This week's PubMed 28th August – 3rd September 2022: articles of interest n = 31

CPR AND COVID-19

1. Pediatr Crit Care Med. 2022 Sep 2. doi: 10.1097/PCC.0000000000003073. Online ahead of print.
The Temporal Association of the COVID-19 Pandemic and Pediatric Cardiopulmonary Resuscitation Quality and Outcomes.
Morgan RW(1), Wolfe HA(1), Reeder RW(2), Alvey JS(2), Frazier AH(3)(4), Friess SH(5), Maa T(6), McQuillen PS(7), Meert KL(8), Nadkarni VM(1), Sharron MP(9), Siems A(9), Yates AR(6), Ahmed T(8), Bell MJ(9), Bishop R(10), Bochkoris M(11), Burns C(5)(12), Carcillo JA(11), Carpenter TC(10), Dean JM(2), Diddle JW(9), Federman M(13), Fernandez R(6), Fink EL(11), Franzon D(7), Hall M(6), Hehir D(1)(14), Horvat CM(11), Huard LL(13), Manga A(5), Mourani PM(10), Naim MY(1), Notterman D(15), Pollack MM(9), Sapru A(13), Schneiter C(10), Srivastava N(13), Tabbutt S(7), Tilford B(8), Viteri S(14), Wessel D(9), Zuppa AF(1), Berg RA(1), Sutton RM(1).
ABSTRACT
OBJECTIVES: The COVID-19 pandemic resulted in adaptations to pediatric resuscitation systems of care. The objective of this study was to determine the temporal association between the pandemic and pediatric in-hospital cardiac arrest (IHCA) process of care metrics, cardiopulmonary resuscitation (cardiopulmonary resuscitation) quality, and patient outcomes. DESIGN: Multicenter retrospective analysis of a dataset comprising observations of IHCA outcomes pre pandemic (March 1, 2019 to February 29, 2020) versus pandemic (March 1, 2020 to February 28, 2021). SETTING: Data source was the ICU-RESUScitation Project ("ICU-RESUS;" NCT028374497), a prospective, multicenter, cluster randomized interventional trial. PATIENTS: Children (≤ 18 yr) who received cardiopulmonary resuscitation while admitted to the ICU and were enrolled in ICU-RESUS. INTERVENTIONS: None. MEASUREMENTS AND MAIN RESULTS: Among 429 IHCAs meeting inclusion criteria, occurrence during the pandemic period was associated with higher frequency of hypotension as the immediate cause of arrest. Cardiac arrest physiology, cardiopulmonary resuscitation quality metrics, and postarrest physiologic and quality of care metrics were similar between the two periods. Survival with favorable neurologic outcome (Pediatric Cerebral Performance Category score 1-3 or unchanged from baseline) occurred in 102 of 195 subjects (52%) during the pandemic compared with 140 of 234 (60%) pre pandemic (p = 0.12). Among survivors, occurrence of IHCA during the pandemic period was associated with a greater increase in Functional Status Scale (FSS) (i.e., worsening) from baseline (1 [0-3] vs 0 [0-2]; p = 0.01). After adjustment for confounders, IHCA survival during the pandemic period was associated with a greater increase in FSS from baseline (+1.19 [95% CI, 0.35-2.04] FSS points; p = 0.006) and higher odds of a new FSS-defined morbidity (adjusted odds ratio, 1.88 [95% CI, 1.03-3.46]; p = 0.04). CONCLUSIONS: Using the ICU-RESUS dataset, we found that relative to the year prior, pediatric IHCA during the first year of the COVID-19 pandemic was associated with greater worsening of functional status and higher odds of new functional morbidity among survivors.

2. R I Med J (2013). 2022 Sep 1;105(7):58-61.
In-Hospital Cardiac Arrest Outcomes During the Early COVID-19 Pandemic in RI: A Qualitative Analysis.
Noureddine B(1), Mrad A(2), Sorin C(3), Carino G(3).
ABSTRACT
Throughout the COVID-19 pandemic, there has been growing but limited data describing the poor mortality outcomes in COVID-19 patients who experienced In-Hospital Cardiac Arrest (IHCA). This study evaluated the baseline characteristics and outcomes of COVID-19 patients who underwent

cardiopulmonary resuscitation (CPR) during hospitalization in the early phases of the pandemic and compared them to that of several national and international centers. A list of all the IHCA events in the Lifespan hospital network from March 2020 to April 2021 was generated, and data, including de-identified patient characteristics, comorbidities, and details of the IHCA event, were examined. The primary outcome of all-cause mortality was then calculated. Forty-three patients with COVID-19 who experienced an IHCA event and underwent CPR were identified. Return of spontaneous circulation (ROSC) was achieved in 23 (53%) patients, and all-cause in-hospital mortality was 97.67%, with only one patient surviving until discharge. During the early pandemic, experiencing an IHCA event while admitted with COVID-19 carried an extremely poor prognosis, even if ROSC was achieved. This outcome likely reflects the lack of clear management guidelines or established therapeutic agents and the prevalence of the Delta strain during this time period.

3. J Crit Care. 2022 Oct;71:154114. doi: 10.1016/j.jcrc.2022.154114. Epub 2022 Jul 18.
Heart rate variability and adrenal size provide clues to sudden cardiac death in hospitalized COVID-19 patients.
Ranard BL(1), Megjhani M(2), Terilli K(2), Yarmohammadi H(3), Ausiello J(4), Park S(5).
ABSTRACT
PURPOSE: To examine the association between a measure of heart rate variability and sudden cardiac death (SCD) in COVID-19 patients. METHODS: Patients with SARS-COV-2 infection admitted to Columbia University Irving Medical Center who died between 4/25/2020 and 7/14/2020 and had an autopsy were examined for root mean square of successive differences (RMSSD), organ weights, and evidence of SCD. RESULTS: Thirty COVID-19 patients were included and 12 had SCD. The RMSSD over 7 days without vs with SCD was median 0.0129 (IQR 0.0074-0.026) versus 0.0098 (IQR 0.0056-0.0197), $p < 0.0001$. The total adjusted adrenal weight of the non-SCD group was 0.40 g/kg (IQR 0.35-0.55) versus 0.25 g/kg (IQR 0.21-0.31) in the SCD group, $p = 0.0007$. CONCLUSIONS: Hospitalized patients with COVID-19 who experienced SCD had lower parasympathetic activity (RMSSD) and smaller sized adrenal glands. Further research is required to replicate these findings.

CPR/MECHANICAL CHEST COMPRESSION

1. Clin Exp Emerg Med. 2022 Aug 31. doi: 10.15441/ceem.21.142. Online ahead of print.
Neurologic outcomes of prehospital mechanical chest compression device use during transportation of out-of-hospital cardiac arrest patients: a multicenter observational study.
Min C(1), Lee DE(2), Ryoo HW(1), Jung H(1), Cho JW(1), Kim YJ(2), Ahn JY(1), Park J(1), Mun YH(3), Jang TC(4), Jin SC(5).
ABSTRACT
OBJECTIVE: High-quality cardiopulmonary resuscitation with chest compression is important for good neurologic outcomes during out-of-hospital cardiac arrest (OHCA). Several types of mechanical chest compression devices have recently been implemented in Korean emergency medical services. This study aimed to identify the effect of prehospital mechanical chest compression device use on the outcomes of OHCA patients. METHODS: We retrospectively analyzed data drawn from the regional cardiac arrest registry in Daegu, Korea. This registry prospectively collected data from January 2017 to December 2020. Patients aged 18 years or older who experienced cardiac arrest presumed to have a medical etiology were included. The exposure variable was the use of a prehospital mechanical device during transportation by emergency medical technicians. The outcomes measured were neurologic outcomes and survival to discharge. Logistic regression analysis was used. RESULTS: Among 3,230 OHCA patients, 1,111 (34.4%) and 2,119 (65.6%) were managed with manual chest compression and with a mechanical chest compression device,

respectively. The mechanical chest compression group showed poorer neurologic outcomes than the manual chest compression group (adjusted odds ratio, 0.12; 95% confidence interval, 0.04-0.33) and decreased survival to discharge (adjusted odds ratio, 0.39; 95% confidence interval, 0.19-0.82) after adjustment for confounding variables. CONCLUSION: Prehospital mechanical chest compression device use in OHCA was associated with poorer neurologic outcomes and survival to discharge compared to manual chest compression.

