiac arrest are largely unknown. OBJECTIVE: To examine the short-term and long-term risks of common neurologic outcomes (stroke, epilepsy, Parkinson disease, and dementia) and psychiatric outcomes (depression and anxiety) in patients after hospitalization for cardiac arrest. DESIGN, SETTING, AND PARTICIPANTS: This nationwide population-based cohort study with 21 years of follow-up included data on 250 838 adults from all Danish hospitals between January 1, 1996, and December 31, 2016. Danish medical registries were used to identify all patients with a first-time diagnosis of cardiac arrest and 2 matched comparison cohorts. The first comparison cohort included patients with a first-time diagnosis of myocardial infarction; the second comprised people from the general population. Data analysis was performed from November 1, 2020, to June 30, 2021. EXPOSURES: In-hospital or out-of-hospital cardiac arrest. MAIN OUTCOMES AND MEASURES: Neurologic and psychiatric outcomes after hospital discharge were ascertained using medical registries. Twenty-one-year hazard ratios (HRs) and 95% CIs were computed based on Cox regression analysis, controlled for matching factors, and adjusted for comorbidity and socioeconomic status. RESULTS: Among the 250 838 individuals included in this study (median age, 67 years [IQR, 57-76 years]; 173 946 [69.3%] male), 3 groups were identified: 12 046 patients with cardiac arrest, 118 332 patients with myocardial infarction, and 120 460 people from the general population. Compared with patients with myocardial infarction, patients with cardiac arrest had an increased rate of ischemic stroke (10 per 1000 persons; HR, 1.30; 95% CI, 1.02-1.64) and hemorrhagic stroke (2 per 1000 persons; HR, 2.03; 95% CI, 1.12-3.67) in the first year after discharge. During the full follow-up period, rates were as follows: for epilepsy, 28 per 1000 persons (HR, 2.01; 95% CI, 1.66-2.44); for dementia, 73 per 1000 persons (HR, 1.23; 95% CI, 1.09-1.38); for mood disorders including depression, 270 per 1000 persons (HR, 1.78; 95% CI, 1.68-1.89); and for anxiety, 187 per 1000 persons (HR, 1.98; 95% CI, 1.85-2.12). The rate of Parkinson disease was similar in the 2 cohorts (8 per 1000 persons; HR, 0.96; 95% CI, 0.65-1.42). The rates of the aforementioned outcomes were highest during the first year after cardiac arrest and then declined over time. Comparisons between the cohort of patients with cardiac arrest and the general population cohort showed higher rates of epilepsy, dementia, depression, and anxiety in the cardiac arrest group. CONCLUSIONS AND RELEVANCE: In this cohort study, patients discharged after cardiac arrest had an increased rate of subsequent stroke, epilepsy, dementia, depression, and anxiety compared with patients with myocardial infarction and people from the general population, with declining rates over time. These findings suggest the need for preventive strategies and close follow-up of cardiac arrest survivors.

2. JAMA Netw Open. 2022 May 2;5(5):e2214639. doi: 10.1001/jamanetworkopen.2022.14639.

Association of High-Volume Centers With Survival Outcomes Among Patients With Nontraumatic Out-of-Hospital Cardiac Arrest: A Systematic Review and Meta-Analysis.

Goh AXC(1), Seow JC(1), Lai MYH(1), Liu N(2)(3), Man Goh Y(1), Ong MEH(3)(4), Lim SL(5), Ho JSY(6), Yeo JW(1), Ho AFW(4)(7).

ABSTRACT

IMPORTANCE: Although high volume of cases of out-of-hospital cardiac arrest (OHCA) is a key feature of cardiac arrest centers, which have proven survival benefit, the role of center volume as an independent variable associated with improved outcomes is unclear. OBJECTIVE: To assess the association of high-volume centers with survival and neurological outcomes in nontraumatic OHCA.

DATA SOURCES: Medline, Embase, and the Cochrane Central Register of Controlled Trials were searched from inception to October 11, 2021, for studies including adult patients with nontraumatic OHCA who were treated at high-volume vs non-high-volume centers. STUDY SELECTION: Randomized clinical trials, nonrandomized studies of interventions, prospective cohort studies, and retrospective cohort studies were selected that met the following criteria: (1) adult patients with OHCA of nontraumatic etiology, (2) comparison of high-volume with low-volume centers, (3) report of a volume-outcome association, and (4) report of outcomes of interest. At least 2 authors independently reviewed each article, blinded to each other's decision. DATA EXTRACTION AND SYNTHESIS: Data abstraction and quality assessment were independently conducted by 2 authors. Meta-analyses were performed for adjusted odds ratios (aORs) and crude ORs using a random-effects model. This study followed the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) reporting guideline. MAIN OUTCOMES AND MEASURES: Survival and good neurological outcomes according to the Cerebral Performance Categories Scale at hospital discharge or 30 days. RESULTS: A total of 16 studies involving 82 769 patients were included. Five studies defined high volume as 40 or more cases of OHCA per year; 3 studies defined high volume as greater than 100 cases of OHCA per year. All other studies differed in definitions. Survival to discharge or 30 days improved with treatment at high-volume centers, regardless of whether aORs (1.28 [95% CI, 1.00-1.64]) or crude ORs (1.43 [95% CI, 1.09-1.87]) were pooled. There was no association between center volume and good neurological outcomes at 30 days or hospital discharge in patients with OHCA (aOR, 0.96 [95% CI, 0.77-1.20]). CONCLUSIONS AND RELEVANCE: In this meta-analysis and systematic review, care at high-volume centers was associated with improved survival outcomes, even after adjustment for potential confounders, but was not associated with improved neurological outcomes for patients with nontraumatic OHCA. More studies evaluating the relative importance of center volume compared with other variables (eg, the availability of treatment modalities) associated with survival outcomes in patients with OHCA are required.

ULTRASOUND AND CPR

No articles identified.

ORGANISATION AND TRAINING

1. J Am Heart Assoc. 2022 Jun 3:e025661. doi: 10.1161/JAHA.122.025661. Online ahead of print.
Faculty Development Approaches for Life Support Courses: A Scoping Review.
Ko YC(1), Hsieh MJ(1), Cheng A(2), Lauridsen KG(3)(4)(5), Sawyer TL(6)(7), Bhanji F(8), Greif R(9)(10); International Liaison Committee on Resuscitation Education, Implementation, Teams (EIT) Task Force *.

ABSTRACT
The aim of this scoping review initiated by the Education, Implementation and Teams Task Force of the International Liaison Committee on Resuscitation was to identify faculty development approaches to improve instructional competence in accredited life support courses. We searched PubMed, Ovid Embase, Cumulative Index to Nursing and Allied Health Literature, and the Cochrane Central Register of Controlled Trials to identify studies published from January 1, 1966 to December 31, 2021 on approaches to improve faculty development for life support courses. Data on participant characteristics, interventions, design, and outcomes of included studies were extracted. Of the initially identified 10 310 studies, we included 20 studies (5 conference abstracts, 1 short communication, 14 full-length articles). Among them, 12 studies aimed to improve instructors/

candidates' teaching ability in basic life support courses. A wide variety of interventions were identified. The interventions were categorized into 4 themes: instructor qualification/training (n=9), assessment tools (n=3), teaching skills enhancement (n=3), and additional courses for instructors (n=5). Most studies showed that these interventions improved specific teaching ability or confidence of the instructors and learning outcomes in different kinds of life support courses. However, no studies addressed clinical outcomes of patients. In conclusion, the faculty development approaches for instructors are generally associated with improved learning outcomes for participants, and also improved teaching ability and self-confidence of the instructors. It is encouraged that local organizations implement faculty development programs for their teaching staff of their accredited resuscitation courses. Further studies should explore the best ways to strengthen and maintain instructor competency, and define the cost-effectiveness of various different faculty development strategies.

