

## **RCP I COVID-19**

1. Med J Aust. 2020 Aug;213(3):126-133. doi: 10.5694/mja2.50699. Epub 2020 Jul 12.

### **Management of adult cardiac arrest in the COVID-19 era: consensus statement from the Australasian College for Emergency Medicine.**

Craig S(1)(2), Cubitt M(3)(4), Jaison A(5), Troupakis S(1)(6), Hood N(1)(7), Fong C(1)(6), Bilgrami A(1), Leman P(8)(9), Ascencio-Lane JC(10)(11), Nagaraj G(12)(13), Bonning J(14)(15), Blecher G(2)(16), Mitchell R(2)(5), Burkett E(17)(18), McCarthy SM(13)(19), Rojek AM(3)(4), Hansen K(20)(21), Psihogios H(1), Allely P(9)(22), Judkins S(23), Foong LH(24)(25), Bernard S(26), Cameron PA(2)(5).

#### **Abstract**

**Introduction:** The global pandemic of coronavirus disease 2019 (COVID-19) has caused significant worldwide disruption. Although Australia and New Zealand have not been affected as much as some other countries, resuscitation may still pose a risk to health care workers and necessitates a change to our traditional approach. This consensus statement for adult cardiac arrest in the setting of COVID-19 has been produced by the Australasian College for Emergency Medicine (ACEM) and aligns with national and international recommendations.

**Main recommendations:** In a setting of low community transmission, most cardiac arrests are not due to COVID-19. Early defibrillation saves lives and is not considered an aerosol generating procedure. Compression-only cardiopulmonary resuscitation is thought to be a low risk procedure and can be safely initiated with the patient's mouth and nose covered. All other resuscitative procedures are considered aerosol generating and require the use of airborne personal protective equipment (PPE). It is important to balance the appropriateness of resuscitation against the risk of infection. Methods to reduce nosocomial transmission of COVID-19 include a physical barrier such as a towel or mask over the patient's mouth and nose, appropriate use of PPE, minimising the staff involved in resuscitation, and use of mechanical chest compression devices when available. If COVID-19 significantly affects hospital resource availability, the ethics of resource allocation must be considered.

**Changes in management:** The changes outlined in this document require a significant adaptation for many doctors, nurses and paramedics. It is critically important that all health care workers have regular PPE and advanced life support training, are able to access in situ simulation sessions, and receive extensive debriefing after actual resuscitations. This will ensure safe, timely and effective management of the patients with cardiac arrest in the COVID-19 era.

#### **FREE FULL TEXT**

2. Resuscitation. 2020 Aug 3:S0300-9572(20)30298-7. doi: 10.1016/j.resuscitation.2020.07.021. Online ahead of print.

### **Evidence-based crisis standards of care for out-of-hospital cardiac arrests in a pandemic.**

Natalzia P(1), Murk W(1), Thompson JJ(1), Dorsett M(2), Cushman JT(2), Reed P(3), Clemency BM(4); CARES Surveillance Group.

#### **Abstract**

**Background & purpose:** Pandemics such as COVID-19 can lead to severe shortages in healthcare resources, requiring the development of evidence-based Crisis Standard of Care (CSC) protocols. A protocol that limits the resuscitation of out-of-hospital cardiac arrests (OHCA) to events that are more likely to result in a positive outcome can lower hospital burdens and reduce emergency medical services resources and infection risk, although it would come at the cost of lives lost that could otherwise be saved. Our primary objective was to evaluate candidate OHCA CSC protocols involving known predictors of survival and identify the protocol that results in the smallest resource burden, as measured by the number of hospitalizations required per favorable OHCA outcome achieved. Our secondary objective was to describe the effects of the CSC protocols in terms of health outcomes and other measures of resource burden.

**Methods:** We conducted a retrospective cohort study of adult patients in the Cardiac Arrest Registry to Enhance Survival (CARES) database. Non-traumatic OHCA events from 2018 were included (n = 79,533). Candidate CSC protocols involving combinations of known predictors of good survival for OHCA were applied to the existing dataset to measure the resulting numbers of resuscitation attempts, transportations to hospital, hospital admissions, and favorable neurological outcomes. These outcomes were also assessed under Standard Care, defined as no CSC protocol applied to the data.

**Results:** The CSC protocol with the smallest number of hospitalizations per survivor with a favorable neurological outcome was that an OHCA resuscitation should only be attempted if the arrest was witnessed by emergency medical services or the first monitored rhythm was shockable (number of hospitalizations: 2.26 [95% CI: 2.21-2.31] vs. 3.46 [95% CI: 3.39-3.53] under Standard Care). This rule resulted in significant reductions in resource utilization (46.1% of hospitalizations and 29.2% of resuscitation attempts compared to Standard Care) while still preserving 70.5% of the favorable neurological outcomes under Standard Care. For every favorable neurological outcome lost under this CSC protocol, 6.3 hospital beds were made free that could be used to treat other patients.

**Conclusion:** In a pandemic scenario, pre-hospital CSC protocols that might not otherwise be considered have the potential to greatly improve overall survival, and this study provides an evidence-based approach towards selecting such a protocol. As this study was performed using data generated before the COVID-19 pandemic, future studies incorporating pandemic-era data will further help develop evidence-based CSC protocols.

## **RCP / COMPRESSIONS TORÀCIQUES MECÀNIQUES**

1. J Emerg Med. 2020 Aug 5;S0736-4679(20)30571-0. doi: 10.1016/j.jemermed.2020.06.022. Online ahead of print.

### **LUCAS II Device for Cardiopulmonary Resuscitation in a Nonselective Out-of-Hospital Cardiac Arrest Population Leads to Worse 30-Day Survival Rate Than Manual Chest Compressions.**

Karasek J(1), Ostadal P(2), Klein F(3), Rechova A(3), Seiner J(4), Strycek M(4), Polasek R(4), Widimsky P(5).

#### **Abstract**

**Background:** The LUCAS (Lund University Cardiopulmonary Assist System; Physio-Control Inc./Jolife AB, Lund, Sweden) was developed for automatic chest compressions during cardiopulmonary resuscitation (CPR). Evidence on the use of this device in out-of-hospital cardiac arrest (OHCA) suggests that it should not be used routinely because it has no superior effects.

**Objective:** The aim of this study was to compare the effect of CPR for OHCA with and without LUCAS via a regional nonurban emergency medical service (EMS) physician-present prehospital medical system.

