This week's PubMed 24th – 30th September 2023: articles of interest n = 42

CPR AND COVID-19

1. Ann Agric Environ Med. 2023 Sep 28;30(3):498-504. doi: 10.26444/aaem/166757. Epub 2023 Jun 16.
Uncovering the effects of COVID-19 on in-hospital cardiac arrest - a living systematic review and meta-analysis.
Bielski K(1)(2), Pruc M(1)(3), Rafique Z(4), Peacock FW(4), Chmielewski J(5)(2), Panasiuk L(6), Szarpak L(4)(7), Bragazzi NL(8), Chojnowska-Ćwiąkała I(9).
ABSTRACT
INTRODUCTION AND OBJECTIVE: Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) caused a global pandemic and had a negative impact on the entire health care system. To understand the effect of COVID-19 on outcomes of in-hospital cardiac arrest (IHCA), a systematic review and meta-analysis of studies was designed to compare the pre- and intra-pandemic periods of adult patients who suffered cardiac arrest, and additionally by performing a sub-analysis related to COVID-19 positive vs. negative patients in the same group of patients. MATERIAL AND METHODS: To evaluate the impact of COVID-19 on IHCA outcomes a systematic review and meta-analysis was performed. Pubmed (MEDLINE), Scopus, Embase, Web of Science, and Cochrane database were searched for articles published from 1 January 2020 - 8 April 2023. RESULTS: Return of spontaneous circulation events among IHCA patients in pre-COVID-19 and COVID-19 pandemic periods varied and amounted to 64.0% vs. 60.0%, respectively (OR=1.23; 95%CI: 1.19 to 1.26; p<0.001). Re-arrest occurrence was 4.5% vs. 4.9%, respectively (OR=1.24; 95%CI: 1.00 to 1.53; p=0.05). Survival to hospital discharge (SHD) was 25.1% compared to 20.9% for COVID-19 period (OR = 1.17; 95%CI: 0.96 to 1.41; p=0.12). During the COVID-19 period, SHD in COVID-19 positive patients was 14.0% compared to 25.9% for patients without COVID-19 (OR=0.72; 95%CI: 0.28 to 1.86; p=0.50). 30-day
survival rate among COVID-19 positive vs. negative patients was 62.6% vs. 58.3%, respectively (OR =0.99; 95%CI: 0.23 to 4.24; p=0.99). CONCLUSIONS: Patients with SARS-CoV-2 infection had reduced rates of ROSC and SDH, as well as poorer neurologic outcomes and increased in hospital re-arrests during the COVID-19 period. However, the 30-day survival rate was similar in SARS-CoV-2 positive and negative patients.

CPR/MECHANICAL CHEST COMPRESSION

No articles identified.

REGISTRIES, REVIEWS AND EDITORIALS

1. Am J Emerg Med. 2023 Sep 18:S0735-6757(23)00492-8. doi: 10.1016/j.ajem.2023.09.021. Online ahead of print.
The fallen athlete: Fellow athletes are not performing cardiopulmonary resuscitation when a teammate suffers sudden cardiac arrest.
Chukumerije M(1), Truglio TS(2), Dadekian GA(2), Toft LEB(3).
NO ABSTRACT AVAILABLE

2. J Clin Med. 2023 Sep 13;12(18):5945. doi: 10.3390/jcm12185945.
Intra-Aortic Balloon Pump among Shockable Out-of-Hospital Cardiac Arrest Patients: A Propensity-Weighted Analysis in a Multicenter, Nationwide Observational Study in Japan (The JAAM-OHCA Registry).
Yoshimura S(1), Kiguchi T(2), Irisawa T(3), Yamada T(4), Yoshiya K(5), Park C(6), Nishimura T(7), Ishibe T(8), Kobata H(9), Kishimoto M(10), Kim SH(11), Ito Y(12), Sogabe T(13), Morooka T(14), Sakamoto H(15), Suzuki K(16), Onoe A(17), Matsuyama T(18), Matsui S(19), Nishioka N(1), Okada Y(1)(20), Makino Y(1), Kimata S(1), Kawai S(1), Zha L(19), Kiyohara K(21), Kitamura T(19), Iwami T(1).
ABSTRACT
BACKGROUND: The effectiveness of IABP for shockable out-of-hospital cardiac arrest (OHCA) has not been extensively investigated. This study aimed to investigate whether the use of an intra-aortic balloon pump (IABP) for non-traumatic shockable OHCA patients was associated with favorable neurological outcomes. METHODS: From the Japanese Association for Acute Medicine Out-of-Hospital Cardiac Arrest registry, a nationwide multicenter prospective registry, we enrolled adult patients with non-traumatic and shockable OHCA for whom resuscitation was attempted, and who were transported to participating hospitals between 2014 and 2019. The primary outcome was 1-month survival with favorable neurological outcomes after OHCA. After adopting the propensity score (PS) inverse probability of weighting (IPW), we evaluated the association between IABP and favorable neurological outcomes. RESULTS: Of 57,754 patients in the database, we included a total of 2738 adult non-traumatic shockable patients. In the original cohort, the primary outcome was lower in the IABP group (OR with 95% confidence intervals (CIs)), 0.57 (0.48-0.68), whereas, in the IPW cohort, it was not different between patients with and without IABP (OR, 1.18; 95% CI, 0.91-1.53). CONCLUSION: In adult patients with non-traumatic shockable OHCA, IABP use was not associated with 1-month survival with favorable neurological outcomes.

3. Am J Cardiol. 2023 Sep 25;207:222-228. doi: 10.1016/j.amjcard.2023.08.108. Online ahead of print.
Predicting Neurologically Intact Survival for Advanced Age Adults After Successful Resuscitation of Out-of-Hospital Cardiac Arrest.
Adams D(1), Nathanson BH(2), White CN(1), Jackson EA(3), Mader TJ(4), Coute RA(5); CARES Surveillance Group(6).
ABSTRACT
We sought to predict survival to hospital discharge with favorable neurologic outcome for advanced age adults (≥65 years) after successful resuscitation of non-traumatic out-of-hospital cardiac arrest (OHCA). A retrospective observational cohort analysis was performed using the national Cardiac Arrest Registry to Enhance Survival database from January 1, 2013 to December 31, 2021. All nontraumatic OHCA occurring in advanced age adults who survived to hospital admission were included. The primary outcome was survival with favorable neurologic outcome defined as a cerebral performance category score of 1 or 2 at hospital discharge. Multivariable logistic regression including patient variables (age category, gender, co-morbidities) and OHCA characteristics (location, rhythm category, witnessed status, and who initiated cardiopulmonary resuscitation) were used to predict hospital outcome. 83,574 patients met study inclusion criteria with 19,298 (23.1%) surviving with favorable neurologic outcome. The median age was 75 years (interquartile range 69 to 82 years), 58.9% were male, and a majority of events occurred at home (67.3%). Age was found to have a linear, negative association with outcome. Survival with cerebral performance category 1 or 2 ranged from 28.8% in those between the age of 65 to 69 years (n = 23,161) and 13.7% for those age >90 years (n = 4,666). The regression model produced outcome probabilities ranging from 2.6% to 80.8% with a cross-validated AUROC of 0.742 (95% confidence interval 0.738 to 0.746) and a Brier score of 0.151. In conclusion, a simple model with basic patient and OHCA characteristics can predict hospital outcomes in advanced age adults with good discrimination and calibration.

4. Acute Med Surg. 2023 Sep 24;10(1):e892. doi: 10.1002/ams2.892. eCollection 2023 Jan-Dec.

Effects of cardiopulmonary resuscitation instructions on the outcomes of out-of-hospital cardiac arrest: An analysis of the JAAM-OHCA registry.
Inoue T(1), Kaneda K(1), Ise N(2), Koga Y(1), Yagi T(1), Todani M(1), Nakahara T(1), Fujita M(1), Tsuruta R(1).
ABSTRACT
AIM: To determine whether dispatcher-provided cardiopulmonary resuscitation (CPR) instructions improve the outcomes of out-of-hospital cardiac arrest (OHCA). METHODS: Cases registered in the Japanese Association for Acute Medicine Out-of-Hospital Cardiac Arrest (JAAM-OHCA) Registry between June 2014 and December 2019 were included. Cases in which the dispatcher provided CPR
instructions to the bystander were included in the "Instructions" group", and cases without CPR instructions were included in the "No Instructions" group. The primary outcome was the proportion of patients with a favorable neurological outcome, defined as a Glasgow-Pittsburgh cerebral performance category scale of 1 to 2 at 1 month after OHCA. RESULTS: Overall, 51,199 patients with OHCA were registered in the JAAM-OHCA Registry during the study period. Of these, 33,745 were eligible for the study, with 16,509 in the Instructions group and 17,236 in the No Instructions group.
The proportion of patients with a favorable neurological outcome at 1 month after OHCA was inferior in the Instructions group than in the No Instructions group (2.3% versus 3.0%, $p < 0.001$). After adjustment for patient background characteristics, no association was found between CPR instructions provided by a dispatcher and favorable neurological outcomes at 1 month after OHCA (adjusted odds ratio, 1.000; 95% confidence interval, 0.869-1.151, $p = 0.996$). CONCLUSION: The present study found no clear clinical benefit of dispatcher-provided CPR instructions on the neurological outcomes of cases with OHCA.