2. Resusc Plus. 2022 May 24;10:100250. doi: 10.1016/j.resplu.2022.100250. eCollection 2022 Jun.
Can high school students teach their peers high quality cardiopulmonary resuscitation (CPR)?
Damvall DA(1), Birkenes TS(2), Nilsen K(3), Haaland SH(2), Myklebust H(2), Nordseth T(4)(5).
ABSTRACT
BACKGROUND: If adolescents can teach each other cardiopulmonary resuscitation (CPR) during school hours, this may be a cost-effective approach to CPR training. The aim of this study was to evaluate CPR quality among students trained by student instructors in CPR. MATERIAL AND METHODS: Three high schools participated. Recruited student instructors (SIs) were given a two-day course by professional instructors. Theoretic knowledge was acquired through an e-learning program. The SIs then trained fellow students in a 90-minute practical CPR session during physical education classes. All participants performed a 4-minutes test of CPR performance. Data was collected using Little Anne QCPR manikins with QCPR classroom software (Laerdal Medical Inc, Norway). Statistical equivalence in CPR performance was assessed applying the two one-sided tests (TOST)-procedure. RESULTS: Eight professional instructors trained 76 SIs who trained approximately 2650 students in CPR. The number of available tests for analysis of student performance was 982. The compression rates were within guideline recommendations for SIs (mean 110.6, SD 5.4) and students (mean 118.6, SD 8.6). The corresponding numbers for mean compression depth were 7.2 cm (SD 0.7) and 7 cm (SD 1.0). Students demonstrated greater variation in mouth-to-mouth (MTM) skills, with only 41% performing at least 15 successful ventilations during the test. Except for the total number of MTM ventilations (mean difference -5.6), CPR performance was deemed statistically equivalent between professional instructors, SIs and students. CONCLUSIONS: High school students can be trained as CPR instructors and teach fellow students CPR with good quality, with some variation in MTM-ventilation skills.

3. Acta Anaesthesiol Scand. 2022 May 31. doi: 10.1111/aas.14096. Online ahead of print.
International Initiation and Termination of Resuscitation Practices.
Havshøj U(1)(2)(3), Juhl ID(2)(4), Milling L(1)(3), Kjaer Jørgensen J(1), Christensen HC(5), Lippert F(5), Morrison LJ(1)(6), Mikkelsen S(1)(3), Brøchner AC(1)(2)(3).
ABSTRACT
BACKGROUND: Substantial variation in survival following out-of-hospital cardiac arrest is described both internationally and nationally. The Utstein factors account for half of the variation, but the remaining is not fully understood. Local regulations or guidelines concerning the withholding and termination of resuscitation may influence the reporting of cardiac arrests when comparing outcomes between different EMS systems. METHOD: We have developed an online cross-sectional mixed-methods explanatory design survey aimed at describing the international and national

variations in the initiation, the termination of resuscitation, and the refraining from resuscitation of adult patients (>18 years of age) suffering from non-traumatic OHCA. The respondents will be national experts and the questionnaire will be distributed among members of EUPHOREA, the International Liaison Committee of Resuscitation (ILCOR), the European Resuscitation Council, and the Resuscitation Academy. Each invited country will have to identify at least two national experts with special expertise in prehospital resuscitation practices. We exclude countries with less than two respondents. RESULTS: The survey will provide both quantitative and qualitative data. Quantitative data will be presented as frequencies and proportions. Qualitative data will be analyzed using content analysis. CONCLUSION: This survey could be of importance in understanding the multiple factors leading to the substantial variation in survival found following OHCA. Furthermore, the interpretation of future studies on OHCA from different settings may be improved to further increase survival following OHCA.

4. Front Cardiovasc Med. 2022 May 16;9:897263. doi: 10.3389/fcvm.2022.897263. eCollection 2022.
Knowledge of Symptoms of Acute Myocardial Infarction, Reaction to the Symptoms, and Ability to Perform Cardiopulmonary Resuscitation: Results From a Cross-sectional Survey in Four Regions in Germany.
Kartschmit N(1), Birnbach B(1), Hartwig S(1), Mikolajczyk R(1).
ABSTRACT
BACKGROUND: Ischemic heart disease affects 126 million individuals globally which illustrates the importance of finding ways to decrease mortality and morbidity in case of an acute myocardial infarction (AMI). Since knowledge of symptoms, correct reaction to symptoms, and ability to perform cardiopulmonary resuscitation (CPR) decreases the time from symptoms-onset to reperfusion, which leads to lower AMI mortality, we aimed to examine those factors and identify predicting variables in regions with low and high AMI mortality rates. METHODS: We conducted a cross-sectional online survey including 633 respondents from the general population in four federal states in Germany with low and high AMI mortality and morbidity rates. We used uni- and multivariable regressions to find health-related and sociodemographic factors associated with knowledge, reaction to symptoms, and skills in CPR. RESULTS: Out of 11 symptoms, the mean of correctly attributed AMI symptoms was 7.3 (standard deviation 1.96). About 93% of respondents chose to call an ambulance when witnessing an AMI. However, when confronted with the description of a real-life situation, only 35 and 65% of the participants would call an ambulance in case of abdominal and chest pain, respectively. The predicting variables for higher knowledge were being female, knowing someone with heart disease, and being an ex-smoker compared to people who never smoked. Higher knowledge was associated with adequate reaction in the description of a real-life situation and ability to perform CPR. Prevalence ratio for being able to perform CPR was lower in females, older participants, and participants with low educational level. About 38% of participants state to know how to perform CPR. Our results indicate rather no difference regarding knowledge, reaction to AMI symptoms, and ability to perform CPR among different regions in Germany. CONCLUSIONS: Knowledge of symptoms and first responder reaction including skills in CPR is inadequate when confronted with the description of a real-life situation. Educational health campaigns should focus on conveying information close to real-life situations. Interventions for enhancing ability to perform CPR should be compulsory in regular intervals. Interestingly, we found no difference regarding the factors in regions with high and low AMI mortality rates in Germany.

5. Front Med (Lausanne). 2022 May 12;9:825823. doi: 10.3389/fmed.2022.825823. eCollection 2022.
Innovative Tele-Instruction Approach Impacts Basic Life Support Performance: A Non-inferiority Trial.

Schauwinhold MT(1)(2), Schmidt M(1)(2), Rudolph JW(3)(4), Klasen M(1)(2), Lambert SI(1)(2), Krusch A(1)(2), Vogt L(1)(2), Sopka S(1)(2).

