

**This week's PubMed 13<sup>th</sup> – 19<sup>th</sup> August 2023: articles of interest n = 28**

### **CPR AND COVID-19**

1. Ther Hypothermia Temp Manag. 2023 Aug 11. doi: 10.1089/ther.2023.0033. Online ahead of print.

#### **Targeted Temperature Management After Cardiac Arrest in COVID-19 Patients.**

Binda DD(1), Logan CM(1), Rosales V(1), Nozari A(1), Rendon LF(1).

#### **ABSTRACT**

There is a paucity of evidence regarding the utility of targeted temperature management (TTM) in COVID-19 patients who suffer cardiac arrest. This systematic review and meta-analysis aimed to use the available data of how temperature predicts outcomes in COVID-19 patients and the association between active cooling and outcomes in non-COVID-19 cardiac arrest patients to give recommendations for the utility of TTM in COVID-19 survivors of cardiac arrest. The PubMed, Embase, and Web of Science databases were queried in August 2022 for two separate searches: (1) temperature as a predictor of clinical outcomes in COVID-19 and (2) active cooling after return of spontaneous circulation (ROSC) in non-COVID-19. Forest plots were generated to summarize the results. Of the 4209 abstracts screened, none assessed the target population of TTM in COVID-19 victims of cardiac arrest. One retrospective cohort study evaluated hyperthermia in critically ill COVID-19 patients, two retrospective cohort studies evaluated hypothermia in septic COVID-19 patients, and 20 randomized controlled trials evaluated active cooling in non-COVID-19 patients after ROSC. Risk of death was higher in COVID-19 patients who presented with hyperthermia (risk ratio [RR] = 1.87) or hypothermia (RR = 1.77;  $p < 0.001$ ). In non-COVID-19 victims of cardiac arrest, there was no significant difference in mortality (RR = 0.94;  $p = 0.098$ ) or favorable neurological outcome (RR = 1.05;  $p = 0.41$ ) with active cooling after ROSC. Further studies are needed to evaluate TTM in COVID-19 victims of cardiac arrest. However, given the available evidence that hyperthermia or hypothermia in COVID-19 patients is associated with increased mortality as well as our findings suggesting limited utility for active cooling in non-COVID-19 cardiac arrest patients, we posit that TTM to normothermia (core body temperature  $\sim 37^{\circ}\text{C}$ ) would most likely be optimal for the best outcomes in COVID-19 survivors of cardiac arrest.

### **CPR/MECHANICAL CHEST COMPRESSION**

No articles identified.

### **REGISTRIES, REVIEWS AND EDITORIALS**

1. Resuscitation. 2023 Aug 8:109929. doi: 10.1016/j.resuscitation.2023.109929. Online ahead of print.

#### **Corrigendum to "Vasopressin and glucocorticoids for in-hospital cardiac arrest: A systematic review and meta-analysis of individual participant data" [Resuscitation 171 (2022) 48-56].**

Holmberg MJ(1), Granfeldt A(2), Mentzelopoulos SD(3), Andersen LW(4).

**NO ABSTRACT AVAILABLE**

## **IN-HOSPITAL CARDIAC ARREST**

No articles identified.

## **INJURIES AND CPR**

No articles identified.

## **CAUSE OF THE ARREST**

1. PLoS One. 2023 Aug 18;18(8):e0287915. doi: 10.1371/journal.pone.0287915. eCollection 2023.

### **Interaction effects between insomnia and depression on risk of out-of-hospital cardiac arrest: Multi-center study.**

Jung E(1), Ryu HH(1)(2), Kim SW(3), Lee JH(1), Song KJ(4), Ro YS(5), Cha KC(6), Hwang SO(6); Phase II Cardiac Arrest Pursuit Trial with Unique Registry and Epidemiologic Surveillance (CAPTURES-II investigators).