5. Resuscitation. 2023 Oct;191:109919. doi: 10.1016/j.resuscitation.2023.109919. Epub 2023 Aug 2.
When your patient has a non-shockable rhythm: Which rhythm might be next and is it better?
Noordergraaf GJ(1), van Rijbroek LS(2).
NO ABSTRACT AVAILABLE

6. PLoS One. 2023 Sep 28;18(9):e0291258. doi: 10.1371/journal.pone.0291258. eCollection 2023.
Bayesian network predicted variables for good neurological outcomes in patients with out-of-hospital cardiac arrest.
Shinada K(1), Matsuoka A(1), Koami H(1), Sakamoto Y(1).
ABSTRACT
Out-of-hospital cardiac arrest (OHCA) is linked to a poor prognosis and remains a public health concern. Several studies have predicted good neurological outcomes of OHCA. In this study, we used the Bayesian network to identify variables closely associated with good neurological survival outcomes in patients with OHCA. This was a retrospective observational study using the Japan
Association for Acute Medicine OHCA registry. Fifteen explanatory variables were used, and the outcome was one-month survival with Glasgow-Pittsburgh cerebral performance category (CPC) 1-2. The 2014-2018 dataset was used as training data. The variables selected were identified and a sensitivity analysis was performed. The 2019 dataset was used for the validation analysis. Four variables were identified, including the motor response component of the Glasgow Coma Scale
(GCS M), initial rhythm, age, and absence of epinephrine. Estimated probabilities were increased in the following order: GCS M score: 2-6; epinephrine: non-administered; initial rhythm: spontaneous rhythm and shockable; and age: <58 and 59-70 years. The validation showed a sensitivity of 75.4% and a specificity of 95.4%. We identified GCS M score of 2-6, initial rhythm (spontaneous rhythm and shockable), younger age, and absence of epinephrine as variables associated with one-month survival with CPC 1-2. These variables may help clinicians in the decision-making process while treating patients with OHCA.

7. Circ Cardiovasc Interv. 2023 Sep 26:e013537. doi: 10.1161/CIRCINTERVENTIONS.123.013537. Online ahead of print.
Refractory Shockable Rhythms: The Exception That Proves the Rule After Out-of-Hospital Cardiac Arrest.
Reynolds JC(1).
NO ABSTRACT AVAILABLE

8. Am J Emerg Med. 2023 Sep 18:S0735-6757(23)00493-X. doi: 10.1016/j.ajem.2023.09.022. Online ahead of print.
Comment on: PCO2 on arrival as a predictive biomarker in patients with out-of-hospital cardiac arrest.
Jouffroy R(1), Gault T(2), Vivien B(3).
NO ABSTRACT AVAILABLE

IN-HOSPITAL CARDIAC ARREST

1. Resuscitation. 2023 Sep 22:109978. doi: 10.1016/j.resuscitation.2023.109978. Online ahead of print.
Rapid response team activation prior to in-hospital cardiac arrest: Areas for improvements based on a national cohort study.
Thorén A(1), Jonsson M(2), Spångfors M(3), Joelsson-Alm E(4), Jakobsson J(5), Rawshani A(6), Kahan T(7), Engdahl J(7), Jadenius A(8), Boberg von Platen E(9), Herlitz J(10), Djärv T(11).
ABSTRACT
INTRODUCTION: Rapid response teams (RRTs) are designed to improve the "chain of prevention" of in-hospital cardiac arrest (IHCA). We studied the 30-day survival of patients reviewed by RRTs within 24 hours prior to IHCA, as compared to patients not reviewed by RRTs. METHODS: A nationwide cohort study based on the Swedish Registry of Cardiopulmonary Resuscitation, between January 1st, 2014, and December 31st, 2021. An explorative, hypothesis-generating additional in-depth data collection from medical records was performed in a small subgroup of general ward patients reviewed by RRTs. RESULTS: In all, 12,915 IHCA patients were included. RRT-reviewed patients
(n=2,058) had a lower unadjusted 30-day survival (25% vs 33%, $p<0.001$), a propensity score based odds ratio for 30-day survival of 0.92 (95% confidence interval 0.90-0.94, $p<0.001$) and were more likely to have a respiratory cause of IHCA (22% vs 15%, $p<0.001$). In the subgroup (n=82), respiratory distress was the most common RRT trigger, and 24% of the RRT reviews were delayed. Patient transfer to a higher level of care was associated with a higher 30-day survival rate (20% vs 2%, $p<0.001$). CONCLUSION: IHCA preceded by RRT review is associated with a lower 30-day survival rate and a greater likelihood of a respiratory cause of cardiac arrest. In the small explorative subgroup, respiratory distress was the most common RRT trigger and delayed RRT activation was frequent. Early detection of respiratory abnormalities and timely interventions may have a potential to improve outcomes in RRT-reviewed patients and prevent further progress into IHCA.

INJURIES AND CPR

No articles identified.

CAUSE OF THE ARREST

1. Am J Cardiol. 2023 Sep 25;207:253-256. doi: 10.1016/j.amjcard.2023.08.182. Online ahead of print.
Diagnostic Value of High-Sensitivity Cardiac Troponin-I in Patients After Out-of-Hospital Cardiac Arrest.
Elad B(1), Aronson D(2), Cohn-Schwartz D(3), Kapeliovich M(4).
ABSTRACT
Knowing the etiology of cardiac arrest (CA) is important for treatment decisions. Results of previous studies on the diagnostic role of cardiac troponin in patients resuscitated from CA are controversial, few studies were done during the era of high-sensitivity cardiac troponin-I (hs-cTnI), and kinetics of hs-cTnI was not thoroughly investigated. We aimed to explore the diagnostic value of hs-cTnI in patients resuscitated from out-of-hospital CA (OHCA). This retrospective study included 201 consecutive patients after OHCA admitted to the intensive cardiac care unit at Rambam Health Care Campus from 2016 to 2021. Patients were divided into 2 groups according to etiology of CA: group 1-patients with definite acute myocardial infarction (AMI), group 2-patients in whom AMI was excluded. Values of hs-cTnI on admission, peak hs-cTnI, and hs-cTnI upslope were compared between patients with AMI and non-AMI. Peak hs-cTnI and hs-cTnI upslope differed significantly between patients with non-AMI versus AMI CA (median 1,424 vs 32,558 ng/L, p <0.0001 and median 109 vs 2,322 ng/L/h, p <0.0001, respectively). Moreover, peak hs-cTnI and hs-cTnI upslope were found to have good discrimination performance between patients with non-AMI and AMI, with area under the curve receiver operating characteristics (ROC) curves of 0.83 and 0.80, respectively. In conclusion, in patients resuscitated from OHCA values of peak hs-cTnI and hs-cTnI upslope could be helpful in the diagnosis of etiology of CA as adjunct to other diagnostic methods.

END-TIDAL CO_2

1. Prehosp Emerg Care. 2023 Sep 26:1-23. doi: 10.1080/10903127.2023.2262566. Online ahead of print.
The association of prehospital end-tidal carbon dioxide with survival following out-of-hospital cardiac arrest.
Smida T(1), Menegazzi JJ(2), Crowe RP(3), Salcido DD(2), Bardes J(4), Myers B(3).
ABSTRACT
Objective End tidal carbon dioxide (ETCO2) is often used to assess ventilation and perfusion during cardiac arrest resuscitation. However, few data exist on the relationship between ETCO2 values and mortality in the context of contemporary resuscitation practices. We aimed to explore the association between ETCO2 and mortality following out-of-hospital cardiac arrest (OHCA).Methods We used the 2018-2021 ESO annual datasets to query all non-traumatic OHCA patients with attempted resuscitation. Patients with documented DNR/POLST, EMS-witnessed arrest, ROSC after bystander CPR only, or < 2 documented ETCO2 values were excluded. The lowest and highest ETCO2 values recorded during the total prehospital interval, in addition to the pre- and post-ROSC intervals for resuscitated patients, were calculated. Multivariable logistic regression models adjusted for age, sex, initial rhythm, witnessed status, bystander CPR, etiology, OHCA location, sodium bicarbonate administration, number of milligrams of epinephrine administered, and response interval were used to evaluate the association between measures of ETCO2 and mortality. Results Hospital outcome data were available for 14,122 patients, and 2,209 (15.6%) were classified as surviving to discharge. Compared to patients with maximum prehospital ETCO2 values of 30-40 mmHg, odds of mortality were increased for patients with maximum prehospital ETCO2 values of <20 mmHg (aOR: 3.5 [2.1, 5,9]), 20-29 mmHg (aOR: 1.5 [1.1, 2.1]), and >50 mmHg (aOR: 1.5 [1.2, 1.8]). After 20 minutes of CPR, <12% of patients had ETCO2 values <10 mmHg. This cutpoint was 96.7% specific and 6.9% sensitive for mortality.Conclusion In this dataset, both high and low ETCO2 values were associated with increased mortality. Contemporary resuscitation practices may make low ETCO2 values uncommon, and field termination decision algorithms should not use ETCO2 values in isolation.

ORGAN DONATION

No articles identified.