REGISTRIES, REVIEWS AND EDITORIALS

1. J Emerg Med. 2022 Aug 26:S0736-4679(22)00323-7. doi: 10.1016/ j.jemermed. 2022.05.018. Online ahead of print.
Hyperoxemia is Associated With Poor Neurological Outcomes in Patients With Out-of-Hospital Cardiac Arrest Rescued by Extracorporeal Cardiopulmonary Resuscitation: Insight From the Nationwide Multicenter Observational JAAM-OHCA (Japan Association for Acute Medicine) Registry.
Nishihara M(1), Hiasa KI(2), Enzan N(2), Ichimura K(3), Iyonaga T(1), Shono Y(4), Kashiura M(5), Moriya T(5), Kitazono T(4), Tsutsui H(2).
ABSTRACT
BACKGROUND: Previous studies have shown an association between hyperoxemia and mortality in patients with out-of-hospital cardiac arrest (OHCA) after cardiopulmonary resuscitation (CPR); however, evidence is lacking in the extracorporeal CPR (ECPR) setting. OBJECTIVE: The aim of this study was to test the hypothesis that hyperoxemia is associated with poor neurological outcomes in patients treated by ECPR. METHODS: The Japanese Association for Acute Medicine OHCA Registry is a multicenter, prospective, observational registry of patients from 2014 to 2017. Adult (18 years or older) patients who had undergone ECPR after OHCA were included. Eligible patients were divided into two groups based on the partial pressure of oxygen in arterial blood (PaO2) levels at 24 h after ECPR: the high-PaO2 group (n = 242) defined as PaO2 ≥ 157 mm Hg (median) and the low-PaO2 group (n = 211) defined as PaO2 60 to < 157 mm Hg. The primary outcome was the favorable neurological outcome, defined as a Cerebral Performance Categories Scale score of 1 to 2 at 30 days after OHCA. RESULTS: Of 34,754 patients with OHCA, 453 patients were included. The neurological outcome was significantly lower in the high-PaO2 group than in the low-PaO2 group (15.9 vs. 33.5%; p < 0.001). After adjusting for potential confounders, high PaO2 was negatively associated with favorable neurological outcomes (adjusted odds ratio [aOR] 0.48; 95% confidence interval [CI] 0.24-0.97; p = 0.040). In a multivariate analysis with multiple imputation, high PaO2 was also negatively associated with favorable neurological outcomes (aOR 0.63; 95% CI 0.49-0.81; p < 0.001). CONCLUSIONS: Hyperoxemia was associated with worse neurological outcomes in OHCA patients with ECPR.

2. Anaesthesiologie. 2022 Aug 29. doi: 10.1007/s00101-022-01193-w. Online ahead of print.
Association between prehospital FPS and ROSC in adults with OHCA : A retrospective multicenter study using the German Resuscitation Registry and Intubation Registry (FiPS-CPR). [Article in English]
Montag S(1), Herdtle S(2), John S(3), Lehmann T(4), Behringer W(5), Hohenstein C(6).
ABSTRACT
BACKGROUND: Advanced airway management (AAM) is part of the standard treatment during advanced cardiac life support (ACLS). Current studies underline the importance of a first-pass intubation success (FPS) during in-hospital ACLS. It was shown that a failed initial intubation attempt in out-of-hospital cardiac arrest (OHCA) patients in the emergency department is an independent

risk factor for the decreased effectiveness of ACLS measured by the return of spontaneous circulation (ROSC). OBJECTIVE: This study first examines the association between prehospital FPS and ROSC in adults with OHCA and second identifies factors associated with FPS and ROSC. The initial hypothesis was that FPS would increase the probability of ROSC as well as decrease the time to ROSC. MATERIAL AND METHODS: A retrospective multicenter analysis of 180 adult non-traumatic OHCA patients on whom advanced airway management (AAM) was performed between July 2017 and December 2018 in five different German physician-staffed ambulance stations. For information on FPS the Intubation Registry, and for information on ROSC the German Resuscitation Registry were used. In addition to yes/no questions, multiple answers and free text answers are possible in those questionnaires. The main outcome variables were 'FPS', 'ROSC' and 'time to ROSC'. Mann-Whitney tests, χ2-tests, Fisher's exact tests and multivariate binary logistic regressions were used for the statistical evaluation. Demographic factors, characteristics of the performer, selected equipment, laryngoscopy type, intubation method, medications, verification of tube position, respiratory evaluation, complications and time to ROSC were examined with respect to the influence on FPS. Concerning ROSC, the following factors were examined: demographic factors, initial heart rhythm, initial breathing, medications, defibrillation and AAM. RESULTS: An FPS was recorded in 150 patients (83.3%), and ROSC was achieved in 82 patients (45.5%) after an average time of 22.16 min. There was a positive association between FPS and ROSC ($p = 0.027$). In patients with FPS, a trend for shorter time to ROSC was observed ($p = 0.059$; FPS 18 min; no FPS 28 min). The use of capnography (odds ratio, OR = 7.384, 95% confidence interval, CI 1.886-28.917) and complications during AAM (OR = 0.033, 95% CI: 0.007-0.153) were independently associated with FPS. The independent factor associated with ROSC was FPS (OR = 5.281, 95% CI: 1.800-15.494). CONCLUSION: In prehospitally resuscitated adult OHCA patients with AAM, FPS is associated with a higher chance of ROSC.

3. Resusc Plus. 2022 Aug 18;11:100290. doi: 10.1016/j.resplu.2022.100290. eCollection 2022 Sep.
A scoping review to determine the barriers and facilitators to initiation and performance of bystander cardiopulmonary resuscitation during emergency calls.
Aldridge ES(1), Perera N(1), Ball S(1)(2), Finn J(1)(2)(3), Bray J(1)(3).
ABSTRACT
BACKGROUND: To maximise out-of-hospital cardiac arrest (OHCA) patients' survival, bystanders should perform continuous, good quality cardiopulmonary resuscitation (CPR) until ambulance arrival. OBJECTIVES: To identify published literature describing barriers and facilitators between callers and call-takers, which affect initiation and performance (continuation and quality) of bystander CPR (B-CPR) throughout the OHCA emergency call. ELIGIBILITY CRITERIA: Studies were included if they reported on the population (emergency callers and call-takers), concept (psychological, physical and communication barriers and facilitators impacting the initiation and performance of B-CPR) and context (studies that analysed OHCA emergency calls). SOURCES OF EVIDENCE: Medline, CINAHL, Cochrane CENTRAL, Embase, Scopus and ProQuest were searched from inception to 9 March 2022. CHARTING METHODS: Study characteristics were extracted and presented in a narrative format accompanied by summary tables. RESULTS: Thirty studies identified factors that impacted B-CPR initiation or performance during the emergency call. Twenty-eight studies described barriers to the provision of CPR instructions and CPR initiation, with prominent themes being caller reluctance (psychological), physical ability (physical), and callers hanging up the phone prior to CPR instructions (communication). There was little evidence examining barriers and facilitators to ongoing CPR performance (2 studies) or CPR quality (2 studies). CONCLUSIONS: This scoping review using emergency calls as the source, described barriers to the provision of B-CPR instructions and B-CPR initiation. Further research is needed to explore facilitators and barriers to B-

CPR continuation and quality throughout the emergency call, and to examine the effectiveness of call-taker strategies to motivate callers to perform B-CPR.