#### **ABSTRACT**

**BACKGROUND:** Insomnia and depression have been known to be risk factors of several diseases, including coronary heart disease. We hypothesized that insomnia affects the out-of-hospital cardiac arrest (OHCA) incidence, and these effects may vary depending on whether it is accompanied by depression. This study aimed to determine the association between insomnia and OHCA incidence and whether the effect of insomnia is influenced by depression. **METHODS:** This prospective multicenter case-control study was performed using Phase II Cardiac Arrest Pursuit Trial with Unique Registration and Epidemiology Surveillance (CAPTURES-II) project database for OHCA cases and community-based controls in Korea. The main exposure was history of insomnia. We conducted conditional logistic regression analysis to estimate the effect of insomnia on the risk of OHCA incidence and performed interaction analysis between insomnia and depression. Finally, subgroup analysis was conducted in the patients with insomnia. **RESULTS:** Insomnia was not associated with increased OHCA risk (0.95 [0.64-1.40]). In the interaction analysis, insomnia interacted with depression on OHCA incidence in the young population. Insomnia was associated with significantly higher odds of OHCA incidence (3.65 [1.29-10.33]) in patients with depression than in those without depression (0.84 [0.59-1.17]). In the subgroup analysis, depression increased OHCA incidence only in patients who were not taking insomnia medication (3.66 [1.15-11.66]). **CONCLUSION:** Insomnia with depression is a risk factor for OHCA in the young population. This trend was maintained only in the population not consuming insomnia medication. Early and active medical intervention for patients with insomnia may contribute to lowering the risk of OHCA.

2. Zhonghua Wei Zhong Bing Ji Jiu Yi Xue. 2023 Aug;35(8):844-848. doi: 10.3760/cma.j.cn121430-20230207-00071.

### **[Characteristics and resuscitation effects of out-of-hospital sudden death: a study based on Internet data]. [Article in Chinese]**

Sun M(1), Zhao J, Zhu A.

#### **ABSTRACT**

**OBJECTIVE:** To collect the Internet news about "sudden death", analyze its characteristics and resuscitation effects, so as to provide reference for formulating intervention strategies. **METHODS:** The Internet was used to search for "sudden death" and "cardiac arrest" on "Baidu" and "360" websites. Reports of sudden death events were collected from January 2013 to December 2022. The

age, gender, characteristics of sudden death, implementation characteristics of cardiopulmonary resuscitation (CPR), and pre-hospital and final clinical outcomes of sudden death patients were recorded and analyzed. Subgroup analyses were performed for pre-hospital and final clinical outcomes. Unconditional multivariate Logistic regression analysis was used to screen the related factors affecting the pre-hospital and final clinical outcomes in patients with sudden death. RESULTS: 177 news reports were finally confirmed, involving 177 sudden death patients, including 152 males (85.9%) and 25 females (14.1%), aged (37.27±16.82) years old, and 53.1% in the 16-45 years old group. Triggering factors included strenuous exercise (29.9%), heart disease history (7.9%), overwork (6.2%), staying up late and insomnia (4.0%), activation of emotion (2.8%), and no obvious inducement (48.0%). After on-site first aid, 104 cases (58.8%) achieved restoration of spontaneous circulation (ROSC) before hospital admission, and 18 cases (10.2%) recovered consciousness. After clinical treatment, 109 cases (61.6%) achieved ROSC, 86 cases (48.6%) recovered consciousness, and 22 cases (12.4%) did not report the final outcome. Subgroup analysis showed that compared with patients who achieved pre-hospital ROSC (n = 104), sudden death in non-ROSC patients (n = 73) mainly occurred during sleep, in residence and without immediate CPR, full CPR, or automated external defibrillator (AED); and patients who ultimately did not recover consciousness clinically (n = 91) showed similar characteristics compared with patients who recovered consciousness (n = 86). Multifactorial Logistic regression analysis showed that immediate CPR [pre-hospital ROSC: odds ratio (OR) = 8.06, 95% confidence interval (95%CI) was 2.36-27.46; final recovery of consciousness: OR = 9.10, 95%CI was 2.46-33.68] and AED defibrillation (pre-hospital ROSC: OR = 36.31, 95%CI was 4.53-291.19; final recovery of consciousness: OR = 3.53, 95%CI was 1.45-8.61) facilitated pre-hospital achievement of sudden death patients ROSC and final recovery of consciousness. CONCLUSIONS: Out-of-hospital sudden death mainly occurs in young people, and vigorous exercise is one of the potential factors for out-of-hospital sudden death, with nearly half having no obvious cause. Immediate and rapid CPR and defibrillation are the simplest and most effective on-site first aid methods. Strengthening public CPR and defibrillation education and training, and advocating healthy lifestyle are effective ways to improve the survival rate of sudden death and reduce the occurrence of sudden death. Based on practical clinical rescue experience, the implementation of bystander CPR by medical personnel is also a factor that cannot be ignored in affecting the clinical outcomes of sudden death patients.