FEEDBACK

1. J Clin Med. 2023 Sep 18;12(18):6023. doi: 10.3390/jcm12186023.
Effect of a Real-Time Audio Ventilation Feedback Device on the Survival Rate and Outcomes of Patients with Out-of-Hospital Cardiac Arrest: A Prospective Randomized Controlled Study.
Lee ED(1), Jang YD(1), Kang JH(1), Seo YS(1), Yoon YS(1), Kim YW(1), Jeong WB(1), Ji JG(1).
ABSTRACT
The purpose of this study was to evaluate the effect of real-time audio ventilation feedback on the survival of patients with an out-of-hospital cardiac arrest (OHCA) during advanced cardiac life support (ACLS) performed by paramedics. This research was a prospective randomized controlled study performed in Busan, South Korea, from July 2022 to December 2022. This study included 121 patients, ages 19 and up, who were transferred to the study site, excluding 91 patients who did not receive CPR under a doctor's direction as well as those who had a '(DNR)' order among 212 adult CA patients. OHCA patients' clinical prognosis was compared by being randomly assigned to either a general manual defibrillator (NVF) group (N = 58) or a manual defibrillator with an audio ventilation feedback (AVF) group (N = 63). To verify the primary outcome, the cerebral performance category (CPC), return of spontaneous consciousness (ROSC), 30h survival, and survival discharge were compared. Multivariate logistic regression was conducted to analyze the association between the audio-feedback manual defibrillator (AVF) and the ROSC of OHCA patients. This study analyzed 121 patients among 212 OHCA patients. The ROSC (AVF group: 32 {26.4%} vs. NVF group: 21 {17.3%}), 24 h survival (AVF group: 24 {19.8%} vs. NVF group: 11 {9.0%}), and survival discharge (AVF group: 12 {9.9%} vs. NVF group: 6 {4.9%}) were higher in the AVF group than the NVF group. However, upon analyzing CPC scores in the surviving patients between the two groups, there was no significant difference (AVF group: 4.1 ± 1.23 vs. NVF group:4.7 ± 1.23, p = 1.232). Multivariate logistic regression analysis showed that the use of AVF was associated with a higher ROSC (odds ratio {OR}, 0.46; 95% confidence interval {CI}, 0.23-0.73; p < 0.01) and higher survival at 30 h (OR, 0.63; 95% CI, 0.41-0.98; p = 0.01).

DRUGS

1. Resuscitation. 2023 Oct;191:109884. doi: 10.1016/j.resuscitation.2023.109884.
Does sodium bicarbonate significantly improve survival in asystolic and PEA out-of-hospital cardiac arrest?
Albano J(1), Conner TM(2).
NO ABSTRACT AVAILABLE

TRAUMA

1. Sci Rep. 2023 Sep 25;13(1):16042. doi: 10.1038/s41598-023-43318-0.
Potential harms of emergency department thoracotomy in patients with persistent cardiac arrest following trauma: a nationwide observational study.
Yamamoto R(1), Suzuki M(2), Sasaki J(3).
ABSTRACT
Emergency department thoracotomy (EDT) was incorporated into traumatic out-of-hospital cardiac arrest (t-OHCA) resuscitation. Although current guidelines recommend EDT with survival predictors, futility following EDT has been demonstrated and the potential risks have not been thoroughly investigated. This study aimed to elucidate the benefits and harms of EDT for persistent cardiac arrest following injury until hospital arrival. This retrospective cohort study used a nationwide trauma registry (2019-2021) and included adult patients with t-OHCA both at the scene and on hospital arrival. Survival to discharge, hemostatic procedure frequency, and transfusion amount were compared between patients treated with and without EDT. Inverse probability weighting using a propensity score was conducted to adjust age, sex, comorbidities, mechanism of injury, prehospital resuscitative procedure, prehospital physician presence, presence of signs of life, degree of thoracic injury, transportation time, and institutional characteristics. Among 1289 patients, 374 underwent EDT. The longest transportation time for survivors was 8 and 23 min in patients with and without EDT, respectively. EDT was associated with lower survival to discharge (4/374 [1.1%] vs. 22/915 [2.4%]; adjusted odds ratio [OR], 0.43 [95% CI 0.22-0.84]; p = 0.011), although patients with EDT underwent more frequent hemostatic surgeries (46.0% vs. 5.0%; adjusted OR, 16.39 [95% CI 12.50-21.74]) and received a higher amount of transfusion. Subgroup analyses revealed no association between EDT and lower survival in patients with severe chest injuries (1.0% vs. 1.4%; adjusted OR, 0.72 [95% CI 0.28-1.84]). EDT was associated with lower survival till discharge in trauma patients with persistent cardiac arrests after adjusting for various patient backgrounds, including known indications for EDT. The idea that EDT is the last resort for t-OHCA should be reconsidered and EDT indications need to be deliberately determined.

2. J Trauma Acute Care Surg. 2023 Oct 1;95(4):577-582. doi: 10.1097/TA.0000000000004070. Epub 2023 Jun 15.
The futility of closed chest compressions after trauma: A multi-institutional study.
Fierro NM(1), Dhillon NK, Park G, Stupinski J, Drevets P, Zheng DJ, Tillou A, Ugarte C, Schellenberg M, Tay-Lasso E, Nahmias J, Parker P, Ley EJ.
ABSTRACT
BACKGROUND: The desire to deliver appropriate care after trauma creates challenges when deciding to proceed if care appears futile. This study aimed to analyze survival rates for trauma patients who undergo closed chest compressions by decade of life. METHODS: A multicenter retrospective review of trauma patients with an Injury Severity Score ≥16 who underwent closed chest compressions from 2015 to 2020 at four large, urban, academic Level I trauma centers was conducted. Those with
intraoperative arrest were excluded. The primary endpoint was survival to discharge. RESULTS: Of the 247 patients meeting inclusion criteria, 18% were 70 years or older, 78% were male, and 24% presented due to a penetrating mechanism of injury. Compressions occurred in the prehospital setting (56%), emergency department (21%), intensive care unit (19%), and on the floor (3%). On average, patients arrested on hospital day 2, and survived 1 day after arrest if return of spontaneous circulation was achieved. Overall mortality was 92%. Average hospital length of stay was lower in patients 70 years or older (3 days vs. 6 days, $p < 0.01$). Survival was highest in patients 60 years to 69 years (24%), and although patients 70 years or older presented with lower Injury Severity Scores (28 vs. 32, $p = 0.04$), no patient 70 years or older survived to hospital discharge (0% v 9%, $p = 0.03$).
CONCLUSION: Closed chest compressions are associated with a high mortality rate after moderate to severe trauma with 100% mortality in patients older than 70 years. This information may assist with the decision to withhold chest compression, especially in older adults.

VENTILATION

1. Prehosp Emerg Care. 2023 Sep 25:1-12. doi: 10.1080/10903127.2023.2260479. Online ahead of print.
Prehospital advanced airway management and ventilation for out-of-hospital cardiac arrest with prehospital return of spontaneous circulation: a prospective observational cohort study in Japan.
Nakayama R(1), Bunya N(1), Uemura S(1), Sawamoto K(1), Narimatsu E(1).
ABSTRACT
BackgroundThe relationship among advanced airway management (AAM), ventilation, and oxygenation in patients with out-of-hospital cardiac arrest (OHCA) who achieve prehospital return of spontaneous circulation (ROSC) has not been validated. This study was designed to evaluate ventilation and oxygenation for each AAM technique (supraglottic devices [SGA] or endotracheal intubation [ETI]) using arterial blood gas (ABG) results immediately after hospital arrival. Methods This observational cohort study, using data from the Japanese Association for Acute Medicine OHCA Registry, included patients with OHCA with prehospital and hospital arrival ROSC between July 1, 2014, and December 31, 2019. The primary outcomes were the partial pressure of carbon dioxide in the arterial blood ($PaCO_2$) and partial pressure of oxygen in the arterial blood (PaO_2) in the initial ABG at the hospital for each AAM technique (SGA or ETI) performed by paramedics. The secondary outcome was favorable neurological outcome (cerebral performance category [CPC] 1 or 2) for specific $PaCO_2$ levels, which were defined as good ventilation ($PaCO_2$ ≤45 mmHg) and insufficient
ventilation ($PaCO_2$ >45 mmHg).ResultsThis study included 1,527 patients. Regarding AAM, 1,114 and 413 patients were ventilated using SGA and ETI, respectively. The median $PaCO_2$ and PaO_2 levels were 74.50 mmHg and 151.35 mmHg in the SGA group, while 66.30 mmHg and 173.50 mmHg in the ETI group. $PaCO_2$ was significantly lower in the ETI group than in the SGA group (12.55 mmHg; 95% CI 15.27 to 8.20, P-value < 0.001), while no significant difference was found in PaO_2 by multivariate linear regression analysis. After stabilizing inverse probability of weighting (IPW), the adjusted odds ratio for favorable neurological outcome at 1 month was significant in the good ventilation group compared to the insufficient ventilation cohort (adjusted odds ratio = 2.12, 95%CI: 1.40 to 3.19, P value < 0.001).ConclusionThe study showed that in OHCA patients with prehospital ROSC, the $PaCO_2$ levels in the initial ABG were lower in the group with AAM by ETI than in the SGA group. Furthermore, patients with prehospital ROSC and $PaCO_2$ ≤45 mmHg on arrival had an increased odds of favorable neurological outcome after stabilized IPW adjustment.

CERERBRAL MONITORING

1. J Clin Neurophysiol. 2023 Sep 25. doi: 10.1097/WNP.0000000000001042. Online ahead of print.
Correlation Between Quantitative Background Suppression on EEG and Serum NSE in Patients With Hypoxic-ischemic Encephalopathy.
Lee DA(1), Sohn GM(1), Kim BJ(1), Yoo BC(2), Lee JH(2), Choi HJ(2), Kim SE(1).
ABSTRACT
PURPOSE: We evaluated the correlation between quantitative background activities on electroencephalography (EEG) and serum neuron specific enolase (NSE) in patients with hypoxic-ischemic encephalopathy as well as a diagnostic value of prognostication. METHODS: This retrospective cohort study enrolled patients with return of spontaneous circulation after cardiac arrest from March 2010 to March 2020. The inclusion criteria

were (1) older than the age of 16 years and (2) patients who had both EEG and NSE. The median time for EEG and NSE were 3 days interquartile range 2-5 days) and 3 days (interquartile range 2-4 days), respectively. The quantification of background activity was conducted with the suppression ratio (SR). We used a machine learning (eXtreme Gradient Boosting algorithm) to evaluate whether the SR could improve the accuracy of prognostication. RESULTS: We enrolled 151 patients. The receiver operating characteristic analysis revealed a cut-off value of serum NSE and the SR for poor outcome, serum NSE (>31.9 μg/L, area under curve [AUC] = 0.88), and the SR (>21.5%, AUC = 0.75 in the right hemisphere, >34.4%, AUC = 0.76 in the left hemisphere). There was a significant positive correlation between the severity of SR and the level of NSE ($\rho = 0.57$, $p < 0.0001$ for the right hemisphere, $\rho = 0.58$, $p < 0.0001$ for the left hemisphere). The SR showed an excellent diagnostic value for predicting
poor outcome (93% specificity, 60% sensitivity in the right hemisphere and 93% specificity, 58% sensitivity in the left hemisphere). With machine learning analysis, there was an increment in distinguishing the neurological outcome by adding SR on clinical factors. CONCLUSIONS: The SR showed a positive correlation with the level of serum NSE. The diagnostic value of the SR for predicting poor outcome was excellent, suggesting that it can be a possible biomarker for neuroprognostication in patients with hypoxic-ischemic encephalopathy.

