This week's PubMed 1st – 7th May 2022: articles of interest n = 53

CPR AND COVID-19

1. Cureus. 2022 Apr 3;14(4):e23775. doi: 10.7759/cureus.23775. eCollection 2022 Apr.
Impact of COVID-19 on Basic Life Support Training Among Medical Students: An Experimental Study.
Rajaram N(1), Krishna H(2), Singh R(3), Narayan AK(1).
ABSTRACT
AIMS AND OBJECTIVES: Sudden cardiac death (SCD) is the most common cause of mortality worldwide. Bystander cardiopulmonary resuscitation (CPR) improves the victim's outcome, especially when the response time for advanced life support is prolonged. We performed a study to estimate the difference in knowledge among first-year medical students after basic life support (BLS) training (part of their foundation course) before and during the novel COVID-19 pandemic. MATERIALS AND METHODS: We recruited first-year medical college students (batch of 2019-20: pre-COVID group - P and batch of 2020-21: COVID-19 era group - C) who were undergoing BLS training for the first time and consented to this study. Since the training was delayed and affected by COVID-19 for the batch of 2020-21, their training duration was shorter with more usage of audiovisual aids. The difference in the change in knowledge (by a questionnaire with 10 questions of one mark each) after training by the two methods was analysed. Analysis of variance, Wilcoxon signed-rank test, Mann-Whitney U test, and chi-square tests was used as applicable to compare the groups, and p-value <0.05 was considered significant. The results are analysed by IBM SPSS version 20.0 software (SPSS Inc, Chicago, IL, USA). RESULTS: The median (inter-quartile range) marks in group P (89 students) in the pre-test was 3 (4-2) and in the post-test was 6 (7-5) (out of 10). The corresponding marks in group C (112 students) in the pre-test were 3 (4-2) and in post-test was 7 (8-6). The knowledge improvement in group C was more with all the three changes being significant (p=0.0001). In group C, females had more improvement than males (p=0.0001). CONCLUSION: We found a significant increase in the improvement of the knowledge after the BLS training in group C compared to group P. In group C, the improvement was better in females (59% increase in mean marks versus 22% in males).

2. Crit Care Med. 2022 May 1;50(5):883-885. doi: 10.1097/CCM.0000000000005411. Epub 2022 Jan 3.
Resuscitation in Out-of-Hospital Cardiac Arrest Patients With COVID? Never Tell Me the Odds!
Barnicle RN(1), Wright BJ(1).
NO ABSTRACT AVAILABLE

3. Crit Care Med. 2022 May 1;50(5):791-798. doi: 10.1097/CCM.0000000000005374. Epub 2021 Oct 4.
Coronavirus Disease 2019 and Out-of-Hospital Cardiac Arrest: No Survivors.
Baert V(1)(2), Beuscart JB(1), Recher M(1), Javaudin F(1), Hugenschmitt D(1), Bony T(1), Revaux F(1), Mansouri N(1), Larcher F(1), Chazard E(1), Hubert H(1)(2); French National OHCA Registry (RéAC) Study Group.
ABSTRACT
OBJECTIVES: To describe and compare survival among patients with out-of-hospital cardiac arrest as a function of their status for coronavirus disease 2019. DESIGN: We performed an observational study of out-of-hospital cardiac arrest patients between March 2020 and December 2020. Coronavirus disease 2019 status (confirmed, suspected, or negative) was defined according to the

World Health Organization's criteria. SETTING: Information on the patients and their care was extracted from the French national out-of-hospital cardiac arrest registry. The French prehospital emergency medical system has two tiers: the fire department intervenes rapidly to provide basic life support, and mobile ICUs provide advanced life support. The study data (including each patient's coronavirus disease 2019 status) were collected by 95 mobile ICUs throughout France. PATIENTS: We included 6,624 out-of-hospital cardiac arrest patients: 127 cases with confirmed coronavirus disease 2019, 473 with suspected coronavirus disease 2019, and 6,024 negative for coronavirus disease 2019. INTERVENTIONS: None. MEASUREMENTS AND MAIN RESULTS: The "confirmed" and "suspected" groups of coronavirus disease 2019 patients had similar characteristics and were more likely to have suffered an out-of-hospital cardiac arrest with a respiratory cause (confirmed: 53.7%, suspected coronavirus disease 2019: 56.5%; p = 0.472) than noncoronavirus disease 2019 patients (14.0%; p < 0.001 vs confirmed coronavirus disease 2019 patients). Advanced life support was initiated for 57.5% of the confirmed coronavirus disease 2019 patients, compared with 64.5% of the suspected coronavirus disease 2019 patients (p = 0.149) and 70.6% of the noncoronavirus disease 2019 ones (p = 0.002). The survival rate at 30-day postout-of-hospital cardiac arrest was 0% in the confirmed coronavirus disease 2019 group, 0.9% in the suspected coronavirus disease 2019 group (p = 0.583 vs confirmed), and 3.5% (p = 0.023) in the noncoronavirus disease 2019 group. CONCLUSIONS: Our results highlighted a zero survival rate in out-of-hospital cardiac arrest patients with confirmed coronavirus disease 2019. This finding raises important questions with regard to the futility of resuscitation for coronavirus disease 2019 patients and the management of the associated risks.

CPR/MECHANICAL CHEST COMPRESSION

No articles identified.

REGISTRIES, REVIEWS AND EDITORIALS

1. Crit Care. 2022 May 2;26(1):120. doi: 10.1186/s13054-022-03994-2.

Cardiopulmonary resuscitation duration and favorable neurological outcome after out-of-hospital cardiac arrest: a nationwide multicenter observational study in Japan (the JAAM-OHCA registry).

Matsuyama T(1), Ohta B(2), Kiyohara K(3), Kitamura T(4).

ABSTRACT

OBJECTIVE: We aimed to assess the association between cardiopulmonary resuscitation (CPR duration) and outcomes after OHCA. METHODS: This secondary analysis of a prospective, multicenter, observational study included adult non-traumatic OHCA patients aged ≥ 18 years between June 2014 and December 2017. CPR duration was defined as the time from professional CPR initiation to the time of return of spontaneous circulation or termination of resuscitation. The primary outcome was 1-month survival, with favorable neurological outcomes defined by cerebral performance category 1 or 2. We performed multivariable logistic regression analysis to investigate the association between CPR duration and favorable neurological outcomes. We also investigated the association between CPR duration and favorable neurological outcomes stratified by case features, including the first documented cardiac rhythm, witnessed status, and presence of bystander CPR. RESULTS: A total of 23,803 patients were included in this analysis. Multivariable logistic regression analysis demonstrated that the probability of favorable neurological outcomes decreased with CPR duration (i.e., 20.8% [226/1084] in the ≤ 20 min group versus 0.0% [0/708] in the 91-120 min group, P for trend < 0.001). Furthermore, the impact of CPR duration differed depending

on the presence of case features; those with shockable, witnessed arrest, and bystander CPR were more likely to achieve favorable neurological outcomes after prolonged CPR duration > 30 min. CONCLUSION: The probability of favorable neurological outcome rapidly decreased within a few minutes of CPR duration. But, the impact of CPR duration may be influenced by each patient's clinical feature.

2. Int J Cardiol Heart Vasc. 2022 Apr 27;40:101036. doi: 10.1016/j.ijcha.2022.101036. eCollection 2022 Jun.

"Impact of age on management and prognosis of resuscitated sudden cardiac death patients".

Sans Roselló J(1), Vidal-Burdeus M(2), Loma-Osorio P(3), Pons Riverola A(4), Bonet Pineda G(5), El Ouaddi N(6), Aboal J(3), Ariza Solé A(4), Scardino C(5), García-García C(6), Fernández-Peregrina E(7), Sionis A(7).

ABSTRACT

BACKGROUND: Sudden cardiac death (SCD) has a great impact on healthcare due to cardiologic and neurological complications. Admissions of elderly people in Cardiology Intensive Care Units have increased. We assessed the impact of age in presentation, therapeutic management and in vital and neurological prognosis of SCD patients. METHODS: We carried out a retrospective, observational, multicenter registry of patients who were admitted with a SCD in 5 tertiary hospitals from January 2013 to December 2020. We divided our cohort into two groups (patients < 80 years and ≥ 80 years). Clinical, analytical and hemodynamic variables as well as in-hospital management were registered and compared between groups. The degree of neurological dysfunction, vital status at discharge and the influence of age on them were also reviewed. RESULTS: We reviewed 1160 patients admitted with a SCD. 11.3% were ≥ 80 years. Use of new antiplatelet agents, performance of a coronary angiography, use of pulmonary artery catheter and temperature control were less carried out in the elderly. Age, non-shockable rhythm, Killip class > 1 at admission, time to CPR initiation > 5 min, time to ROSC > 20 min and lactate > 2 mmol/L were independent predictors for in-hospital mortality. Non-shockable rhythm, Killip class > 1 at admission, time to CPR initiation > 5 min and time to ROSC > 20 min but not age were independent predictors for poor neurological outcomes. CONCLUSIONS: Age determined a less aggressive management and it was associated with a worse vital prognosis in patients admitted with a SCD. Nevertheless, age was not associated with worse neurological outcomes.

3. J Patient Saf. 2022 Apr 1;18(3):e652-e657. doi: 10.1097/PTS.0000000000000912.

A 6-Year Thematic Review of Reported Incidents Associated With Cardiopulmonary Resuscitation Calls in a United Kingdom Hospital.

Beed M, Hussain S(1), Woodier N(1), Fletcher C(1), Brindley PG(2).

ABSTRACT

BACKGROUND: Critical incident reporting can be applied to cardiopulmonary resuscitation (CPR) events as a means of reducing further occurrences. We hypothesized that local CPR-related events might follow patterns only seen after a long period of analysis. DESIGN: We reviewed 6 years of local incidents associated with cardiac arrest calls. The following search terms were used to identify actual or potential resuscitation events: "resuscitation," "cardio-pulmonary," "CPR," "arrest," "heart attack," "DNR," "DNAR," "DNACPR," "Crash," "2222." All identified incidents were independently reviewed and categorized, looking for identifiable patterns. SETTING: Nottingham University Hospitals is a large UK tertiary referral teaching hospital. RESULTS: A total of 1017 reports were identified, relating to 1069 categorizable incidents. During the same time, there were approximately 1350 cardiac arrest calls, although it should be noted that many arrest-related incidents were not associated with cardiac arrest call (e.g., failure to have the correct equipment available in the event

of a cardiac arrest). Incidents could be broadly classified into 10 thematic areas: no identifiable incident (n = 189; 18%), failure to rescue (n = 133; 12%), staffing concerns (n = 134; 13%), equipment/drug concerns (n = 133; 12%), communication issues (n = 122; 10%), do-not-attempt-CPR decisions (n = 101; 9%), appropriateness of patient location or transfer (n = 96; 9%), concerns that the arrest may have been iatrogenic (n = 76; 7%), patient or staff injury (n = 43; 4%), and miscellaneous (n = 52; 5%). Specific patterns of events were seen within each category. CONCLUSIONS: By reviewing incidents, we were able to identify patterns only noticeable over a long time frame, which may be amenable to intervention. Our findings may be generalizable to other centers or encourage others to undertake this exercise themselves.