**3.** Heart. 2023 Aug 15:heartjnl-2023-322520. doi: 10.1136/heartjnl-2023-322520. Online ahead of print.

**Prevalence and impact of recreational drug use in patients with acute cardiovascular events.**

Pezel T(#)(1), Dillinger JG(#)(1), Trimaille A(2), Delmas C(3), Piliero N(4), Bouleti C(5), Pommier T(6), El Ouahidi A(7), Andrieu S(8), Lattuca B(9), Rossanaly Vasram R(10), Fard D(11), Noirclerc N(12), Bonnet G(13)(14), Goralski M(15), Elbaz M(3), Deney A(16), Schurtz G(17), Docq C(18), Roubille F(19), Fauvel C(20), Bochaton T(21), Aboyans V(22), Boccara F(23), Puymirat E(24), Batisse A(25), Steg G(26), Vicaut E(14), Henry P(27); ADDICT-ICCU Investigators.

**ABSTRACT**

**OBJECTIVE:** While recreational drug use is a risk factor for cardiovascular events, its exact prevalence and prognostic impact in patients admitted for these events are not established. We aimed to assess the prevalence of recreational drug use and its association with in-hospital major adverse events (MAEs) in patients admitted to intensive cardiac care units (ICCU). **METHODS:** In the Addiction in Intensive Cardiac Care Units (ADDICT-ICCU) study, systematic screening for recreational drugs was performed by prospective urinary testing all patients admitted to ICCU in 39 French centres from 7 to 22 April 2021. The primary outcome was prevalence of recreational drug detection. In-hospital MAEs were defined by death, resuscitated cardiac arrest, or haemodynamic shock. **RESULTS:** Of 1499

consecutive patients (63±15 years, 70% male), 161 (11%) had a positive test for recreational drugs (cannabis 9.1%, opioids 2.1%, cocaine 1.7%, amphetamines 0.7%, 3,4-methylenedioxymethamphetamine (MDMA) 0.6%). Only 57% of these patients declared recreational drug use. Patients who used recreational drugs exhibited a higher MAE rate than others (13% vs 3%, respectively,  $p<0.001$ ). Recreational drugs were associated with a higher rate of in-hospital MAEs after adjustment for comorbidities (OR 8.84, 95% CI 4.68 to 16.7,  $p<0.001$ ). After adjustment, cannabis, cocaine, and MDMA, assessed separately, were independently associated with in-hospital MAEs. Multiple drug detection was frequent (28% of positive patients) and associated with an even higher incidence of MAEs (OR 12.7, 95% CI 4.80 to 35.6,  $p<0.001$ ). **CONCLUSION:** The prevalence of recreational drug use in patients hospitalised in ICCU was 11%. Recreational drug detection was independently associated with worse in-hospital outcomes.

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

No articles identified.

### **ORGAN DONATION**

No articles identified.

### **FEEDBACK**

No articles identified.

### **DRUGS**

No articles identified.

### **TRAUMA**

1. Prehosp Emerg Care. 2023 Aug 14:1-10. doi: 10.1080/10903127.2023.2241542. Online ahead of print.

#### **Survival following Prehospital Traumatic Cardiac Arrest Resuscitation in the Israel Defense Forces: A Retrospective Study.**

Talmy T(1)(2), Greenstein I(1), Gendler S(1), Chayen D(1)(2), Radomislensky I(3), Ahimor A(1), Koler T(1), Glassberg E(1)(4)(5), Almog O(1)(2).