4. Acute Med Surg. 2022 Aug 27;9(1):e777. doi: 10.1002/ams2.777. eCollection 2022 Jan-Dec.
Survival following an out-of-hospital cardiac arrest in Japan in 2020 versus 2019 according to the cause.
Hosomi S(1)(2), Zha L(2), Kiyohara K(3), Kitamura T(2), Irisawa T(1), Ogura H(1), Oda J(1).
ABSTRACT
AIM: The coronavirus disease (COVID-19) pandemic has led to an increase in out-of-hospital cardiac arrests (OHCAs) and mortality. However, there has been no reports in Japan using nationwide registry data. We compared survival among patients with OHCAs and detailed information on the cause during the COVID-19 pandemic (2020), and during the pre-pandemic period (2019). METHODS: Using a Japanese population-based retrospective cohort study design, we analyzed registry data on 39,324 and 39,170 patients with OHCAs in 2019 and 2020, respectively. We compared patient outcomes in 2019 and 2020 using univariable and multivariable logistic regression analyses. RESULTS: The proportion of OHCAs of cardiac origin increased significantly from 61.6% in 2019 to 62.7% in 2020 (P = 0.001). The use of bystander CPR (6.9% versus 5.7%, P < 0.001) and publicaccess automated external defibrillator pads (3.7% versus 3.0%, P < 0.001) decreased significantly from 2019 to 2020. The 1-month survival for OHCA of cardiac origin (12.1% versus 10.7%; adjusted odds ratio [OR] 0.93, 95% confidence interval [CI] 0.87-1.00), asphyxia (10.9% versus 8.8%; adjusted OR 0.80, 95% CI 0.70-0.92), and external causes (adjusted OR 0.66; 95% CI 0.46-0.96), also decreased significantly from 2019 to 2020. CONCLUSIONS: In Japan, the 1-month survival after OHCA of cardiac origin, or due to asphyxia or external causes, decreased significantly during the COVID-19 pandemic period.

5. Can J Cardiol. 2022 Aug 25:S0828-282X(22)00759-0. doi: 10.1016/j.cjca.2022.08.225. Online ahead of print.
Long-term mortality, readmission and resource utilization among hospital survivors of out-of-hospital cardiac arrest.
Fordyce CB(1), Grunau BE(2), Guan M(3), Hawkins NM(4), Lee MK(3), Helmer JS(5), Wong GC(6), Humphries KH(4), Christenson J(7).
ABSTRACT
BACKGROUND: Among patients with out-of-hospital cardiac arrest (OHCA), the influence of pre- and in-hospital factors on long-term survival, readmission and resource utilization is ill-defined, mainly related to challenges combining disparate data sources. METHODS: Adult non-traumatic OHCA from the British Columbia Cardiac Arrest Registry (Jan 2009 to Dec 2016) were linked to provincial datasets comprising co-morbidities, medications, cardiac procedures, mortality, and hospital admission and discharge. Among hospital-discharge survivors, the 3-year endpoint of mortality or mortality and all-cause readmission was examined using the Kaplan-Meier (KM) method and multivariable Cox regression model for predictors. The use of publicly funded home care and community services (HCCS) within 1-year post-discharge was also evaluated. RESULTS: Of the 10,674 linked, emergency medical services (EMS)-treated adult OHCAs, 3230 were admitted to hospital, and 1325 survived to hospital discharge. At 3-years post-discharge, the estimated Kaplan-Meier (KM) survival rate was 84.1% [95% CI: 81.7%, 86.1%] and freedom from death or all-cause readmission was 31.8% (CI: 29.0%, 34.7%). Following exclusions, 26.6% (n=315/1186) accessed residential or home care services within 1-year. Independent predictors of long-term outcomes included age and co-morbidities but also favorable arrest characteristics and in-hospital factors such as revascularization or receipt of an intracardiac defibrillator prior to discharge. CONCLUSIONS: Among

OHCA hospital survivors, the long-term death or readmission risk persists and is modulated by both pre- and in-hospital factors. However, only 1 in 4 survivors required residential or home care post-discharge. These results support efforts to improve care processes to increase survival to hospital discharge.

IN-HOSPITAL CARDIAC ARREST

1. Arch Acad Emerg Med. 2022 Jul 16;10(1):e57. doi: 10.22037/aaem.v10i1.1678. eCollection 2022.
Effect of Interposed Abdominal Compression on Cardiopulmonary Resuscitation Outcomes; a Randomized Clinical Trial.
Ghanbari Khanghah A(1), Moghadamnia MT(2), Panahi L(3), Pouy S(4), Aghajani Nargesi M(5), Kazemnezhad Leyli E(6).
ABSTRACT
INTRODUCTION: Standard cardiopulmonary resuscitation (STD-CPR) is successful in only 10-15% of cases in emergency department (ED). This study aimed to determine the effect of interposed abdominal compression (IAC) during resuscitation on outcomes of ED cardiac arrests. METHODS: In this randomized clinical trial study, non-trauma patients aged 18-85 years, patients with in-hospital cardiac arrest hospitalized in the ED were randomly assigned into two either STD-CPR or IAC-CPR group on a 1:1 basis and using computer-generated random numbers. Participants in the intervention group, received abdominal compression during the diastole phase of STD-CPR. The rate of return of spontaneous circulation (ROSC), heart rate (HR), respiratory rate (RR), arterial blood gas (ABG) indicators, and survival rate were compared between the two groups. RESULTS: Ninety patients were enrolled (45 in each group). There were no differences between the two groups regarding age ($p = 0.76$), sex ($p = 0.39$), employment status ($p = 0.62$) and Charlson comorbidity scale ($p = 0.46$). Abdominal compression had a positive effect on heart rate ($p < 0.001$), mean arterial pressure ($p = 0.003$), arterial blood oxygen pressure ($p = 0.001$), and arterial blood carbon dioxide pressure ($p = 0.001$) as well as a negative effect on arterial blood oxygen saturation ($p = 0.029$) 30 minutes after resuscitation. Out of the 90 CPR cases, 8 (17.7%) cases in intervention group and 8 (17.7%) cases in control group were successful, among which all of the 8 patients in the intervention group and 5 of the patients in the control group had been discharged from hospital without any complications. CONCLUSION: The results showed that abdominal compression during CPR can improve resuscitation outcomes in patients with cardiac arrest. Therefore, in order to use this technique, further research is recommended.

2. Intern Emerg Med. 2022 Aug 29:1-16. doi: 10.1007/s11739-022-03041-6. Online ahead of print.
The impact of cognitive aids on resuscitation performance in in-hospital cardiac arrest scenarios: a systematic review and meta-analysis.
Corazza F(1), Fiorese E(2), Arpone M(2), Tardini G(2), Frigo AC(3), Cheng A(4), Da Dalt L(1)(2), Bressan S(5)(6).
ABSTRACT
Different cognitive aids have been recently developed to support the management of cardiac arrest, however, their effectiveness remains barely investigated. We aimed to assess whether clinicians using any cognitive aids compared to no or alternative cognitive aids for in-hospital cardiac arrest (IHCA) scenarios achieve improved resuscitation performance. PubMed, EMBASE, the Cochrane Library, CINAHL and ClinicalTrials.gov were systematically searched to identify studies comparing the management of adult/paediatric IHCA simulated scenarios by health professionals using different or no cognitive aids. Our primary outcomes were adherence to guideline recommendations (overall team performance) and time to critical resuscitation actions. Random-effects model meta-analyses were performed. Of the 4.830 screened studies, 16 (14 adult, 2 paediatric) met inclusion criteria. Meta-analyses of eight eligible adult studies indicated that the use of electronic/paper-based

cognitive aids, in comparison with no aid, was significantly associated with better overall resuscitation performance [standard mean difference (SMD) 1.16; 95% confidence interval (CI) 0.64; 1.69; I2 = 79%]. Meta-analyses of the two paediatric studies, showed non-significant improvement of critical actions for resuscitation (adherence to guideline recommended sequence of actions, time to defibrillation, rate of errors in defibrillation, time to start chest compressions), except for significant shorter time to amiodarone administration (SMD - 0.78; 95% CI - 1.39; - 0.18; I2 = 0). To conclude, the use of cognitive aids appears to have benefits in improving the management of simulated adult IHCA scenarios, with potential positive impact on clinical practice. Further paediatric studies are necessary to better assess the impact of cognitive aids on the management of IHCA scenarios.