ULTRASOUND AND CPR

No articles identified.

ORGANISATION AND TRAINING

1. Med J Malaysia. 2023 Sep;78(5):639-645.
Outcome of cardiopulmonary resuscitation in the emergency department of a tertiary hospital in Malaysia.
Iqhbal KM(1), Mokhtar NAM(2), Isa MR(2), Mokhtar MF(2).
ABSTRACT
INTRODUCTION: There are insufficient data available regarding the outcome of cardiac arrest (CA) resuscitated in the emergency department in Malaysia. This study aims to determine the incidence of CA, the return of spontaneous circulation (ROSC), survival to admission (STA), survival to discharge (STD) and factors influencing the overall outcome of CA. MATERIAL AND METHODS: This is a retrospective observational study done in Hospital Sg Buloh (HSB), a tertiary referral centre in an urban area located north of Kuala Lumpur, Malaysia's capital city, from January until December 2018, involving 289 patients. All cases with CPR and a sustained return of spontaneous circulation (ROSC) were included in the study and followed up until discharged or died in the hospital. RESULTS: Out of 236 patients recruited, 25.8% achieved ROSC, 15.7% survived on admission, and 4.2% of patients were discharged alive. Of 74.1% of witnessed OHCA, only 17.5% received bystander CPR. Factors with favourable outcomes include CA in ED ($p<0.001$), the initial rhythm of ventricular fibrillation ($p=0.003$), defibrillation ($p=0.024$), OHCA witnessed by emergency medical services (EMS) ($p=0.024$) and intravenous adrenaline administration ($p=0.001$). When using multivariate regression analysis, positive outcomes were associated with the cardiac and respiratory cause of CA (Adjusted Odd Ratio (AOR) 3.66; 95% Confidence Intervals, 95%CI: 2.52 - 12.61 and AOR 8.76; 95%CI: 5.76- 15.46, respectively) as well as OHCA witnessed by EMS (AOR 10.81; 95%CI: 1.84-19.52).
CONCLUSIONS: Despite being an upper-middle-income country and having advancements in the healthcare system, a relatively lower STD rate among survivors of CA in the ED was observed in this study. There was underutilization of the EMS among patients with CA. The bystander CPR rate among patients with CA in Malaysia is also worryingly low. Aggressive community participation in
cardiac arrest awareness programmes is much required. Additionally, in achieving better outcomes, implementing standardized post-resuscitation care protocols with existing resources will be a challenge for physicians managing cardiac arrest cases.

2. Cureus. 2023 Aug 26;15(8):e44143. doi: 10.7759/cureus.44143. eCollection 2023 Aug.
Knowledge and Attitude of the General Population About Do Not Resuscitate (DNR) in the Western Region, Saudi Arabia.
Taha M Sr(1), Aldabali FOM(2), Alotaibi SH(3), Melybari RZ(4), Alqelaiti BA(5), Alderhami AM(2), Bajaber TA(6).
ABSTRACT
BACKGROUND: A do-not-resuscitate (DNR) order is a medical order issued by a doctor. It directs medical professionals to refrain from performing cardiopulmonary resuscitation (CPR) if a patient's breathing or heartbeat ceases. Patients can refuse CPR in an emergency if they have a DNR order. The DNR order includes precise directives about CPR. Instructions for extra therapies like nourishment, other drugs, or painkillers are not included. AIM: The aim of the study is to learn more about the western region's general population's knowledge and attitudes toward DNR orders and identify any challenges that may arise when dealing with DNR patients. METHODOLOGY: A cross-sectional study was conducted in 2023 in the western region of Saudi Arabia. An online, self-administered questionnaire was distributed randomly from April 8, 2023 to June 6, 2023. The estimated sample size was 384, and 604 were the collected responses. RESULTS: A total of 383 (63.4%) participants were females, and 221 (36.6%) were males. Regarding the knowledge and attitude of the general population about DNR orders in the western region of Saudi Arabia, 276 (45.7%) study participants had satisfactory knowledge and awareness, while 328 (54.3%) had inadequate knowledge. A total of 343 (56.8%) participants thought that DNR is important; 255 (42.2%) felt that the DNR has reduced the pain of their relatives, and 181 (30%) believed that it has reduced the stress felt by the patient's families. Of participants aged 20-30 years, 58.4% had satisfactory knowledge about DNR orders compared with those aged 50 and above; 76.1% of healthcare workers had satisfactory knowledge versus 26.5% of unemployed participants (P=.001).
CONCLUSION: We recommend increasing awareness and knowledge about DNR by conducting educational events about the concept and how to deal with patients who choose to acquire a DNR order.

3. Int J Emerg Med. 2023 Sep 26;16(1):63. doi: 10.1186/s12245-023-00537-6.
Provision of bystander CPR for out-of-hospital cardiac arrest in the Middle East: a retrospective gender-based analysis.
Awad E(1)(2)(3), Alinier G(4)(5)(6)(7), Farhat H(4)(8)(9), Rumbolt N(10), Azizurrahman A(10), Mortada B(10), Shami R(10).
ABSTRACT
BACKGROUND: Previous studies conducted in North America, Europe, and East Asia (Liu et al., EClinicalMedicine 44:101293, 2022; Matsui et al., JAMA Netw Open 2:e195111, 2019; Awad et al., J Am Coll Emerg Physicians Open 4:e12957, 2023; Yoon et al., Prehosp Emerg Care :1-7, 2022) reported gender disparities in the provision of bystander CPR for patients with out-of-hospital cardiac arrest (OHCA). However, it remains unknown whether similar disparities exist in the Middle Eastern and Gulf regions. The primary objective of this study is to evaluate gender differences in the provision of bystander CPR for patients with OHCA in Qatar. METHODS: Retrospective analysis of data obtained from Hamad Medical Corporation OHCA registry in the State of Qatar (2016-2022). We included adults with non-traumatic and EMS-attended OHCA. We used multilevel logistic regression to examine the association between gender and provision of bystander CPR. RESULTS: In total, 4283 patients were included. Of those, 3414 (79.7%) were males, 1639 (38.3%) arrested in public locations, and 1463 (34.2%) received bystander CPR. Unadjusted

comparisons showed that females were significantly older than males (mean age: 62.2 vs. 52.7). Females had a lower proportion of OHCA occurring in public locations (15.1% vs. 44.2%) and a lower proportion of
shockable rhythm (11.9 vs. 27.5%). Regarding the outcome variable (provision of bystander CPR), the unadjusted analysis showed that the proportion of females who received bystander CPR was lower than that of males (29.2% vs. 35.4%, $p < 0.001$). However, after adjustment, we found no significant difference in provision of bystander CPR by gender (adjusted OR female vs. male 0.99, 95% CI 0.84-1.20, $p = 0.97$). In the subgroup who arrested in public locations, the analysis revealed females had greater odds of receiving bystander CPR (adjusted OR female vs. male 1.47, 95% CI 1.10-1.82, $p = 0.04$). CONCLUSIONS: Overall, bystander CPR was less common in female gender; after adjustment for other covariates, including arrest location, we found no significant gender differences in provision of bystander CPR. We also observed that females were found to have a lower incidence of cardiac arrest in public locations. Nevertheless, if females were to experience cardiac arrest in a public location, they would be more likely to receive CPR. Further research is required to explain the observed differences in provision of bystander CPR.

4. Crit Care Med. 2023 Sep 25. doi: 10.1097/CCM.0000000000006067. Online ahead of print.
Trends in Incidence and Outcomes of Cardiac Arrest Occurring in Swedish ICUs.
Flam B(1)(2), Andersson Franko M(3)(4), Skrifvars MB(5), Djärv T(6)(7), Cronhjort M(3)(8), Jonsson Fagerlund M(1)(2), Mårtensson J(1)(2).
ABSTRACT
OBJECTIVE: To determine temporal trends in the incidence of cardiac arrest occurring in the ICU (ICU-CA) and its associated long-term mortality. DESIGN: Retrospective observational study. SETTING: Swedish ICUs, between 2011 and 2017. PATIENTS: Adult patients (≥18 yr old) recorded in the Swedish Intensive Care Registry (SIR). INTERVENTIONS: None. MEASUREMENTS AND MAIN RESULTS: ICU-CA was defined as a first episode of cardiopulmonary resuscitation and/or defibrillation following an ICU admission, as recorded in SIR or the Swedish Cardiopulmonary Resuscitation Registry. Annual adjusted ICU-CA incidence trend (all admissions) was estimated using propensity score-weighted analysis. Six-month mortality trends (first admissions) were assessed using multivariable mixed-effects logistic regression. Analyses were adjusted for pre-admission characteristics (sex, age, socioeconomic status, comorbidities, medications, and healthcare utilization), illness severity on ICU admission, and admitting unit. We included 231,427 adult ICU admissions. Crude ICU-CA incidence was 16.1 per 1,000 admissions, with no significant annual trend
in the propensity score-weighted analysis. Among 186,530 first admissions, crude 6-month mortality in ICU-CA patients was 74.7% (95% CI, 70.1-78.9) in 2011 and 68.8% (95% CI, 64.4-73.0) in 2017. When controlling for multiple potential confounders, the adjusted 6-month mortality odds of ICU-CA patients decreased by 6% per year (95% CI, 2-10). Patients admitted after out-of-hospital or in-hospital cardiac arrest had the highest ICU-CA incidence (136.1/1,000) and subsequent 6-month mortality (76.0% [95% CI, 73.6-78.4]). CONCLUSIONS: In our nationwide Swedish cohort, the adjusted incidence of ICU-CA remained unchanged between 2011 and 2017. More than two-thirds of patients with ICU-CA did not survive to 6 months following admission, but a slight improvement appears to have occurred over time.