ABSTRACT

BACKGROUND: Sustaining Basic Life Support (BLS) training during the COVID-19 pandemic bears substantial challenges. The limited availability of highly qualified instructors and tight economic conditions complicates the delivery of these life-saving trainings. Consequently, innovative and resource-efficient approaches are needed to minimize or eliminate contagion while maintaining high training standards and managing learner anxiety related to infection risk. METHODS: In a non-inferiority trial 346 first-year medical, dentistry, and physiotherapy students underwent BLS training at AIXTRA-Competence Center for Training and Patient Safety at the University Hospital RWTH Aachen. Our objectives were (1) to examine whether peer feedback BLS training supported by tele-instructors matches the learning performance of standard instructor-guided BLS training for laypersons; and (2) to minimize infection risk during BLS training. Therefore, in a parallel group design, we compared arm (1) Standard Instructor Feedback (SIF) BLS training (Historical control group of 2019) with arm (2) a Tele-Instructor Supported Peer-Feedback (TPF) BLS training (Intervention group of 2020). Both study arms were based on Peyton's 4-step approach. Before and after each training session, objective data for BLS performance (compression depth and rate) were recorded using a resuscitation manikin. We also assessed overall BLS performance via standardized instructor evaluation and student self-reports of confidence via questionnaire. Non-inferiority margins for the outcome parameters and sample size calculation were based on previous studies with SIF. Two-sided 95% confidence intervals were employed to determine significance of non-inferiority. RESULTS: The results confirmed non-inferiority of TPF to SIF for all tested outcome parameters. A follow-up after 2 weeks found no confirmed COVID-19 infections among the participants. CONCLUSION: Tele-instructor supported peer feedback is a powerful alternative to in-person instructor feedback on BLS skills during a pandemic, where infection risk needs to be minimized while maximizing the quality of BLS skill learning.

6. Clin Simul Nurs. 2022 Jul;68:9-18. doi: 10.1016/j.ecns.2022.04.004. Epub 2022 May 23.

Comparison of Augmented Reality-assisted and Instructor-assisted Cardiopulmonary Resuscitation: A Simulated Randomized Controlled Pilot Trial.

Hou L(1), Dong X(1), Li K(1), Yang C(1), Yu Y(2), Jin X(1), Shang S(1).

ABSTRACT

BACKGROUND: A trained lay rescuer is the most important determinant of survival from sudden cardiac arrest. Augmented Reality (AR) device may represent a powerful instrument for CPR assistance and self-training especially during the COVID-19 pandemic. METHODS: A prospective, parallel, 1:1 pilot randomized clinical trial was designed. An AR CPR app was developed and 28 participants were randomly allocated into AR-assisted group and instructor-assisted group. Acceptability, usability, and mean per minute/per cycle chest compression depth, rate and accuracy were measured. RESULTS: The mean scores for acceptability and usability were all rated good in each group. Comparing real-time AR-assisted CPR to instructor-assisted CPR, the mean difference of compression depth was 0.18 (95% CI: -0.18-0.53) cm and rate was -1.58 (95% CI: -6.11-2.95) min-1. Comparing AR self-training to instructor training, the AR group was not significantly different between two groups regarding both compression depth, rate and accuracy ($p > .05$). CONCLUSION: We found that the AR CPR app was an acceptable and usable tool both in real-time-assisted CPR and self-training CPR.

POST-CARDIAC ARREST TREATMENTS

1. Eur Heart J Acute Cardiovasc Care. 2022 Jun 3:zuac060. doi: 10.1093/ehjacc/zuac060. Online ahead of print.

Ischaemic electrocardiogram patterns and its association with survival in out-of-hospital cardiac arrest patients without ST-segment elevation myocardial infarction: a COACT trials' post-hoc subgroup analysis.

Spoormans EM(1), Lemkes JS(1), Janssens GN(1), Soultana O(1), van der Hoeven NW(1), Jewbali LSD(2), Dubois EA(2)(3), Meuwissen M(4), Rijpstra TA(5), Bosker HA(6), Blans MJ(7), Bleeker GB(8), Baak R(9), Vlachojannis GJ(10)(11), Eikemans BJW(12), van der Harst P(11)(13), van der Horst ICC(14)(15), Voskuil M(11), van der Heijden JJ(16), Beishuizen A(17), Stoel M(18), Camaro C(19), van der Hoeven H(20), Henriques JP(21), Vlaar APJ(22), Vink MA(23), van den Bogaard B(24), Heestermans TACM(25), de Ruijter W(26), Delnoij TSR(15), Crijns HJGM(27), Oemrawsingh PV(28), Gosselink MTM(29), Plomp K(30), Magro M(31), Elbers PWG(32), van de Ven PM(33), van Royen N(1)(19).

ABSTRACT

AIMS: ST-depression and T-wave inversion are frequently present on the post-resuscitation electrocardiogram (ECG). However, the prognostic value of ischaemic ECG patterns is unknown. METHODS AND RESULTS: In this post-hoc subgroup analysis of the Coronary Angiography after Cardiac arrest (COACT) trial, the first in-hospital post-resuscitation ECG in out-of-hospital cardiac arrest patients with a shockable rhythm was analysed for ischaemic ECG patterns. Ischaemia was defined as ST-depression of ≥0.1 mV, T-wave inversion in ≥2 contiguous leads, or both. The primary endpoint was 90-day survival. Secondary endpoints were rate of acute unstable lesions, levels of serum troponin-T, and left ventricular function. Of the 510 out-of-hospital cardiac arrest patients, 340 (66.7%) patients had ischaemic ECG patterns. Patients with ischaemic ECG patterns had a worse 90-day survival compared with those without [hazard ratio 1.51; 95% confidence interval (CI) 1.08-2.12; P = 0.02]. A higher sum of ST-depression was associated with lower survival (log-rank = 0.01). The rate of acute unstable lesions (14.5 vs. 15.8%; odds ratio 0.90; 95% CI 0.51-1.59) did not differ between the groups. In patients with ischaemic ECG patterns, maximum levels of serum troponin-T (μg/L) were higher [0.595 (interquartile range 0.243-1.430) vs. 0.359 (0.159-0.845); ratio of geometric means 1.58; 1.13-2.20] and left ventricular function (%) was worse (44.7 ± 12.5 vs. 49.9 ± 13.3; mean difference -5.13; 95% CI -8.84 to -1.42). Adjusted for age and time to return of spontaneous circulation, ischaemic ECG patterns were no longer associated with survival. CONCLUSION: Post-arrest ischaemic ECG patterns were associated with worse 90-day survival. A higher sum of ST-depression was associated with lower survival. Adjusted for age and time to return of spontaneous circulation, ischaemic ECG patterns were no longer associated with survival.

2. Resuscitation. 2022 May 27:S0300-9572(22)00166-6. doi: 10.1016/j.resuscitation.2022.05.015. Online ahead of print.

Inhaled anaesthesia compared with conventional sedation in post cardiac arrest patients undergoing temperature control: a systematic review and meta-analysis.

Parlow S(1), Fay Lepage-Ratte M(2), Jung RG(3), Fernando SM(4), Visintini S(5), Sterling LH(6), Di Santo P(7), Simard T(8), Russo JJ(1), Labinaz M(1), Hibbert B(9), Nolan JP(10), Rochwerg B(11), Mathew R(1).

ABSTRACT

INTRODUCTION: Patients admitted with return of spontaneous circulation (ROSC) following out of hospital cardiac arrest (OHCA) are often sedated to facilitate care. Volatile anaesthetics have been proposed as alternative sedatives because of their rapid offset. We performed a systematic review and meta-analysis comparing the use of volatile anaesthetics to conventional sedation in this population. MATERIALS: We searched four databases (MEDLINE,Embase, CENTRAL, and Scopus) from inception to January 6, 2022. We included randomized trials and observational studies evaluating patients admitted following ROSC. We pooled data and reported summary estimates

using odds ratio (OR) for dichotomous outcomes and mean difference (MD) for continuous outcomes, both with 95% confidence intervals (CIs). We assessed risk of bias using the Newcastle Ottawa Scale and certainty of evidence using GRADE methodology. RESULTS: Of 1,973 citations, we included three observational studies (n=604 patients). Compared to conventional sedation, volatile agents had an uncertain effect on delirium (OR 0.96, 95% CI 0.68-1.37), survival to discharge (OR 0.66, 95% CI 0.17-2.61), and ICU length of stay (MD 1.59 days fewer, 95% CI 1.17-4.36, all very low certainty). Patients who received volatile anaesthetic underwent a shorter duration of mechanical ventilation (MD 37.32 hours shorter, 95% CI 7.74-66.90), however this was based on low-certainty evidence. No harms were described with use of volatile anesthetics. CONCLUSION: Volatile anaesthetics may be associated with a decreased duration of mechanical ventilation in patients admitted with ROSC however this is based on low-certainty evidence. Further data are needed to assess their role in this population.