INJURIES AND CPR

1. Am J Emerg Med. 2022 Aug 18;61:81-86. doi: 10.1016/j.ajem.2022.08.034. Online ahead of print.
Trauma associated with cardiopulmonary resuscitation based on autopsy reports after the 2015 ERC guidelines.
Karasek J(1), Blankova A(2), Doubková A(3), Pitasova T(3), Nahalka D(3), Bartes T(3), Hladik J(4), Adamek T(2), Strycek M(5), Jirasek T(2), Polasek R(5), Ostadal P(6).

ABSTRACT
INTRODUCTION: Cardiopulmonary resuscitation (CPR)-related injuries have not been assessed since the 2015 Resuscitation Guidelines were established. AIM: To describe the incidence and severity of CPR-related injuries, and to evaluate the impact of the 2015 European Resuscitation Council (ERC) guidelines on the objective assessment of injuries. METHODS: This multicenter, retrospective study analyzed autopsy reports of patients who underwent CPR. The most severe injuries were objectively assessed using the Abbreviated Injury Scale (AIS) and all injuries were summarized according to the New Injury Severity Score (NISS). RESULTS: Among 628 autopsy reports analyzed, patient characteristics and case details were distributed as follows: male sex, 71.1%; median age, 67 years; out-of-hospital cardiac arrest, 89.2%; bystander CPR, 56.8%. CPR-related injuries included: rib(s) 94.6%; lung(s), 9.9%; sternum, 62.4%; liver, 2.5%; and spleen, 1.8%. The incidence of bystander-provided CPR and severity of injury were similar to CPR provided only by professionals. There were no difference between mechanical and manual compressions. Females were older (p = 0.0001) and, although the frequency of their injuries was similar to males, they were significantly more severe (p = 0.01). Patients with life-threatening injury exhibited a baseline profile similar to those without injury . The median score (according to AIS) of the most severe injury was 3 and the median of summary of injuries was 13 according to the NISS-low risk of fatal injury. CONCLUSION: CPR-related injuries occurred frequently, although those that were life-threatening accounted for only 3% of cases. There were no differences between patients who were resuscitated by bystander(s) or by professionals and no differences between mechanical chest devices or manual resuscitation. Compared with a study based on the 2010 guidelines, similar injuries were found, but with more rib fractures, less visceral organ damage, and fewer life-threatening injuries.

CAUSE OF THE ARREST

1. Am J Emerg Med. 2022 Aug 21;61:74-80. doi: 10.1016/j.ajem.2022.08.035. Online ahead of print.
Cardiac arrest caused by anaphylaxis refractory to prompt management: A case series and review of the literature.
Park H(1), Kim SM(1), Kim WY(2).

ABSTRACT

BACKGROUND: Anaphylaxis is a potentially life-threatening condition that occurs in the emergency department (ED). Although anaphylaxis is rapidly recognized and treated in the hospital compared with that in the community, in some cases, it does not respond to proper management. OBJECTIVE: The aim of this study is to describe our experience of cases of refractory anaphylaxis leading to cardiac arrest in hospital, to review their characteristics compared with those seen in the community, and to discuss the best management practices for anaphylaxis-induced cardiac arrest with a literature review. METHODS: We reviewed the medical records of patients referred to the ED with possible in-hospital anaphylaxis between January 2017 and May 2021. According to the anaphylaxis protocol, epinephrine, corticosteroid, and antihistamine were administered immediately on-site at our institution before the study period. Refractory anaphylaxis was defined as the development of anaphylaxis-induced cardiac arrest even after following the anaphylaxis protocol. RESULTS: A total of 246 cases were evaluated for possible anaphylaxis, with 236 cases meeting the criteria for a diagnosis of anaphylaxis. Among them, 178 patients showed the signs and symptoms of shock, and cardiac arrest occurred in 6 patients (2.5%). Of the six patients, three had a return of spontaneous circulation before admission to the ED, while two died due to refractory cardiac arrest despite resuscitation in the ED. Following post-cardiac arrest care, including temperature management, one patient who received extracorporeal cardiopulmonary resuscitation survived neurologically intact. CONCLUSION: We present our case series to highlight the risk of developing refractory anaphylaxis with subsequent in-hospital cardiac arrest. Patients may progress to cardiac arrest within minutes despite prompt recognition and management. If patients present with potentially fatal symptoms, a more aggressive approach, including intravenous adrenaline infusion, should be taken.

2. Resusc Plus. 2022 Aug 22;11:100293. doi: 10.1016/j.resplu.2022.100293. eCollection 2022 Sep.
Experiences of cardiac arrest survivors among young exercisers in Norway: A qualitative study.
Hardeland C(1)(2), Leonardsen AL(2)(3), Isern CB(1)(4), Berge HM(5).

ABSTRACT

AIM: To explore how young exercisers experience surviving sudden cardiac arrest (SCA), focusing on interpretation of warning signs and experiences with the healthcare system. METHODS: The study had a qualitative design, and data was collected using individual, semi-structured interviews. Inclusion criteria were SCA survivors aged 18-50 years old who reported at least five hours of exercise/week prior to SCA, or who suffered SCA during or ≤60 min after exercise. RESULTS: 18 interviews were performed (4 females), age range 19-49 years old. Analysis identified the themes [1] neglected warning signs, [2] fluctuating between gratitude and criticism and [3] one size does not fit all. When young exercisers experienced symptoms such as fainting, chest pain, arrythmia, shortness of breath and fatigue, these were often ignored by either the participants, healthcare personnel or both. SCA survivors were grateful to the healthcare system and for the efforts made by healthcare personnel, but experienced a mismatch between what patients needed and could utilize, and what they actually received regarding both information and individualised services. Being young exercisers, the participants reported to have individual needs, but treatment and rehabilitation were not adapted and were mainly targeted to rehabilitation of older patients. CONCLUSION: Patients and healthcare personnel should be aware of cardiac related symptoms and warning signs for SCA, and these should be properly assessed in the population of young exercisers. SCA survivors need useful and repeated information. The needs of SCA survivors among young exercisers require individualisation of services.

3. Europace. 2022 Aug 29:euac141. doi: 10.1093/europace/euac141. Online ahead of print.

Causes, circumstances, and potential preventability of cardiac arrest in the young: insights from a state-wide clinical and forensic registry.

Paratz ED(1)(2)(3), van Heusden A(1), Zentner D(4)(5), Morgan N(6), Smith K(7)(8)(9), Thompson T(4), James P(4), Connell V(10), Pflaumer A(10)(11)(12), Semsarian C(13), Ingles J(14)(15), Parsons S(6)(16), Stub D(1)(2)(7)(8), Gerche A(1)(2)(3).