5. J Clin Med. 2023 Sep 10;12(18):5884. doi: 10.3390/jcm12185884.
Telephone-Cardiopulmonary Resuscitation Guided by a Telecommunicator: Design of a Guiding Algorithm for Telecommunicators.
Yacobis-Cervantes TR(1), García-Méndez JA(1), Leal-Costa C(2), Castaño-Molina MÁ(2), Suárez-Cortés M(2), Díaz-Agea JL(2).
ABSTRACT
BACKGROUND: Out-of-hospital cardiac arrest is considered a global problem. In the last few years, there has been a growing interest in telephone-cardiopulmonary resuscitation guided by a telecommunicator. Indeed, several studies have demonstrated that it increases the chances of survival rate. This study focuses on the key points the operator should follow when performing telephone-cardiopulmonary resuscitation. The main objective of this paper is to design an algorithm to improve the telephone-cardiopulmonary resuscitation response protocol. METHODS: The available evidence and the areas of uncertainty that have not been previously mentioned in the literature are discussed. All the information has been analyzed by two discussion groups. Later, a consensus was reached among all members. Finally, a response algorithm was designed and implemented in clinical simulation. RESULTS: All the witnesses were able to recognize the OHCA, call for emergency assistance, follow all the operator's instructions, move the victim, and place their hands in the correct position to perform CPR. DISCUSSION: The results of the pilot study provide us a basis for further experimental studies using randomization and experimental and control groups.
CONCLUSIONS: No standardized recommendations exist for the operator to perform telephone-guided CPR. For this reason, a response algorithm was designed.

6. Medicina (Kaunas). 2023 Aug 23;59(9):1526. doi: 10.3390/medicina59091526.
Learning of Basic Life Support through the Flipped Classroom in Secondary Schoolchildren: A Quasi-Experimental Study with 12-Month Follow-Up.
Cons-Ferreiro M(1)(2), Mecias-Calvo M(2), Romo-Perez V(1), Navarro-Patón R(2).
ABSTRACT
Background and Objectives: International institutions together with the World Health Organisation recommend the teaching of BLS in schools. Therefore, the objective of this research was to study the feasibility of teaching CPR and AED through the flipped classroom, exploring the medium- and long-term retention of knowledge and practical skills among high school students. Materials and Methods: The sample consisted of 260 secondary schoolchildren (137 in the experimental group (EG) and 123 in the control group (CG)) between 12 and 14 years old ($M = 12.75 \pm 1.02$). Results: The data revealed that the EG obtained better post-course results in the correct position of the hands ($p = 0.011$), the depth of external cardiac compression ($p > 0.001$), and the mean time to apply an effective shock with the AED ($p = 0.013$). The CG obtained better results in compressions with complete chest re-expansion ($p = 0.025$). These differences disappeared at 6 months ($p > 0.05$) and 12 months ($p > 0.05$). Conclusions: A training program based on the flipped classroom is as effective and viable as traditional training, although more efficient since it is applied in less time, in the sequence of action in BLS, CPR skills, and the application of an effective shock with an AED.

7. Sci Rep. 2023 Sep 27;13(1):16180. doi: 10.1038/s41598-023-43106-w.
Prehospital predicting factors using a decision tree model for patients with witnessed out-of-hospital cardiac arrest and an initial shockable rhythm.
Tateishi K(#)(1), Saito Y(#)(2), Yasufuku Y(#)(3), Nakagomi A(#)(2), Kitahara H(2), Kobayashi Y(2), Tahara Y(4), Yonemoto N(5), Ikeda T(6), Sato N(7), Okura H(8).
ABSTRACT
The effect of prehospital factors on favorable neurological outcomes remains unclear in patients with witnessed out-of-hospital cardiac arrest (OHCA) and a shockable rhythm. We developed a decision tree model for these patients by using prehospital factors. Using a nationwide OHCA registry database between 2005 and 2020, we retrospectively analyzed a cohort of 1,930,273 patients, of whom 86,495 with witnessed OHCA and an initial shockable rhythm were included. The primary endpoint was defined as favorable neurological survival (cerebral performance category score of 1 or 2 at 1 month). A decision tree model was developed from randomly selected 77,845 patients (development cohort) and

validated in 8650 patients (validation cohort). In the development cohort, the presence of prehospital return of spontaneous circulation was the best predictor of favorable neurological survival, followed by the absence of adrenaline administration and age. The patients were categorized into 9 groups with probabilities of favorable neurological survival ranging from 5.7 to 70.8% (areas under the receiver operating characteristic curve of 0.851 and 0.844 in the development and validation cohorts, respectively). Our model is potentially helpful in stratifying the probability of favorable neurological survival in patients with witnessed OHCA and an initial shockable rhythm.

8. J Am Heart Assoc. 2023 Sep 26:e030138. doi: 10.1161/JAHA.123.030138. Online ahead of print.
Association of Racial Residential Segregation With Long-Term Outcomes and Readmissions After Out-of-Hospital Cardiac Arrest Among Medicare Beneficiaries.
Abbott EE(1)(2)(3), Buckler DG(1), Hsu JY(4), Abella BS(5), Richardson LD(1)(2)(3), Carr BG(1)(2), Zebrowski AM(1)(2).
ABSTRACT
Background The national impact of racial residential segregation on out-of-hospital cardiac arrest outcomes after initial resuscitation remains poorly understood. We sought to characterize the association between measures of racial and economic residential segregation at the ZIP code level and long-term survival and readmissions after out-of-hospital cardiac arrest among Medicare
beneficiaries. Methods and Results In this retrospective cohort study, using Medicare claims data, our primary predictor was the index of concentration at the extremes, a measure of racial and economic segregation. The primary outcomes were death up to 3 years and readmissions. We estimated hazard ratios (HRs) across all 3 types of index of concentration at the extremes measures for each outcome while adjusting for beneficiary demographics, treating hospital characteristics, and index hospital procedures. In fully adjusted models for long-term survival, we found a decreased hazard of death and risk of readmission for beneficiaries residing in the more segregated White communities and higher-income ZIP codes compared with the more segregated Black communities and lower-income ZIP codes across all 3 indices of concentration at the extremes measures (race: HR, 0.87 [95% CI, 0.81-0.93]; income: HR, 0.75 [95% CI, 0.69-0.78]; and race+income: HR, 0.77 [95% CI, 0.72-0.82]). Conclusions We found a decreased hazard of death and risk for readmission for those residing in the more segregated White communities and higher-income ZIP codes compared with the more segregated Black communities and lower-income ZIP codes when using validated measures of racial and economic segregation. Although causal pathways and mechanisms remain unclear, disparities in outcomes after out-of-hospital cardiac arrest are associated with the structural components of race and wealth and persist up to 3 years after discharge.

9. Heart Lung. 2023 Sep 27;63:51-64. doi: 10.1016/j.hrtlng.2023.09.007. Online ahead of print.
Effects of rapid response team on patient outcomes: A systematic review.
Zhang Q(1), Lee K(2), Mansor Z(3), Ismail I(4), Guo Y(5), Xiao Q(6), Lim PY(7).
ABSTRACT
BACKGROUND: Despite the widespread adoption of the rapid response team (RRT) by many hospitals, questions remain regarding their effectiveness in improving several aspects of patient outcomes, such as hospital mortality, cardiopulmonary arrests, unplanned intensive care unit (ICU) admissions, and length of stay (LOS). OBJECTIVES: To conduct a systematic review to understand the rapid response team's (RRT) effect on patient outcomes. METHODS: A systematic search was conducted using PubMed, Cochrane, Embase, CINAHL, Web of Science, and two trial registers. The studies published up to May 6, 2022, from the inception date of the databases were included. Two researchers filtered the title, abstract and full text. The Version 2 of the Cochrane Risk of Bias tool and Bias in Non-Randomized Studies of Interventions (ROBINS-I) tool were used separately for randomized and non-randomized controlled trials for quality appraisal. RESULTS: Sixty-one eligible studies were identified, four randomized controlled trials(RCTs), four non-randomized controlled trials, six interrupted time-series(ITS) design , and 47 pretest-posttest studies. A total of 52 studies
reported hospital mortality, 51 studies reported cardiopulmonary arrests, 18 studies reported unplanned ICU admissions and ten studies reported LOS. CONCLUSION: This systematic review found the variation in context and the type of RRT interventions restricts direct comparisons. The evidence for improving several aspects of patient outcomes was inconsistent, with most studies demonstrating that RRT positively impacts patient outcomes.