3. Eur J Intern Med. 2022 Jun;100:143-145. doi: 10.1016/j.ejim.2022.02.015. Epub 2022 Feb 17.
Is malignancy cancer an adverse factor of in-hospital clinical outcome in post-cardiac arrest?
Chen J(1), Yu M(2), Zeng R(1), Wang Y(1), Liu Q(3).
NO ABSTRACT AVAILABLE

TARGETED TEMPERATURE MANAGEMENT

1. Indian J Crit Care Med. 2022 Summer;26(4):506-513. doi: 10.5005/jp-journals-10071-24173.
Targeted Temperature Management in Unconscious Survivors of Postcardiac Arrest: A Systematic Review and Meta-analysis of Randomized Controlled Trials.
Mishra SB(1), Patnaik R(1), Rath A(1), Samal S(1), Dash A(1), Nayak B(1).
ABSTRACT
BACKGROUND: Targeted temperature management (TTM) is a vital element of postresuscitation management after cardiac arrest. Though international guidelines recommend TTM, the supporting evidence is of low certainty. AIMS AND OBJECTIVES: To estimate the effect of TTM strategy on mortality and neurological outcomes in postcardiac arrest survivors. MATERIALS AND METHODS: Randomized controlled trials (RCTs) published in English evaluating the use of TTM in adult comatose survivors of cardiac arrest were included. Studies were categorized into two groups, based on hypothermia vs normothermia. The main outcome was death due to any origin. The secondary outcome measures evaluated neurological outcome and complications associated with TTM. Outcomes were analyzed by calculating Odds Ratio (OR) of a worse outcome. ORs with 95% CIs in a forest plot were used to show the results of random-effects meta-analyses. RESULTS: On pooled analysis of 11 RCTs, no difference was observed in death due to any origin rates in the hypothermia compared to the normothermia group (OR; 0.88, 95% CI: 0.39-1.16). Overall, no difference in poor neurological outcome was observed between the two groups (OR; 0.86, 95% CI: 0.66-1.12). Trial sequencing analysis for mortality and poor neurological outcome showed that number to achieve power to predict futility has been achieved in both the parameters. CONCLUSIONS: This meta-analysis showed that hypothermia compared to normothermia TTM strategies does not improve survival or neurologic outcomes.

2. Front Med (Lausanne). 2022 May 13;9:880803. doi: 10.3389/fmed.2022.880803. eCollection 2022.
Salivary Alpha Amylase Bronchial Measure for Early Aspiration Pneumonia Diagnosis in Patients Treated With Therapeutic Hypothermia After Out-of-hospital Cardiac Arrest.
Moussali A(1), Cauchois E(1), Carvelli J(1), Hraeich S(2)(3), Bouzana F(1), Lesaux A(1), Boucekine M(3)(4), Bichon A(1), Gainnier M(1)(5), Fromonot J(5)(6), Bourenne J(1)(5).
ABSTRACT

BACKGROUND: Aspiration pneumonia is the most common respiratory complication following out-of-hospital cardiac arrests (OHCA). Alpha-amylase (α-amylase) in pulmonary secretions is a biomarker of interest in detecting inhalation. The main goal of this study is to evaluate the performance of bronchoalveolar levels of α-amylase in early diagnosis of aspiration pneumonia, in patients admitted to intensive care unit (ICU) after OHCA. METHODS: This is a prospective single-center trial, led during 5 years (July 2015 to September 2020). We included patients admitted to ICU after OHCA. A protected specimen bronchial brushing and a mini-bronchoalveolar lavage (mini-BAL) were collected during the first 6 h after admission. Dosage of bronchial α-amylase and standard bacterial analysis were performed. Investigators confirmed pneumonia diagnosis using clinical, radiological, and microbiological criteria. Every patient underwent targeted temperature management. RESULTS: 88 patients were included. The 34% (30 patients) developed aspiration pneumonia within 5 days following admission. The 55% (17) of pneumonias occurred during the first 48 h. The 57% of the patients received a prophylactic antibiotic treatment on their admission day. ICU mortality was 50%. Median value of bronchial α-amylase did not differ whether patients had aspiration pneumonia (15 [0-94]) or not (3 [0-61], p = 0,157). Values were significantly different concerning early-onset pneumonia (within 48 h) [19 (7-297) vs. 3 (0-82), p = 0,047]. If one or more microorganisms were detected in the initial mini-BAL, median value of α-amylase was significantly higher [25 (2-230)] than in sterile cultures (2 [0-43], p = 0,007). With an 8.5 IU/L cut-point, sensitivity and specificity of α-amylase value for predicting aspiration pneumonia during the first 2 days were respectively 74 and 62%. True positive and negative rates were respectively 44 and 86%. The area under the ROC curve was 0,654 (CI 95%; 0,524-0,785). Mechanical ventilation duration, length of ICU stay, and mortality were similar in both groups. CONCLUSION: In our study, dosage of bronchial α-amylase was not useful in predicting aspiration pneumonia within the first 5 days after ICU admission for OHCA. Performance in predicting early-onset pneumonia was moderate.

ELECTROPHYSIOLOGY AND DEFIBRILLATION

1. J Intensive Care Med. 2022 Jun 3:8850666221105236. doi: 10.1177/08850666221105236. Online ahead of print.

Echocardiographic Characteristics of Cardiogenic Shock Patients with and Without Cardiac Arrest.

Tabi M(1), Singam NSV(2), Wiley B(1), Anavekar N(1), Barsness G(1), Jentzer JC(1)(2).

ABSTRACT

Cardiac arrest (CA) is associated with worse outcomes in patients with cardiogenic shock (CS). To better understand the contribution of CA on CS, we evaluated transthoracic echocardiography (TTE) parameters in CS patients with and without CA. Methods: We retrospectively identified CS patients with a TTE performed near cardiac intensive care unit admission between 2007 to 2018. We compared TTE measurements of left ventricular (LV) and right ventricular (RV) function in patients with and without CA. The primary outcome was all-cause in-hospital mortality, as determined using multivariable logistic regression. Results: We included 1085 patients, 35% of whom had CA. Median age was 70 years and 37% were females. CA patients had higher severity of illness, more invasive mechanical ventilation and greater vasopressor/inotrope use. In-hospital mortality was 31% and was higher in CA patients (45% vs. 23%, p <0.001). Although LV ejection fraction (LVEF) was similar (35% vs. 37%, p = 0.05), CA patients had lower cardiac index, mitral valve E wave peak velocity, E/A ratio and E/e' ratio. TTE variables that were associated with hospital mortality varied, among patients with CA, these included measures of RV pressure and function and among patients without CA, these included parameters reflecting LV systolic function. Conclusions: Doppler assessments of RV systolic dysfunction were the strongest TTE predictors of hospital mortality in CS patients with CA,

unlike CS patients without CA in whom LV systolic function was more important. This emphasizes the importance of RV assessment for mortality risk stratification after CA.

2. Resuscitation. 2022 May 30:S0300-9572(22)00168-X. doi: 10.1016/j.resuscitation.2022.05.017. Online ahead of print.

Continuous versus routine EEG in patients after cardiac arrest-Analysis of a randomized controlled trial (CERTA) - RESUS-D-22-00369.