#### **ABSTRACT**

**BACKGROUND:** Prehospital traumatic cardiac arrest (TCA) is associated with a poor prognosis and requires urgent interventions to address its potentially reversible causes. Resuscitative efforts of TCA in the prehospital setting may entail significant resource allocation and impose added tolls on caregivers. The Israel Defense Forces Medical Corps (IDF-MC) instructs clinicians to perform a set protocol in the case of TCA, providing prompt oxygenation, chest decompression and volume resuscitation. This study investigates the settings, interventions, and outcomes of TCA resuscitation by IDF-MC teams over 25 years in both combat and civilian settings. **METHODS:** Retrospective study of the IDF-MC Trauma Registry between 1997-2022. Search criteria were applied to identify cases

where the TCA protocol was initiated. A manual review of cases matching the search criteria was performed by two curators to determine the indications, interventions, and outcomes of casualties with prehospital TCA. Patients for whom interventions were performed outside of the TCA protocol, such as with measurable vital signs, were excluded. The primary outcome was survival to hospital admission, with the secondary outcome being return of vital signs in the prehospital setting.

**RESULTS:** Following case review, 149 patients with prehospital TCA were included, with a median age of 21 (interquartile range 19-27). Eighty-four (56.4%) presented with TCA in military or combat settings, with gunshot wounds and blast injuries being the most common mechanisms in this group. For 56 casualties (37.8%), all components of the protocol were performed (oxygenation, chest decompression, and volume resuscitation). Five (3.4%) casualties had return of vital signs in the prehospital setting, but none survived to hospital admission. **CONCLUSION:** The prognosis of prehospital TCA is poor, and efforts to address its potentially reversible causes may often be futile. These notions may be further emphasized in military settings, where resources are limited, and extensive penetrating injuries are more common.

## **VENTILATION**

1. Resuscitation. 2023 Aug 17:109923. doi: 10.1016/j.resuscitation.2023.109923. Online ahead of print.

### **Association Between the Presence of an Advanced Airway and Ventilation Rate during Pediatric CPR: A Report From the Videography in Pediatric Resuscitation (VIPER) Collaborative.**

O'Connell KJ(1), Dutta A(2), Myers S(3), Neubrand T(4), Sandler A(5), Keane R(6), Kerrey B(7), Donoghue A(8).

#### **ABSTRACT**

**OBJECTIVE:** To determine the association between presence of an advanced airway during pediatric cardiopulmonary resuscitation (CPR) and ventilation rates. **METHODS:** Prospective observational study, January 2017 to June 2020. Patients  $\leq 18$  years receiving CC for  $\geq 2$  minutes were enrolled. Ventilation rate and type of airway (advanced airway (AA), either endotracheal tube (ETT) or supraglottic airway (SGA); or natural airway (NA)) were collected from video review and analyzed in 'CPR segments' (periods of CPR by individual providers). Ventilation rate (breaths per minute, bpm) was calculated for each segment; hyperventilation was defined as  $> 12$  bpm according to 2015 American Heart Association guidelines. Univariate analysis between airway type was done by X<sup>2</sup> testing. Multivariate regression was used to determine the association between the presence of AA with hyperventilation while controlling for within-patient covariance. **RESULTS:** 779 CPR segments from 94 CPR event were analyzed. The mean ventilation rate per CPR segment across all events was 22 bpm ( $\pm 16$  bpm)). Mean ventilation rates were higher with AA, either ETT ( $24 \pm 17$  bpm) or SGA ( $34 \pm 19$  bpm), than with NA ( $17 \pm 14$ ,  $p < 0.001$ ). Hyperventilation occurred more often with AA in place (ETT: 68%; SGA: 96%; NA: 43%;  $p < 0.001$ ). The presence of AA was independently associated with hyperventilation (AOR 9.3, 95% CI 4.3 - 20.1). **CONCLUSIONS:** During pediatric CPR, hyperventilation occurs more often with an AA in place than during CPR with NA. Future research should focus on respiratory physiology during pediatric CPR to determine optimal ventilation rate(s) during pediatric cardiac arrest.

2. Arq Bras Cardiol. 2023 Jul;120(7):e20220564. doi: 10.36660/abc.20220564.

### **Use of a Portable Mechanical Ventilator during Cardiopulmonary Resuscitation is Feasible, Improves Respiratory Parameters, and Prevents the Decrease of Dynamic Lung Compliance.**

Palácio MÁG(1)(2), Paiva EF(3)(2), Oliveira GBF(1)(2), Azevedo LCP(3)(2), Pedron BG(3), Santos ESD(1)(2), Timerman A(1)(2).