**Methods:** We analyzed a prospective registry of all consecutive OHCA patients in four EMS stations. Two of them used a LUCAS device in all CPR, and the EMS crews in the other two stations used manual CPR. Individuals with contraindication to LUCAS or with EMS-witnessed arrest were excluded.

**Results:** Data from 278 patients were included in the analysis, 144 with LUCAS and 134 with manual CPR. There were more witnessed arrests in the LUCAS group (79.17% vs. 64.18%;  $p = 0.0074$ ) and patients in the LUCAS group were older ( $p = 0.03$ ). We found no significant difference in return of spontaneous circulation (30.6% in non-LUCAS vs. 25% in LUCAS;  $p = 0.35$ ). In the LUCAS group, we observed significantly more conversions from nonshockable to shockable rhythm (20.7% vs. 10.10%;  $p = 0.04$ ). The 30-day survival rate was significantly lower in the LUCAS group (5.07% vs. 16.31% in the non-LUCAS group;  $p = 0.044$ ). At 180-day follow-up, we observed no significant difference (5.45% in non-LUCAS vs. 9.42% in LUCAS;  $p = 0.25$ ).

**Conclusions:** Use of the LUCAS system decreased survival rate in OHCA patients. Significantly higher 30-day mortality was seen in LUCAS-treated patients.

## **REGISTRES REVISIONS | EDITORIALS**

1. Neth Heart J. 2020 Aug;28(Suppl 1):108-114. doi: 10.1007/s12471-020-01460-8.

### **The role of coronary angiography in out-of-hospital cardiac arrest patients in the absence of ST-segment elevation: A literature review.**

Spoormans EM(1), Lemkes JS(2), Janssens GN(1), van der Hoeven NW(1), Bonnes JL(3), van Royen N(1)(3).

#### **Abstract**

Out-of-hospital cardiac arrest (OHCA) is a major cause of death. Although the aetiology of cardiac arrest can be diverse, the most common cause is ischaemic heart disease. Coronary angiography and percutaneous coronary intervention, if indicated, has been associated with improved long-term survival for patients with initial shockable rhythm. However, in patients without ST-segment elevation on the post-resuscitation electrocardiogram, the optimal timing of performing this invasive procedure is uncertain. One important challenge that clinicians face is to appropriately select patients that will benefit from immediate coronary angiography, yet avoid unnecessary delay of intensive care support and targeted temperature management. Observational studies have reported contradictory results and until recently, randomised trials were lacking. The Coronary Angiography after Cardiac Arrest without ST-segment elevation (COACT) was the first randomised trial that provided comparative information between coronary angiography treatment strategies. This literature review will provide the current knowledge and gaps in the literature regarding optimal care for patients successfully resuscitated from OHCA in the absence of ST-segment elevation and will primarily focus on the role and timing of coronary angiography in this high-risk patient population.

### **ACR INTRAHOSPITALÀRIA**

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### **LESIONS PER RCP**

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### **CAUSA DE L'ACR**

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### **END-TIDAL CO<sub>2</sub>**

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### **DONACIÓ D'ÒRGANS**

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### **FEEDBACK**

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### **FÀRMACS**

1. Shock. 2020 Aug 4. doi: 10.1097/SHK.0000000000001617. Online ahead of print.

#### **Association Between Intravenous Fluid Resuscitation and Hospital Mortality in Post Cardiac Arrest Patients: A Retrospective Study.**

Gul F(1), Peterson E(1), Dejoy R(1), Albano J(1), Chaudhary S(2), Valestra P(2), Azmaiparashvili Z(1), Lo KB(1), Rangaswami J(3)(4), Patarroyo-Aponte G(2)(4).

**Abstract**

**Objective:** To assess the role for intravenous fluid (IVF) resuscitation in the post arrest state. Primary outcome was survival to hospital discharge and 30-day mortality. Secondary outcomes were associations with amount of vasopressor use and mechanical ventilation days.

**Design:** Retrospective study design.

**Setting:** Single-center tertiary hospital in Philadelphia, Pennsylvania.

**Patients:** All patients admitted to the intensive care unit between 2018 and 2019.

**Interventions:** Patients were divided into 2 groups based on amount of IVF received within 24 hours <30 ml/kg (restricted) and over 30 ml/kg (liberal).

**Measurements and main results:** A total of 264 patients were included in the study, with 200 included in the restrictive (<30 ml/kg) group and 64 included in the liberal (>30 mg/kg) group. There was no difference in 30-day mortality between the two groups with 146 (73%) deaths in the restrictive groups and 44 (69%) deaths in the liberal group ( $p = 0.53$ ). There was also no significant difference between those who survived to hospital discharge in the liberal and restrictive groups on Kaplan-Meier analysis (Log-rank = 1.476  $p = 0.224$ ). However, there was a significant difference between restrictive and liberal groups with the duration of mechanical ventilation ( $4 \pm 6$  days versus  $6 \pm 9$  days;  $p = 0.03$ ) and in the rates of 2 or more vasopressor use (38% versus 59%;  $p = 0.002$ ). End stage renal disease (ESRD) (OR = 2.39;  $p = 0.03$ ) and volume of fluids in ml/kg/24 hours (OR = 1.025;  $p < 0.0001$ ) were independently associated with higher vasopressor need. Volume of fluid in ml/kg/24 hours ( $p = 0.01$ ), ESRD ( $p = 0.015$ ) and chronic obstructive pulmonary disease ( $p = 0.04$ ) were significantly associated with duration of mechanical ventilation, even after adjusting for demographic factors, comorbidities and mortality.

**Conclusions:** A liberal strategy of IVF used in resuscitation after cardiac arrest is not associated with higher mortality. However, it predicts higher vasopressor use and duration of mechanical ventilation.

## **TRAUMA**

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## **VENTILACIÓ**

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## **ECOGRAFIA A LA RESSUSCITACIÓ**

1. J Am Coll Cardiol. 2020 Aug 11;76(6):745-754. doi: 10.1016/j.jacc.2020.05.074.

**Focused Transesophageal Echocardiography During Cardiac Arrest Resuscitation: JACC Review Topic of the Week.**

Teran F(1), Prats MI(2), Nelson BP(3), Kessler R(4), Blaivas M(5), Peberdy MA(6), Shillcutt SK(7), Arntfield RT(8), Bahner D(2).