Valentina Urbano MM(1), Alvarez V(2), Schindler K(3), Rüegg S(4), Ben-Hamouda N(5), Novy J(1), Rossetti AO(6).

ABSTRACT

BACKGROUND: Electroencephalography (EEG) is essential to assess prognosis in patients after cardiac arrest (CA). Use of continuous EEG (cEEG) is increasing in critically-ill patients, but it is more resource-consuming than routine EEG (rEEG). Observational studies did not show a major impact of cEEG versus rEEG on outcome, but randomized studies are lacking. METHODS: We analyzed data of the CERTA trial (NCT03129438), including comatose adults after CA undergoing cEEG (30-48 hours) or two rEEG (20-30 minutes each). We explored correlations between recording EEG type and mortality (primary outcome), or Cerebral Performance Categories (CPC, secondary outcome), assessed blindly at 6 months, using uni- and multivariable analyses (adjusting for other prognostic variables showing some imbalance across groups). RESULTS: We analyzed 112 adults (52 underwent rEEG, 60 cEEG,); 31 (27.7%) were women; 68 (60.7%) patients died. In univariate analysis, mortality (rEEG 59%, cEEG 65%, p=0.318) and good outcome (CPC 1-2; rEEG 33%, cEEG 27%, p=0.247) were comparable across EEG groups. This did not change after multiple logistic regressions, adjusting for shockable rhythm, time to return of spontaneous circulation, serum neuron-specific enolase, EEG background reactivity, regarding mortality (rEEG vs cEEG: OR 1.60, 95% CI 0.43 - 5.83, p=0.477), and good outcome (OR 0.51, 95% CI 0.14 - 1.90, p=0.318). CONCLUSION: This analysis suggests that cEEG or repeated rEEG are related to comparable outcomes of comatose patients after CA. Pending a prospective, large randomized trial, this finding does not support the routine use of cEEG for prognostication in this setting.

3. Heart Rhythm. 2022 Jun;19(6):952-959. doi: 10.1016/j.hrthm.2022.02.010. Epub 2022 Feb 15.

Poor R-wave progression as a predictor of sudden cardiac death in the general population and subjects with coronary artery disease.

Schröder LC(1), Holkeri A(2), Eranti A(3), Haukilahti MAE(4), Kerola T(2), Kenttä TV(4), Noponen K(5), Seppänen T(5), Rissanen H(6), Heliövaara M(6), Knekt P(6), Junttila MJ(4), Huikuri HV(4), Aro AL(7).

ABSTRACT

BACKGROUND: Poor R-wave progression (PRWP) is a common clinical finding on the standard 12-lead electrocardiogram (ECG), but its prognostic significance is unclear. OBJECTIVE: The purpose of this study was to examine the prognosis associated with PRWP in terms of sudden cardiac death (SCD), cardiac death, and all-cause mortality in general population subjects with and without coronary artery disease (CAD). METHODS: Data and 12-lead ECGs were collected from a Finnish general population health examination survey conducted during 1978-1980 with follow-up until 2011. The study population consisted of 6854 subjects. Main end points were SCD, cardiac death, and all-cause mortality. PRWP was defined as R-wave amplitude ≤ 0.3 mV in lead V3 and R-wave amplitude in lead V2 ≤ R-wave amplitude in lead V3. RESULTS: PRWP occurred in 213 subjects (3.1%). During the follow-up period of 24.3 ± 10.4 years, 3723 subjects (54.3%) died. PRWP was associated with older age, higher prevalence of heart failure and CAD, and β-blocker medication. In multivariate analyses, PRWP was associated with SCD (hazard ratio [HR] 2.13; 95% confidence interval [CI] 1.34-3.39), cardiac death (HR 1.75; 95% CI 1.35-2.15), and all-cause mortality (HR 1.29;

95% CI 1.08-1.54). In the subgroup with CAD, PRWP had a stronger association with cardiac mortality (HR 1.71; 95% CI 1.19-2.46) than in the subgroup without CAD, while the association with SCD was significant only in the subgroup with CAD (HR 2.62; 95% CI 1.38-4.98). CONCLUSION: PRWP was associated with adverse prognosis in the general population and with SCD in subjects with CAD.

PEDIATRICS AND CHILDREN

1. Neoreviews. 2022 Jun 1;23(6):e388-e399. doi: 10.1542/neo.23-6-e388.
Cardiopulmonary Resuscitation with an Intact Umbilical Cord.
Koo J(1)(2), Katheria A(1)(2)(3).
ABSTRACT
The body of literature supporting different umbilical management strategies has increased over the past decade as the role of cord management in neonatal transition is realized. Multiple international governing bodies endorse delayed cord clamping, and this practice is now widely accepted by obstetricians and neonatologists. Although term and preterm neonates benefit in some ways from delayed cord clamping, additional research on variations in this practice, including resuscitation with an intact cord, aim to find the optimal cord management practice that reduces mortality and major morbidities.

EXTRACORPOREAL LIFE SUPPORT

1. Scand J Trauma Resusc Emerg Med. 2022 May 31;30(1):37. doi: 10.1186/s13049-022-01024-2.
A novel extracorporeal cardiopulmonary resuscitation strategy using a hybrid emergency room for patients with pulseless electrical activity.
Ijuin S(1), Inoue A(2), Ishihara S(2), Suga M(2), Nishimura T(2), Kikuta S(2), Nakayama H(2), Igarashi N(3), Matsuyama S(2), Doi T(3), Nakayama S(2).
ABSTRACT
BACKGROUND: Whether extracorporeal cardiopulmonary resuscitation (ECPR) is indicated for patients with pulseless electrical activity (PEA) remains unclear. Pulmonary embolism with PEA is a good candidate for ECPR; however, PEA can sometimes include an aortic disease and intracranial haemorrhage, with extremely poor neurological outcomes, and can thus not be used as a suitable candidate. We began employing an ECPR strategy that utilised a hybrid emergency room (ER) to perform computed tomography (CT) before extracorporeal membrane oxygenation (ECMO) induction from January 2020. Therefore, the present study aimed to evaluate the effectiveness of this ECPR strategy. METHODS: Medical records of patients who transferred to our hybrid ER and required ECPR for PEA between January 2020 and November 2021 were reviewed. RESULTS: Twelve consecutive patients (median age, 67 [range, 57-73] years) with PEA requiring ECPR were identified in our hybrid ER. Among these patients, nine were diagnosed using an initial CT scan (intracranial haemorrhage (3); cardiac tamponade due to aortic dissection (3); aortic rupture (2); and cardiac rupture (1)), and unnecessary ECMO was avoided. The remaining three patients underwent ECPR, and two of them survived with favourable neurological outcomes. Patients not indicated for ECPR were excluded before ECMO induction. CONCLUSION: Our ECPR strategy that involved the utilisation of a hybrid ER may be useful for the exclusion of patients with PEA not indicated for ECPR and decision making.

2. Tuberc Respir Dis (Seoul). 2022 May 30. doi: 10.4046/trd.2022.0004. Online ahead of print.
Clinical experiences of high-risk pulmonary thromboembolism receiving extracorporeal membrane oxygenation in single institution.
Jang J(1), Koo SM(2), Kim KU(2), Kim YK(2), Uh ST(2), Jang GE(1), Chang W(3), Lee BY(2).