POST-CARDIAC ARREST TREATMENTS

1. Am J Emerg Med. 2023 Sep 10;74:32-35. doi: 10.1016/j.ajem.2023.09.006. Online ahead of print.
The role of point-of-care testing in cardiac arrest patients.
Rampersaud VM Jr(1), Barberis T(1), Thode HC Jr(1), Singer AJ(2).
ABSTRACT
BACKGROUND: Point-of-care testing (POCT) provides real time information to the clinical team, leading to early diagnosis and treatment. Whether POCT plays a role in improving outcomes in patients with out of hospital cardiac arrest (OHCA) remains unknown. The objective of this study was to describe use of POCT in OHCA and to explore its association with outcomes. METHODS: We conducted a retrospective chart review on patients transferred by emergency medical services (EMS) to the ED for out-of-hospital cardiac arrest (OHCA) in 2019. Data collected from patient charts included baseline information, the Utstein criteria for cardiac arrest, whether POCT was used, whether POCT was abnormal, and what treatment was given, if any, as a result of the abnormal POCT. Outcomes included return of spontaneous circulation (ROSC) and survival to hospital discharge. Outcomes in patients with and without POCT were compared using chi-square and t-tests.
RESULTS: There were 119 study patients. Their mean (SD) age was 65 (18) years and 65% were male. Cardiac arrest was witnessed in 48% and initial rhythm was asystole in 66%. The rates of ROSC and survival were 22.7% (95%CI, 16.1-31.1) and 3.4% (95%CI, 1.3-8.3). POCT was used in 66 patients (55.4%; 95%CI, 46.5-64.1) all of whom had at least one abnormality. The results of POCT led to
administration of a therapy in 60 patients (91.0%; 95%CI, 81.6-95.8). The rates of ROSC in patients with and without POCT were 22.6% vs 22.7% respectively. The rates of survival to discharge in patients with and without POCT were 0% vs 3.8% respectively. CONCLUSIONS: POCT is commonly used in the ED for patients with OHCA and its results often lead to changes in therapies. However, use of POCT was not associated with ROSC or survival to discharge.

TARGETED TEMPERATURE MANAGEMENT

No articles identified.

ELECTROPHYSIOLOGY AND DEFIBRILLATION

1. Comput Methods Programs Biomed. 2023 Sep 23;242:107809. doi: 10.1016/j.cmpb.2023.107809. Online ahead of print.
Electrical-mechanical dynamical coupling between electrocardiographic and photoplethys-mographic signals during cardiopulmonary resuscitation.

Chen S(1), Jiang L(2), Xu F(2), Pang J(2), Pan C(2), Chen Y(3), Wang J(4), Li K(5).

ABSTRACT

BACKGROUND AND OBJECTIVE: Cardiac arrest (CA) remains a significant cause of death and disability. High-quality cardiopulmonary resuscitation (CPR) can improve the survival rate of CA. A challenging issue is to find physiological indicators for screening and evaluating the cardiovascular function associated with CPR. This study aimed to investigate the electrical-mechanical dynamic coupling between electrocardiographic (ECG) and photoplethysmographic (PPG) signals for indicating cardiovascular function in the progress of CPR. METHOD: The ECG and PPG signals were simultaneously collected from a porcine CA model (n = 10) induced by ventricular fibrillation, and were further divided into four periods: Baseline, CA, CPR, and recovery of spontaneous circulation (ROSC). Recurrence quantitative analysis (RQA) was applied to examine the nonlinear dynamics of the ECG and PPG signals individually, and cross recurrence quantitative analysis (CRQA) was used to examine the ECG-PPG dynamical coupling. RESULTS: The CA influenced the dynamic patterns of electrical and mechanical activities and the electrical-mechanical coupling, which can be observed from the reduced entropy (ENTR) ($p < 0.01$), reduced determinism (DET) ($p < 0.01$) and reduced trapping time (TT) ($p < 0.01$) at CA compared to Baseline. The recurrence rate (RR), ENTR, DET, and TT at CPR were significantly lower than the parameters at ROSC but higher than those at CA.

CONCLUSIONS: The electrical-mechanical dynamical coupling was sensitive to CPR and able to reflect the changes in cardiac function in the process of CPR.

2. Circ Cardiovasc Interv. 2023 Sep 26:e013007. doi: 10.1161/CIRCINTERVENTIONS.123.013007. Online ahead of print.

Clinical Features and Outcomes Among Patients With Refractory Out-of-Hospital Cardiac Arrest and an Initial Shockable Rhythm.

Zheng WC(1), Zheng MC(2), Ho FCS(3), Noaman S(1)(3), Haji K(3), Batchelor RJ(4), Hanson LB(1)(3), Bloom JE(1)(5), Shaw JA(1)(5), Yang Y(6), Stub D(1)(5)(7), Cox N(3)(8), Kaye DM(1)(5), Chan W(1)(3)(5)(8).

ABSTRACT

BACKGROUND: Clinical features among patients with refractory out-of-hospital cardiac arrest (OHCA) and initial shockable rhythms of ventricular fibrillation/pulseless ventricular tachycardia are not well-characterized. METHODS: We compared clinical characteristics and coronary angiographic findings between patients with refractory OHCA (incessant ventricular fibrillation/pulseless ventricular tachycardia after ≥3 direct-current shocks) and those without refractory OHCA. RESULTS: Between 2014 and 2018, a total of 204 patients with ventricular fibrillation/pulseless ventricular tachycardia OHCA (median age 62; males 78%) were divided into groups with (36%, 74/204) and without refractory arrest (64%, 130/204). Refractory OHCA patients had longer cardiopulmonary resuscitation (23 versus 15 minutes), more frequently required ≥450 mg amiodarone (34% versus 3.8%), and had cardiogenic shock (80% versus 55%) necessitating higher adrenaline dose (4.0 versus 1.0 mg) and higher rates of mechanical ventilation (92% versus 74%; all P<0.01). Of 167 patients (82%) selected for coronary angiography, 33% (n=55) had refractory OHCA (P=0.035). Significant coronary artery disease (≥1 major vessel with >70% stenosis) was present in >70% of patients. Refractory OHCA patients frequently had acute coronary occlusion (64% versus 47%), especially left circumflex (20% versus 6.4%) and graft vessel (7.3% versus 0.9%; all P<0.05) compared with those without refractory OHCA. Refractory OHCA group had higher in-hospital mortality (45% versus 30%, P=0.036) and greater new requirement for dialysis (18% versus 6.3%, P=0.011). After adjustment, refractory OHCA was associated with over 2-fold higher odds of in-hospital mortality (odds ratio, 2.28 [95% CI, 1.06-4.89]; P=0.034). CONCLUSIONS: Refractory ventricular fibrillation/pulseless ventricular tachycardia OHCA was associated with more intensive resuscitation, higher rates of acute coronary occlusion, and poorer in-hospital outcomes, underscoring the need for future studies in this extreme-risk subgroup.

PEDIATRICS AND CHILDREN

No articles identified.

EXTRACORPOREAL LIFE SUPPORT

1. Resusc Plus. 2023 Sep 20;16:100474. doi: 10.1016/j.resplu.2023.100474. eCollection 2023 Dec.

Frequency, clinical characteristics, and outcomes of pneumonia in patients with out-of-hospital cardiac arrest undergoing extracorporeal cardiopulmonary resuscitation.

Iida E(1), Ichihara N(2)(3), Hifumi T(1), Shirasaki K(1), Horie K(1), Isokawa S(1), Inoue A(4), Sakamoto T(5), Kuroda Y(6), Otani N(1); SAVE-J II study group.

ABSTRACT

AIM: This study aimed to describe the frequency, clinical characteristics, and outcomes of pneumonia in OHCA patients treated with ECPR in a multicenter setting. METHODS: This is a secondary analysis of the SAVE-J II study, which was a multicenter, retrospective cohort of OHCA patients treated with ECPR. Age, sex, comorbidities, presence of witnessed CA, presence of bystander CPR, initial rhythm, cause of CA, low-flow time, initiation of targeted temperature management, details of sputum culture, pneumonia, and prophylactic antibiotic use were recorded. Pneumonia was diagnosed when the patients met all the clinical, radiologic, and microbiologic criteria acquired after hospitalization. RESULTS: In total, 1,986 patients were included in the analysis, and 947 (48%) died during the first 2 days of admission. A prophylactic antibiotic was used in 712 (35.9%) patients. Overall, the hazard of death was high on days 1 and 2 of admission, exceeding 20% on both days; 251 (12.6%) patients developed pneumonia during hospitalization, and the hazard of pneumonia development remained high (>2%) in the first 7 days of admission.Staphylococcus aureus and Klebsiella species were commonly identified in the sputum culture. Among patients who survived the first 7 days, the odds ratio (OR) of those with pneumonia and unfavorable neurological outcomes defined by cerebral performance category 3-5 was approximately 1. In those who survived the first 10 days, the OR was greater than 1 with a wide confidence interval. CONCLUSIONS: This is the first study describing details of pneumonia in OHCA patients treated with ECPR using a large dataset.

2. Cochrane Database Syst Rev. 2023 Sep 26;9(9):CD010381. doi: 10.1002/14651858. CD010381.pub3.

Extracorporeal membrane oxygenation for critically ill adults.

Burrell A(1)(2), Kim J(1), Alliegro P(1), Romero L(3), Serpa Neto A(1)(4), Mariajoseph F(1), Hodgson C(1)(5).

ABSTRACT

BACKGROUND: Extracorporeal membrane oxygenation (ECMO) may provide benefit in certain populations of adults, including those with severe cardiac failure, severe respiratory failure, and cardiac arrest. However, it is also associated with serious short- and long-term complications, and there remains a lack of high-quality evidence to guide practice. Recently several large randomized controlled trials (RCTs) have been published, therefore, we undertook an update of our previous systematic review published in 2014.