### **Abstract**

Focused transthoracic echocardiography (TTE) during cardiac arrest resuscitation can enable the characterization of myocardial activity, identify potentially treatable pathologies, assist with rhythm interpretation, and provide prognostic information. However, an important limitation of TTE is the difficulty obtaining interpretable images due to external and patient-related limiting factors. Over the last decade, focused transesophageal echocardiography (TEE) has been proposed as a tool that is ideally suited to image patients in extremis—those in cardiac arrest and periarrest states. In addition to the same diagnostic and prognostic role provided by TTE images, TEE provides unique advantages including the potential to optimize the quality of chest compressions, shorten cardiopulmonary resuscitation interruptions, guide resuscitative procedures, and provides a continuous image of myocardial activity. This review discusses the rationale, supporting evidence, opportunities, and challenges, and proposes a research agenda for the use of focused TEE in cardiac arrest with the goal to improve resuscitation outcomes.

### **MONITORATGE CEREBRAL**

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### **ORGANITZACIÓ I ENTRANAMENT**

1. Lancet Public Health. 2020 Aug;5(8):e428-e436. doi: 10.1016/S2468-2667(20)30140-7.

#### **Impact of bystander-focused public health interventions on cardiopulmonary resuscitation and survival: a cohort study.**

Blewer AL(1), Ho AFW(2), Shahidah N(3), White AE(4), Pek PP(5), Ng YY(6), Mao DR(7), Tiah L(8), Chia MY(9), Leong BS(10), Cheah SO(11), Tham LP(12), Kua JPH(12), Arulanandam S(13), Østbye T(14), Bosworth HB(15), Ong MEH(5).

### **Abstract**

**Background:** Bystander cardiopulmonary resuscitation (CPR) increases an individual's chance of survival from out-of-hospital cardiac arrest (OHCA), but the frequency of bystander CPR is low in many communities. We aimed to assess the cumulative effect of CPR-targeted public health interventions in Singapore, which were incrementally introduced between 2012 and 2016.

**Methods:** We did a secondary analysis of a prospective cohort study of adult, non-traumatic OHCAs, through the Singapore registry. National interventions introduced during this time included emergency services interventions, as well as dispatch-assisted CPR (introduced on July 1, 2012), a training programme for CPR and automated external defibrillators (April 1, 2014), and a first responder mobile application (myResponder; April 17, 2015). Using multilevel mixed-effects logistic regression, we modelled the likelihood of receiving bystander CPR with the increasing number of interventions, accounting for year as a random effect.

**Findings:** The Singapore registry contained 11 465 OHCA events between Jan 1, 2011, and Dec 31, 2016. Paediatric arrests, arrests witnessed by emergency medical services, and healthcare-facility arrests were excluded, and 6788 events were analysed. Bystander CPR was administered in 3248

(48%) of 6788 events. Compared with no intervention, likelihood of bystander CPR was not significantly altered by the addition of emergency medical services interventions (odds ratio [OR] 1.33 [95% CI 0.98-1.79];  $p=0.065$ ), but increased with implementation of dispatch-assisted CPR (3.72 [2.84-4.88];  $p<0.0001$ ), with addition of the CPR and automated external defibrillator training programme (6.16 [4.66-8.14];  $p<0.0001$ ), and with addition of the myResponder application (7.66 [5.85-10.03];  $p<0.0001$ ). Survival to hospital discharge increased after the addition of all interventions, compared with no intervention (OR 3.10 [95% CI 1.53-6.26];  $p<0.0001$ ).

Interpretation: National bystander-focused public health interventions were associated with an increased likelihood of bystander CPR, and an increased survival to hospital discharge. Understanding the combined impact of public health interventions might improve strategies to increase the likelihood of bystander CPR, and inform targeted initiatives to improve survival from OHCA.

2. Resuscitation. 2020 Aug 5;50300-9572(20)30302-6. doi: 10.1016/j.resuscitation.2020.07.025. Online ahead of print.

### **A systematic review of the impact of emergency medical service practitioner experience and exposure to out of hospital cardiac arrest on patient outcomes.**

Bray J(1), Nehme Z(2), Nguyen A(3), Lockey A(4), Finn J(4); Education, Implementation, Teams Task Force of the International Liaison Committee on Resuscitation.

#### **Abstract**

**Aim:** To conduct a systematic review to evaluate the impact of emergency medical service (EMS) practitioner's years of career experience and exposure to out-of-hospital cardiac arrest (OHCA) on patient outcomes.

**Methods:** We searched electronic databases (Ovid MEDLINE, EMBASE, CINAHL, Cochrane Central Register of Controlled Trials, Web of Science Core Collection) from inception until 10 April 2020. Studies were included that examined the exposures of interest on OHCA patient outcomes: good neurological outcome at discharge/30 days, survival to hospital discharge/30 days, survival to hospital and return of spontaneous circulation (ROSC). Prospero Registration: CRD42019153599.

**Results:** We included 7 of 22 observational studies shortlisted. Four of these studies examined the years of career experience of EMS practitioners, and four studies examined their exposure to attempted resuscitation. The evidence for both exposures of interest was assessed as very-low certainty. Overall, we found no association between patient outcomes and years of career experience. However, the best evidence found, from two large studies, suggests greater recent exposure to cases of attempted resuscitation is associated with better outcomes (ROSC/survival to hospital discharge). One of these studies also reports lower survival to hospital discharge when the team attempting resuscitation had no exposure in the previous six-months.

**Conclusion:** Very low certainty evidence suggests higher exposure to attempted resuscitation cases, but not years of clinical EMS experience, is associated with improved OHCA patient outcomes. This review highlights the need for EMS to monitor OHCA exposure, and the need for further research exploring the relationship between EMS exposure and patient outcomes.

3. Int Emerg Nurs. 2020 Aug 10;52:100893. doi: 10.1016/j.ienj.2020.100893. Online ahead of print.

## **Influence of summer tourist flows on occurrence of out-of-hospital cardiac arrest in an Italian tourist-intensive area.**

Tammaro G(1), Picconi E(2), Scardia M(1), Scardia S(3), Sabetta C(1), Antonaci D(1), Ruggeri DR(1), Tortorolo L(4).

### **Abstract**

**Introduction:** The study aims to evaluate the seasonal variation of out-of hospital cardiac arrest (OHCA) in a tourist-intensive area.

**Methods:** Data of all OHCA treated by the Emergency Medical Service of Lecce (LE-EMS), Italy, between 2013 and 2017, were retrospectively analyzed and complemented with information about tourist flows, in order to determine the influence of the seasonal variation of population on incidence and outcome.