4. J Am Coll Cardiol. 2022 May 10;79(18):1828-1831. doi: 10.1016/j.jacc.2022.03.004.
Cardiac Arrest and Sudden Death: Establishing the Need for Focusing on Prehospital and In-Hospital Care.
Benditt DG(1), Cannom DS(2).
NO ABSTRACT AVAILABLE

5. J Am Coll Cardiol. 2022 May 10;79(18):1818-1827. doi: 10.1016/j.jacc.2022.02.041.
Incidence of Sudden Cardiac Death in the European Union.
Jean-Philippe E(1), Lerner I(1), Valentin E(1), Folke F(2), Böttiger B(3), Gislason G(2), Jonsson M(4), Ringh M(4), Beganton F(1), Bougouin W(5), Marijon E(1), Blom M(6), Tan H(7), Jouven X(8); ESCAPE-NET Investigators.
ABSTRACT
BACKGROUND: Although sudden cardiac death (SCD) is recognized as a high-priority public health topic, reliable estimates of the incidence of SCD or, more broadly, out-of-hospital cardiac arrest (OHCA), in the population are scarce, especially in the European Union. OBJECTIVES: The study objective was to determine the incidence of SCD and OHCA in the European Union. METHODS: The study examined 4 large (ie, >2 million inhabitants) European population-based prospective registries collecting emergency medical services (EMS)-attended (ie, with attempted resuscitation) OHCA and SCD (OHCA without obvious extracardiac causes) for >5 consecutive years from January 2012 to December 2017 in the Paris region (France), the North Holland region (the Netherlands), the Stockholm region (Sweden), and in all of Denmark. RESULTS: The average annual incidence of SCD in the 4 registries ranged from 36.8 per 100,000 (95% CI: 23.5-50.1 per 100,000) to 39.7 per 100,000 (95% CI: 32.6-46.8 per 100,000). When extrapolating to each European country and accounting for age and sex, this yields to 249,538 SCD cases per year (95% CI: 155,377-343,719 SCD cases per year). The average annual incidence of OHCA in the 4 registries ranged from 47.8 per 100,000 (95% CI: 21.2-74.4 per 100,000) to 57.9 per 100,000 (95% CI: 19.6-96.3 per 100,000), corresponding to 343,496 OHCA cases per year (95% CI: 216,472-464,922 OHCA cases per year) in the European Union. Incidence rates of SCD and OHCA increased with age and were systematically higher in men compared with women. CONCLUSIONS: By combining data from 4 large, population-based registries with at least 5 years of data collection, this study provided an estimate of the incidence of SCD and OHCA in the European Union.

6. JAMA Cardiol. 2022 May 4. doi: 10.1001/jamacardio.2022.0795. Online ahead of print.
Long-term Survival After Out-of-Hospital Cardiac Arrest: A Systematic Review and Meta-analysis.
Amacher SA(1)(2), Bohren C(2), Blatter R(2), Becker C(2)(3), Beck K(2), Mueller J(2), Loretz N(2), Gross S(2), Tisljar K(1), Sutter R(1)(4), Appenzeller-Herzog C(4)(5), Marsch S(1)(4), Hunziker S(2)(4).
ABSTRACT

IMPORTANCE: Data on long-term survival beyond 12 months after out-of-hospital cardiac arrest (OHCA) of a presumed cardiac cause are scarce. OBJECTIVE: To investigate the long-term survival of adult patients after surviving the initial hospital stay for an OHCA. DATA SOURCES: A systematic search of the EMBASE and MEDLINE databases was performed from database inception to March 25, 2021. STUDY SELECTION: Clinical studies reporting long-term survival after OHCA were selected based on predefined inclusion and exclusion criteria according to a preregistered study protocol. DATA EXTRACTION AND SYNTHESIS: Patient data were reconstructed from Kaplan-Meier curves using an iterative algorithm and then pooled to generate survival curves. As a separate analysis, an aggregate data meta-analysis was performed. MAIN OUTCOMES AND MEASURES: The primary outcome was long-term survival (>12 months) after OHCA for patients surviving to hospital discharge or 30 days after OHCA. RESULTS: The search identified 15 347 reports, of which 21 studies (11 800 patients) were included in the Kaplan-Meier-based meta-analysis and 33 studies (16 933 patients) in an aggregate data meta-analysis. In the Kaplan-Meier-based analysis, the median survival time for patients surviving to hospital discharge was 5.0 years (IQR, 2.3-7.9 years). The estimated survival rates were 82.8% (95% CI, 81.9%-83.7%) at 3 years, 77.0% (95% CI, 75.9%-78.0%) at 5 years, 63.9% (95% CI, 62.3%-65.4%) at 10 years, and 57.5% (95% CI, 54.8%-60.1%) at 15 years. Compared with patients with a nonshockable initial rhythm, patients with a shockable rhythm had a lower risk of long-term mortality (hazard ratio, 0.30; 95% CI, 0.23-0.39; P < .001). Different analyses, including an aggregate data meta-analysis, confirmed these results. CONCLUSIONS AND RELEVANCE: In this comprehensive systematic review and meta-analysis, long-term survival after 10 years in patients surviving the initial hospital stay after OHCA was between 62% and 64%. Additional research is needed to understand and improve the long-term survival in this vulnerable patient population.

7. Curr Cardiol Rep. 2022 May;24(5):497-504. doi: 10.1007/s11886-022-01671-y. Epub 2022 Mar 1.
The Impact of Obesity on Sudden Cardiac Death Risk.
Margolis G(1)(2), Elbaz-Greener G(3)(4), Ruskin JN(5), Roguin A(1)(2), Amir O(3)(4), Rozen G(6)(7)(8).
ABSTRACT
PURPOSE OF REVIEW: We aimed to describe the epidemiology of sudden cardiac death (SCD) in the obese, elaborating on the potential pathophysiological mechanisms linking obesity, SCD, and the outcomes in SCD survivors, as well as looking into the intriguing "obesity paradox" in these patients. RECENT FINDINGS: Several studies show increased mortality in patients with BMI > 30 kg/m2 admitted to the hospital following SCD. At the same time, other studies have implied that the "obesity paradox," described in various cardiovascular conditions, applies to patients admitted after SCD, showing lower mortality in the obese compared to normal weight and underweight patients. We found a significant body of evidence to support that while obesity increases the risk for SCD, the outcomes of obese patients post SCD are better. These findings should not be interpreted as supporting weight gain, as it is always better to prevent the "disaster" from happening than to improve your chances of surviving it. Obesity is shown to be significantly associated with increased risk for SCD; however, there is a growing body of evidence, supporting the "obesity paradox" in the survival of SCD victims. Prospectively, well-designed studies are needed to confirm these findings.

IN-HOSPITAL CARDIAC ARREST

1. Pulm Circ. 2022 Apr 1;12(2):e12066. doi: 10.1002/pul2.12066. eCollection 2022 Apr.
Outcomes of cardiopulmonary resuscitation in patients with pulmonary arterial hypertension.
Yang JZ(1), Odish MF(1), Mathers H(2), Pebley N(2), Wardi G(1), Papamatheakis DG(1), Poch DS(1), Kim NH(1), Fernandes TM(1), Sell RE(1).
ABSTRACT

Over the past 20 years, despite significant advancements in pulmonary arterial hypertension (PAH) medical therapy, many patients require admission to the hospital and are at risk for in-hospital cardiac arrest (IHCA). Prior data found poor survival in PAH patients after cardiac arrest. The purpose of this study was to explore post-IHCA outcomes in PAH patients receiving advanced medical therapies. This is a single-center retrospective study of PAH patients who underwent cardiopulmonary resuscitation for IHCA between July 2005 and May 2021. Patients were identified through an internal cardiac arrest database. Twenty six patients were included. Half of the cohort had idiopathic PAH, with 54% of patients on combination therapy, 27% on monotherapy, and 19% of patients on no therapy. Mean right atrial pressure, mean pulmonary artery pressure, cardiac index, and pulmonary vascular resistance were 13 ± 6 mmHg, 57 ± 13 mmHg, 2.0 ± 0.7 L/min/m2, and 14.5 ± 7.6 Wood units, respectively. Most common etiology of cardiac arrest was circulatory collapse. Initial arrest rhythm in all but one patient was pulseless electrical activity. Six patients (23%) achieved return of spontaneous circulation (ROSC) and one patient (4%) survived to hospital discharge. Rates of ROSC and survival to discharge after IHCA are poor in patients with PAH. Even patients with mild hemodynamics had low likelihood of survival. In patients who are lung transplant candidates, there should be early consideration of extracorporeal support before cardiac arrest.

2. Resuscitation. 2022 Apr 28:S0300-9572(22)00142-3. doi: 10.1016/j.resuscitation.2022.04.024. Online ahead of print.
Pulseless Electrical Activity in In-Hospital Cardiac Arrest - A crossroad for decisions.
Norvik A(1), Unneland E(2), Bergum D(3), Buckler DG(4), Bhardwaj A(5), Eftestøl T(6), Aramendi E(7), Nordseth T(1), Abella BS(8), Kvaløy JT(9), Skogvoll E(1).
ABSTRACT
BACKGROUND: PEA is often seen during resuscitation, either as the presenting clinical state in cardiac arrest or as a secondary rhythm following transient return of spontaneous circulation (ROSC), ventricular fibrillation/tachycardia (VF/VT), or asystole (ASY). The aim of this study was to explore and quantify the evolution from primary/secondary PEA to ROSC in adults during in-hospital cardiac arrest (IHCA). METHODS: We analyzed 700 IHCA episodes at one Norwegian hospital and three U.S. hospitals at different time periods between 2002 and 2021. During resuscitation ECG, chest compressions, and ventilations were recorded by defibrillators. Each event was manually annotated using a graphical application. We quantified the transition intensities, i.e., the propensity to change from PEA to another clinical state using time-to-event statistical methods. RESULTS: Most patients experienced PEA at least once before achieving ROSC or being declared dead. Time average transition intensities to ROSC from primary PEA (n= 230) and secondary PEA after ASY (n= 72) were 0.1 per min, peaking at 4 and 7 minutes, respectively; thus, a patient in these types of PEA showed a 10% chance of achieving ROSC in one minute. Much higher transition intensities to ROSC, average of 0.15 per min, were observed for secondary PEA after VF/VT (n= 83) or after ROSC (n=134). DISCUSSION: PEA is a crossroad in which the subsequent course is determined. The four distinct presentations of PEA behave differently on important characteristics. A transition to PEA during resuscitation should encourage the resuscitation team to continue resuscitative efforts.

3. Resusc Plus. 2022 Apr 27;10:100238. doi: 10.1016/j.resplu.2022.100238. eCollection 2022 Jun.
Impact of holiday periods on survival following an in-hospital cardiac arrest.
Persson CD(1), Djärv T(1)(2), Rödström MY(1)(2)
ABSTRACT
INTRODUCTION: Higher rates of mortality following an in-hospital cardiac arrest (IHCA) has been shown during nights and weekends, changes in staff density and composition has been suggested as a possible explanation. Changes in hospital staffing patterns are also common during holiday periods. AIM: To investigate whether holiday periods are associated with decreased survival following an IHCA. MATERIAL AND METHODS: All patients ≥18 years who experienced an IHCA at Karolinska University Hospital between 2006 and 2019 were included. Patients were identified via

and data was collected from the Swedish Registry for Cardiopulmonary Resuscitation. Holiday was defined as two periods, a seven-week summer period and an approximately two-week Christmas period. The primary outcome was return of spontaneous circulation (ROSC), secondary survival to hospital discharge. Logistic regression was performed to calculate odds ratio (OR) with 95% confidence intervals (CI), adjustment was done for known confounders. RESULTS: Out of 1936 registered cases, 264 (14%) occurred during holiday periods. Patient and event characteristics were similar on holidays compared to non-holidays. Both ratio for ROSC (45% and 55%, respectively) and survival (25% and 32% respectively) was poorer during holiday periods Adjusted OR for ROSC and survival was poorer during holiday periods compared non-holiday periods (OR 0.69 [95% CI, 0.53-0.92] and OR 0.69 [95% CI, 0.49-0.96], respectively). CONCLUSION: Outcomes after IHCA was poorer during holiday periods compared to non-holiday periods even if patient and event characteristics was similar. Further research is needed to better understand to what degree staffing patterns and other factors contribute to the observed difference.