#### **ABSTRACT**

**BACKGROUND:** For practical and protective ventilation during cardiopulmonary resuscitation (CPR), a 150-grams mechanical ventilator (VLP2000E) that limits peak inspiratory pressure (PIP) during simultaneous ventilation with chest compressions was developed. **OBJECTIVES:** To evaluate the feasibility of VLP2000E ventilation during CPR and to compare monitored parameters versus bag-valve ventilation. **METHODS:** A randomized experimental study with 10 intubated pigs per group. After seven minutes of ventricular fibrillation, 2-minute CPR cycles were delivered. All animals were placed on VLP2000E after achieving return of spontaneous circulation (ROSC). **RESULTS:** Bag-valve and VLP2000E groups had similar ROSC rate (60% vs. 50%, respectively) and arterial oxygen saturation in most CPR cycles, different baseline tidal volume [0.764 (0.068) vs. 0.591 (0.123) L,  $p = 0.0309$ , respectively] and, in 14 cycles, different PIP [52 (9) vs. 39 (5) cm H<sub>2</sub>O, respectively], tidal volume [0.635 (0.172) vs. 0.306 (0.129) L], ETCO<sub>2</sub>[14 (8) vs. 27 (9) mm Hg], and peak inspiratory flow [0.878 (0.234) vs. 0.533 (0.105) L/s], all  $p < 0.0001$ . Dynamic lung compliance ( $\geq 0.025$  L/cm H<sub>2</sub>O) decreased after ROSC in bag-valve group but was maintained in VLP2000E group [0.019 (0.006) vs. 0.024 (0.008) L/cm H<sub>2</sub>O,  $p = 0.0003$ ]. **CONCLUSIONS:** VLP2000E ventilation during CPR is feasible and equivalent to bag-valve ventilation in ROSC rate and arterial oxygen saturation. It produces better respiratory parameters, with lower airway pressure and tidal volume. VLP2000E ventilation also prevents the significant decrease of dynamic lung compliance observed after bag-valve ventilation. Further preclinical studies confirming these findings would be interesting.

### **CEREBRAL MONITORING**

1. Resuscitation. 2023 Aug 15:109937. doi: 10.1016/j.resuscitation.2023.109937. Online ahead of print.

#### **Brain-derived extracellular vesicles as serologic markers of brain injury following cardiac arrest: a pilot feasibility study.**

Shen H(1), Zaitseva D(2), Yang Z(3), Forsythe L(2), Joergensen S(2), Zone AI(2), Shehu J(2), Maghraoui S(2), Ghorbani A(2), Davila A(4), Issadore D(1), Abella BS(5).

#### **ABSTRACT**

**AIM:** Assessment of neurologic injury within the immediate hours following out-of-hospital cardiac arrest (OHCA) resuscitation remains a major clinical challenge. Extracellular vesicles (EVs), small bodies derived from cytosolic contents during injury, may provide the opportunity for "liquid biopsy" within hours following resuscitation, as they contain proteins and RNA linked to cell type of origin. We evaluated whether micro-RNA (miRNA) from serologic EVs were associated with post-arrest neurologic outcome. **METHODS:** We obtained serial blood samples in an OHCA cohort. Using novel microfluidic techniques to isolate EVs based on EV surface marker GluR2 (present on excitatory neuronal dendrites enriched in hippocampal tissue), we employed reverse transcription quantitative polymerase chain reaction (RT-qPCR) methods to measure a panel of miRNAs and tested association with dichotomized modified Rankin Score (mRS) at discharge. **RESULTS:** EVs were assessed in 27 post-arrest patients between 7/3/2019-7/21/2022; 9 patients experienced good outcomes. Several miRNA species including miR-124 were statistically associated with mRS at discharge when measured within 6 hours of resuscitation (AUC=0.84 for miR-124,  $p < 0.05$ ). In a Kendall ranked correlation analysis, miRNA associations with outcome were not strongly correlated with standard serologic marker measurements, or amongst themselves, suggesting that miRNA provide distinct information from common protein biomarkers. **CONCLUSIONS:** This study explores the associations between miRNAs from neuron-derived EVs (NDEs) and circulating protein biomarkers within 6 hours with neurologic outcome, suggesting a panel of very early biomarker may be useful during clinical care. Future work will be required to test larger cohorts with a broader panel of miRNA species.

## **ULTRASOUND AND CPR**

No articles identified.