**Results:** Tourist arrivals were around 1,700,000 per year, mostly in summer, adding up to 803,161 residents. The occurrence of OHCA did not show a monthly variation when referring to the resident population ( $p = 0.90$ ). When taking into account the tourist flows, a difference in occurrence of OHCA across months was found, with the highest rate of arrests in December and the lowest in August (10.3 vs 3.4 per 100,000 persons,  $p < 0.01$ ). No difference was found in terms of EMS arrival time and event survival rate between summer and the rest of the year (13.6 vs 13.8 min,  $p = 0.55$ , and 4.4% vs 4.5%,  $p = 0.86$ , respectively).

**Conclusion:** In summer tourism areas, the occurrence of OHCA is unchanged throughout the year, while the actual population presents seasonal increases. Summer enhancement of provincial EMS may contribute to maintain the performance of emergency care.

4. Curr Pharm Biotechnol. 2020 Aug 6. doi: 10.2174/1389201021666200807105136. Online ahead of print.

## **Evaluation of Microbiological Contamination of Dummies used in Cardio-pulmonary Resuscitation in Korea.**

Cho SH(1), Bak YS(2), Kim CH(3), Kim JB(4).

### **Abstract**

**Objectives:** In order to prevent infections through dummies used during Cardiopulmonary Resuscitation (CPR) training, we analyzed the microbiological contamination on dummies used in CPR institutions.

**Methods:** A total of 31 dummy samples were collected from 13 different institutions in Korea, and were evaluated for the number of contaminating bacteria and fungi on the surface. PCR and biochemical tests were performed to identify pathogenic bacteria and fungi, including methicillin-resistant *Staphylococcus aureus* (MRSA). Moreover, we further assessed the survival rate of microorganisms on the surface of the dummies.

**Results:** We assessed the total number of microorganisms on the surface to be 77,752 CFU/cm<sup>2</sup> ( $\pm 50,047$  CFU), which is up to 188 times higher than the requirement surface contamination level. Gram-positive cocci such as *Micrococcus* spp. and *Staphylococcus* spp. accounted for the highest proportion (55.3%). Especially, we detected three MRSA strains. Considering the isolated fungi and yeast, *Aspergillus* spp. and *Candida* spp. accounted for the highest proportion. Assessing the



contamination level simulation and survival rate on humanoid surface showed that within two weeks of training, the level of contamination on the dummy's surface exceeded the standard, and artificially contaminated pathogenic strains on the surface of the dummy survived for at least 40 days.

Conclusion: To minimize the possibility of secondary infections during CPR training, there is a requirement for a standardized protocol for proper microbiological management of dummies.

5. *Acute Med Surg.* 2020 Aug 6;7(1):e548. doi: 10.1002/ams2.548. eCollection 2020 Jan-Dec.

**A follow-up report on the effect of a simplified basic life support training program for non-medical staff working at a university hospital: changes in attitude toward cardiopulmonary resuscitation and automated external defibrillator use through repeat training.**

Matsuura H(1), Sakai T(1), Katayama Y(1), Kitamura T(2), Hirose T(1), Matsumoto H(1), Matsubara T(1), Iwami T(3), Fujino Y(4), Shimazu T(1).

**Abstract**

**Aim:** This study aimed to investigate the effect of repeat training and the interval of reattending a simplified basic life support (BLS) training course.

**Methods:** We administered a questionnaire on the attitude toward cardiopulmonary resuscitation (CPR) and automated external defibrillator (AED) use (check for response, chest compression, and using an AED) before and immediately after a 45-min BLS training program provided for non-medical staff working at a university hospital from September 2010 to November 2018. The main outcome was positive willingness of the participants toward CPR and AED use. The effect of repeat training was assessed with McNemar's test and multivariable logistic regression analysis. Differences in the interval of reattending the simplified BLS training course were assessed with Fisher's exact test.

**Results:** Fifty-nine training courses were held. Among the total participant count of 1,025, 760 individuals attended, of whom 126 attended the training multiple times. The proportion of participants showing a positive attitude toward chest compression before the course increased as the number of attendances increased (adjusted odds ratio 1.62: 9.8% at first training to 58.8% at sixth training). The positive attitude of participants before the course was significantly greater when the training interval was <1 year (36.1% versus 18.7%). There was no significant difference for a 6-month interval (40% versus 23.2%).

**Conclusions:** Repeat training for non-medical staff in a chest compression-only CPR training course showed a cumulative effect of repeat attendance. A course interval of <1 year from the previous attendance would be important for maintaining a positive attitude toward CPR and AED use.

**CURES POST-RCE**

1. *Shock.* 2020 Aug 4. doi: 10.1097/SHK.0000000000001600. Online ahead of print.

**Shock Severity and Hospital Mortality in Out of Hospital Cardiac Arrest Patients Treated With Targeted Temperature Management.**

Tabi M(1), Burstein BJ(2), Ahmed A(2), Dezfulian C(3), Kashani KB(2)(4), Jentzer JC(1)(2).

## Abstract

**Background:** Shock in patients resuscitated after out of hospital cardiac arrest (OHCA) is associated with an increased risk of mortality. We sought to determine the associations between lactate level, mean arterial pressure (MAP), and vasopressor/inotrope doses with mortality.

**Methods:** Retrospective cohort study of adult patients with OHCA of presumed cardiac etiology treated with targeted temperature management (TTM) between December 2005 and September 2016. Multivariable logistic regression was performed to determine predictors of hospital death.

**Results:** Among 268 included patients, the median age was 64 (55, 71.8) years, including 27% females. Witnessed arrest in 89%, shockable rhythm in 87%, and 64% received bystander CPR. Vasopressors were required during the first 24 hours in 60%. Hospital mortality occurred in 104 (38.8%) patients. Higher initial lactate, peak Vasoactive-Inotropic Score (VIS) and lower mean 24-hour MAP were associated with higher hospital mortality (all  $p < 0.001$ ). After multivariable regression, both higher initial lactate (adjusted OR 1.15 per 1 mmol/L higher, 95% CI 1.00-1.31,  $p = 0.03$ ) and higher peak VIS (adjusted OR 1.20 per 10 units higher, 95% CI 1.10-1.54,  $p = 0.003$ ) were associated with higher hospital mortality, but mMAP was not ( $p = 0.92$ ). However, patients with a mMAP  $< 70$  mmHg remained at higher risk of hospital mortality after multivariable adjustment (adjusted OR 9.30, 95% CI 1.39-62.02,  $p = 0.02$ ).

**Conclusions:** In patients treated with TTM after OHCA, greater shock severity, as reflected by higher lactate levels, mMAP  $< 70$  mmHg, and higher vasopressor requirements during the first 24 hours was associated with an increased rate of hospital mortality.