4. Resuscitation. 2022 Apr 28:S0300-9572(22)00141-1. doi: 10.1016/j.resuscitation.2022.04.023. Online ahead of print.
In-hospital versus out-of-hospital cardiac arrest: characteristics and outcomes in patients admitted to intensive care after return of spontaneous circulation.
Andersson A(1), Arctaedius I(2), Cronberg T(3), Levin H(4), Nielsen N(5), Friberg H(6), Lybeck A(7).
ABSTRACT
INTRODUCTION: Cardiac arrest is characterized depending on location as in-hospital cardiac arrest (IHCA) or out-of-hospital cardiac arrest (OHCA). Strategies for Post Cardiac Arrest Care were developed based on evidence from OHCA. The aim of this study was to compare characteristics and outcomes in patients admitted to intensive care after IHCA and OHCA. METHODS: A retrospective multicenter observational study of adult survivors of cardiac arrest admitted to intensive care in southern Sweden between 2014-2018. Data was collected from registries and medical notes. The primary outcome was neurological outcome according to the Cerebral Performance Category (CPC) scale at 2-6 months. RESULTS: 799 patients were included, 245 IHCA and 554 OHCA. IHCA patients were older, less frequently male and less frequently without comorbidity. In IHCA the first recorded rhythm was more often non-shockable, all delay-times (ROSC, no-flow, low-flow, time to advanced life support) were shorter and a cardiac cause of the arrest was less common. Good long-term neurological outcome was more common after IHCA than OHCA. In multivariable analysis, witnessed arrest, age, shorter arrest duration (no-flow and low-flow times), low lactate, shockable rhythm, and a cardiac cause were all independent predictors of good long-term neurological outcome whereas location of arrest (IHCA vs OHCA) was not. CONCLUSION: In patients admitted to intensive care after cardiac arrest, patients who suffered IHCA vs OHCA differed in demographics, co-morbidities, cardiac arrest characteristics and outcomes. In multivariable analyses, cardiac arrest characteristics were independent predictors of outcome, whereas location of arrest (IHCA vs OHCA) was not.

INJURIES AND CPR

No articles identified.

CAUSE OF THE ARREST

1. BMC Emerg Med. 2022 May 6;22(1):77. doi: 10.1186/s12873-022-00634-4.
Contrast Agent Pooling (C.A.P.) sign and imminent cardiac arrest: a retrospective study.
Lee YH(1), Chen J(1), Chen PA(1), Sun JT(1), Kang BH(1), Chu SE(1), Fan CM(1), Tsai KC(1), Sim SS(2).
ABSTRACT

BACKGROUND: The sign of contrast agent pooling (C.A.P.) in dependent part of the venous system were reported in some case reports, which happened in the patients before sudden cardiac arrest. Until now, there is no solid evidence enough to address the importance of the sign. This study aimed to assess the accuracy of the C.A.P. sign in predicting imminent cardiac arrest and the association of the C.A.P. sign with patient's survival. METHODS: This is a retrospective cohort study. The study included all patients who visited the emergency department, who received contrast computed tomography (CT) scan and then experienced cardiac arrest at the emergency department (from January 1, 2016 to December 31, 2018). We evaluated the occurrence of the C.A.P. sign on the chest or abdominal CT scan, patients with ECMO were excluded. With positive C.A.P. sign, the primary outcome is whether in-hospital cardiac arrest happens within an hour; the accuracy of C.A.P. sign was calculated. The secondary outcome is survival to discharge. RESULTS: In the study, 128 patients were included. 8.6% (N = 11) patients had positive C.A.P. sign and 91.4% (N = 117) patients did not. The accuracy of C.A.P. sign in predicting cardiac arrest within 1 h was 85.94%. The C.A.P. sign had a positive association with IHCA within 1 h after the CT scan (adjusted odds ratio 7.35, 95% confidence interval [CI] 1.27 - 42.69). The relative risk (RR) of survival to discharge was 0.90 with positive C.A.P. sign (95% CI 0.85 - 0.96). CONCLUSIONS: The C.A.P. sign can be considered as an alarm for imminent cardiac arrest and poor prognosis. The patients with positive C.A.P. sign were more likely to experience imminent cardiac arrest; in contrast, less likely to survive.

2. Front Pharmacol. 2022 Apr 20;13:861953. doi: 10.3389/fphar.2022.861953. eCollection 2022.
The Risk of Ventricular Dysrhythmia or Sudden Death in Patients Receiving Serotonin Reuptake Inhibitors With Methadone: A Population-Based Study.
Antoniou T(1)(2)(3)(4), McCormack D(4), Tadrous M(4)(5)(6), Juurlink DN(4)(7)(8), Gomes T(2)(4)(5)(9).

ABSTRACT

Background: Methadone is associated with ventricular dysrhythmias and sudden death. Serotonin reuptake inhibitors (SRIs) may increase the risk of these events either by inhibiting metabolism of methadone's proarrhythmic (S)-enantiomer, additive QT interval prolongation, or both. We sought to determine whether certain SRIs were associated with a higher risk of methadone-related ventricular dysrhythmias or sudden death. Methods: We conducted a nested case-control study of Ontario residents receiving methadone between April 1, 1996 and December 31, 2017. Cases, defined as patients who died of sudden cardiac death or were hospitalized with a ventricular dysrhythmia while on methadone, were matched with up to four controls who also received methadone on age, sex, and a disease risk score. We determined the odds ratio (OR) and p-value functions for the association between methadone-related cardiotoxicity and treatment with SRIs known to inhibit metabolism of (S)-methadone (paroxetine, fluvoxamine, sertraline) or prolong the QT interval (citalopram and escitalopram). Patients who were not treated with an SRI served as the reference group. Results: During the study period, we identified 626 cases and 2,299 matched controls. Following multivariable adjustment, we found that recent use of sertraline, fluvoxamine or paroxetine (adjusted OR 1.30; 95% confidence intervals [CI] 0.90-1.86) and citalopram and escitalopram (adjusted OR 1.26; 95% CI 0.97-1.63) were associated with small increases in the risk methadone-related cardiac toxicity, an assertion supported by the corresponding p-value functions. Interpretation: Certain SRIs may be associated with a small increase in cardiac toxicity in methadone-treated patients.

3. Pharmacoepidemiol Drug Saf. 2022 Jun;31(6):670-679. doi: 10.1002/pds.5428. Epub 2022 Mar 24.
Proton pump inhibitors may enhance the risk of citalopram- and escitalopram-associated sudden cardiac death among patients receiving hemodialysis.

Assimon MM(1), Pun PH(2)(3), Al-Khatib SM(3)(4), Brookhart MA(5), Gaynes BN(6)(7), Winkelmayer WC(8), Flythe JE(1)(9).

ABSTRACT

PURPOSE: Polypharmacy is common in the hemodialysis population and increases the likelihood that patients will be exposed to clinically significant drug-drug interactions. Concurrent use of proton pump inhibitors (PPIs) with citalopram or escitalopram may potentiate the QT-prolonging effects of these selective serotonin reuptake inhibitors through pharmacodynamic and/or pharmacokinetic interactions. METHODS: We conducted a retrospective cohort study using data from the U.S. Renal Data System (2007-2017) and a new-user design to examine the differential risk of sudden cardiac death (SCD) associated with citalopram/escitalopram initiation vs. sertraline initiation in the presence and absence of PPI use among adults receiving hemodialysis. We studied 72 559 patients:14 983 (21%) citalopram/ escitalopram initiators using a PPI; 26 503 (36%) citalopram/ escitalopram initiators not using a PPI;10 779 (15%) sertraline initiators using a PPI; and 20 294 (28%) sertraline initiators not using a PPI (referent). The outcome of interest was 1-year SCD. We used inverse probability of treatment weighted survival models to estimate weighted hazard ratios (HRs) and 95% confidence intervals (CIs). RESULTS: Compared with sertraline initiators not using a PPI, citalopram/escitalopram initiators using a PPI had the numerically highest risk of SCD (HR [95% CI] = 1.31 [1.11-1.54]), followed by citalopram/escitalopram initiators not using a PPI (HR [95% CI] = 1.22 [1.06-1.41]). Sertraline initiators using a PPI had a similar risk of SCD compared with those not using a PPI (HR [95% CI] = 1.03 [0.85-1.26]). CONCLUSIONS: Existing PPI use may elevate the risk of SCD associated with citalopram or escitalopram initiation among hemodialysis patients.

END-TIDAL CO_2

No articles identified.

ORGAN DONATION

No articles identified.

FEEDBACK

No articles identified.

DRUGS

1. Eur J Emerg Med. 2022 Jun 1;29(3):210-220. doi: 10.1097/MEJ.0000000000000918. Epub 2022 Mar 16.

Effect of sodium bicarbonate on functional outcome in patients with out-of-hospital cardiac arrest: a post-hoc analysis of a French and North-American dataset.

Touron M(1), Javaudin F(2), Lebastard Q(2), Baert V(3)(4), Heidet M(5), Hubert H(3)(4), Leclere B(6), Lascarrou JB(1)(7)(8); RéAC Network.

ABSTRACT

BACKGROUND AND IMPORTANCE: No large randomised controlled trial has assessed the potential benefits on neurologic outcomes of prehospital sodium bicarbonate administration in patients with nontraumatic out-of-hospital cardiac arrest (OHCA). OBJECTIVE: To obtain information of assistance

in designing a randomised controlled trial of bicarbonate therapy after OHCA in specific patient subgroups. DESIGN: We conducted two, separate, simultaneous, retrospective studies of two distinct, unlinked datasets. SETTING AND PARTICIPANTS: One dataset was a French nationwide population-based registry (RéAC Registry, French dataset) and the other was a randomised controlled trial comparing continuous to interrupted chest compressions in North America (ROC-CCC trial, North-American dataset). INTERVENTION: We investigated whether prehospital bicarbonate administration was associated with better neurologic outcomes. OUTCOME MEASURES AND ANALYSES: The main outcome measure was the functional outcome at hospital discharge. To adjust for potential confounders, we conducted a nested propensity-score-matched analysis with inverse probability-of-treatment weighting. MAIN RESULTS: In the French dataset, of the 54 807 patients, 1234 (2.2%) received sodium bicarbonate and 450 were matched. After propensity-score matching, sodium bicarbonate was not associated with a higher likelihood of favourable functional outcomes on day 30 [adjusted odds ratio (aOR), 0.912; 95% confidence interval (95%CI), 0.501-1.655]. In the North-American dataset, of the 23 711 included patients, 4902 (20.6%) received sodium bicarbonate and 1238 were matched. After propensity-score matching, sodium bicarbonate was associated with a lower likelihood of favourable functional outcomes at hospital discharge (aOR, 0.45; 95% CI, 0.34-0.58). CONCLUSION: In patients with OHCA, prehospital sodium bicarbonate administration was not associated with neurologic outcomes in a French dataset and was associated with worse neurologic outcomes in a North-American dataset. Given the considerable variability in sodium bicarbonate use by different prehospital care systems and the potential resuscitation-time bias in the present study, a large randomised clinical trial targeting specific patient subgroups may be needed to determine whether sodium bicarbonate has a role in the prehospital management of prolonged OHCA.