## **ORGANISATION AND TRAINING**

1. Resusc Plus. 2023 Aug 5;15:100434. doi: 10.1016/j.resplu.2023.100434. eCollection 2023 Sep. **Comparison of outcomes of out-of-hospital cardiac arrest patients: Emergency calls placed from mobile phones vs. landline phones.**

Nishimura T(1)(2), Suga M(1)(2), Hongo T(1), Yumoto T(1), Nakao A(1), Ishihara S(2), Naito H(1).

### **ABSTRACT**

**BACKGROUND:** Until recently, calls to the emergency medical service (EMS) from landline phones, which display the caller's exact location at the dispatch center, had been common. Since the use of mobile phones has become widespread, many emergency calls are now made from mobile phones. Differences in outcomes of out-of-hospital cardiac arrest (OHCA) patients for whom EMS was called from mobile versus landline phones has not yet been fully elucidated. **METHODS:** We performed a retrospective, population-based analysis in Kobe, Japan to examine whether EMS calls from mobiles improved the prognosis of OHCA patients over EMS calls placed from landlines. The primary outcome was favorable neurological outcome, defined as Cerebral Performance Category (CPC) scores of 1 or 2 at discharge. Secondary outcomes were survival at one-month, survival at discharge, and time durations between call and EMS activities. **RESULTS:** Of 4,231 OHCA cases, 2,194 cases (706 landline cases vs. 1,488 mobile cases) were included in this study. The percentages of favorable neurological outcomes were 0.7% (5/706) in the landline group and 3.8% (56/1,488) in the mobile group. Adjusted multivariable logistic regression revealed that favorable neurological outcomes (odds ratio [OR] 3.03, 95% confidence interval [CI] 1.12-8.17,  $p = 0.03$ ) were better in the mobile group, while one-month survival (OR 1.30, 95% CI 0.80-2.14,  $p = 0.29$ ) was not significantly different. Bystander CPR was more frequently administered in the mobile group (landlines 61.3% vs. mobiles 68.4%,  $p < 0.01$ ). Time durations between call to EMS dispatch (184.5 [IQR 157-220 s] vs. 205 [IQR 174-248 s],  $p < 0.01$ ) and EMS arrival (476.5 [IQR 377-599 s] vs. 491 [IQR 407.5-611.5 s],  $p < 0.01$ ) were shorter in the landline group. **CONCLUSIONS:** Although the landline caller location display system seems effective for shorter times between EMS call and EMS arrival, mobile phone use was associated with better neurological outcomes.

2. medRxiv. 2023 Aug 4:2023.08.02.23293573. doi: 10.1101/2023.08.02.23293573. Preprint.

**Impact of social vulnerability on cardiac arrest mortality in the United States, 2016-2020.**

Gonuguntla K, Chobufo MD, Shaik A, Patel N, Penmetsa M, Sattar Y, Thyagaturu H, Chan PS, Balla S.

### **ABSTRACT**

**IMPORTANCE:** Cardiac arrest is one of the leading causes of morbidity and mortality, with an estimated 340,000 out-of-hospital and 292,000 in-hospital cardiac arrest events per year in the U.S. Survival rates are lower in certain racial and socioeconomic groups. **OBJECTIVE:** To examine the impact of social determinants on cardiac arrest mortality among adults stratified by age, race, and sex in the U.S. **DESIGN:** A county-level cross-sectional longitudinal study using death data between 2016 and 2020 from the Centers for Disease Control and Prevention's (CDC) Wide-Ranging Online Data for Epidemiologic Research (WONDER) database. **SETTING:** Using the multiple causes of death dataset from the CDC's WONDER database, cardiac arrests were identified using the International Classification of Diseases (ICD), tenth revision, clinical modification codes. **PARTICIPANTS:** Individuals aged 15 years or more whose death was attributed to cardiac arrest.