ABSTRACT

BACKGROUND: The main cause of death in pulmonary embolism (PE) is right-heart failure due to acute pressure overload. In this sense, extracorporeal membrane oxygenation (ECMO) might be useful in maintaining hemodynamic stability and improving organ perfusion. Some previous studies have reported ECMO as a bridge to reperfusion therapy of PE. However, little is known about which patient will benefit from ECMO. METHODS: Patients who underwent ECMO due to pulmonary thromboembolism at a single university-affiliated hospital between January 2010 and December 2018 were retrospectively reviewed. RESULTS: During the study period, nine patients were receiving ECMO in high-risk PE. The median age of the patients was 60 years (range, 22 to 76 years), and six (66.7%) were male. All nine patients had cardiac arrests, of which three occurred outside the hospital. All patients received mechanical support with veno-arterial (V-A) ECMO, and the median ECMO duration was 1.1 days (Range, 0.2 to 14.0 days). ECMO with anticoagulation alone was performed in six (66.7%), and ECMO with reperfusion therapy was done in three (33.3%). The 30-day mortality rate was 77.8%. The median time taken from the first cardiac arrest to initiation of ECMO was 31 minutes (range, 30 to 32 minutes) in survivors (n=2) and 65 minutes (range, 33 to 482 minutes) in non-survivors (n=7). CONCLUSION: High-risk PE with cardiac arrest has a high mortality rate despite aggressive management with ECMO and reperfusion therapy. Early decision to start ECMO and its rapid initiation might help save those with cardiac arrest in high-risk PE.

3. Prehosp Emerg Care. 2022 Jun 6:1-8. doi: 10.1080/10903127.2022.2079782. Online ahead of print.

The Use of Predictive Modeling to Compare Prehospital eCPR Strategies.

Spigner M(1)(2), Braude D(1), Pruett K(1), Ortiz C(3), Glazer J(2), Marinaro J(1).

ABSTRACT

The duration of low flow prior to initiation of extracorporeal cardiopulmonary resuscitation (eCPR) appears to influence survival. Strategies to reduce the low-flow interval for out-of-hospital cardiac arrest have been focused on expediting patient transport to the hospital or initiating extracorporeal support in the prehospital setting. To date, a direct comparison of low-flow interval between these strategies has not been made. To attempt this comparison, a model was created to predict low-flow intervals for each strategy at different locations across the city of Albuquerque, New Mexico. The data, specific to Albuquerque, suggest that a prehospital cannulation strategy consistently outperforms an expedited transport strategy, with an estimated difference in low-flow interval of 34.3 to 37.2 minutes, depending on location. There is no location within the city in which an expedited transport strategy results in a shorter low-flow interval than prehospital cannulation. It would be rare to successfully initiate eCPR by either strategy in fewer than 30 minutes from the time of patient collapse. Using a prehospital cannulation strategy, the entire coverage area could be eligible for eCPR within 60 minutes of patient collapse. The use of predictive modeling can be a low-cost solution to assist with strategic deployment of prehospital resources and may have potential for real-time decision support for prehospital clinicians.

4. Med Klin Intensivmed Notfmed. 2022 Jun;117(5):325-332. doi: 10.1007/s00063-022-00913-9. Epub 2022 Apr 11.

[Extracorporeal resuscitation-criteria, prerequisites, outcome : A reality check].

[Article in German; Abstract available in German from the publisher]

Magnet I(1), Poppe M(2).

ABSTRACT

In select patients, in whom conventional cardiopulmonary resuscitation (cCPR) fails to re-establish circulation, the 2021 European Resuscitation Council guidelines suggest considering extracorporeal resuscitation (eCPR) as a rescue therapy in settings in which it can be implemented. eCPR is becoming established during refractory cardiac arrest as a bridge-to-therapy for diagnosis and treatment of reversible causes of cardiac arrest, such as myocardial infarction, pulmonary embolism,

accidental hypothermia, overdose with cardiotoxic substances, and acute hypoxia. Patient selection criteria comprise prognostic characteristics of cardiac arrest such as witnessed status, resuscitation efforts within 5 min, shockable initial rhythm, and characteristics of effective cCPR such as signs of life during resuscitation, persistent ventricular fibrillation, intermittent episodes of spontaneous circulation or end-tidal CO2 levels constantly > 10 mm Hg, patient age and health status. The timeframe from cardiac arrest to eCPR is a major contributor for neurologically favourable survival and should not exceed 60 min according to current guidelines. This may be achieved with an efficient "load & go" strategy, including early patient selection and rapid transport with ongoing mechanical cCPR to the eCPR centre, or with a prehospital eCPR strategy. Two randomized controlled eCPR trials demonstrated survival rates of 43% and 31.5% in patients with refractory ventricular fibrillation and cardiac-origin cardiac arrest, respectively. Whether these results are generalizable outside such highly specialized centres, and which prehospital and in-hospital strategy is best for which patients, remains to be determined in future studies.

EXPERIMENTAL RESEARCH

1. World J Emerg Med. 2022;13(3):208-214. doi: 10.5847/wjem.j.1920-8642.2022.052.
Increasing angiotensin-converting enzyme (ACE) 2/ACE axes ratio alleviates early pulmonary vascular remodeling in a porcine model of acute pulmonary embolism with cardiac arrest.
Xiao HL(1), Zhao LX(2), Yang J(3), Tong N(3), An L(3), Wang GX(1), Xie MR(1), Li CS(1).
ABSTRACT
BACKGROUND: Acute pulmonary embolism (APE) with cardiac arrest (CA) is characterized by high mortality in emergency due to pulmonary arterial hypertension (PAH). This study aims to determine whether early pulmonary artery remodeling occurs in PAH caused by massive APE with CA and the protective effects of increasing angiotensin-converting enzyme (ACE) 2-angiotensin (Ang) (1-7)-Mas receptor axis and ACE-Ang II-Ang II type 1 receptor (AT1) axis (ACE2/ACE axes) ratio on pulmonary artery lesion after return of spontaneous circulation (ROSC). METHODS: To establish a porcine massive APE with CA model, autologous thrombus was injected into the external jugular vein until mean arterial pressure dropped below 30 mmHg (1 mmHg=0.133 kPa). Cardiopulmonary resuscitation and thrombolysis were delivered to regain spontaneous circulation. Pigs were divided into four groups of five pigs each: control group, APE-CA group, ROSC-saline group, and ROSC-captopril group, to examine the endothelial pathological changes and expression of ACE2/ACE axes in pulmonary artery with or without captopril. RESULTS: Histological analysis of samples from the APE-CA and ROSC-saline groups showed that pulmonary arterioles were almost completely occluded by accumulated endothelial cells. Western blotting analysis revealed a decrease in the pulmonary arterial ACE2/ACE axes ratio and increases in angiopoietin-2/angiopoietin-1 ratio and expression of vascular endothelial growth factor (VEGF) in the APE-CA group compared with the control group. Captopril significantly suppressed the activation of angiopoietin-2/angiopoietin-1 and VEGF in plexiform lesions formed by proliferative endothelial cells after ROSC. Captopril also alleviated endothelial cell apoptosis by increasing the B-cell lymphoma-2 (Bcl-2)/Bcl-2-associated X (Bax) ratio and decreasing cleaved caspase-3 expression. CONCLUSION: Increasing the ACE2/ACE axes ratio may

ameliorate pulmonary arterial remodeling by inhibiting the apoptosis and proliferation of endothelial cells after ROSC induced by APE.