2. Scand J Trauma Resusc Emerg Med. 2020 Aug 5;28(1):75. doi: 10.1186/s13049-020-00765-2.

## Predictive accuracy of biomarkers for survival among cardiac arrest patients with hypothermia: a prospective observational cohort study in Japan.

Okada Y(1)(2), Kiguchi T(3)(4), Irisawa T(5), Yoshiya K(5), Yamada T(6), Hayakawa K(7), Noguchi K(8), Nishimura T(9), Ishibe T(10), Yagi Y(11), Kishimoto M(12), Shintani H(13), Hayashi Y(14), Sogabe T(15), Morooka T(16), Sakamoto H(17), Suzuki K(18), Nakamura F(19), Nishioka N(1), Matsuyama T(20), Matsui S(21), Shimazu T(5), Koike K(2), Kawamura T(1)(3), Kitamura T(21), Iwami T(22)(23).

## Abstract

**Background:** There is limited information on the predictive accuracy of commonly used predictors, such as lactate, pH or serum potassium for the survival among out-of-hospital cardiac arrest (OHCA) patients with hypothermia. This study aimed to identify the predictive accuracy of these biomarkers for survival among OHCA patients with hypothermia.

**Methods:** In this retrospective analysis, we analyzed the data from a multicenter, prospective nationwide registry among OHCA patients transported to emergency departments in Japan (the JAAM-OHCA Registry). We included all adult ( $\geq 18$  years) OHCA patients with hypothermia ( $\leq 32.0$  °C) who were registered from June 2014 to December 2017 and whose blood test results on hospital arrival were recorded. We calculated the predictive accuracy of pH, lactate, and potassium for 1-month survival.

Results: Of the 34,754 patients in the JAAM-OHCA database, we included 754 patients from 66 hospitals. The 1-month survival was 5.8% (44/754). The areas under the curve of the predictors and 95% confidence interval were as follows: pH 0.829 [0.767-0.877] and lactate 0.843 [0.793-0.882]. On setting the cutoff points of 6.9 in pH and 120 mg/dL (13.3 mmol/L) in lactate, the predictors had a high sensitivity (lactate: 0.91; pH 0.91) and a low negative likelihood ratio (lactate: 0.14; pH 0.13), which are suitable to exclude survival to 1 month. Furthermore, in additional analysis that included only the patients with potassium values available, a cutoff point of 7.0 (mmol/L) for serum potassium had high sensitivity (0.96) and a low negative likelihood ratio (0.09).

Conclusion: This study indicated the predictive accuracy of serum lactate, pH, and potassium for 1-month survival among adult OHCA patients with hypothermia. These biomarkers may help define a more appropriate resuscitation strategy.

#### FREE FULL TEXT

3. Intern Emerg Med. 2020 Aug 9. doi: 10.1007/s11739-020-02459-0. Online ahead of print.

#### **Blood lactate predicts survival after percutaneous implantation of extracorporeal life support for refractory cardiac arrest or cardiogenic shock complicating acute coronary syndrome: insights from the CareGem registry.**

Porto I(1)(2), Mattesini A(3), D'Amario D(4), Sorini Dini C(5), Della Bona R(1), Scicchitano M(6), Vergallo R(4), Martellini A(3), Caporusso S(7), Trani C(4), Burzotta F(4), Bruno P(4), Di Mario C(3), Crea F(4), Valente S(8), Massetti M(9).

#### **Abstract**

Refractory cardiogenic shock (RCS) or refractory cardiac arrest (RCA) complicating acute coronary syndrome (ACS) is associated with extremely high mortality rate. Veno-arterial extracorporeal life support (VA-ECLS) represents a valuable therapeutic option to stabilize patients' condition before or at the time of emergency revascularization. We analyzed 29 consecutive patients with RCS or RCA complicating ACS, and implanted with VA-ECLS in two centers who have adopted a similar, structured approach to ECLS implantation. Data were collected from January 2010 to December 2015 and ECLS had to be percutaneously implanted either before (within 48 h) or at the time of attempted percutaneous coronary revascularization (PCI). We investigated in-hospital outcome and factors associated with survival. Twenty-one (72%) were implanted for RCA, whereas 8 (28%) were implanted on ECLS for RCS. All RCA were witnessed and no-flow time was shorter than 5 min in all cases but one. All patients underwent attempted emergency PCI, using radial access in ten cases (34.5%), whereas in three patients a subsequent CABG was performed. Overall, ten patients (34.5%) survived, nine of them with a good neurological outcome. Life threatening complications, including stroke (4 pts), leg ischemia (4 pts), intestinal ischemia (5 pts), and deep vein thrombosis (2 pts), occurred frequently, but were not associated with in-hospital death. Main cause of death was multi-organ failure. PCI variables did not predict survival. Survivors were younger, with shorter low-flow time, and with ECLS mainly implanted for RCS. At multivariate analysis, levels of lactate at ECLS implantation (OR 4.32, 95%CI 1.01-18.51,  $p = 0.049$ ) emerged as the only variable that independently predicted survival. In patients with RCA or RCS complicating ACS who are percutaneously implanted with ECLS before or at the time of coronary revascularization, in hospital survival rate is higher than 30%. Level of lactate at ECLS implantation appears to be the most important factor to predict survival.

## **TARGETED TEMPERATURE MANAGEMENT**

1. Cureus. 2020 Aug 4;12(8):e9545. doi: 10.7759/cureus.9545.

### **Outcomes and Utilization of Therapeutic Hypothermia in Post-Cardiac Arrest Patients in Teaching Versus Non-Teaching Hospitals: Retrospective Study of the Nationwide Inpatient Sample Database (2016).**

Jha A(1), Thota A(2), Buda KG(3), Goel A(4), Sharma A(5), Krishnan AM(6), Patel HK(7), Wu F(8).