ABSTRACT

AIMS: The causes, circumstances, and preventability of young sudden cardiac arrest remain uncertain. METHODS AND RESULTS: A prospective state-wide multi-source registry identified all out-of-hospital cardiac arrests (OHCAs) in 1-50 year olds in Victoria, Australia, from 2019 to 2021. Cases were adjudicated using hospital and forensic records, clinic assessments and interviews of survivors and family members. For confirmed cardiac causes of OHCA, circumstances and cardiac history were collected. National time-use data was used to contextualize circumstances. 1319 OHCAs were included. 725 (55.0%) cases had a cardiac aetiology of OHCA, with coronary disease (n = 314, 23.8%) the most common pathology. Drug toxicity (n = 226, 17.1%) was the most common non-cardiac cause of OHCA and the second-most common cause overall. OHCAs were most likely to occur in sleep (n = 233, 41.2%). However, when compared to the typical Australian day, OHCAs occurred disproportionately more commonly during exercise (9% of patients vs. 1.3% of typical day, P = 0.018) and less commonly while sedentary (39.6 vs. 54.6%, P = 0.047). 38.2% of patients had known standard modifiable cardiovascular risk factors. 77% of patients with a cardiac cause of OHCA had not reported cardiac symptoms nor been evaluated by a cardiologist prior to their OHCA. CONCLUSION: Approximately half of OHCAs in the young have a cardiac cause, with coronary disease and drug toxicity dominant aetiologies. OHCAs disproportionately occur during exercise. Of patients with cardiac cause of OHCA, almost two-thirds have no standard modifiable cardiovascular risk factors, and more than three-quarters had no prior warning symptoms or interaction with a cardiologist.

4. Resuscitation. 2022 Aug 25:S0300-9572(22)00651-7. doi: 10.1016/j.resuscitation.2022.08.016. Online ahead of print.

Factors predicting cardiac arrest in acute coronary syndrome patients under 50: a state-wide angiographic and forensic evaluation of outcomes.

Paratz ED(1), van Heusden A(2), Smith K(3), Brennan A(4), Dinh D(4), Ball J(4), Lefkovits J(4), Kaye DM(5), Nicholls S(4), Pflaumer A(6), La Gerche A(7), Stub D(8); EndUCD Investigators.

ABSTRACT

BACKGROUND: An uncertain proportion of patients with acute coronary syndrome (ACS) also experience out-of-hospital cardiac arrest (OHCA). Predictors of OHCA in ACS remain unclear and vulnerable to selection bias as pre-hospital deceased patients are usually not included. METHODS: Data on patients aged 18-50 years from a percutaneous coronary intervention (PCI) and OHCA registry were combined to identify all patients experiencing OHCA due to ACS (not including those managed medically or who proceeded to cardiac surgery). Clinical, angiographic and forensic details were collated. In-hospital and post-discharge outcomes were compared between OHCA survivors and non-OHCA ACS patients. RESULTS: OHCA occurred in 6.0% of ACS patients transported to hospital and 10.0% of all ACS patients. Clinical predictors were non-diabetic status (p=0.015), non-obesity (p=0.004), ST-elevation myocardial infarction (p<0.0001) and left main (p<0.0002) or left anterior descending (LAD) coronary artery (p<0.0001) as culprit vessel. OHCA patients had poorer in-hospital clinical outcomes, including longer length of stay and higher pre-procedural intubation, cardiogenic shock, major adverse cardiovascular events, bleeding, and mortality (p<0.0001 for all). At 30 days, OHCA survivors had equivalent cardiac function and return to premorbid independence but higher rates of anxiety/depression (p=0.029). CONCLUSION: OHCA complicates approximately

10% of ACS in the young. Predictors of OHCA are being non-diabetic, non-obese, having a STEMI presentation, and left main or LAD coronary culprit lesion. For OHCA patients surviving to PCI, higher rates of in-hospital complications are observed. Despite this, recovery of pre-morbid physical and cardiac function is equivalent to non-OHCA patients, apart from higher rates of anxiety/depression.

5. J Am Coll Cardiol. 2022 Aug 30;80(9):873-883. doi: 10.1016/j.jacc.2022.05.049.
Polygenic Risk Score Predicts Sudden Death in Patients With Coronary Disease and Preserved Systolic Function.
Sandhu RK(1), Dron JS(2), Liu Y(3), Moorthy MV(4), Chatterjee NA(5), Ellinor PT(6), Chasman DI(4), Cook NR(4), Khera AV(7), Albert CM(8).
ABSTRACT
BACKGROUND: A familial predisposition to sudden and/or arrhythmic death (SAD) in the setting of coronary artery disease (CAD) exists; however, the genetic basis is poorly understood. OBJECTIVES: The purpose of this study was to determine whether a genome-wide polygenic score for coronary artery disease (GPSCAD) might have utility in SAD risk stratification in CAD patients without severe systolic dysfunction. METHODS: A previously validated GPSCAD was generated utilizing genome-wide genotyping in 4,698 PRE-DETERMINE participants of European ancestry with CAD and left ventricular ejection fraction >30%-35%. The population was dichotomized according to top GPSCAD decile as defined by the general population, and absolute, proportional, and relative risks for SAD and non-SAD were estimated using competing risk analyses. RESULTS: Over a median follow-up of 8.0 years, participants in the top GPSCAD decile were at elevated absolute SAD risk (8.0%; 95% CI: 5.1%-12.4% vs 4.8%; 95% CI: 3.3%-7.0%; P = 0.005) and proportional SAD risk (29% vs 16%; P = 0.0003) compared with the remainder. After controlling for left ventricular ejection fraction, clinical factors, and electrocardiogram parameters, the top GPSCAD decile was associated with SAD (subdistribution HR: 1.77; 95% CI: 1.23-2.54; P = 0.002) but not non-SAD (subdistribution HR: 1.00; 95% CI: 0.80-1.25; P = 0.98) (P for Δ = 0.003). The addition of the top GPSCAD decile to the multivariable model significantly improved net reclassification indexes (NRIs) (continuous NRI: 14.0%; P = 0.024; and categorical NRI: 6.6%; P = 0.005) but not the C-index (difference in C-index: 0.007; P = 0.143). CONCLUSIONS: Among CAD patients without severe systolic dysfunction, high GPSCAD specifically predicted SAD and enriched for both absolute and proportional SAD risk, identifying a population who might benefit from defibrillator therapy.

END-TIDAL CO_2

No articles identified.

ORGAN DONATION

No articles identified.

FEEDBACK

No articles identified.

DRUGS

1. Prehosp Emerg Care. 2022 Aug 30:1-13. doi: 10.1080/10903127.2022.2120135. Online ahead of print.

One and Done Epinephrine in Out-of-Hospital Cardiac Arrest? Outcomes in a Multiagency United States Study.

Ashburn NP(1)(2), Beaver BP(3), Snavely AC(1)(4), Nazir N(5), Winslow JT(1), Nelson RD(1), Mahler SA(1)(6)(7), Stopyra JP(1).

ABSTRACT

Background: Cardiac arrest guidelines recommend epinephrine every 3-5 minutes during cardiac arrest resuscitation. However, it is unclear if multiple epinephrine doses are associated with improved outcomes. The objective of this study was to determine if a single-dose epinephrine protocol was associated with improved survival compared to traditional multidose protocols. Methods: We conducted a pre-post study across five North Carolina EMS agencies from 11/1/2016 to 10/29/2019. Patients ≥18 years old with attempted resuscitation for non-traumatic prehospital cardiac arrest were included. Data were collected 1 year before and after implementation of the single-dose epinephrine protocol. Prior to implementation, all agencies used a multidose epinephrine protocol. The Cardiac Arrest Registry to Enhance Survival was used to obtain patient outcomes. Study outcomes were survival to hospital discharge (primary) and return of spontaneous circulation (ROSC). Analysis was by intention to treat. Outcomes were compared pre- vs. post-implementation using generalized estimating equations to account for clustering within EMS agencies. Adjusted analyses included age, sex, race, shockable vs. non-shockable rhythm, witnessed arrest, automatic external defibrillator availability, EMS response interval, and bystander cardiopulmonary resuscitation.Results: During the study period there were 1,690 encounters (899 pre- and 791 post-implementation). The population was 74.7% white, 61.1% male, and had a median age of 65 (IQR 53-76) years. Survival to hospital discharge was similar pre- vs. post-implementation [13.6% (122/899) vs. 15.4% (122/791); OR 1.19, 95%CI 0.89-1.59]. However, ROSC was more common post-implementation [42.3% (380/899) vs. 32.5% (257/791); OR 0.66, 95%CI 0.54-0.81]. After adjusting for covariates, the single-dose protocol was associated with similar survival to discharge rates (aOR 0.88, 95%CI 0.77-1.29), but with decreased ROSC rates (aOR 0.58, 95%CI 0.47-0.72). Conclusion: A prehospital single-dose epinephrine protocol was associated with similar survival to hospital discharge, but decreased ROSC rates compared to the traditional multidose epinephrine protocol.