OBJECTIVES: To evaluate whether venovenous (VV), venoarterial (VA), or ECMO cardiopulmonary resuscitation (ECPR) improve mortality compared to conventional cardiopulmonary support in critically ill adults. SEARCH METHODS: We used standard, extensive Cochrane search methods. The latest search date was March 2022. The search was limited to English language only. SELECTION CRITERIA: We included RCTs, quasi-RCTs, and cluster-RCTs that compared VV ECMO, VA ECMO or ECPR to conventional support in critically ill adults. DATA COLLECTION AND

ANALYSIS: We used standard Cochrane methods. Our primary outcome was 1. all-cause mortality at day 90 to one year. Our secondary outcomes were 2. length of hospital stay, 3. survival to discharge, 4. disability, 5. adverse outcomes/safety events, 6. health-related quality of life, 7. longer-term health status, and 8. cost-effectiveness. We used GRADE to assess certainty of evidence. MAIN RESULTS: Five RCTs met our inclusion criteria, with four new studies being added to the original review (total 757 participants). Two studies were of VV ECMO (429 participants), one VA ECMO (41 participants), and two ECPR (285 participants). Four RCTs had a low risk of bias and one was unclear, and the overall certainty of the results (GRADE score) was moderate, reduced primarily
due to indirectness of the study populations and interventions. ECMO was associated with a reduction in 90-day to one-year mortality compared to conventional treatment (risk ratio [RR] 0.80, 95% confidence interval [CI] 0.70 to 0.92; P = 0.002, I2 = 11%). This finding remained stable after performing a sensitivity analysis by removing the single trial with an uncertain risk of bias. Subgroup analyses did not reveal a significant subgroup effect across VV, VA, or ECPR modes (P = 0.73). Four studies reported an increased risk of major hemorrhage with ECMO (RR 3.32, 95% CI 1.90 to 5.82; P < 0.001), while two studies reported no difference in favorable neurologic outcome (RR 2.83, 95% CI
0.36 to 22.42; P = 0.32). Other secondary outcomes were not consistently reported across the studies. AUTHORS' CONCLUSIONS: In this updated systematic review, which included four additional RCTs, we found that ECMO was associated with a reduction in day-90 to one-year all-cause mortality, as well as three times increased risk of bleeding. However, the certainty of this result was only low to moderate, limited by a low number of small trials, clinical heterogeneity, and indirectness across studies.

3. Resuscitation. 2023 Oct;191:109927. doi: 10.1016/j.resuscitation.2023.109927. Epub 2023 Aug 6.
Time-saving effect of real-time ultrasound-guided cannulation for extracorporeal cardiopulmonary resuscitation: A multicenter retrospective cohort study.
Nakatsutsumi K(1), Endo A(2), Costantini TW(3), Takayama W(4), Morishita K(4), Otomo Y(5), Inoue A(6), Hifumi T(7), Sakamoto T(8), Kuroda Y(9); SAVE-J II study group.
ABSTRACT
BACKGROUND: Extracorporeal cardiopulmonary resuscitation (ECPR), a bridge to treatments for cardiac arrest patients, can be technically challenging and requires expertise. While ultrasound guidance is frequently used for vascular access, its effects on cannulation time in patients treated with ECPR are poorly defined. We hypothesized that real-time ultrasound guidance would contribute to faster and safer cannulation for ECPR. METHODS: This nationwide, multicenter, retrospective study analyzed data from 36 Japanese institutions. Patients who were over age 18 years and underwent ECPR between January 1, 2013, and December 31, 2018, were included. Patients who
underwent open surgical vascular access were excluded. Cannulation time and outcomes of patients who underwent real-time ultrasound-guided cannulation (i.e., ultrasound-guided group) were compared to those cannulated without the use of real-time ultrasound guidance (control group) using propensity score matching analysis. RESULTS: The ultrasound-guided group comprised 510 cases, whereas the control group comprised 941 cases. Of those, 443 propensity score-matched pairs were evaluated. Cannulation time in the ultrasound-guided group was 2.5 minutes shorter than in the control group [difference, -2.5 minutes; 95% Confidence interval (CI), -3.7 to -1.3, p < 0.001]. The incidence of catheter-related complications and the incidence of the poor neurological outcomes (Cerebral Performance Category ≥3) did not differ between groups [Odds ratio (OR), 1.51;
95% CI, 0.64-3.74; OR, 1.08; 95% CI, 0.83-1.59]. CONCLUSION: Real-time ultrasound-guided cannulation was associated with shorter cannulation time of ECPR.

EXPERIMENTAL RESEARCH

1. Brain Sci. 2023 Sep 4;13(9):1285. doi: 10.3390/brainsci13091285.
Moderate Hyperkalemia Regulates Autophagy to Reduce Cerebral Ischemia-Reperfusion Injury in a CA/CPR Rat Model.
Wang X(1), Tian X(1), Shen H(1), Zhang X(2), Xie L(2), Chen M(1).
ABSTRACT
BACKGROUND: Cerebral ischemia-reperfusion injury (CIRI) can cause irreversible brain damage and autophagy has been implicated in the pathophysiology. Increasing serum potassium (K+) levels reduces CIRI, but the relationship between its protective mechanism and autophagy is unclear. In this study, we aimed to find the optimal degree of raising serum (K+) and to investigate the
relationship between high (K+) and autophagy and the underlying mechanisms in a cardiac arrest/cardiopulmonary resuscitation (CA/CPR) rat model. METHODS: Sprague Dawley (SD) rats were divided into four groups: S group, N group, P group, and Q group. The rats S group and N group were administered saline. The rats P group and Q group were administered 640 mg/kg of potassium chloride (KCl) continuously pumped at 4 mL/h (21.3 mg/(kg·min) and divided according to the electrocardiogram (ECG) changes during the administration of KCl. After 24-h of resuscitation, neural damage was assessed by measuring neurological deficit score (NDS), oxidative stress markers, and pathological staining of the cerebral cortex. The level of autophagy and the expression of mTOR-ULK1-Beclin1 pathway-related proteins were evaluated using transmission electron microscopy (TEM), immunostaining, and western blotting. RESULTS: Our results revealed that high (K+) improved NDS and decreased the oxidative stress markers. The autophagosomes, autolysosomes, and lysosomes were decreased following treatment KCl.
Furthermore, the levels of micro-tubule-associated protein 1 light chain 3 (LC3) Ⅱ/Ⅰ, Unc-51-like kinase 1 (ULK1), and Beclin1 were decreased, whereas mTOR expression was increased in the cortex. CONCLUSION: The results demonstrated that moderate hyperkalemia could alleviate autophagy after CIRI via regulating the mTOR-ULK1-Beclin1 pathway.

2. PLoS One. 2023 Sep 25;18(9):e0291915. doi: 10.1371/journal.pone.0291915. eCollection 2023.
2-iminobiotin, a selective inhibitor of nitric oxide synthase, improves memory and learning in a rat model after four vessel occlusion, mimicking cardiac arrest.
Peeters-Scholte C(1), Meilin S(2), Berckovich Y(2), Westers P(3).
ABSTRACT
Survivors of out-of-hospital cardiac arrest (OHCA) experience between 30% and 50% cognitive deficits several years post-discharge. Especially spatial memory is affected due to ischemia-induced neuronal damage in the hippocampus. Aim of this study was to investigate the potential neuroprotective effect of 2-iminobiotin (2-IB), a biotin analogue, on memory and learning in a four-vessel occlusion model of global ischemia using the Water Maze test. Sprague-Dawley rats were randomly assigned to either sham operation (n = 6), vehicle treatment (n = 20), 1.1 (n = 15), 3.3 (n = 14), 10 (n = 14), or 30 mg/kg/dose 2-IB treatment (n = 15). Treatment was subcutaneously (s.c.) administered immediately upon reperfusion, at 12h, and at 24h after reperfusion. Memory function on day 32 was significantly preserved in all doses of 2-IB rats compared to vehicle, as was the learning curve in the 1.1, 3.3 and 30 mg/kg dose group. Adult rats treated s.c. with 3 gifts of 2-IB every 12 h in a dose range of

1.1-30 mg/kg/dose directly upon reperfusion showed significant improved memory and learning after four vessel occlusion compared to vehicle-treated rats. Since
2-IB has already shown to be safe in a phase 1 clinical trial in adult human volunteers, it is a suitable candidate for translation to a human phase 2 study after OHCA.

3. Ann Clin Transl Neurol. 2023 Sep 30. doi: 10.1002/acn3.51907. Online ahead of print.
Hyperacute autonomic and cortical function recovery following cardiac arrest resuscitation in a rodent model.
Guo Y(1), Gharibani P(2), Agarwal P(3), Cho SM(4), Thakor NV(1), Geocadin RG(4).
ABSTRACT
OBJECTIVE: There is a complex interaction between nervous and cardiovascular systems, but sparse data exist on brain-heart electrophysiological responses to cardiac arrest resuscitation. Our aim was to investigate dynamic changes in autonomic and cortical function during hyperacute stage post-resuscitation. METHODS: Ten rats were resuscitated from 7-min cardiac arrest, as indicators of autonomic response, heart rate (HR), and its variability (HRV) were measured. HR was monitored through continuous electrocardiography, while HRV was assessed via spectral analysis, whereby the ratio of low-/high-frequency (LF/HF) power indicates the balance between sympathetic/parasympathetic activities. Cortical response was evaluated by continuous electroencephalography and quantitative analysis. Parameters were quantified at 5-min intervals over the first-hour post-resuscitation. Neurological outcome was assessed by Neurological Deficit Score (NDS, range 0-80, higher = better outcomes) at 4-h post-resuscitation. RESULTS: A significant increase in HR was noted over 15-30 min post-resuscitation ($p < 0.01$ vs.15-min, respectively) and correlated with higher NDS ($rs = 0.56$, $p < 0.01$). LF/HF ratio over 15-20 min was positively correlated with NDS ($rs = 0.75$, $p < 0.05$). Gamma band power surged over 15-30 min post-resuscitation ($p < 0.05$ vs. 0-15 min, respectively), and gamma band fraction during this period was associated with NDS ($rs \geq 0.70$, $p < 0.05$, respectively). Significant correlations were identified between increased HR and gamma band power during 15-30 min ($rs \geq 0.83$, $p < 0.01$, respectively) and between gamma band fraction and LF/HF ratio over 15-20 min post-resuscitation ($rs = 0.85$, $p < 0.01$). INTERPRETATIONS: Hyperacute recovery of autonomic and cortical function is associated with favorable functional outcomes. While this observation needs further validation, it presents a translational opportunity for better autonomic and neurologic monitoring during early periods post-resuscitation to develop novel interventions.