#### **Abstract**

**Background** Using therapeutic hypothermia (TH) reduces the core body temperature of survivors of cardiac arrest to minimize the neurological damage caused by severe hypoxia. The TH protocol is initiated following return of spontaneous circulation (ROSC) in non-responsive patients. Clinical trials examining this technique have shown significant improvement in neurological function among survivors of cardiac arrests. Though there is strong evidence to support TH use to improve the neurologic outcomes in shockable and nonshockable rhythms, predictors of TH utilization are not well-characterized. Our study tried to evaluate TH utilization, as well as the effect of the teaching status of hospitals, on outcomes, including mortality, length of stay, and total hospitalization charges. **Method** We conducted a retrospective analysis of the Healthcare Cost and Utilization Project - Nationwide Inpatient Sample (HCUP-NIS) database. Patients with an admitting diagnosis of cardiac arrest, as identified by the corresponding International Classification of Disease, 10<sup>th</sup> Revision (ICD-10) code for the year 2016 were analyzed. In addition, we identified TH using the ICD-10 procedure code. A weighted descriptive analysis was performed to generate national estimates. Groups of patients admitted to teaching hospitals were compared to those admitted in non-teaching hospitals. Patients were stratified by age, sex, race, and demographic and clinical data, including the Charlson Comorbidity Index (CCI), for these two groups, and statistical analysis was done for the primary outcome, in-hospital mortality, as well as the secondary outcomes, including length of stay (LOS) and total hospitalization charges. Fisher's exact test was used to compare proportions and student's t-test for continuous variables. Statistical analysis was completed by linear regression analysis. **Results** A total of 13,780 patients met the inclusion criteria for cardiac arrest admission. The number of patients with cardiac arrest admitted to a teaching hospital was 9285. A total of 670 patients received TH, with 495 admissions to teaching hospitals. The population of females in the hypothermia group was 270. The mean age of patients received TH was 59.4 years. In patients who received TH, 65% were Caucasians followed by Hispanics (16%), with no significant statistical racial differences in groups ( $p=0.30$ ). The majority of patients with TH in both groups (teaching vs. non-teaching admissions) had Medicare (58.8% vs 49.5%;  $p=0.75$ ). Hospitals in the southern region had the most admissions in both groups (45.7% and 31.3%), with the northeast region having the least non-teaching hospital admissions (8.5%) and approximately similar teaching hospital admissions in other regions (~22%) ( $p=0.27$ ). The total number of deaths in this group was 510, out of which 370 were in a teaching hospital. After adjusting for age, sex, race, income, the CCI, hospital location, and bed size, mortality was not significantly different between these two groups ( $p=0.797$ ). We found increased LOS in patients admitted to teaching hospitals ( $p=0.021$ ). With a p-value of 0.097, there were no differences in total hospitalization charges in both groups. **Conclusion** There were no significant differences in mortality or total hospitalization charge between patients admitted with cardiac arrest to a teaching hospital and received TH as compared to a non-teaching hospital although patients admitted to teaching hospitals stayed longer.

## **ELECTROFISIOLOGIA I DESFIBRIL·LACIÓ**

1. J Am Heart Assoc. 2020 Aug 8:e016485. doi: 10.1161/JAHA.120.016485. Online ahead of print.

## **Increased QT Dispersion Is Linked to Worse Outcomes in Patients Hospitalized for Out-of-Hospital Cardiac Arrest.**

Kosmopoulos M(1), Roukoz H(1), Sebastian P(1), Kalra R(1), Goslar T(1)(2), Bartos JA(1), Yannopoulos D(1), Benditt DG(1).

### **Abstract**

**Background** The incidence and mortality of out-of-hospital cardiac arrest (OHCA) remains high, but predicting outcomes is challenging. Being able to better assess prognosis of hospitalized patients after return of spontaneous circulation would enable improved management of survival expectations. In this study, we assessed the predictive value of ECG indexes in hospitalized patients with OHCA. **Methods and Results** PR interval and QT interval corrected by the Bazett formula (QTc) for all leads were calculated from standard 12-lead ECGs 24 hours after return of spontaneous circulation in 93 patients who were hospitalized following OHCA. PR interval and QT and QTc duration did not differentiate OHCA survivors and nonsurvivors. However, QT and QTc dispersion was significantly increased in patients who died during hospitalization compared with survivors discharged from the hospital ( $P < 0.01$ ). Logistic regression indicated a strong association between increased QT dispersion and in-hospital mortality ( $P < 0.0001$ ; area under the curve, 0.8918 for QT dispersion and 0.8673 for QTc dispersion). Multinomial logistic regression indicated that the increase of QTc dispersion correlated with worse Cerebral Performance Category scores at discharge ( $P < 0.001$ ; likelihood ratio, 51.42). There was also significant correlation between dispersion measures and serum potassium at the time of measurement and between dispersion measures and cumulative epinephrine administration. No difference existed regarding the number of measurable leads. **Conclusions** Lesser QT and QTc dispersion at 24 hours after return of spontaneous circulation was significantly associated with survival and neurologic status at discharge. Routine evaluation of QT and QTc dispersion during hospitalization following return of spontaneous circulation might improve outcome prognostication for patients hospitalized for OHCA.

## **PEDIATRIA**

1. Resuscitation. 2020 Aug 5;S0300-9572(20)30303-8. doi: 10.1016/j.resuscitation.2020.07.026. Online ahead of print.

## **The landscape of paediatric in-hospital cardiac arrest in the United Kingdom National Cardiac Arrest Audit.**

Skelleth S(1), Orzechowska I(2), Thomas K(3), Fortune PM(4).

### **Abstract**

**Aim:** To report the patient characteristics and clinical outcome of paediatric in-hospital cardiac arrest in the United Kingdom (UK) National Cardiac Arrest Audit (NCAA) database.

**Methods:** Analysis of all recorded paediatric cardiac arrests in the NCAA dataset over a seven-year period ending on 31 December 2018, within acute children's hospitals (including standalone paediatric hospitals and hospitals with tertiary paediatric services) and acute general hospitals participating in NCAA. In this period 1456 patients (with 1580 events), 1 month to 16 years of age, received chest compressions and/or defibrillation and were attended by a hospital-based resuscitation team in response to an emergency call. The main outcome measure was survival to discharge.

**Results:** For this cohort of paediatric in-hospital cardiac arrest patients the overall rates of sustained return of spontaneous circulation (ROSC) were 69.1% with unadjusted survival to hospital discharge of 54.2%. The presenting rhythm was shockable in 4.3% of events and non-shockable in 82.1% (remainder undetermined); rates of survival to hospital discharge associated with these rhythms were 63.9% and 51.7%. A difference in outcomes was observed between Children's hospitals and acute general hospitals with ROSC rates of 79.1% and 55.5% respectively and survival to hospital discharge rates of 57.7% and 49.3% respectively.

**Conclusions:** These first results from the NCAA database describing the outcome of paediatric in-hospital cardiac arrest in UK hospitals will serve as a benchmark from which to assess the future impact of changes in service delivery, organisation and treatment for in-hospital cardiac arrest in young people. Outcomes for specialist paediatric centres should be studied further as higher rates of ROSC and survival to hospital discharge were observed.