TRAUMA

No articles identified.

VENTILATION

No articles identified.

CERERBRAL MONITORING

No articles identified.

ULTRASOUND AND CPR

1. CASE (Phila). 2022 Aug 15;6(6):263-265. doi: 10.1016/j.case.2022.05.003. eCollection 2022 Aug.
Cardiac Tamponade: A Case for Point-of-Care Ultrasound.
Wharton RH(1), Greenstein SA(1).
ABSTRACT
• POCUS is increasingly being used in the evaluation of critically ill patients. • POCUS can shorten pulse check duration and prognosticate outcomes in cardiac arrest. • POCUS can identify the etiology of cardiac arrest after the first image. • POCUS can be used without delay or interrupting treatment.

ORGANISATION AND TRAINING

1. BMC Med Ethics. 2022 Sep 2;23(1):91. doi: 10.1186/s12910-022-00828-2.
Decision-making ethics in regards to life-sustaining interventions: when physicians refer to what other patients decide.
Sterie AC(1)(2), Jox RJ(3), Rubli Truchard E(4)(5).
ABSTRACT
BACKGROUND: Health decisions occur in a context with omnipresent social influences. Information concerning what other patients decide may present certain interventions as more desirable than others. OBJECTIVES: To explore how physicians refer to what other people decide in conversations about the relevancy of cardio-pulmonary resuscitation (CPR) or do-not-attempt-resuscitation orders (DNAR). METHODS: We recorded forty-three physician-patient admission interviews taking place in a hospital in French-speaking Switzerland, during which CPR is discussed. Data was analysed with conversation analysis. RESULTS: Reference to what other people decide in regards to CPR is used five times, through reported speech. The reference is generic, and employed as a resource to deal with trouble encountered with the patient's preference, either because it is absent or potentially incompatible with the medical recommendation. In our data, it is a way for physicians to present decisional paths and to steer towards the relevancy of DNAR orders ("Patients tell us 'no futile care'"). By calling out to a sense of membership, it builds towards the patient embracing norms that are associated with a desirable or relevant social group. CONCLUSIONS: Introducing DNAR decisions in terms of what other people opt for is a way for physicians to bring up the eventuality of allowing natural death in a less overt way. Formulating treatment choices in terms of what other people do has implications in terms of supporting autonomous and informed decision making, since it nudges patients towards conformity with what is presented as the most preferable choice on the basis of social norms.

2. Front Public Health. 2022 Aug 10;10:909889. doi: 10.3389/fpubh.2022.909889. eCollection 2022.
Evaluation of teaching effect of first-aid comprehensive simulation-based education in clinical medical students.
Peng M(1), Su N(1), Hou R(1), Geng H(1), Cai F(1), Zhong W(1), Zhang W(1), Zhong J(1), Yang Z(1), Cao W(2).
ABSTRACT
BACKGROUND: Although students mastered the composition skills, they lack of the ability to effectively integrate these composition skills in real clinical situations. To address the problem, we set up different levels of situational simulation training for medical students in grades 2-4, and evaluate the teaching effect of first-aid situation comprehensive simulation-based education (SBE) on clinical medical students. METHODS: The medical students in Grade 2, 3, and 4 received different

situational SBE, respectively. The 2nd-year medical students received a single skill module which included cardiopulmonary resuscitation, endotracheal intubation, and electric defibrillation training. The 3rd-year medical students received a single subject module which included cardiovascular and respiratory system training. The 4th-year medical students received the integrated multidisciplinary module which combined first-aid skills, clinical thinking, and teamwork training. The primary outcome was the expert evaluation and peer evaluation. The secondary outcome was students' satisfaction questionnaire response. In our training, we arranged an adequate teaching staff for intensive training and timely feedback (the student-teacher ratio of 5:1), adequate time for repetitive practice (Each SBE was carried out within 4 h), curriculum design, and integration from real cases by clinicians, realistic computer-driven mannequins to ensure simulation fidelity, providing a different difficult level of SBE to different grades of students, and pre- and post-tests for outcome measurement. RESULTS: In all of the single skill module, single subject module or comprehensive disciplines module, the scores in the expert evaluation and peer assessment after the training were significantly higher than before the training, and the differences were statistically significant ($p < 0.05$). The integrated subject training, although having the lowest pre-and post-test marks, had the largest increase in score. CONCLUSION: The first aid comprehensive simulation-based education in grade 2-4 clinical medical students, basing on timely feedback, repetitive practice, curriculum integration, simulation fidelity, and outcome measurement are effective in improving the students' proficiency in managing the real emergencies.

3. Sci Rep. 2022 Aug 26;12(1):14575. doi: 10.1038/s41598-022-18873-7.
Remote synchronous usability testing of public access defibrillators during social distancing in a pandemic.
Currie H(1)(2)(3), Harvey A(4)(5), Bond R(6), Magee J(6), Finlay D(6).
ABSTRACT
Public access automated external defibrillators (AEDs) represent emergency medical devices that may be used by untrained lay-persons in a life-critical event. As such their usability must be confirmed through simulation testing. In 2020 the novel coronavirus caused a global pandemic. In order to reduce the spread of the virus, many restrictions such as social distancing and travel bans were enforced. Usability testing of AEDs is typically conducted in-person, but due to these restrictions, other usability solutions must be investigated. Two studies were conducted, each with 18 participants: (1) an in-person usability study of an AED conducted in an office space, and (2) a synchronous remote usability study of the same AED conducted using video conferencing software. Key metrics associated with AED use, such as time to turn on, time to place pads and time to deliver a shock, were assessed in both studies. There was no difference in time taken to turn the AED on in the in-person study compared to the remote study, but the time to place electrode pads and to deliver a shock were significantly lower in the in-person study than in the remote study. Overall, the results of this study indicate that remote user testing of public access defibrillators may be appropriate in formative usability studies for determining understanding of the user interface.

4. Cardiol Young. 2022 Sep 1:1-8. doi: 10.1017/S1047951122002815. Online ahead of print.
Sudden cardiac arrest response preparedness in Durham County schools.
Sooy-Mossey M(1), DeRusso M(2), Green CL(3), Best DL(4).
ABSTRACT
Sudden cardiac arrest is an uncommon event with high morbidity and mortality. There are improved outcomes with early access to an automated external defibrillator and cardiopulmonary resuscitation. We assessed the availability of automated external defibrillators and emergency cardiac arrest plans in schools. A cross-sectional electronic survey was conducted to determine the

status of emergency cardiac arrest plans and automated external defibrillator presence. Most schools (88%) had access to an automated external defibrillator; however, trained staff and maintenance plans were highly variable. Automated external defibrillator availability did not differ by racial/ethnic or socio-economic composition; however, there was a relationship between number of automated external defibrillators and student population (p = 0.0030). The majority of schools either did not have (28%) or did not know if they had (36%) an emergency cardiac arrest plan. Even without state legislation, automated external defibrillators were largely available in schools. However, there remains a paucity of emergency cardiac arrest plans and automated external defibrillator maintenance plans.