2. Cardiol J. 2022 May 6. doi: 10.5603/CJ.a2022.0029. Online ahead of print.
The impact of mild therapeutic hypothermia on platelet reactivity in comatose survivors of cardiac arrest with acute myocardial infarction treated with ticagrelor.
Umińska JM(1), Ratajczak J(2), Pstrągowski K(2), Buszko K(3), Nadolny K(4)(5), Fabiszak T(2), Steblovnik K(6), Noč M(6), Kubica J(2).
ABSTRACT
BACKGROUND: The aim of the study was to assess the antiplatelet effect of ticagrelor in patients with myocardial infarction (MI) after out-of-hospital cardiac arrest (OHCA) treated with percutaneous coronary intervention (PCI) and mild therapeutic hypothermia (MTH) vs. MI patients without OHCA treated with PCI. METHODS: The study was designed and performed as a phase IV, single-center, investigator-initiated, prospective, observational study assessing the early pharmacodynamic effect (within first 24 h) of a ticagrelor loading dose (180 mg) in both groups of patients (MTH group vs. MI group). For assessment of ticagrelor pharmacodynamics Multiple Electrode Aggregometry (MEA) was applied. RESULTS: Compared with the MTH group, platelet inhibition was persistently stronger in the MI group over the entire observation period (up to 24 h), with the highest difference at 4 hours after loading with ticagrelor (25.8 ± 26.4 vs. 75.8 ± 40.9 U, $p = 0.002$). As a consequence, there was a higher prevalence of high platelet reactivity in the MTH group, with the most explicit difference at 6 hours after the loading dose of ticagrelor (78% vs. 7%, $p < 0.001$). CONCLUSIONS: In comparison with patients treated with primary PCI for uncomplicated MI, the antiplatelet effect of ticagrelor in patients with MI complicated with OHCA, undergoing MTH and primary PCI, is attenuated and delayed.

3. Resuscitation. 2022 Apr 28:S0300-9572(22)00135-6. doi: 10.1016/j.resuscitation.2022.04.017. Online ahead of print.

Effect of Vasopressin and Methylprednisolone vs. Placebo on Long-Term Outcomes in Patients with In-Hospital Cardiac Arrest A Randomized Clinical Trial.

Granfeldt A(1), Sindberg B(2), Isbye D(3), Kjærgaard J(4), Kristensen CM(3), Darling S(5), Zwisler ST(5), Fisker S(5), Christian Schmidt J(5), Kirkegaard H(2), Grejs AM(6), R G Rossau J(1), Larsen JM(7), Rasmussen BS(8), Riddersholm S(9), Iversen K(10), Schultz M(11), Nielsen JL(12), Løfgren B(13), Lauridsen KG(14), Sølling C(15), Pælestik K(15), Kjærgaard AG(16), Due-Rasmussen D(16), Folke F(17), Charlot MG(18), Malene H G Jepsen R(19), Wiberg S(19), Høybye M(2), Holmberg MJ(20), Andersen LW(21).

ABSTRACT

OBJECTIVE: The primary results from the Vasopressin and Methylprednisolone for In-Hospital Cardiac Arrest (VAM-IHCA) trial have previously been reported. The objective of the current manuscript is to report long-term outcomes. METHODS: The VAM-IHCA trial was a multicenter, randomized, double-blind, placebo-controlled trial conducted at ten hospitals in Denmark. Adult patients (age ≥ 18 years) were eligible for the trial if they had an in-hospital cardiac arrest and received at least one dose of epinephrine during resuscitation. The trial drugs consisted of 40 mg methylprednisolone (Solu-Medrol®, Pfizer) and 20 IU of vasopressin (Empressin®, Amomed Pharma GmbH) given as soon as possible after the first dose of epinephrine. This manuscript report outcomes at 6 months and 1 year including survival, survival with favorable neurological outcome, and health-related quality of life. RESULTS: 501 patients were included in the analysis. At 1 year, 15 patients (6.3%) in the intervention group and 22 patients (8.3%) in the placebo group were alive corresponding to a risk ratio of 0.76 (95% CI, 0.41-1.41). A favorable neurologic outcome at 1 year, based on the Cerebral Performance Category score, was observed in 14 patients (5.9%) in the intervention group and 20 patients (7.6%) in the placebo group (risk ratio, 0.78 [95% CI, 0.41-1.49]. No differences existed between groups for favorable neurological outcome and health-related quality of life at either 6 months or 1 year. CONCLUSIONS: Administration of vasopressin and methylprednisolone, compared with placebo, in patients with in-hospital cardiac arrest did not improve long-term outcomes in this trial.

TRAUMA

1. Am Surg. 2022 May 2:31348221094213. doi: 10.1177/00031348221094213. Online ahead of print.

Cardiopulmonary Resuscitation and Epinephrine Use in Pediatric Traumatic Cardiac Arrest.

Lelak KA(1), Arora R(1), Mowbray FI(2), Arkatkar Bs A(3), Krouse C(4), Cloutier D(4), Donoghue L(4)(5), Sethuraman U(1)(6).

NO ABSTRACT AVAILABLE

VENTILATION

1. Am J Emerg Med. 2022 Apr 27;57:60-69. doi: 10.1016/j.ajem.2022.04.027. Online ahead of print.

Outcome of cardiopulmonary resuscitation with different ventilation modes in adults: A meta-analysis.

Tang Y(1), Sun M(1), Zhu A(2).

ABSTRACT

BACKGROUND: The optimal airway management strategy for cardiac arrest remains unclear. This study aimed to compare the effects of different initial airway interventions on improving clinical outcomes based on the 2010 cardiopulmonary resuscitation (CPR) guidelines and later. METHODS: We searched PubMed, EMBASE, and the Cochrane Library for CPR articles tailored to each database from October 19, 2010, to July 31, 2021, to compare endotracheal intubation (ETI), supraglottic

airway (SGA), or bag-valve-mask ventilation (BMV). The initial results and long-term results were investigated by meta-analysis. RESULTS: Twenty-five articles (n = 196,486) were included. The ROSC rate in the ETI group (ES = 0.49, 95% CI: 0.38-0.59) was significantly higher than that in the SGA group (ES = 0.27, 95% CI: 0.20-0.34) and BMV group (ES = 0.24, 95% CI: 0.17-0.31). The rate of ROSC upon admission to the hospital in the ETI group (ES = 0.27, 95% CI: 0.13-0.42) was significantly higher than that in the SGA group (ES = 0.18, 95% CI: 0.13-0.23) and BMV group (ES = 0.16, 95% CI: 0.10-0.22). Compared with the BMV group (ES = 0.09, 95% CI: 0.04-0.14) and the SGA group (ES = 0.08, 95% CI: 0.05-0.10), the ETI group (ES = 0.14, 95% CI: 0.10-0.17) had a higher discharge rate, but all of the groups had the same neurological outcome (ETI group [ES = 0.06, 95% CI: 0.04-0.08], BMV group [ES = 0.05, 95% CI: 0.03-0.08] and SGA group [ES = 0.04, 95% CI: 0.03-0.05]). CONCLUSIONS: Opening the airway is significantly associated with improved clinical outcomes, and the findings suggest that effective ETI based on mask ventilation should be implemented as early as possible once the patient has experienced cardiac arrest.

CERERBRAL MONITORING

1. Front Physiol. 2022 Apr 20;13:866844. doi: 10.3389/fphys.2022.866844. eCollection 2022.
Preserved Electroencephalogram Power and Global Synchronization Predict Better Neurological Outcome in Sudden Cardiac Arrest Survivors.
Ho LT(1)(2), Serafico BMF(3), Hsu CE(3), Chen ZW(3), Lin TY(3), Lin C(3), Lin LY(1), Lo MT(3), Chien KL(1)(2).
ABSTRACT
Quantitative EEG (qEEG) delineates complex brain activities. Global field synchronization (GFS) is one multichannel EEG analysis that measures global functional connectivity through quantification of synchronization between signals. We hypothesized that preservation of global functional connectivity of brain activity might be a surrogate marker for good outcome in sudden cardiac arrest (SCA) survivors. In addition, we examined the relation of phase coherence and GFS in a mathematical approach. We retrospectively collected EEG data of SCA survivors in one academic medical center. We included 75 comatose patients who were resuscitated following in-hospital or out-of-hospital nontraumatic cardiac arrest between 2013 and 2017 in the intensive care unit (ICU) of National Taiwan University Hospital (NTUH). Twelve patients (16%) were defined as good outcome (GO) (CPC 1-2). The mean age in the GO group was low (51.6 ± 15.7 vs. 68.1 ± 12.9, $p < 0.001$). We analyzed standard EEG power, computed EEG GFS, and assessed the cerebral performance category (CPC) score 3 months after discharge. The alpha band showed the highest discrimination ability (area under curve [AUC] = 0.78) to predict GO using power. The alpha band of GFS showed the highest AUC value (0.8) to predict GO in GFS. Furthermore, by combining EEG power + GFS, the alpha band showed the best prediction value (AUC 0.86) in predicting GO. The sensitivity of EEG power + GFS was 73%, specificity was 93%, PPV was 0.67%, and NPV was 0.94%. In conclusion, by combining GFS and EEG power analysis, the neurological outcome of the nontraumatic cardiac arrest survivor can be well-predicted. Furthermore, we proved from a mathematical point of view that although both amplitude and phase contribute to obtaining GFS, the interference in phase variation drastically changes the possibility of generating a good GFS score.

2. Yonsei Med J. 2022 May;63(5):461-469. doi: 10.3349/ymj.2022.63.5.461.
Thrombotic Microangiopathy Score as a New Predictor of Neurologic Outcomes in Patients after Out-of-Hospital Cardiac Arrest.
You JS(1), Lee HS(2), Jeon S(2), Lee JW(3), Chung HS(1), Chung SP(1), Kong T(4).
ABSTRACT

PURPOSE: Given the morphological characteristics of schistocytes, thrombotic microangiopathy (TMA) score can be beneficial as it can be automatically and accurately measured. This study aimed to investigate whether serial TMA scores until 48 h post admission are associated with clinical outcomes in patients undergoing targeted temperature management (TTM) after out-of-hospital cardiac arrest (OHCA). MATERIALS AND METHODS: We retrospectively evaluated a cohort of 185 patients using a prospective registry. We analyzed TMA scores at admission and after 12, 24, and 48 hours. The primary outcome measures were poor neurological outcome at discharge and 30-day mortality. RESULTS: Increased TMA scores at all measured time points were independent predictors of poor neurological outcomes and 30-day mortality, with TMA score at time-12 showing the strongest correlation [odds ratio (OR), 3.008; 95% confidence interval (CI), 1.707-5.300; p<0.001 and hazard ratio (HR), 1.517; 95% CI, 1.196-1.925; p<0.001]. Specifically, a TMA score ≥2 at time-12 was closely associated with an increased predictability of poor neurological outcomes (OR, 6.302; 95% CI, 2.841-13.976; p<0.001) and 30-day mortality (HR, 2.656; 95% CI, 1.675-4.211; p<0.001). CONCLUSION: Increased TMA scores predicted neurological outcomes and 30-day mortality in patients undergoing TTM after OHCA. In addition to the benefit of being serially measured using an automated hematology analyzer, TMA score may be a helpful tool for rapid risk stratification and identification of the need for intensive care in patients with return of spontaneous circulation after OHCA.

3. Resuscitation. 2022 Apr 30:S0300-9572(22)00144-7. doi: 10.1016/j.resuscitation.2022.04.026. Online ahead of print.

Pain pupillary index to prognosticate unfavorable outcome in comatose cardiac arrest patients.

Macchini E(1), Bertelli A(1), Gouvea Bogossian E(1), Annoni F(1), Minini A(1), Quispe Cornejo A(1), Creteur J(1), Donadello K(2), Silvio Taccone F(1), Peluso L(3).