## **ECMO**

1. ANN INTENSIVE CARE. 2020 AUG 10;10(1):112. DOI: 10.1186/s13613-020-00730-3.

**GASPING DURING REFRACTORY OUT-OF-HOSPITAL CARDIAC ARREST IS A PROGNOSTIC MARKER FOR FAVOURABLE NEUROLOGICAL OUTCOME FOLLOWING EXTRACORPOREAL CARDIOPULMONARY RESUSCITATION: A RETROSPECTIVE STUDY.**

BUNYA N(1), OHNISHI H(2), WADA K(3), KAKIZAKI R(3), KASAI T(3), NAGANO N(4), KOKUBU N(4), MIYATA K(5), UEMURA S(3), HARADA K(3), NARIMATSU E(3).

## **Abstract**

**Background:** Gasping during cardiac arrest is associated with favourable neurological outcomes for out-of-hospital cardiac arrest. Moreover, while extracorporeal cardiopulmonary resuscitation (ECPR) performed for refractory cardiac arrest can improve outcomes, factors for favourable neurological outcomes remain unknown. This study aimed to examine whether gasping during cardiac arrest resuscitation during transport by emergency medical services (EMS) was independently associated with a favourable neurological outcome for patients who underwent ECPR. This retrospective study was based on medical records of all adult patients who underwent ECPR due to refractory cardiac arrest. The primary endpoint was neurologically intact survival at discharge. The study was undertaken at Sapporo Medical University Hospital, a tertiary care centre approved by the Ministry of Health, Labour and Welfare, located in the city of Sapporo, Japan, between January 2012 and December 2018.

**Results:** Overall, 166 patients who underwent ECPR were included. During transportation by EMS, 38 patients exhibited gasping, and 128 patients did not. Twenty patients who exhibited gasping during EMS transportation achieved a favourable neurological outcome (20/38; 52.6%); 14 patients who did not exhibit gasping achieved a favourable neurological outcome (14/128; 10.9%). Gasping during transportation by EMS was independently associated with favourable neurological outcome irrespective of the type of analysis performed (multiple logistic regression analysis, odds ratio [OR] 9.52; inverse probability of treatment weighting using propensity score, OR 9.14).

**Conclusions:** The presence of gasping during transportation by EMS was independently associated with a favourable neurological outcome in patients who underwent ECPR. The association of gasping with a favourable neurological outcome in patients with refractory cardiac arrest suggests that ECPR may be considered in such patients.

## **RECERCA EXPERIMENTAL**

1. Ther Hypothermia Temp Manag. 2020 Aug 4. doi: 10.1089/ther.2020.0016. Online ahead of print.

### **Total Tau-Protein as Investigated by Cerebral Microdialysis Increases in Hypothermic Cardiac Arrest: A Pig Study.**

Schiefecker AJ(1), Putzer G(2), Braun P(2), Martini J(2), Strapazzon G(3), Antunes AP(1)(4), Mulino M(5), Pinggera D(5), Glodny B(6), Brugger H(3), Paal P(7), Mair P(2), Pfausler B(1), Beer R(1), Humpel C(8), Helbok R(1).

#### **Abstract**

The understanding and neurological prognostication of hypoxic ischemic encephalopathy (HIE) after hypothermic cardiac arrest (CA) is limited. Recent data suggest that the protein *tau* (total *tau*) might be a useful marker for outcome in patients with HIE. This translational porcine study aimed to analyze brain physiology in relation to total *tau* protein release during hypothermic CA. Eight domestic pigs were studied as part of a prospective porcine study using cerebral microdialysis (CMD). CMD samples for *tau* analysis were collected at baseline, after reaching the targeted core temperature of 28°C (hypothermia), after hypoxic hypercapnia (partial asphyxia), and finally 20 minutes after cardiopulmonary resuscitation. CMD-total *tau*-protein was analyzed using enzyme-linked immunosorbent assay. Cerebral *tau* protein was slightly elevated at baseline most likely due to an insertion trauma, remained stable during hypercapnic hypoxia, and significantly ( $p = 0.009$ ) increased in 8/8 pigs during resuscitation to 1335 pg/mL (interquartile range: 705-2100). CMD-*tau* release was associated with lower levels of brain tissue oxygen tension ( $p = 0.011$ ), higher CMD-lactate/pyruvate ratio, higher CMD-lactate, CMD-glutamate, and CMD-glycerol levels ( $p < 0.001$ , respectively), but not with cerebral perfusion pressure, intracranial pressure, or CMD-glucose levels. This study demonstrates an immediate *tau* protein release accompanied by deranged cerebral metabolism and decreased brain tissue oxygen tension during mechanical resuscitation in hypothermic CA. Understanding *tau* physiology and release kinetics is important for the design and interpretation of studies investigating *tau* as a biomarker of HIE.

2. J Inflamm (Lond). 2020 Aug 5;17:25. doi: 10.1186/s12950-020-00255-3. eCollection 2020.

### **N-acetylcysteine alleviates post-resuscitation myocardial dysfunction and improves survival outcomes via partly inhibiting NLRP3 inflammasome induced-pyroptosis.**

He F(#)(1), Zheng G(#)(2), Hou J(2), Hu Q(2), Ling Q(3), Wu G(3), Zhao H(1), Yang J(1), Wang Y(2), Jiang L(2), Tang W(2)(3), Yang Z(2)(4).

#### **Abstract**

Background: NOD-like receptor 3 (NLRP3) inflammasome is necessary to initiate acute sterile inflammation. Increasing evidence indicates the activation of NLRP3 inflammasome induced pyroptosis is closely related to reactive oxygen species (ROS) in the sterile inflammatory response triggered by ischemia/reperfusion (I/R) injury. N-acetylcysteine (NAC) is an antioxidant and plays a protective role in local myocardial I/R injury, while its effect on post-resuscitation myocardial dysfunction, as well as its mechanisms, remain elusive. In this study, we aimed to investigate the effect of NAC on post-resuscitation myocardial dysfunction in a cardiac arrest rat model, and

whether its underlying mechanism may be linked to ROS and NLRP3 inflammasome-induced pyroptosis.

**Methods:** The rats were randomized into three groups: (1) sham group, (2) cardiopulmonary resuscitation (CPR) group, and (3) CPR + NAC group. CPR group and CPR + NAC group went through the induction of ventricular fibrillation (VF) and resuscitation. After return of spontaneous circulation (ROSC), rats in the CPR and CPR + NAC groups were again randomly divided into two subgroups, ROSC 6 h and ROSC 72 h, for further analysis. Hemodynamic measurements and myocardial function were measured by echocardiography, and western blot was used to detect the expression of proteins.