POST-CARDIAC ARREST TREATMENTS

1. Am J Cardiol. 2022 Sep 15;179:126. doi: 10.1016/j.amjcard.2022.06.050. Epub 2022 Jul 25.
Effect of Hemoglobin Levels on Cases of Cardiac Arrest.
Mandapaka S(1), Gharib I(2), Annie FH(2).
NO ABSTRACT AVAILABLE

2. Acta Anaesthesiol Scand. 2022 Aug 21. doi: 10.1111/aas.14135. Online ahead of print.
Supranormal arterial oxygen tension only during the first six hours after cardiac arrest is associated with unfavourable outcomes.
Lee HY(1), Jung YH(2)(3), Jeung KW(2)(3), Noh E(4), Lee J(2), Kim JC(5), Lee BK(2)(3), Heo T(2)(3), Min YI(2)(3).
ABSTRACT
BACKGROUND: Multiple studies have investigated the association between hyperoxaemia following cardiac arrest (CA) and unfavourable outcomes; however, they have yielded inconsistent results. Most previous studies quantified oxygen exposure without considering its timing or duration. We investigated the relationship between unfavourable outcomes and supranormal arterial oxygen tension (PaO_2), commonly defined as $PaO_2 > 100$ mmHg, at specific time intervals within 24 h following CA. METHODS: This retrospective observational study included 838 adult non-traumatic patients with CA. The first 24 h following CA were divided into four 6-h time intervals, and the first 6-h period was further divided into three 2-h segments. Multivariable logistic regression analyses were conducted to assess associations of the highest PaO_2 and time-weighted average PaO_2 (TWA-PaO_2) values at each time interval with unfavourable outcomes at hospital discharge (cerebral performance categories 3-5). RESULTS: The highest PaO_2 (p = .028) and TWA-PaO_2 (p = .022) values during the 0-6-h time interval were significantly associated with unfavourable outcomes, whereas those at time intervals beyond 6 h were not. The association was the strongest at supranormal PaO_2 values within the 0-2-h time interval, becoming significant at PaO_2 values ≥ 150 mmHg. During the first 6 h, longer time spent at ≥150 mmHg of PaO_2 was associated with an increased risk of unfavourable outcomes (p = .038). The results were consistent across several sensitivity analyses. CONCLUSION: Supranormal PaO_2 during but not after the first 6 h following cardiac arrest was independently associated with unfavourable outcomes.

TARGETED TEMPERATURE MANAGEMENT

No articles identified.

ELECTROPHYSIOLOGY AND DEFIBRILLATION

1. Resuscitation. 2022 Aug 25:S0300-9572(22)00650-5. doi: 10.1016/j.resuscitation.2022.08.015. Online ahead of print.

Continuous Assessment of Ventricular Fibrillation Prognostic Status during CPR: Implications for Resuscitation.

Coult J(1), Kwok H(2), Eftestøl T(3), Bhandari S(4), Blackwood J(5), Sotoodehnia N(6), Kudenchuk PJ(7), Rea TD(8).

ABSTRACT

BACKGROUND: Ventricular fibrillation (VF) waveform measures reflect myocardial physiologic status. Continuous assessment of VF prognosis using such measures could guide resuscitation, but has not been possible due to CPR artifact in the ECG. A recently-validated VF measure (termed VitalityScore), which estimates the probability (0-100%) of return-of-rhythm (ROR) after shock, can assess VF during CPR, suggesting potential for continuous application during resuscitation. OBJECTIVE: We evaluated VF using VitalityScore to characterize VF prognostic status continuously during resuscitation. METHODS: We characterized VF using VitalityScore during 60 seconds of CPR and 10 seconds of subsequent pre-shock CPR interruption in patients with out-of-hospital VF arrest. VitalityScore utility was quantified using area under the receiver operating characteristic curve (AUC). VitalityScore trends over time were estimated using mixed-effects models, and associations between trends and ROR were evaluated using logistic models. A sensitivity analysis characterized VF during protracted (100-second) periods of CPR. RESULTS: We evaluated 724 VF episodes among 434 patients. After an initial decline from 0-8 seconds following VF onset, VitalityScore increased slightly during CPR from 8-60 seconds (slope: 0.18 %/min). During the first 10 seconds of subsequent pre-shock CPR interruption, VitalityScore declined (slope: -14 %/min). VitalityScore predicted ROR throughout CPR with AUCs 0.73-0.75. Individual VitalityScore trends during 8-60 seconds of CPR were marginally associated with subsequent ROR (adjusted odds ratio for interquartile slope change (OR)=1.10, p=0.21), and became significant with protracted (≥100 seconds) CPR duration (OR=1.28, p=0.006). CONCLUSION: VF prognostic status can be continuously evaluated during resuscitation, a development that could translate to patient-specific resuscitation strategies.

2. JACC Clin Electrophysiol. 2022 Aug 29:S2405-500X(22)00583-7. doi: **10.1016/j.jacep.2022.06.022. Online ahead of print.**

Survivors of Sudden Cardiac Arrest Presenting With Pulseless Electrical Activity: Clinical Substrate, Triggers, Long-Term Prognosis.

Holmstrom L(1), Salmasi S(2), Chugh H(2), Uy-Evanado A(2), Sorenson C(2), Bhanji Z(2), Seifer BM(2), Sargsyan A(2), Salvucci A(3), Jui J(4), Reinier K(2), Chugh SS(5).

ABSTRACT

BACKGROUND: The proportion of sudden cardiac arrest (SCA) presenting as pulseless electrical activity (PEA) is rising, and survival remains low. The pathophysiology of PEA-SCA is poorly understood, and current clinical practice lacks specific options for the management of survivors. OBJECTIVES: In this study, the authors sought to investigate clinical profile, triggers, and long-term prognosis in survivors of SCA presenting with PEA. METHODS: The community-based Oregon SUDS (Sudden Unexpected Death Study) (since 2002) and Ventura PRESTO (Prediction of Sudden Death in Multi-ethnic Communities) (since 2015) studies prospectively ascertain all out-of-hospital SCAs of likely cardiac etiology. Lifetime clinical history and detailed evaluation of SCA events is available. We evaluated all SCA survivors with PEA as the presenting rhythm. RESULTS: The study population included 201 PEA-SCA survivors. Of these, 97 could be contacted for access to their clinical records. Among the latter, the mean age was 67 ± 17 years and 58 (60%) were male. After in-hospital examinations, 29 events (30%) were associated with acute myocardial infarction, and 5 (5%) had

bradyarrhythmias. Among the remaining 63 patients (65%), specific triggers remained undetermined, although 31 (49%) had a previous history of heart failure. Of the 201 overall survivors, 91 (45%) were deceased after a mean follow-up of 4.2 ± 4.0 years. Survivors under the age of 40 years had an excellent long-term prognosis. CONCLUSIONS: Survivors of PEA-SCA are a heterogeneous group with high prevalence of multiple comorbidities, especially heart failure. Surprisingly good long-term survival was observed in young individuals. Acute myocardial infarction as the precipitating event was common, but triggers remained undetermined in the majority. Provision of individualized care to PEA survivors requires a renewed investigative focus on PEA-SCA.