ABSTRACT

BACKGROUND: The prognostic role of the Pupillary Pain Index (PPI), derived from automated pupillometry, remains unknown in post-anoxic brain injury. METHODS: Single-center retrospective study in adult comatose cardiac arrest (CA) patients. Quantitative PPI and Neurologic Pupil Index (NPi) were concomitantly recorded on day 1 and day 2 after CA. The primary outcome was to assess the prognostic value of PPI to predict 3-month unfavourable outcome (UO, defined as Cerebral Performance Category of 3-5). Secondary outcome was the agreement between PPI and NPi to predict unfavourable outcome. RESULTS: A total of 102 patients were included; patients with UO (n=69, 68%) showed a lower NPi (4.2 [3.5-4.5] vs. 4.6 [4.3-4.7]; p<0.01 on day 1 - 4.3 [3.8-4.7] vs 4.6 [4.3-4.8] on day 2), and PPI (3 [1-6] vs. 6 [3-7]; p<0.01 on day 1 - 3 [1-6] vs 6 [4-8]; p<0.01 on day 2) than others. A PPI=1 on day 2 showed a sensitivity of 26 [95% CI 16-38]% and a specificity of 100 [95% CI 89-100]% to predict UO (p=0.003 vs. NPi≤2). On day 2, a total of 6 patients had concomitant PPI=1 and NPi ≤2, while 12 showed NPi>2 and PPI=1; the coefficient of agreement was 0.42. Moreover, NPi and PPI values showed a moderate correlation both on day 1 and day 2. CONCLUSIONS: In this study, PPI=1 on day 2 could predict UO in comatose CA patients with 100% specificity, but with a low sensitivity (yet higher than NPi). The agreement between PPI and NPi values was moderate.

ULTRASOUND AND CPR

No articles identified.

ORGANISATION AND TRAINING

1. Aust Health Rev. 2022 May 5. doi: 10.1071/AH21321. Online ahead of print.
The impact of standardised goals of care documentation on the use of cardiopulmonary resuscitation, mechanical ventilation, and intensive care unit admissions in older patients: a retrospective observational analysis.
Dignam C, Brown M, Horwood C, Thompson CH.
ABSTRACT
Background In South Australian hospitals, 'Do Not Resuscitate' orders have been replaced by '7-Step Pathway Acute Resuscitation Plans', a standardised form and approach that encourages shared decision-making while providing staff with clarity about goals of care. This initiative has led to increased rates of documentation about treatment preferences, including 'Not-For-Cardiopulmonary Resuscitation'.AimTo quantify any effect of the 7-Step Pathway form versus previous 'Do Not Resuscitate' orders on cardiopulmonary resuscitation, mechanical ventilation, and/or intensive care unit admission during hospitalisation. Methods We completed a retrospective, observational study in two Australian tertiary hospitals using interrupted time-series analysis. We examined the number of medical inpatients aged 70 years and over who received one or more Intensive Treatments-cardiopulmonary resuscitation, mechanical ventilation, or intensive care unit admission-in the 2 years before and 2 years after the introduction of the form. Results There were 2759 Intensive Treatments across 66 051 inpatient admissions; 1304/32 489 (4.0%) pre-intervention and 1455/33 562 post-intervention (4.3%). Sub-group analysis of those who died in hospital showed 400/1669 (24%) received Intensive Treatments pre-intervention and 382/1624 post-intervention (24%). Interrupted time-series analysis suggested that the intervention did not significantly alter Intensive Treatments over time at Hospital 1 and was associated with a significant slowing of the already decreasing use of Intensive Treatments at Hospital 2. Among patients who died in hospital, there was minimal change at either site. ConclusionsThere was no reduction in Intensive Treatments in older medical inpatients following the introduction of standardised goals of care documentation.

2. Resusc Plus. 2022 Apr 28;10:100233. doi: 10.1016/j.resplu.2022.100233. eCollection 2022 Jun.
Simulation-based assessment of trainee's performance in post-cardiac arrest resuscitation.
Ali AA(1), Chang WW(1)(2), Tabatabai A(3)(2), Pergakis MB(4)(2), Gutierrez CA(4), Neustein B(2), Gilbert GE(5), Podell JE(4)(2), Parikh G(4)(2), Badjatia N(4)(2), Motta M(4)(2), Lerner DP(6), Morris NA(4)(2).
ABSTRACT
OBJECTIVES: To assess trainees' performance in managing a patient with post-cardiac arrest complicated by status epilepticus. METHODS: In this prospective, observational, single-center simulation-based study, trainees ranging from sub interns to critical care fellows evaluated and managed a post cardiac arrest patient, complicated by status epilepticus. Critical action items were developed by a modified Delphi approach based on American Heart Association guidelines and the Neurocritical Care Society's Emergency Neurological Life Support protocols. The primary outcome measure was the critical action item sum score. We sought validity evidence to support our findings by including attending neurocritical care physicians and comparing performance across four levels of training. RESULTS: Forty-nine participants completed the simulation. The mean sum of critical actions completed by trainees was 10/21 (49%). Eleven (22%) trainees verbalized a differential diagnosis for the arrest. Thirty-two (65%) reviewed the electrocardiogram, recognized it as abnormal, and consulted cardiology. Forty trainees (81%) independently decided to start temperature management, but only 20 (41%) insisted on it when asked to reconsider. There was an effect of level of training on critical action checklist sum scores (novice mean score [standard deviation (SD)] = 4.8(1.8) vs. intermediate mean score (SD) = 10.4(2.1) vs. advanced mean score

(D) = 11.6(3.0) vs. expert mean score (SD) = 14.7(2.2)). CONCLUSIONS: High-fidelity manikin-based simulation holds promise as an assessment tool in the performance of post-cardiac arrest care.

3. Eur J Emerg Med. 2022 Jun 1;29(3):163-172. doi: 10.1097/MEJ.0000000000000915. Epub 2022 Mar 10.

Dispatching citizens as first responders to out-of-hospital cardiac arrests: a systematic review and meta-analysis.

Scquizzato T(1), Belloni O(1), Semeraro F(2), Greif R(3)(4), Metelmann C(5), Landoni G(1)(6), Zangrillo A(1)(6).

ABSTRACT

Mobile phone technologies to alert citizen first responders to out-of-hospital cardiac arrests (OHCAs) were implemented in numerous countries. This systematic review and meta-analysis aim to investigate whether activating citizen first responders increases bystanders' interventions and improves outcomes. We searched PubMed, EMBASE, and the Cochrane Central Register of Controlled Trials from inception to 24 November 2021, for studies comparing citizen first responders' activation versus standard emergency response in the case of OHCA. The primary outcome was survival at hospital discharge or 30 days. Secondary outcomes were discharge with favourable neurological outcome, bystander-initiated cardiopulmonary resuscitation (CPR), and the use of automated external defibrillators (AEDs) before ambulance arrival. Evidence certainty was evaluated with GRADE. Our search strategy yielded 1215 articles. After screening, we included 10 studies for a total of 23 351 patients. OHCAs for which citizen first responders were activated had higher rates of survival at hospital discharge or 30 days compared with standard emergency response [nine studies; 903/9978 (9.1%) vs. 1104/13 247 (8.3%); odds ratio (OR), 1.45; 95% confidence interval (CI), 1.21-1.74; P < 0.001], return of spontaneous circulation [nine studies; 2575/9169 (28%) vs. 3445/12 607 (27%); OR, 1.40; 95% CI, 1.07-1.81; P = 0.01], bystander-initiated CPR [eight studies; 5876/9074 (65%) vs. 6384/11 970 (53%); OR, 1.75; 95% CI, 1.43-2.15; P < 0.001], and AED use [eight studies; 654/9132 (7.2%) vs. 624/14 848 (4.2%); OR, 1.82; 95% CI, 1.31-2.53; P < 0.001], but similar rates of neurological intact discharge [three studies; 316/2685 (12%) vs. 276/2972 (9.3%); OR, 1.37; 95% CI, 0.81-2.33; P = 0.24]. Alerting citizen first responders to OHCA patients is associated with higher rates of bystander-initiated CPR, use of AED before ambulance arrival, and survival at hospital discharge or 30 days.

4. Front Pediatr. 2022 Apr 18;10:866775. doi: 10.3389/fped.2022.866775. eCollection 2022.

Advanced Clinical Neonatal Nursing Students' Transfer of Performance: From Skills Training With Real-Time Feedback on Ventilation to a Simulated Neonatal Resuscitation Scenario.

Rød I(1), Jørstad AK(2), Aagaard H(1), Rønnestad A(2)(3), Solevåg AL(1)(3).

ABSTRACT

BACKGROUND: Advanced clinical neonatal nurses are expected to have technical skills including bag-mask ventilation. Previous studies on neonatal bag-mask ventilation skills training focus largely on medical students and/or physicians. The aim of this study was to investigate whether advanced clinical neonatal nursing students' bag-mask ventilation training with real-time feedback resulted in transfer of bag-mask ventilation performance to a simulated setting without feedback on ventilation. MATERIALS AND METHODS: Students in advanced clinical neonatal nursing practiced bag-mask ventilation on a premature manikin (Premature Anne, Laerdal Medical, Stavanger, Norway) during skills training. A flow sensor (Neo Training, Monivent AB, Gothenburg, Sweden) was placed between the facemask and the self-inflating bag (Laerdal Medical), and visual feedback on mask leak (%), expiratory tidal volume (VT e in ml/kg), ventilation rate and inflation pressure was provided. Two months later, the students participated in a simulated neonatal resuscitation

scenario. The same variables were recorded, but not fed back to the students. We compared ventilation data from skills- and simulation training. A structured questionnaire was used to investigate the students' self-perceived neonatal ventilation competence before and after the skills- and simulation training. RESULTS: Mask leakage and ventilation rate was higher, and VT e lower and highly variable in the simulated scenario compared with skills training (all $p < 0.001$). There was no statistically significant difference in inflation pressure ($p = 0.92$). The fraction of ventilations with VT e within the target range was lower during simulation (21%) compared to skills training (30%) ($p < 0.001$). There was no difference in the students' self-perceived competence in bag-mask ventilation before vs. after skills- and simulation training. CONCLUSION: Skills training with real-time feedback on mask leak, ventilation rate, tidal volume, and inflation pressure did not result in objective or subjective improvements in bag-mask ventilation in a simulated neonatal resuscitation situation. Incorrect VT e delivery was common even when feedback was provided. It would be of interest to study whether more frequent training, and training both with and without feedback, could improve transfer of performance to a simulated resuscitation setting.

POST-CARDIAC ARREST TREATMENTS

1. JAMA Cardiol. 2022 May 4. doi: 10.1001/jamacardio.2022.0803. Online ahead of print.
Treatment of Out-of-Hospital Cardiac Arrest.
Lascarrou JB(1), Nichol G(2).
NO ABSTRACT AVAILABLE

2. Med Klin Intensivmed Notfmed. 2022 May;117(4):309-311. doi: 10.1007/s00063-022-00902-y. Epub 2022 Feb 16.
[Does every patient with cardiac arrest require immediate coronary angiography?].
[Article in German]
Adler C(1), Michels G(2).
NO ABSTRACT AVAILABLE

3. Sci Rep. 2022 May 6;12(1):7405. doi: 10.1038/s41598-022-11081-3.
The association between anion gap and in-hospital mortality of post-cardiac arrest patients: a retrospective study.
Chen J(#)(1), Dai C(#)(1), Yang Y(1), Wang Y(1), Zeng R(1), Li B(2), Liu Q(3)(4).
ABSTRACT
We aimed to determine the association between anion gap and in-hospital mortality in post-cardiac arrest (CA) patients. Extracted the data of patients diagnosed with CA from MIMIC-IV database. Generalized additive model (GAM), Cox regression and Kaplan-Meier survival analysis were used to demonstrate the association between AG levels and in-hospital mortality. ROC curve analysis for assessing the discrimination of AG for predicting in-hospital mortality. Totally, 1724 eligible subjects were included in our study finally. 936 patients (551 males and 385 females) died in hospital, with the prevalence of in-hospital mortality was 54.3%. The result of the Kaplan-Meier analysis showed that the higher value of AG had significant lower survival possibility during the hospitalization compared with the lower-value of AG patients. In the crude Cox regression model, high-level of AG subjects was associated with significant higher HR compared with low-level of AG subjects. After adjusted the vital signs data, laboratory data, and treatment, high-level of AG (group Q3 and group Q4) were also associated with increased risk of in-hospital mortality compared with low-level of AG group, 1.52 (95% Cl 1.17-1.85; $P < 0.001$), 1.64 (95% Cl 1.21-2.08; $P < 0.001$), respectively. The ROC curve indicated that AG has acceptable discrimination for predicting in-hospital mortality. The AUC value was found to be 0.671 (95% CI 0.646-0.698). Higher AG levels was associated with poor

prognosis in post-CA patients. AG is a predictor for predicting in-hospital mortality of CA, and could help refine risk stratification.