2. Front Med (Lausanne). 2022 May 17;9:848491. doi: 10.3389/fmed.2022.848491. eCollection 2022.
Protection Against Post-resuscitation Acute Kidney Injury by N-Acetylcysteine via Activation of the Nrf2/HO-1 Pathway.
Wang S(1), Liu G(1), Jia T(1), Wang C(1), Lu X(1), Tian L(1), Yang Q(1), Zhu C(1).
ABSTRACT
BACKGROUND AND OBJECTIVE: Acute kidney injury (AKI), the common complication after cardio-pulmonary resuscitation (CPR), seriously affects the prognosis of cardiac arrest (CA) patients. However, there are limited studies on post-resuscitation AKI. In addition, it has been demonstrated that N-acetylcysteine (N-AC) as an ROS scavenger, has multiorgan-protective effects on systemic and regional ischaemia-reperfusion injuries. However, no studies have reported its protective effects against post-resuscitation AKI and potential mechanisms. This study aimed to clarify the protective effects of N-AC on post-resuscitation AKI and investigate whether its potential mechanism was mediated by activating Nrf-2/HO-1 pathway in the kidney. METHODS: We established cardiac arrest models in rats. All animals were divided into four groups: the sham, control, N-AC, and ZnPP groups. Animals in each group except for the ZnPP group were assigned into two subgroups based on the survival time: 6 and 48 h. The rats in the control, N-AC, and ZnPP groups underwent induction of ventricular fibrillation (VF), 8 min untreated VF and cardiopulmonary resuscitation. Renal function indicators, were detected using commercial kits. Renal pathologic changes were assessed by haematoxylin-eosin (HE) staining. Oxidative stress and inflammatory responses were measured using the corresponding indicators. Apoptosis was evaluated using terminal uridine nick-end labeling (TUNEL) staining, and expression of proteins associated with apoptosis and the Nrf-2/HO-1 pathway was measured by western blotting. RESULTS: N-AC inhibited post-resuscitation AKI. We observed that N-AC reduced the levels of biomarkers of renal function derangement; improved renal pathological changes; and suppressed apoptosis, oxidative stress, and inflammatory response. Additionally, the production of ROS in the kidneys markedly decreased by N-AC. More importantly, compared with the control group, N-AC further upregulated the expression of nuclear Nrf2 and endogenous HO-1 in N-AC group. However, N-AC-determined protective effects on postresuscitation AKI were markedly reversed after pretreatment of the HO-1 inhibitor zinc protoporphyrin (ZnPP). CONCLUSIONS: N-AC alleviated renal dysfunction and prolonged survival in animal models of CA. N-AC partially exerts beneficial renal protection via activation of the Nrf-2/HO-1 pathway. Altogether, all these findings indicated that N-AC as a common clinical agent, may have the potentially clinical utility to improve patients the outcomes in cardiac arrest.

3. Comput Biol Med. 2022 May 27:105665. doi: 10.1016/j.compbiomed.2022.105665. Online ahead of print.
An In-Silico model for evaluating the directional shock vectors in terminating and modulating rotors.
Kulangareth NV(1), Magtibay K(2), Massé S(3), Krishnakumar Nair(3), Dorian P(4), Nanthakumar K(3), Umapathy K(2).
ABSTRACT
Out-of-hospital cardiac arrest (OHCA) accounts for a majority of mortality worldwide. Survivability from an OHCA highly depends on timely and effective defibrillation. Most of the OHCA cases are due to ventricular fibrillation (VF), a lethal form of cardiac arrhythmia. During VF, previous studies have shown the presence of spatiotemporally organized electrical activities called rotors and that terminating these rotor-like activities could modulate or terminate VF in an in-hospital or research

setting. However, such an approach is not feasible for OHCA scenarios. In the case of an OHCA, external defibrillation remains the main therapeutic option despite the low survival rates. In this study, we evaluated whether defibrillation effectiveness in an OHCA scenario could be improved if a shock vector directly targets rotor-like, spatiotemporal electrical activities on the myocardium. Specifically, we hypothesized that the position of defibrillator pads with respect to a rotor's core axis and shock current density could influence the likelihood of rotor termination and thereby result in successful defibrillation. We created a bidomain cardiac model based on porcine heart data using Aliev-Panfilov bidomain equations. We simulated localized rotors, which we attempted to terminate using different defibrillation pad orientations relative to the rotor axis (i.e., perpendicular, parallel, and oblique). In addition, we gradually increased current densities for each defibrillation pad orientation from 4 to 12 A/m2. We repeated the above defibrillation procedure for rotors originating from four different locations on the ventricles. The shock parameters and the outcomes were analyzed using a Generalized Linear Mixed Model (GLMM) with Logistic Regression to link rotor termination with the defibrillation pad orientation and current density. Our results suggest the highest average likelihood of terminating rotors during VF is when defibrillator pads are placed perpendicular to the rotor axis (0.99 ± 0.03), with an average current density of 7.2 A/m2, compared to any other orientation (parallel: 0.76 ± 0.26 and oblique: 0.08 ± 0.12). Our simulations suggest that optimal defibrillator pad orientation, combined with sufficient current density magnitude, could improve the likelihood of rotor termination during VF and thereby improving defibrillation success in OHCA patients.

4. Front Med (Lausanne). 2022 May 12;9:892472. doi: 10.3389/fmed.2022.892472. eCollection 2022.

The Effects of Alda-1 Treatment on Renal and Intestinal Injuries After Cardiopulmonary Resuscitation in Pigs.

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ABSTRACT

AIM: After successful cardiopulmonary resuscitation (CPR), most survivors will develop acute kidney injury and intestinal barrier dysfunction, both of which contribute to the poor outcomes of cardiac arrest (CA) victims. Recently, the aldehyde dehydrogenase 2 (ALDH2) agonist, Alda-1 was shown to effectively alleviate regional ischemia/reperfusion injury of various organs. In the present study, we investigated the effects of Alda-1 treatment on renal and intestinal injuries after CA and resuscitation in pigs. METHODS: Twenty-four male domestic pigs were randomly divided into one of the three groups: sham (n = 6), CPR (n = 10), or CPR+Alda-1 (n = 8). CA was induced and untreated for 8 min, and then CPR was performed for 8 min in the CPR and CPR+Alda-1 groups. At 5 min after resuscitation, a dose of 0.88 mg/kg of Alda-1 was intravenously administered in the CPR+Alda-1 group. The biomarkers of renal and intestinal injuries after resuscitation were regularly measured for a total of 24 h. Subsequently, the animals were euthanized, and then renal and intestinal tissues were obtained for the measurements of ALDH2 activity and expression, and cell apoptosis and ferroptosis. RESULTS: Five of the 10 animals in the CPR group and six of the eight animals in the CPR+Alda-1 group were successfully resuscitated. After resuscitation, the levels of biomarkers of renal and intestinal injuries were significantly increased in all animals experiencing CA and resuscitation compared with the sham group; however, Alda-1 treatment significantly alleviated renal and intestinal injuries compared to the CPR group. Post-resuscitation ALDH2 activity was significantly decreased and its expression was markedly reduced in the kidney and intestine in those resuscitated animals compared with the sham group; nevertheless, both of them were significantly greater in those animals receiving Alda-1 treatment compared to the CPR group. In addition, renal, intestinal apoptosis and ferroptosis after resuscitation were observed in the CPR and CPR+Alda-1

groups, in which both of them were significantly milder in the CPR+Alda1 group than in the CPR group. CONCLUSIONS: The activation of ALDH2 by Alda-1 treatment significantly alleviated post-resuscitation renal and intestinal injuries through the inhibition of cell apoptosis and ferroptosis in a pig model of CA and resuscitation.