3. Acta Anaesthesiol Scand. 2022 Aug 27. doi: 10.1111/aas.14145. Online ahead of print.
Markers of neutrophil mediated inflammation associate with disturbed continuous electroencephalogram after out of hospital cardiac arrest.
Pekkarinen PT(#)(1), Carbone F(#)(2)(3), Minetti S(2)(3), Ramoni D(2)(3), Ristagno G(4)(5), Latini R(6), Wihersaari L(7), Blennow K(8)(9), Zetterberg H(8)(9)(10)(11)(12), Toppila J(13), Jakkula P(1), Reinikainen M(7), Montecucco F(#)(2)(3), Skrifvars MB(#)(14).
ABSTRACT
BACKGROUND: Achieving an acceptable neurological outcome in cardiac arrest survivors remains challenging. Ischaemia-reperfusion injury induces inflammation, which may cause secondary neurological damage. We studied the association of ICU admission levels of inflammatory biomarkers with disturbed 48-hour continuous electroencephalogram (cEEG), and the association of the daily levels of these markers up to 72 hours with poor 6-month neurological outcome. METHODS: This is an observational, post-hoc sub-study of the COMACARE trial. We measured serum concentrations of procalcitonin (PCT), high-sensitivity C-reactive protein (hsCRP), osteopontin (OPN), myeloperoxidase (MPO), resistin, and proprotein convertase subtilisin/kexin type 9 (PCSK9) in 112 unconscious, mechanically ventilated ICU-treated adult OHCA survivors with initial shockable rhythm. We used grading of 48-hour cEEG monitoring as a measure for the severity of the early neurological disturbance. We defined 6-month Cerebral Performance Category (CPC) 1-2 as good and CPC 3-5 as poor long-term neurological outcome. We compared the prognostic value of biomarkers for 6-month neurological outcome to neurofilament light (NFL) measured at 48 hours. RESULTS: Higher OPN ($P = 0.03$), MPO ($P < 0.01$) and resistin ($P = 0.01$) concentrations at ICU admission were associated with poor grade 48-hour cEEG. Higher levels of ICU admission OPN [OR 3.18; 95% CI 1.25 - 8.11 per ln(ng/mL)] and MPO (OR 2.34; 95% CI 1.30 - 4.21) were independently associated with poor 48-hour cEEG in a multivariable logistic regression model. Poor 6-month neurological outcome was more common in the poor cEEG group (63% vs. 19% $P < 0.001$, respectively). We found a significant fixed effect of poor 6-month neurological outcome on concentrations of PCT ($F = 7.7$, $P < 0.01$), hsCRP ($F = 4.0$, $P < 0.05$), and OPN ($F = 5.6$, $P < 0.05$) measured daily from ICU admission to 72 hours. However, the biomarkers did not have independent predictive value for poor 6-month outcome in a multivariable logistic regression model with 48-hour NFL. CONCLUSION: Elevated ICU admission levels of OPN and MPO predicted disturbances in cEEG during the subsequent 48 hours after cardiac arrest. Thus, they may provide early information about the risk of secondary neurological damage. However, the studied inflammatory markers had little value for long term prognostication compared to 48-hour NFL. Editorial Comment: These findings show that new biomarkers and continuous EEG are disturbed following successful resuscitation after cardiac arrest at the ICU. However, these parameters alone do not add to the prediction of long-term outcomes. Thus, established markers and especially time and neurological assessments remain hallmarks in the prediction of outcome in post-cardiac arrest patients.

PEDIATRICS AND CHILDREN

No articles identified.

EXTRACORPOREAL LIFE SUPPORT

No articles identified.

EXPERIMENTAL RESEARCH

1. J Neuroinflammation. 2022 Sep 1;19(1):214. doi: 10.1186/s12974-022-02571-2.
Flufenamic acid improves survival and neurologic outcome after successful cardiopulmonary resuscitation in mice.
Chen J(1), Chang Y(1), Zhu J(1), Peng Y(1), Li Z(1), Zhang K(1), Zhang Y(1), Lin C(1), Lin Z(1), Pan S(2), Huang K(3).

ABSTRACT
BACKGROUND: Brain injury is the main cause of high mortality and disability after successful cardiopulmonary resuscitation (CPR) from sudden cardiac arrest (CA). The transient receptor potential M4 (TRPM4) channel is a novel target for ameliorating blood-brain barrier (BBB) disruption and neuroinflammation. Herein, we tested whether flufenamic acid (FFA), which is reported to block TRPM4 with high potency, could confer neuroprotection against brain injury secondary to CA/CPR and whether its action was exerted by blocking the TRPM4 channel. METHODS: Wild-type (WT) and Trpm4 knockout (Trpm4-/-) mice subjected to 10-min CA/CPR were randomized to receive FFA or vehicle once daily. Post-CA/CPR brain injuries including neurologic deficits, survival rate, histological damage, edema formation, BBB destabilization and neuroinflammation were assessed. RESULTS: In WT mice subjected to CA/CPR, FFA was effective in improving survival and neurologic outcome, reducing neuropathological injuries, attenuating brain edema, lessening the leakage of IgG and Evans blue dye, restoring tight junction protein expression and promoting microglia/macrophages from the pro-inflammatory subtype toward the anti-inflammatory subtype. In comparison to WT mice, Trpm4-/- mice exhibited less neurologic deficiency, milder histological impairment, more BBB integrity and more anti-inflammatory microglia/macrophage polarization. As expected, FFA did not provide a benefit of superposition compared with vehicle in the Trpm4-/- mice after CA/CPR. CONCLUSIONS: FFA mitigates BBB breach and modifies the functional status of microglia/ macrophages, thereby improving survival and neurologic deficits following CA/CPR. The neuroprotective effects occur at least partially by interfering with the TRPM4 channel in the neurovascular unit. These results indicate the significant clinical potential of FFA to improve the prognosis for CA victims who are successfully resuscitated.

CASE REPORTS

1. BMC Anesthesiol. 2022 Aug 31;22(1):275. doi: 10.1186/s12871-022-01820-4.
Spinal cord infarction secondary to pulmonary embolism-induced cardiac arrest: a case report.
Xu J(1), Zhou X(1), Liu Z(2), Xu Z(3).

ABSTRACT
BACKGROUND: Pulmonary embolism is a common cause of cardiac arrest. Pulmonary embolism-induced cardiac arrest typically suffers from ischemic injuries to various organs, including the central

nervous system. However, spinal cord infarction is a rare complication of pulmonary embolism-induced cardiac arrest. At present, there is no case report on the occurrence of spinal cord infarction secondary to pulmonary embolism-induced cardiac arrest without accompanied cerebral complications. CASE PRESENTATION: A 72-year-old woman with dyspnea and chest tightness was admitted to the emergency room. Cardiac arrest occurred within a short period after admission. Subsequent computed tomographic pulmonary angiography revealed multiple pulmonary thromboses, which were highly suspected to be the cause of cardiac arrest. Thrombolytic therapy with alteplase was given after the return of spontaneous circulation. Unfortunately, she was found to be paraplegic in both lower extremities after regaining consciousness. Spinal cord infarction was confirmed by thoracic magnetic resonance imaging. CONCLUSIONS: Despite receiving high-quality cardiopulmonary resuscitation, patients with cardiac arrest are at high risk of ischemic injury to the central nervous system. After the recovery of consciousness, clinicians should pay more attention to preclude the possibility of spinal cord infarction.

2. Heart Lung Circ. 2022 Aug 30:S1443-9506(22)01044-7. doi: 10.1016/j.hlc.2022.07.019. Online ahead of print.

VA-ECMO With Pericardiocentesis and Autologous Blood Transfusion - Stabilisation Strategy in Acute Cardiac Free Wall Rupture.

Ho CB(1), Wong I(2), Chun Chan AK(2), Yan Chan HH(3), Chan KT(2), Kang-Yin Lee M(2).

ABSTRACT

A 68-year old lady present with left ventricular free wall rupture and cardiac arrest post-myocardial infarction. This article illustrates a strategy combining pericardiocentesis with autologous transfusion together with VA-ECMO as a bridge to definitive surgical repair.