TARGETED TEMPERATURE MANAGEMENT

1. Sci Rep. 2022 May 4;12(1):7254. doi: 10.1038/s41598-022-11201-z.

Artificial neural network-boosted Cardiac Arrest Survival Post-Resuscitation In-hospital (CASPRI) score accurately predicts outcome in cardiac arrest patients treated with targeted temperature management.

Chou SY(#)(1)(2), Bamodu OA(#)(3)(4)(5), Chiu WT(6)(7)(8), Hong CT(6)(7), Chan L(9)(10), Chung CC(11)(12)(13).

ABSTRACT

Existing prognostic models to predict the neurological recovery in patients with cardiac arrest receiving targeted temperature management (TTM) either exhibit moderate accuracy or are too complicated for clinical application. This necessitates the development of a simple and generalizable prediction model to inform clinical decision-making for patients receiving TTM. The present study explores the predictive validity of the Cardiac Arrest Survival Post-resuscitation In-hospital (CASPRI) score in cardiac arrest patients receiving TTM, regardless of cardiac event location, and uses artificial neural network (ANN) algorithms to boost the prediction performance. This retrospective observational study evaluated the prognostic relevance of the CASPRI score and applied ANN to develop outcome prediction models in a cohort of 570 patients with cardiac arrest and treated with TTM between 2014 and 2019 in a nationwide multicenter registry in Taiwan. In univariate logistic regression analysis, the CASPRI score was significantly associated with neurological outcome, with the area under the receiver operating characteristics curve (AUC) of 0.811. The generated ANN model, based on 10 items of the CASPRI score, achieved a training AUC of 0.976 and validation AUC of 0.921, with the accuracy, precision, sensitivity, and specificity of 89.2%, 91.6%, 87.6%, and 91.2%, respectively, for the validation set. CASPRI score has prognostic relevance in patients who received TTM after cardiac arrest. The generated ANN-boosted, CASPRI-based model exhibited good performance for predicting TTM neurological outcome, thus, we propose its clinical application to improve outcome prediction, facilitate decision-making, and formulate individualized therapeutic plans for patients receiving TTM.

2. Front Med (Lausanne). 2022 Apr 13;9:779781. doi: 10.3389/fmed.2022.779781. eCollection 2022.

A Study on the Outcome of Targeted Temperature Management Comparing Cardiac Arrest Patients Who Received Bystander Cardiopulmonary Resuscitation With Those Who Did Not, Using the Nationwide TIMECARD Multicenter Registry.

Liou FY(1)(2), Tsai MS(3), Kuo LK(4)(5), Hsu HH(6), Lai CH(7)(8), Lin KC(1), Huang WC(1)(9)(10).

ABSTRACT

BACKGROUND AND PURPOSE: Targeted temperature management (TTM) is associated with decreased mortality and improved neurological function after cardiac arrest. Additionally, studies have shown that bystander cardiopulmonary resuscitation (BCPR) doubled the survival of patients with out-of-hospital cardiac arrest (OHCA) compared to patients who received no BPCR (no-BCPR). However, the outcome benefits of BCPR on patients who received TTM are not fully understood. Therefore, this study aimed to investigate the outcome differences between BCPR and no-BCPR in patients who received TTM after cardiac arrest. METHODS: The Taiwan Network of Targeted Temperature Management for Cardiac Arrest (TIMECARD) multicenter registry established a study cohort and a database for patients receiving TTM between January 2013 and September 2019. A total of 580 patients were enrolled and divided into 376 and 204 patients in the BCPR and no-BCPR

groups, respectively. RESULTS: Compared to the no-BCPR group, the BCPR group had a better hospital discharge and survival rate (42.25 vs. 31.86%, P = 0.0305). The BCPR group also had a better neurological outcome at hospital discharge. It had a higher average GCS score (11.3 vs. 8.31, P < 0.0001) and a lower average Glasgow-Pittsburgh cerebral performance category (CPC) scale score (2.14 vs. 2.98, P < 0.0001). After undertaking a multiple logistic regression analysis, it was found that BCPR was a significant positive predictor for in-hospital survival (OR = 0.66, 95% CI: 0.45-0.97, P = 0.0363). CONCLUSIONS: This study demonstrated that BCPR had a positive survival and neurological impact on the return of spontaneous circulation (ROSC) in patients receiving TTM after cardiac arrest.

3. Med Klin Intensivmed Notfmed. 2022 May;117(4):297-304. doi: 10.1007/s00063-021-00814-3. Epub 2021 Apr 20.

[Influence of therapeutic temperature management on the clinical course in patients after in-hospital cardiac arrest : A retrospective analysis].

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

Wanek F(1), Meißner S(2), Nuding S(2), Hoberück S(3), Werdan K(2), Noutsias M(2), Ebelt H(4).

ABSTRACT

METHODS: Retrospective analysis of all patients with in-hospital cardiac arrest and return of spontaneous circulation (ROSC) in the ICU of the cardiologic department of the University Hospital of Halle (Saale) between 1999 and 2009. RESULTS: During the observation period, 169 patients with in-hospital cardiac arrest and information regarding temperature measurements were treated. Invasive therapeutic temperature management (TTM+) was applied in 64 patients (37.9%), while 105 patients (62.1%) underwent no therapeutic temperature management (TTM-). TTM+ and TTM- showed no relevant differences regarding patient age (TTM+: 67.6 ± 12.6 years; TTM-: 69.8 ± 12.6 years; p = 0.257), comorbidities and the initial rhythm; however, there were more men in the TTM+ group (76.6% vs. 58.1%; p = 0.015). All patients had been intubated. Time until ROSC in TTM+ was significantly longer (25.9 ± 25.8 min vs. 15.0 ± 12.4 min; p < 0.005). TTM+ resulted in a lower 30-day survival and an unfavourable neurologic outcome (Glasgow outcome scale I or II: 75% TTM+ vs. 55.2% TTM-). This negative effect persisted after adjustment for age of the patients, but not after adjustment for age and duration of reanimation (nonadjusted odds ratio for adverse neurologic outcome under TTM+: 0.411 (p = 0.011); odds ratio after adjusting for age: 0.361 (p = 0.09); odds ratio after adjusting for age and duration of the reanimation: 0.505 (p = 0.121)).

4. BMJ Neurol Open. 2022 Apr 18;4(1):e000273. doi: 10.1136/bmjno-2022-000273. eCollection 2022.

Association of time-temperature curves with outcomes in temperature management for cardiac arrest.

Luedke MW(1), Graffagnino C(1), McKinney BG(2), Piper J(3), Iversen E(4), Kolls B(1)(5).

ABSTRACT

BACKGROUND/PURPOSE: Cardiac arrest is a common cause of death and neurological injury; therapeutic cooling for neuroprotection is standard of care. Despite numerous and ongoing trials targeting a specified cooling temperature for a target duration, the concept of temperature dose-the duration spent at a given depth of hypothermia-is not as well explored. METHODS: In this retrospective study, we examined 66 patients 18 years of age or older undergoing therapeutic hypothermia for cardiac arrest between 2007 and 2010 to assess the relationship of temperature dose with outcomes. Demographic, clinical, outcome and temperature data were collected. Demographic and clinical data underwent bivariate regression analysis for association with outcome.

Time-temperature curves were divided into pre-determined temperature thresholds and assessed by logistic regression analysis for association with outcome. A second, multivariate regression analysis was performed controlling for factors associated with poor outcomes. RESULTS: Old age was significantly associated with poor outcome and a shockable arrest rhythm was significantly associated with positive outcome. Subjects spent an average of 2.82 hours below 35°C, 7.31 hours ≥35°C to ≤36.5°C, 24.75 hours >36.5 to <38.0°C and 7.06 hours ≥38°C. Logistic regression analysis revealed borderline significant positive association between good outcome and time at a cooling depth (35°C-36.5°C, p=0.05); adjusted for old age, the association became significant (p=0.04). CONCLUSION: Controlling for old age, longer durations between >35°C, ≤36.5°C during therapeutic hypothermia for cardiac arrest were significantly associated with good clinical outcomes. Time spent within a given temperature range may be useful for measuring the effect of temperature management.

5. Front Med (Lausanne). 2022 Apr 13;9:810825. doi: 10.3389/fmed.2022.810825. eCollection 2022.
Non-Invasive Monitoring of Core Body Temperature for Targeted Temperature Management in Post-Cardiac Arrest Care.
Fiorini K(1)(2), Tamasi T(3), Dorie J(3), Hegazy AF(2)(4), Lee TY(5)(6), Slessarev M(2)(3)(7).
ABSTRACT
IMPORTANCE: Accurate monitoring of core body temperature is integral to targeted temperature management (TTM) following cardiac arrest. However, there are no reliable non-invasive methods for monitoring temperature during TTM. OBJECTIVES: We compared the accuracy and precision of a novel non-invasive Zero-Heat-Flux Thermometer (SpotOn™) to a standard invasive esophageal probe in a cohort of patients undergoing TTM post-cardiac arrest. DESIGN SETTING AND PARTICIPANTS: We prospectively enrolled 20 patients undergoing post-cardiac arrest care in the intensive care units at the London Health Sciences Centre in London, Canada. A SpotOn™ probe was applied on each patient's forehead, while an esophageal temperature probe was inserted, and both temperature readings were recorded at 1-min intervals for the duration of TTM. MAIN OUTCOMES AND MEASURES: We compared the SpotOn™ and esophageal monitors using the Bland-Altman analysis and the Pearson correlation, with accuracy set as a primary outcome. Secondary outcomes included precision and correlation. Bias exceeding 0.1°C and limits of agreement exceeding 0.5°C were considered clinically important. RESULTS: Sixteen (80%) of patients had complete data used in the final analysis. The median (interquartile range) duration of recording was 38 (12-56) h. Compared to the esophageal probe, SpotOn™ had a bias of 0.06 ± 0.45°C and 95% limits of agreement of -0.83 to 0.95°C. The Pearson correlation coefficient was 0.97 (95% confidence interval 0.9663-0.9678), with a two-tailed $p < 0.0001$. CONCLUSION AND RELEVANCE: The SpotOn™ is an accurate method that may enable non-invasive monitoring of core body temperature during TTM, although its precision is slightly worse than the predefined 0.5°C when compared to invasive esophageal probe.

ELECTROPHYSIOLOGY AND DEFIBRILLATION

1. Resusc Plus. 2022 Apr 29;10:100237. doi: 10.1016/j.resplu.2022.100237. eCollection 2022 Jun.
Strategic placement of automated external defibrillators (AEDs) for cardiac arrests in public locations and private residences.
Ball S(1)(2), Morgan A(1), Simmonds S(2), Bray J(1)(3), Bailey P(1)(2), Finn J(1)(2)(3)(4).
ABSTRACT
AIM: The aim of our study was to determine whether businesses can be identified that rank highly for their potential to improve coverage of out-of-hospital cardiac arrests (OHCAs) by automated external defibrillators (AEDs), both in public locations and private residences. METHODS: The cohort

comprised 10,422 non-traumatic OHCAs from 2014 to 2020 in Perth, Western Australia. We ranked 115 business brands (across 5,006 facilities) for their potential to supplement coverage by the 3,068 registered public-access AEDs in Perth, while accounting for AED access hours. RESULTS: Registered public-access AEDs provided 100 m coverage of 23% of public-location arrests, and 4% of arrests in private residences. Of the 10 business brands ranked highest for increasing the coverage of public OHCAs, six brands were ranked in the top 10 for increased coverage of OHCAs in private residences. A public phone brand stood out clearly as the highest-ranked of all brands, with more than double the coverage-increase of the second-ranked brand. If all 115 business brands hosted AEDs with 24-7 access, 57% of OHCAs would remain without 100 m coverage for public arrests, and 92% without 100 m coverage for arrests in private residences. CONCLUSION: Many businesses that ranked highly for increased coverage of arrests in public locations also rank well for increasing coverage of arrests in private residences. However, even if the business landscape was highly saturated with AEDs, large gaps in coverage of OHCAs would remain, highlighting the importance of considering other modes of AED delivery in metropolitan landscapes.