**Results:** Results showed that after treatment with NAC, there was significantly better myocardial function and survival duration; protein expression levels of NLRP3, adaptor apoptosis-associated speck-like protein (ASC), Cleaved-Caspase-1 and gasdermin D (GSDMD) in myocardial tissues were significantly decreased; and inflammatory cytokines levels were reduced. The marker of oxidative stress malondialdehyde (MDA) decreased and superoxide dismutase (SOD) increased with NAC treatment.

**Conclusions:** NAC improved myocardial dysfunction and prolonged animal survival duration in a rat model of cardiac arrest. Moreover, possibly by partly inhibiting ROS-mediated NLRP3 inflammasome-induced pyroptosis.

3. *J Clin Monit Comput.* 2020 Aug 11:1-9. doi: 10.1007/s10877-020-00576-x. Online ahead of print.

#### **Pulse rate as an alternative, real-time feedback indicator for chest compression rate: a porcine model of cardiac arrest.**

Fu Y(1), Yin L(1)(2), Seery S(3), Dai J(1), Zhu H(1), Jin K(1), Li Y(4), Yu S(1), Zhang L(1), Xu J(5), Yu X(6).

#### **Abstract**

Feedback indicators can improve chest compression quality during cardiopulmonary resuscitation (CPR). However, the application of feedback indicators in the clinic practice is rare. Pulse oximetry has been widely used and reported to correlate spontaneous circulation restoration during CPR. However, it is unclear if pulse oximetry can monitor the quality of chest compression. We hypothesized that pulse rate monitored by pulse oximetry can be used as a feedback indicator of the chest compression rate during CPR in a porcine model of cardiac arrest. Seven domestic male pigs (30-35 kg) were utilized in this study. Eighteen intermittent chest compression periods of 2 min were performed on each animal. Chest compression and pulse oximetry plethysmographic waveforms were recorded simultaneously. Chest compression and pulse rates were calculated based on both waveforms. Compression interruption and synchronous pulse interruption times were also measured. Agreement was analyzed between pulse rates and synchronous chest compression rates, as well as between compression interruption times and synchronous pulse interruption times. A total of 126 compression periods of 2 min were performed on seven animals. Interclass correlation coefficients and Bland-Altman analysis revealed reliable agreement between pulse rates and synchronous chest compression rates. Similarly, compression interruption and synchronous pulse interruption times obtained also showed high agreement. Pulse rate can be used as an alternative indicator of chest compression rate during CPR in a porcine model of cardiac arrest. Pulse interruption time also can be used to reflect compression interruption time precisely in this model.

4. *J Cereb Blood Flow Metab.* 2020 Aug 12:271678X20948612. doi: 10.1177/0271678X20948612. Online ahead of print.



## **Cardiac arrest and resuscitation activates the hypothalamic-pituitary-adrenal axis and results in severe immunosuppression.**

Zhao Q(1), Shen Y(1)(2), Li R(1), Wu J(1), Lyu J(1)(3), Jiang M(1)(2), Lu L(1), Zhu M(4), Wang W(1), Wang Z(1), Liu Q(5), Hoffmann U(1), Karhausen J(1), Sheng H(1), Zhang W(4), Yang W(1).

### **Abstract**

In patients who are successfully resuscitated after initial cardiac arrest (CA), mortality and morbidity rates are high, due to ischemia/reperfusion injury to the whole body including the nervous and immune systems. How the interactions between these two critical systems contribute to post-CA outcome remains largely unknown. Using a mouse model of CA and cardiopulmonary resuscitation (CA/CPR), we demonstrate that CA/CPR induced neuroinflammation in the brain, in particular, a marked increase in pro-inflammatory cytokines, which subsequently activated the hypothalamic-pituitary-adrenal (HPA) axis. Importantly, this activation was associated with a severe immunosuppression phenotype after CA. The phenotype was characterized by a striking reduction in size of lymphoid organs accompanied by a massive loss of immune cells and reduced immune function of splenic lymphocytes. The mechanistic link between post-CA immunosuppression and the HPA axis was substantiated, as we discovered that glucocorticoid treatment, which mimics effects of the activated HPA axis, exacerbated post-CA immunosuppression, while RU486 treatment, which suppresses its effects, significantly mitigated lymphopenia and lymphoid organ atrophy and improved CA outcome. Taken together, targeting the HPA axis could be a viable immunomodulatory therapeutic to preserve immune homeostasis after CA/CPR and thus improve prognosis of post-resuscitation CA patients.

### **CASE REPORTS**

1. Perfusion. 2020 Aug 6:267659120946730. doi: 10.1177/0267659120946730. Online ahead of print.

#### **Extracorporeal cardiopulmonary resuscitation with low pump flow for blocked modified Blalock-Taussig shunt followed by spontaneous recanalization.**

Bakos M(1), Dilber D(1)(2), Belina D(1), Rubic F(1), Matic T(1)(2).

### **Abstract**

A 2-week-old male newborn with a double inlet left ventricle developed a cardiac arrest following modified Blalock-Taussig anastomosis in pediatric intensive care unit. Probable causes of the arrest were hemodynamic instability and thrombosed shunt, which was later recanalized on extracorporeal membrane oxygenation therapy, which was successfully used with a pump flow lower than recommended in these patients-without the shunt clip, but without any complications.

2. CJEM. 2020 AUG 12:1-4. DOI: 10.1017/CEM.2020.450. ONLINE AHEAD OF PRINT.

#### **JUST THE FACTS: EXTRACORPOREAL CARDIOPULMONARY RESUSCITATION FOR OUT-OF-HOSPITAL CARDIAC ARREST.**

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### **Abstract**

A 58-year-old man is brought by the ambulance to the emergency department (ED) of a tertiary care centre following an out-of-hospital cardiac arrest. Paramedics were called by the patient's wife after he had collapsed. She immediately initiated cardiopulmonary resuscitation (CPR). Prior to his collapse, he had been complaining of chest pain. His initial rhythm in the field was ventricular fibrillation, and he received defibrillation. An automated CPR device was applied prior to transport. En route, return of spontaneous circulation is achieved. An electrocardiogram shows ST-segment elevation in the anterior leads. Just prior to arrival, the patient suffers recurrent cardiac arrest with two further rounds of unsuccessful defibrillation in the ED. At this point, a decision is made to proceed with extracorporeal cardiopulmonary resuscitation (ECPR), prior to transport for cardiac catheterization.