4. J Am Heart Assoc. 2023 Sep 30:e029774. doi: 10.1161/JAHA.123.029774. Online ahead of print.
Assessment of the Effects of Sodium Nitroprusside Administered Via Intracranial Subdural Catheters on the Cerebral Blood Flow and Lactate Using Dynamic Susceptibility Contrast Magnetic Resonance Imaging and Proton Magnetic Resonance Spectroscopy in a Pig Cardiac Arrest Model.
Lee HY(1), Jung YH(2)(3), Mamadjonov N(4), Jeung KW(2)(3), Lee BK(2)(3), Kim TH(5), Kim HJ(6), Gumucio JA(7), Salcido DD(7).
ABSTRACT
Background Cerebral blood flow (CBF) is impaired in the early phase after return of spontaneous circulation. Sodium nitroprusside (SNP) administration via intracranial subdural catheters improves cerebral cortical microcirculation. We determined whether the SNP treatment improves CBF in the subcortical tissue and evaluated the effects of this treatment on cerebral lactate. Methods and Results Sixty minutes after return of spontaneous circulation following 14 minutes of untreated cardiac arrest, 14 minipigs randomly received 4 mg SNP or saline via intracranial subdural catheters. CBF was measured in regions of interest within the cerebrum and thalamus using dynamic susceptibility contrast-magnetic resonance imaging. After return of spontaneous circulation, CBF was expressed as a percentage of the baseline value. In the saline group, the %CBF in the regions
of interest within the cerebrum remained at approximately 50% until 3.5 hours after return of spontaneous circulation, whereas %CBF in the thalamic regions of interest recovered to approximately 73% at this time point. The percentages of the baseline values in the cortical gray matter and subcortical white matter were higher in the SNP group (group effect P=0.026 and 0.025, respectively) but not in the thalamus. The cerebral lactate/creatine ratio measured using magnetic
resonance spectroscopy increased over time in the saline group but not in the SNP group (group-time interaction P=0.035). The thalamic lactate/creatine ratio was similar in the 2 groups. Conclusions SNP administered via intracranial subdural catheters improved CBF not only in the cortical gray matter but also in the subcortical white matter. The CBF improvement by SNP was accompanied by a decrease in cerebral lactate.

CASE REPORTS

1. Medicine (Baltimore). 2023 Sep 29;102(39):e35450. doi: 10.1097/MD.0000000000035450.
Successful perioperative management with damage control surgery following cardiac arrest due to massive postpartum hemorrhage: A case report.
Park CH(1), Bae JG(2), Lee JW(1).
ABSTRACT
INTRODUCTION: Although declining, maternal mortality due to postpartum hemorrhage (PPH) remains significant. Here we report the case of a 31-year-old primipara patient admitted with cardiac arrest due to PPH. CASE PRESENTATION: Labor was induced at gestational week 39, and the infant was delivered rapidly. Cardiac arrest due to PPH occurred during the transfer to our hospital, and the patient underwent cardiopulmonary resuscitation upon arrival to the emergency room. On admission, her hemoglobin level was 0.7 g/dL and she was in hypovolemic shock. Resuscitation and hysterectomy were performed immediately, including damage control surgery and gauze packing, to control the diffuse oozing bleeding due to severe disseminated intravascular coagulation. Relaparotomy for hemostasis was subsequently performed because of a decrease in hemoglobin level and blood pressure, and gauze packing was reinserted with temporary abdominal closure. Two days later, the abdominal wall was closed after confirming the absence of bleeding and the patient recovered well without further intervention. CONCLUSION: A prompt and assertive intensive response through collaborative efforts, utilizing feasible damage control surgery, can elegantly salvage uncontrolled bleeding in PPH patients with disseminated intravascular coagulation.

2. Medicine (Baltimore). 2023 Sep 29;102(39):e35226. doi: 10.1097/MD.0000000000035226.
A case report: A patient rescued by VA-ECMO after cardiac arrest triggered by trigeminocardiac reflex after nasal surgery.
Zhang X(1), Sun B(1), Pac-Soo C(2)(3), Ma D(2), Wang L(1).
ABSTRACT
RATIONALE: Cardiac arrest (CA) caused by trigeminocardiac reflex (TCR) after endoscopic nasal surgery is rare. Hence, when a patient suffers from TCR induced CA in the recovery room, most doctors may not be able to find the cause in a short time, and standard cardiopulmonary resuscitation and resuscitation measures may not be effective. Providing circulatory assistance through venous-arterial extracorporeal membrane oxygenation (VA-ECMO) can help healthcare providers gain time to identify the etiology and initiate symptom-specific treatment. PATIENT CONCERNS: We report a rare case of CA after endoscopic nasal surgery treated with VA-ECMO.

DIAGNOSES: We excluded myocardial infarction, pulmonary embolism, allergies, hypoxia, and electrolyte abnormalities based on the relevant examination results. Following a multidisciplinary consultation, clinical manifestation and a review of previous literature, we reasoned that the CA was due to TCR. INTERVENTIONS: VA-ECMO was established to resuscitate the patient successfully during effective cardiopulmonary resuscitation. OUTCOMES: ECMO was successfully evacuated a period of 190 minutes of therapy. The patient was discharged home on day 8. LESSONS: TCR is notable during endoscopic nasal surgery. Our case indicates that CA in operating room is worth prolonged CCPR. The ideal time for ECPR implementation should not be limited within 20 minutes after CCPR.

3. Int J Emerg Med. 2023 Sep 26;16(1):61. doi: 10.1186/s12245-023-00543-8.
Lethal abdominal compartment syndrome after extracorporeal cardiopulmonary resuscitation in a patient with out-of-hospital cardiac arrest: a case report.
Kim GJ(1), Lim KH(2), Oh TH(3), Lee HJ(4), Hwang D(5), Jung H(6).
ABSTRACT
BACKGROUND: Clinical attempts of extracorporeal cardiopulmonary resuscitation (ECPR) in patients with out-of-hospital cardiac arrest (OHCA) have increased in recent years; however, it also has life-threatening complications. Massive fluid and transfusion resuscitation, shock status, or low cardiac output status during ECPR may lead to ascites and interstitial edema, resulting in secondary abdominal compartment syndrome (ACS). CASE PRESENTATION: A 43-year-old male patient was admitted to the emergency department due to cardiac arrest. Due to refractory ventricular fibrillation, ECPR was initiated. Approximately, 3 h after extracorporeal membrane oxygenation support, abdominal distension and rigidity developed. Therefore, ACS was suspected. Decompression laparotomy was required to relieve elevated intra-abdominal pressure. CONCLUSIONS: We report a case of a patient with OHCA who developed lethal ACS after ECPR. Despite this, the patient was able to recover from several major crises. Regardless of how lethal the patient is, if compartment syndrome develops in any part of the body, we should aggressively consider surgical decompression.

4. J Cardiovasc Dev Dis. 2023 Sep 1;10(9):374. doi: 10.3390/jcdd10090374.
ST-Segment Elevation: An Unexpected Culprit.
Sá Couto D(1)(2), Alexandre A(1)(2), Costa R(1), Campinas A(1)(2), Santos M(1)(2), Ribeiro D(1), Torres S(1)(2), Luz A(1)(2)(3).
ABSTRACT
The clinical presentation of pulmonary embolism (PE) and acute coronary syndrome can be similar. We report a case of a patient presenting with antero-septal ST-segment elevation after cardiac arrest, found to have acute-PE-mimicking ST-segment elevation myocardial infarction (STEMI), treated with aspiration thrombectomy and catheter-directed thrombolysis (CDT). A 78-year-old man was admitted with dyspnea, chest pain and tachycardia. During evaluation, cardiac arrest in pulseless electrical activity was documented. Advanced life support was started immediately. ECG post-ROSC revealed ST-segment elevation in V1-V4 and aVR. Echocardiography showed normal left ventricular function but right ventricular (RV) dilation and severe dysfunction. The patient was in shock and was promptly referred to cardiac catheterization that excluded significant CAD. Due to the discordant ECG and echocardiogram findings, acute PE was suspected, and immediate invasive pulmonary angiography revealed bilateral massive pulmonary embolism. Successful aspiration thrombectomy was performed followed by local alteplase infusion. At the end of the procedure, mPAP was reduced and blood pressure normalized allowing withdrawal of vasopressor support. Twenty-four-hour echocardiographic reassessment showed normal-sized cardiac chambers with preserved biventricular systolic function. Bedside echocardiography in patients with ST-segment elevation post-ROSC is instrumental in raising the suspicion of acute PE. In the absence of a culprit coronary lesion, prompt pulmonary angiography should be considered if immediately feasible. In these cases, CDT and aspiration in high-risk acute PE seem safe and effective in relieving obstructive shock and restoring hemodynamics.

5. Oxf Med Case Reports. 2023 Sep 25;2023(9):omad093. doi: 10.1093/omcr/omad093. eCollection 2023 Sep.
Aspiration thrombectomy for massive pulmonary embolism with cardiac arrest.
Tamura H(1), Kurimoto S(1), Harada T(1), Hosokawa S(1).
NO ABSTRACT AVAILABLE