PEDIATRICS AND CHILDREN

1. Cardiol Young. 2022 May 4:1-7. doi: 10.1017/S1047951122001160. Online ahead of print.
Cardiac arrest during endotracheal intubation of children with systolic dysfunction.
Esangbedo ID(1), Yu P(2), Brandewie K(3), Ebraheem M(4)(5), Rahman AF(6), Byrnes J(7).
ABSTRACT
This multicenter study aimed to describe peri-intubation cardiac arrest in paediatric cardiac patients with significant (moderate or severe) systolic dysfunction of the systemic ventricle. Intubation data were collected from 4 paediatric cardiac ICUs in the United States (January 2015 - December 2017). Clinician practices during intubation of patients with significant dysfunction were compared to practices during intubation of patients without significant systolic dysfunction. There were 67 intubations in patients with significant systolic dysfunction. Peri-intubation cardiac arrest rate in this population was 14.9% (10/67); peri-intubation mortality was 3%. Majority (6/10; 60%) of the cardiac arrests were classified as pulseless electrical activity. Patients with cardiac arrest upon intubation had a higher serum lactate and lower serum pH than patients without peri-intubation cardiac arrest in the significant systolic dysfunction group.In comparing cardiac ICU patients with significant systolic dysfunction (n = 67) to patients from the same time period with normal ventricular function or mild dysfunction (n = 183), clinicians were less likely to use midazolam (11.9% versus 25.1%; p = 0.03) and more likely to use etomidate (16.4% versus 4.4%; p = 0.002) for intubation. Use of other sedative agents, video laryngoscopy, atropine, inotrope initiation, and consultation of an anaesthesiologist for intubation were not statistically different between the groups. This is the first study to describe the rate of and risk factors for peri-intubation cardiac arrest in paediatric cardiac ICU patients with systolic dysfunction. There was a higher peri-intubation cardiac arrest rate compared to published rates in critically ill children with heart disease and compared to children with significant systolic dysfunction undergoing elective general anaesthesia.

2. Emergencias. 2022 Apr;34(2):148-150.
Out-of-hospital cardiac arrest in children: epidemiology of events attended by emergency medical services in the Basque Country. [Article in English, Spanish]
Ballesteros Peña S(1), Jiménez Mercado ME(2), Fernández Aedo I(2).
NO ABSTRACT AVAILABLE

3. Prehosp Emerg Care. 2022 May 5:1-13. doi: 10.1080/10903127.2022.2074180. Online ahead of print.

Identification of factors associated with return of spontaneous circulation after pediatric out-of-hospital cardiac arrest using natural language processing.

Harris M(1), Crowe RP(2), Anders J(3), D'Acunto S(4), Adelgais KM(5), Fishe JN(4)(6).

ABSTRACT

Introduction: Prior studies examining prehospital characteristics related to return of spontaneous circulation (ROSC) in pediatric out-of-hospital cardiac arrest (OHCA) are limited to structured data. Natural language processing (NLP) could identify new factors from unstructured data using free-text narratives. The purpose of this study was to use NLP to examine EMS clinician free-text narratives for characteristics associated with prehospital ROSC in pediatric OHCA. Methods: This was a retrospective analysis of patients ages 0-17 with OHCA in 2019 from the ESO Data Collaborative. We performed an exploratory analysis of EMS narratives using NLP with an a priori token library. We then constructed biostatistical and machine learning models and compared their performance in predicting ROSC.Results: There were 1,726 included EMS encounters for pediatric OHCA; 60% were male patients, and the median age was 1 year (IQR 0-9). Most cardiac arrest events (61.3%) were unwitnessed, 87.3% were identified as having medical causes, and 5.9% had initial shockable rhythms. Prehospital ROSC was achieved in 23.1%. Words most positively correlated with ROSC were "ROSC" ($r = 0.42$), "pulse" ($r = 0.29$), "drowning" ($r = 0.13$), and "PEA" ($r = 0.12$). Words negatively correlated with ROSC included "asystole" ($r = -0.25$), "lividity" ($r = -0.14$), and "cold" ($r = -0.14$). The terms 'asystole,' 'pulse', 'no breathing', 'PEA', and 'dry' had the greatest difference in frequency of appearance between encounters with and without ROSC ($p < 0.05$). The best-performing model for predicting prehospital ROSC was logistic regression with random oversampling using free-text data only (area under the receiver operating characteristic curve 0.92).Conclusions: EMS clinician free-text narratives reveal additional characteristics associated with prehospital ROSC in pediatric OHCA. Incorporating those terms into machine learning models of prehospital ROSC improves predictive ability. Therefore, NLP holds promise as a tool for use in predictive models with the goal to increase evidence-based management of pediatric OHCA.

4. J Am Coll Emerg Physicians Open. 2022 Apr 29;3(3):e12726. doi: 10.1002/emp2.12726. eCollection 2022 Jun.

A chart review tool to systematically assess the safety of prehospital care for children with out-of-hospital cardiac arrest.

Schoonover A(1), Eriksson CO(2), Nguyen T(3), Meckler G(4), Hansen M(5), Harrod T(1), Guise JM(1)(2)(5)(6)(7).

ABSTRACT

OBJECTIVE: Create an easy-to-use pediatric out-of-hospital cardiac arrest (OHCA)-specific chart review tool to reliably detect severe adverse safety events (ASEs) in the prehospital care of children with OHCA. METHODS: We revised our previously validated pediatric prehospital adverse event detection system (PEDS) tool, used to evaluate ASEs in the prehospital care of children during emergent calls, to create an OHCA-specific chart review tool. We developed decision support for reviewers, reviewer training, and a dedicated section for chart data abstraction. We randomly selected 28 charts for independent review by 2 expert reviewers who determined the presence or absence of a severe ASE for each care episode and identified the domain of care and preventability for each ASE. We calculated inter-rater agreement in the assessment of the presence or absence of a severe ASE using Gwet's first-order agreement coefficient (AC1). RESULTS: The PEDS-OHCA chart review tool has 6 sections, with a minimum of 70 and maximum of 667 total possible fields. We found inter-rater agreement of 0.83 (95% confidence interval, 0.63-0.99) between our 2 reviewers

for the overall detection of a severe ASE and an average time to complete of 8 minutes (range, 2-25 minutes). Inter-rater agreement in the detection of a severe ASE in each individual domain ranged from 0.36 to 0.96. CONCLUSIONS: The PEDS-OHCA is the first chart review tool to systematically evaluate the safety and quality of EMS care for children with OHCA. This tool may help improve understanding of the quality of EMS care for children with OHCA, which is essential to improving outcomes.

EXTRACORPOREAL LIFE SUPPORT

1. Resusc Plus. 2022 Apr 22;10:100234. doi: 10.1016/j.resplu.2022.100234. eCollection 2022 Jun.
The effect of a structured ECPR protocol aided by specific simulation training in a quaternary ECMO centre: A retrospective pre-post study.
Read AC(1), Morgan S(2), Reynolds C(2), Breeding J(2), Scott S(3), Lowe DA(2), Newman S(2), Kennedy R(2), Buscher H(2)(4).
ABSTRACT
BACKGROUND: There is limited literature exploring the relationship between simulation training and extracorporeal cardiopulmonary resuscitation (ECPR) outcomes. We examined whether there was an association between the implementation of an in situ simulation training program and ECPR utilisation, time to extracorporeal membrane oxygenation (ECMO), and neurologically intact survival. METHODS: In this retrospective pre-post study of in-hospital cardiac arrests (IHCA) and out-of-hospital cardiac arrests (OHCA), we analysed data for all patients recorded as receiving ECPR from September 2009 to December 2020 at our institution, relative to the implementation of an in situ ECPR simulation training program and a standardised procedure for high-quality ECPR. The primary outcome was Cerebral Performance Category (CPC) 1 or 2 at hospital discharge. RESULTS: There were 27 patients in the pre-intervention period and 39 patients in the post-intervention period. The median ECPR rate per year was 2 pre-intervention and 7 post-intervention ($p = 0.073$). There was an association between the implementation of the program and decreased median time from OHCA to ECMO flow, from 87 (IQR 78-95) minutes pre-intervention to 70 (IQR 69-72) minutes post-intervention ($p = 0.002$). Median time from IHCA to ECMO flow was 40 (IQR 20-75) minutes pre-intervention and 28 (IQR 16-41) minutes post-intervention ($p = 0.134$). Survival with CPC 1 or 2 was 7/27 (25.9%) pre-intervention and 15/39 (38.5%) post-intervention ($p = 0.288$). CONCLUSION: We observed an association between the implementation of an ECPR-specific simulation program and decreased time from OHCA to ECMO flow. There was no association between the implementation of the program and neurologically intact survival at hospital discharge.

2. Resusc Plus. 2022 Apr 21;10:100235. doi: 10.1016/j.resplu.2022.100235. eCollection 2022 Jun.
Extracorporeal CPR: Now a standard of care?
Scquizzato T(1), Bernard SA(2).
NO ABSTRACT AVAILABLE

EXPERIMENTAL RESEARCH

1. Exp Ther Med. 2022 Jun;23(6):380. doi: 10.3892/etm.2022.11307. Epub 2022 Apr 8.
Targeting TNFα-mediated cytotoxicity using thalidomide after experimental cardiac arrest in rats: An exploratory study.
Palmer AA(1)(2), Stezoski JP(1)(3)(4), Janesko-Feldman K(1)(2), Kochanek PM(1)(3)(5), Drabek T(1)(4).

ABSTRACT
Cardiac arrest (CA) results in a central and systemic cytokine and inflammatory response. Thalidomide has been reported to be neuroprotective by selectively decreasing TNFα synthesis. We hypothesized that thalidomide would decrease the systemic and organ-specific TNFα/cytokine response and biomarkers of injury in rats subjected to 10 min CA. Naïves, CA treated with vehicle (CA) and CA treated with thalidomide (50 mg/kg; CA+T) were studied (n=6 per group). TNFα and key cytokines were assessed at 3 h after resuscitation in the cortex, hippocampus, striatum, cerebellum, plasma, heart and lung. Neuron specific enolase (NSE), S100b, cardiac troponin T (cTnT) and intestinal fatty acid binding protein (IFABP) were used to assess neuronal, glial, cardiac and intestinal damage, respectively. CA increased TNFα and multiple pro-inflammatory cytokines in plasma and selected tissues with no differences between the CA and CA+T groups in any region. NSE, S100b, cTnT and IFABP were increased after CA or CA+T vs. in the naïve group (all $P<0.05$) without significant differences between the CA and CA+T groups. In conclusion, CA resulted in a TNFα and cytokine response, with increased biomarkers of organ injury. Notably, thalidomide at a dose reported to improve the outcome in in vivo models of brain ischemia did not decrease TNFα or cytokine levels in plasma, brain or extracerebral organs, or biomarkers of injury. Although CA at 3 h post resuscitation produces a robust TNFα response, it cannot be ruled out that an alternative dosing regimen or assessment at other time-points might yield different results. The marked systemic and regional cytokine response to CA remains a potential therapeutic target.