EXPOSURES: Social vulnerability index (SVI), reported by the CDC, is a composite measure that includes socioeconomic vulnerability, household composition, disability, minority status and language, and housing and transportation domains. MAIN OUTCOMES AND MEASURES: Cardiac arrest mortality per 100,000 adults. RESULTS: Overall age-adjusted cardiac arrest mortality (AAMR) during the study period was 95.6 per 100,000 persons. The AAMR was higher for men as compared with women (119.6 vs. 89.9 per 100,000) and for Black, as compared with White, adults (150.4 vs. 92.3 per 100,000). The AAMR increased from 64.8 per 100,000 persons in counties in Quintile 1 (Q1) of SVI to 141 per 100,000 persons in Quintile 5, with an average increase of 13% (95% CI: 9.8-16.9) in AAMR per quintile increase. CONCLUSION AND RELEVANCE: Mortality from cardiac arrest varies widely, with a more than 2-fold difference between the counties with the highest and lowest social vulnerability, highlighting the differential burden of cardiac arrest deaths throughout the U.S. based on social determinants of health. KEY POINTS: Question: What is the impact of social determinants of health on cardiac arrest mortality in the United States (U.S.)? Findings: In this national cross-sectional study spanning 5 years, we found that counties in higher quintiles of the social vulnerability index had higher rates of mortality from cardiac arrest, which was consistent across all subgroups. Meaning: Our data suggests that sizable disparities in cardiac arrest remain in the U.S. A multi-dimensional approach to address gaps, with emphasis on social determinants of health, is needed for vulnerable populations to impact outcomes.

3. Resusc Plus. 2023 Aug 2;15:100437. doi: 10.1016/j.resplu.2023.100437. eCollection 2023 Sep. **The Minnesota first-responder AED project: Aiming to increase survival in out-of-hospital cardiac arrest.**

Gaisendrees C(1)(2)(3), Jaeger D(1)(2)(4), Kalra R(1)(2), Kosmopoulos M(2), Harkins K(2), Marquez A(2), Hodgson L(2), Kollmar L(2), Bartos J(1)(2), Yannopoulos D(1)(2).

#### **ABSTRACT**

There are 350,000 out-of-hospital cardiac arrest (OHCA) cases annually in the United States of America. Using automated external defibrillators (AEDs) has increased survival in cardiac arrests (CA) with an initial shockable rhythm. Thus, guidelines recommend complete geographical coverage with AEDs. To fill in the gaps in Minnesota, the Center for Resuscitation Medicine at the University of Minnesota raised an \$18.8 million grant from the Helmsley Charitable Trust to supply law enforcement first responders with AEDs and, thus, increase survival rates after OHCA by reducing the time to first shock. This report elaborates on the decision-making, fundraising, and logistic strategy required to reach statewide AED coverage. METHODS: The baseline need for AEDs was analyzed using a questionnaire sent out to state law enforcement agencies, state patrols, city and county agencies, and tribal agencies in 2021. Furthermore, OHCA cases of 2021 were reviewed. The combination of this information led to an action plan to equip and train all agencies throughout the state's eight regions with AEDs. RESULTS: The electronic survey was initially sent out to 358 agencies. The initial response rate was 77% (n = 276). This resulted in a total need of 8300 AEDs to be deployed over three years (2022-2025). As of 2023, over 4769 AEDs have been distributed, covering 237 sites. CONCLUSION: By equipping first responders with AED systems, the Center for Resuscitation Medicine aims to shorten the gap in statewide AED coverage, thus increasing the chances of survival after OHCA.

4. Lancet Glob Health. 2023 Sep;11(9):e1444-e1453. doi: 10.1016/S2214-109X(23)00302-9.

**Cardiopulmonary resuscitation in low-resource settings: a statement by the International Liaison Committee on Resuscitation, supported by the AFEM, EUSEM, IFEM, and IFRC.**

Schnaubelt S(1), Garg R(2), Atiq H(3), Baig N(4), Bernardino M(5), Bigham B(6), Dickson S(7), Geduld H(8), Al-Hilali Z(9), Karki S(10), Lahri S(8), Maconochie I(11), Montealegre F(12), Tageldin Mustafa



M(13), Niermeyer S(14), Athieno Odakha J(15), Perlman JM(16), Monsieurs KG(17), Greif R(18);  
Cardiopulmonary Resuscitation in Low-Resource Settings Group.