CASE REPORTS

1. Cureus. 2022 Apr 27;14(4):e24537. doi: 10.7759/cureus.24537. eCollection 2022 Apr.
Another Way to Break Hearts: Reverse Takotsubo Cardiomyopathy.
Zhang Y(1), Nuthulaganti SR(1), Liu K(2), Blanco A(2), Esmail K(2)(3).
ABSTRACT
A 34-year-old female was found to be hypoxic shortly after intubation during elective eye surgery. The patient then went into ventricular fibrillation leading to cardiac arrest. Return of spontaneous circulation (ROSC) was achieved after several rounds of cardiopulmonary resuscitation with epinephrine. The patient was immediately taken for cardiac catherization which revealed angiographically normal coronary arteries. A computed tomography angiogram chest showed pulmonary embolism and unclear chronicity. Transthoracic echocardiogram (TTE) showed a reduced ejection fraction of 30%-35% with nearly akinetic basal walls, consistent with reverse Takotsubo cardiomyopathy. The patient was started on anticoagulation and was successfully extubated shortly afterward. Cardiac magnetic resonance imaging (MRI) one week later revealed a recovered left ventricular ejection fraction. Our case demonstrated variants of Takotsubo cardiomyopathy while highlighting the notion that cardiac function can be temporarily compromised by acute physiological stressors.

2. World J Clin Cases. 2022 Apr 26;10(12):3899-3906. doi: 10.12998/wjcc.v10.i12.3899.
Combined use of extracorporeal membrane oxygenation with interventional surgery for acute pancreatitis with pulmonary embolism: A case report.
Yan LL(1), Jin XX(1), Yan XD(1), Peng JB(1), Li ZY(1), He BL(2).
ABSTRACT
BACKGROUND: Acute pancreatitis (AP) is an acute inflammatory process of the pancreas characterized by self-digestion of pancreatic tissue, which can trigger a systemic inflammatory response. Venous thrombosis, resulting from a hypercoagulable state, is a vascular complication of AP. AP complicated by pulmonary embolism (PE) is very rare, and the combined use of extracorporeal membrane oxygenation (ECMO) with a vascular interventional procedure for AP complicated by PE is even rarer. CASE SUMMARY: A 32-year-old man with a history of obesity developed rapidly worsening AP secondary to hypertriglyceridemia. During treatment, the patient developed chest tightness, shortness of breath, and cardiac arrest. Computed tomography (CT) scans of his upper abdomen were consistent with pancreatitis. PE was identified by chest CT angiography involving the right main pulmonary artery and multiple lobar pulmonary arteries. The patient's D-dimer level was significantly elevated (> 20 mg/L). The patient received high-frequency oxygen inhalation, continuous renal replacement therapies, anti-infective therapy, inhibition of pancreatic secretion, emergent endotracheal intubation, and advanced cardiac life support with cardiopulmonary resuscitation. Following both ECMO and a vascular interventional procedure, the patient recovered and was discharged. CONCLUSION: PE is a rare but potentially lethal complication of AP. The early diagnosis of PE is important because an accurate diagnosis and timely interventional procedures can reduce mortality. The combined use of ECMO with a vascular interventional procedure for AP complicated by PE can be considered a feasible treatment method. A collaborative effort between multiple teams is also vital.

3. Front Med (Lausanne). 2022 May 11;9:843282. doi: 10.3389/fmed.2022.843282. eCollection 2022.
Sudden Cardiac Arrest in a Patient With COVID-19 as a Result of Severe Hyperkalemia After Administration of Succinylcholine Chloride for Reintubation. A Case Report.
Putowski M(1)(2), Drygalski T(2), Morajda A(2), Woroń J(2)(3), Sanak T(1)(2), Wordliczek J(2)(4).
ABSTRACT
BACKGROUND: We present a case study of a man with coronavirus disease 2019 (COVID-19) who developed cardiac arrest as a result of hyperkalemia following administration of chlororsuccinylcholine during endotracheal intubation. CASE SUMMARY: A patient with a severe course of COVID-19, hospitalized in the Intensive Care Unit, underwent reintubation on day 16. The applied scheme was rapid sequence induction and intubation with administration of chlororsuccinyl-choline. Immediately after intubation, there was a sudden cardiac arrest due to hyper-kalemia (cK + 10.2 meq/L). Treatment was initiated as per guidelines, which resulted in a return to spontaneous circulation after 6 min. CONCLUSION: Chlorsucynylcholine may cause life-threatening hyperkalemia. We recommend using rocuronium as a neuromuscular blocking agent in critically ill COVID-19 patients due to its more optimal safety profile.

4. Prehosp Emerg Care. 2022 Jun 6:1-3. doi: 10.1080/10903127.2022.2082609. Online ahead of print.
The Role of Ultrasound Examination in the Differential Diagnosis of Cardiac Arrest in Prehospital Care: A Case Report.
Soták M(1)(2), Tyll T(1), Pochop M(1).
ABSTRACT
The survival rate of patients with out-of-hospital cardiac arrest has improved in recent years; however, it remains low. One approach to improving outcomes in these cases is to implement point-of-care ultrasound as an integral part of advanced cardiac life support management. Due to its growing popularity among emergency physicians, several protocols for this examination have been developed; however, there are little data on its use in the prehospital setting. We present a case report on the role of ultrasound examination in cardiac arrest for both diagnostic and therapeutic management.

5. Case Rep Obstet Gynecol. 2022 May 18;2022:9658708. doi: 10.1155/2022/9658708. eCollection 2022.
Rotational Thromboelastometry-Guided Venoarterial Extracorporeal Membrane Oxygenation in the Treatment of Amniotic Fluid Embolism.
Wothe JK(1), Elfstrand E(2), Mooney MR(3), Wothe DD(2)
ABSTRACT
Amniotic fluid embolism (AFE) is a rare and often fatal complication of pregnancy that occurs during the puerperium. The low incidence of AFE has resulted in few large studies, which makes evidence-based management of AFE challenging. The use of extracorporeal membrane oxygenation (ECMO) has been reported but is limited by availability and challenges managing anticoagulation. In this report, we detail the case of a 29-year-old female who suffered from an AFE leading to cardiac arrest and disseminated intravascular coagulopathy. She was treated with protocolized A-OK (adenosine, ondansetron, and ketorolac), emergency c-section, cardiopulmonary resuscitation, massive blood transfusion, and rotational thromboelastometry-guided ECMO, allowing her to forgo initial anticoagulation. After a prolonged rehabilitation with initial poor neurological status, she made a complete recovery. In this report, we describe the protocols that contributed to her recovery and detail management of complicated AFE for other clinicians.

6. Allergy Asthma Clin Immunol. 2022 Jun 2;18(1):44. doi: 10.1186/s13223-022-00687-x.

Honey bee venom re-challenge during specific immunotherapy: prolonged cardio-pulmonary resuscitation allowed survival in a case of near fatal anaphylaxis.

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ABSTRACT

BACKGROUND: Specific immunotherapy for patients with honey bee hypersensitivity is commonly applied. Re-challenge with venom is performed to prove protection in individual cases. CASE PRESENATION: We report a case of near fatal anaphylaxis with asystole for 24 min in a 35-years-old patient with mastocytosis after honey bee sting challenge, despite 5-years of specific immuno-therapy. Successful cardiopulmonary resuscitation was applied for 32 min. CONCLUSION: This intervention demonstrates, that in anaphylaxis with cardio-vascular arrest, prolonged cardio-pulmonary resuscitation for up to 40 min may be appropriate to overcome the half-life of massively released histamine. Failure of specific immunotherapy was possibly due to sensitization to the allergen Api m10, potentially underrepresented in commercial honey bee venom extracts. Molecular analyses may provide additional clues to the potentially unsuccessful outcome of venom specific immunotherapy, especially in high-risk patients such as mastocytosis.