2. Exp Ther Med. 2022 Jun;23(6):376. doi: 10.3892/etm.2022.11302. Epub 2022 Apr 7.
Hydrogen therapy after resuscitation improves myocardial injury involving inhibition of autophagy in an asphyxial rat model of cardiac arrest.
Gong X(1)(2)(3)(4)(5)(6)(7), Fan X(1)(3)(4)(5)(6), Yin X(1)(3)(4)(5)(6), Xu T(1)(3)(4)(5)(6), Li J(1)(3)(4)(5)(6), Guo J(1)(3)(4)(5)(6), Zhao X(1)(3)(4)(5)(6), Wei S(1)(3)(4)(5)(6), Yuan Q(1)(3)(4)(5)(6), Wang J(1)(3)(4)(5)(6), Han X(2)(7), Chen Y(1)(3)(4)(5)(6).

ABSTRACT
Hydrogen (H2) therapy is a therapeutic strategy using molecular H2. Due to its ability to regulate cell homeostasis, H2 therapy has exhibited marked therapeutic effects on a number of oxidative stress-associated diseases. The present study investigated the effectiveness of H2 therapy in protecting against myocardial injury in a rat model of asphyxial cardiac arrest and cardiopulmonary resuscitation. Rats underwent 10-min asphyxia-induced cardiac arrest (CA) and cardiopulmonary resuscitation (CPR), and were randomly divided into control and H2 therapy groups. After resuscitation, the H2 therapy group was administered room air mixed with 2% H2 gas for respiration. During CA/CPR, the arterial pressure and heart rate were measured every minute. Survival rate, cardiac function, myocardial injury biomarkers creatine kinase-MB and cardiac troponin-T, and histopathological changes were evaluated to determine the protective effects of H2 therapy in CA/CPR. Immunohistochemistry and western blot analysis were used to determine the expression levels of autophagy-associated proteins. In vitro, H9C2 cells were subjected to hypoxia/reoxygenation and H2-rich medium was used in H2 treatment groups. Western blotting and immunofluorescence were used to observe the expression levels of autophagy-associated proteins. Moreover, an adenovirus-monomeric red fluorescent protein-green fluorescent protein-LC3

construct was used to explore the dynamics of autophagy in the H9C2 cells. The results showed that H2 therapy significantly improved post-resuscitation survival and cardiac function. H2 therapy also improved mitochondrial mass and decreased autophagosome numbers in cardiomyocytes after resuscitation. The treatment inhibited autophagy activation, with lower expression levels of autophagy-associated proteins and decreased autophagosome formation in vivo and vitro. In conclusion, H2 gas inhalation after return of spontaneous circulation improved cardiac function via the inhibition of autophagy.

3. Shock. 2022 Apr 1;57(4):576-582. doi: 10.1097/SHK.0000000000001884.
Changes of Key Rate-Limiting Enzyme Activity in Glucose Metabolism After Cardiopulmonary Resuscitation.
Wang L(1)(2), Wu L(1)(2), Fu Y(2)(3), Jiang L(1)(2), Huang Z(1)(2), Yang Z(1)(2), Fang X(1)(2).
ABSTRACT
OBJECTIVES: To investigate the activity of key rate-limiting enzymes of glucose metabolism after restoration of spontaneous circulation (ROSC), to explore the potential pathophysiological mechanism of impaired myocardial energy metabolism after cardiopulmonary resuscitation (CPR). METHODS: Twenty-one male Sprague-Dawley rats were randomized into three experimental groups assigned in accordance with different observation times after ROSC: Sham, instrumented rats without induced cardiac arrest or resuscitation; post-resuscitation (PR2 h); PR24 h. In these groups, CPR, including precordial compressions and synchronized mechanical ventilation, was initiated 6 min after asphyxia-induced cardiac arrest. Hearts were harvested after ROSC and samples were used to detect high-energy phosphate and glucose metabolic enzyme activity. RESULTS: Compared with sham, the contents of phosphocreatine and adenosine triphosphate reduced in the PR2 h group, while remained unchanged in the PR24 h group. Activities of hexokinase and pyruvate kinase did not change after ROSC. Phosphofructokinase activity decreased only in the PR24 h group. Activities of pyruvate dehydrogenase and citrate synthase fell in PR2 h group and recovered in the PR24 h group. However, isocitrate dehydrogenase and α-ketoglutarate dehydrogenase activities fell in the PR2 h group, but did not recover in the PR24 h group. CONCLUSIONS: Lowered key rate-limiting enzymes activity in glucose metabolism resulted in impairment of energy production in the early stage of ROSC, but partially recovered in 24 h. This process has a role in the mechanism of impaired myocardial energy metabolism after CPR. This investigation might shed light on new strategies to treat post resuscitation myocardial dysfunction.

CASE REPORTS

1. Medicine (Baltimore). 2022 Apr 22;101(16):e29114. doi: 10.1097/MD.0000000000029114.
Thrombolysis after cardiopulmonary resuscitation in myocardial infarction with abdominal pain as the first presentation: A case report.
Zheng YJ(1), Wang WN(1), Lin HL(2), Wu YN(1).
ABSTRACT
RATIONALE: Thrombolysis after cardiopulmonary resuscitation in patients with acute ST-segment elevation myocardial infarction (STEMI) is controversial. This case report describes a successful thrombolysis after resuscitation in delayed-diagnosis STEMI. PATIENT CONCERNS: A 58-year-old man presented with acute abdominal pain as the first symptom of a subsequent STEMI diagnosis. When he returned to the clinic after having been assisted with abdominal pain relief, he suffered a sudden cardiac arrest. Cardiopulmonary resuscitation was performed immediately, and thrombolysis was carried out for his anterior STEMI. He was successfully resuscitated in a short period of time.

DIAGNOSIS: The patient was diagnosed with acute and extensive anterior STEMI. The D-dimer level was normal, and pericardial effusion was ruled out. INTERVENTIONS: After successful resuscitation, the patient received half-dose alteplase thrombolytic therapy. After a few days, the patient was transferred to a general ward. Coronary angiography revealed unobstructed flow in the left anterior descending artery. OUTCOMES: The ST segment of the patient gradually declined after thrombolytic therapy, and the myocardial injury marker levels increased. A small amount of pleural fluid in the lungs and pulmonary infection were observed. With effective diuretic, anti-infective, and other treatments, the patient's condition gradually improved, the ventilator was removed, and vasoactive drugs were successfully discontinued. Coronary angiography revealed that the flow of the culprit artery was unobstructed, and a drug-coated balloon was implanted. No wall motion abnormalities were detected on echocardiography, and the patient recovered well. CONCLUSIONS: In patients with abdominal pain as the first presentation, a simple initial electrocardiogram may help reduce the risk of missed STEMI diagnosis. Thrombolysis after successful resuscitation is an effective treatment for these patients. However, the effects of thrombolysis after resuscitation remain unclear. The point of dispute lies in the effectiveness and safety of thrombolysis (primarily for bleeding). Prompt thrombolysis would lead to a better prognosis if spontaneous circulation can be restored within 10 minutes.

2. JACC Case Rep. 2022 Mar 16;4(6):364-369. doi: 10.1016/j.jaccas.2022.01.018. eCollection 2022 Mar 16.

Mechanical Chest Compressions and Intra-Aortic Balloon Pump Combination for Refractory Ventricular Fibrillation During Primary PCI.

Buckley AJ(1), O'Connor C(1), Fitzgerald S(2), Hennessy T(1), Kiernan T(1).

ABSTRACT

This case highlights the successful resuscitation of a 43-year-old man with ST-segment elevation myocardial infarction and refractory ventricular fibrillation by using a combination of mechanical chest compressions and intra-aortic balloon pump insertion. This bailout strategy facilitated primary multivessel percutaneous coronary intervention in a center without on-site extracorporeal membrane oxygenation. (Level of Difficulty: Advanced.).

3. Am J Case Rep. 2022 May 7;23:e935605. doi: 10.12659/AJCR.935605.

Successful Resuscitation of Cardiac Arrest After Refeeding Syndrome Associated with Hiatal Hernia: A Case Report.

Kotake K(1), Hongo T(2), Sugiyama H(3), Iizuka N(4), Momoki N(3), Kawakami Y(1).

ABSTRACT

BACKGROUND Refeeding syndrome (RFS) is a life-threatening syndrome, which can cause sudden death. RFS has been reported frequently in young patients with anorexia without organic disease; however, there are few reports in elderly patients with organic disease. Herein, we report a case of cardiac arrest after refeeding syndrome associated with hiatal hernia. CASE REPORT We report the case of a 59-year-old woman who had a diagnosis of RFS during treatment for anorexia secondary to hiatal hernia. She was hospitalized with hypothermia, anemia, and hypovolemic shock and treated with electrolytes, hydration, and transfusion at the Emergency Department. Upper gastrointestinal endoscopy revealed hiatal hernia with severe reflux esophagitis. We initiated parenteral nutrition (8.7 kcal/kg/day). However, QTc prolongation caused pulseless ventricular tachycardia. Temporary cardiac pacing was performed to prevent recurrence. Her nutritional status steadily improved, and she was transferred to another hospital without complications. CONCLUSIONS Patients with gastrointestinal comorbidities are more likely to have inadequate food intake and to be

undernourished on admission and therefore should be carefully started on nutritional therapy, considering their risk of RFS.

4. Asian Cardiovasc Thorac Ann. 2022 May 3:2184923221097841. doi:10.1177/02184923221097841. Online ahead of print.
A case of cardiac herniation after right pneumonectomy.
Inoue M(1), Yotsukura M(1), Yoshida Y(1), Nakagawa K(1), Watanabe SI(1).
ABSTRACT
A cardiac herniation is a rare but life-threatening complication after pneumonectomy. In most cases, it manifests suddenly as severe hypotension and cardiac arrest within 24 h of pneumonectomy. Here, we report a case of sudden-onset cardiac herniation after right pneumonectomy during which the pericardium was incised. The diagnosis was made immediately based on chest X-ray and electrocardiogram findings, and the heart was repositioned by repeat thoracotomy as an urgent life-saving measure. Surgeons should be aware of this potential surgical complication as well as its clinical manifestations, given that delayed diagnosis would directly lead to a fatal outcome.

5. Unfallchirurg. 2022 May 2. doi: 10.1007/s00113-022-01183-y. Online ahead of print.
[Successful in-hospital clamshell thoracotomy in a young male patient with polytrauma (ISS 57) : A case report]. [Article in German; Abstract available in German from the publisher]
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ABSTRACT
Life-threatened injured patients who suffer a cardiovascular arrest after a trauma are still enormously challenging for both the paramedics and the trauma team in the clinic. This case illustrates the treatment of a 16-year-old boy who suffered a blunt abdominal trauma with a traumatic cardiac arrest followed by an open resuscitation after clamshell thoracotomy. Subsequently, the treatment after damage control is discussed regarding the current literature and recommendations for treatment.

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Management of a patient with cardiac arrest, intestinal ischemia necrosis, multiple fractures, hemorrhagic shock, renal failure, disseminated intravascular coagulation, and thrombosis after severe abdominal crush injury: A case report.
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ABSTRACT
Abdominal crush injury has been widely reported. However, abdominal crush injury cases involving most of the organ systems have seldom been reported. In the present case report, a 58-year-old man was hit in the abdomen by a 4-ton machine tool. The case described a rare combination of cardiac arrest, intestinal ischemia necrosis, multiple fractures, hemorrhagic shock, renal failure, disseminated intravascular coagulation and thrombosis after severe abdominal crush injury. During the treatment, crush syndrome, anemia, electrolyte disorder, pleural effusion, pulmonary emphysema, compartment syndrome, respiratory failure, pulmonary hemorrhage, injury of the right common peroneal nerve and tibial nerve, septum abscess and malnutrition were also observed. Systemic and symptomatic treatments were performed for >3 months, after which the patient was discharged from hospital without any further risk of fatality. The related treatments were also described in detail in the present case report. This case represented one of the most complicated cases among abdominal crush injuries that have been reported, and the treatment experiences reported here will hopefully provide suitable reference points for similar cases.