#### **ABSTRACT**

Most recommendations on cardiopulmonary resuscitation were developed from the perspective of high-resource settings with the aim of applying them in these settings. These so-called international guidelines are often not applicable in low-resource settings. Organisations including the International Liaison Committee on Resuscitation (ILCOR) have not sufficiently addressed this problem. We formed a collaborative group of experts from various settings including low-income, middle-income, and high-income countries, and conducted a prospective, multiphase consensus process to formulate this ILCOR Task Force statement. We highlight the discrepancy between current cardiopulmonary resuscitation guidelines and their applicability in low-resource settings. Successful existing initiatives such as the Helping Babies Breathe programme and the WHO Emergency Care Systems Framework are acknowledged. The concept of the chainmail of survival as an adaptive approach towards a framework of resuscitation, the potential enablers of and barriers to this framework, and gaps in the knowledge are discussed, focusing on low-resource settings. Action points are proposed, which might be expanded into future recommendations and suggestions, addressing a large diversity of addressees from caregivers to stakeholders. This statement serves as a stepping-stone to developing a truly global approach to guide resuscitation care and science, including in health-care systems worldwide.

5. Iran J Public Health. 2023 Jul;52(7):1428-1438. doi: 10.18502/ijph.v52i7.13244.

#### **Comparing the Effectiveness of Two New CPR Training Methods in Korea: Medical Virtual Reality Simulation and Flipped Learning.**

Kim EA(1), Cho KJ(2).

#### **ABSTRACT**

**BACKGROUND:** We compared the educational effects of two training methods that have gained momentum: medical virtual reality (medi-VR) simulation and flipped learning. **METHODS:** Firefighters (n=128; 116 men and 12 women; mean age=28 years) in training from the Emergency Educational Simulation Center of Korea National Fire Service Academy, Gongju-si, Korea, were randomly assigned to two groups: medi-VR simulation and flipped learning in 2022. The participants were trained to perform cardiopulmonary resuscitation (CPR) using medi-VR simulation and the flipped learning methods. CPR self-efficacy, knowledge, performance, class immersion, and class satisfaction were compared between the groups. To analyze educational effects, paired and independent t-tests were performed. **RESULTS:** The post-education scores for CPR performance knowledge and CPR performance were significantly higher in the medi-VR simulation group compared to the flipped learning counterparts ( $P<0.001$ ). Moreover, despite the lack of a significant difference between the groups, post-education scores for self-efficacy, class immersion, and class satisfaction showed a positive effect on learning. **CONCLUSION:** Medi-VR simulation can be utilized as effective educational intervention, while providing a new direction for teaching methods.

### **POST-CARDIAC ARREST TREATMENTS**

1. Intern Emerg Med. 2023 Aug 17. doi: 10.1007/s11739-023-03389-3. Online ahead of print.

#### **Multiorgan failure in patients after out of hospital resuscitation: a retrospective single center study.**

Hasin Y(1), Helviz Y(2), Einav S(2)(3).

#### **ABSTRACT**

**BACKGROUND:** Information on extracerebral system dysfunction is important for assessing the needs of critically ill patients after cardiac arrest. **AIMS:** To describe the prevalence of organ dysfunction and patient severity after out of hospital cardiac arrest (OHCA) using scores commonly used in intensive care and the association between these and mortality. **METHODS:** Retrospective analysis of observational data collected in real time in a tertiary medical center where care withdrawal is mostly illegal. Adult patients after nontraumatic OHCA with ROSC who survived for more than two hours were included. Primary outcome-prevalence of organ failure, based on common definitions for organ dysfunction, in the 1 days of hospitalization. Secondary outcomes-rates of survival to hospital discharge and survival with a good neurological outcome (CPC 1 or 2), and associations between organ dysfunction SOFA and APACHE-II scores and outcomes. Associations were assessed using fisher's exact test for categorical variables and Mann-Whitney and T test for continuous variables. Multivariable models were also constructed for all measurements showing associations in previous tests. For severity scores compatibility, we used receiver-operating curve (ROC). **RESULTS:** Overall 369 patients (median age 75 years, 65% male) were included. Most arrests (64%) were witnessed, bystander CPR was provided in 15%. Median call to arrival time was 4 min. The presenting rhythm was asystole in 48% and VT/VF in 22%. Cardiovascular causes of arrest predominated (48%, n = 178). The median length of hospitalization was 5 days. Overall 28% of the patients (n = 98) survived to hospital discharge, mostly with a good neurological status (18.7%, n = 57). The rates of organ dysfunction were: hemodynamic instability 65% (n = 247), respiratory dysfunction 94% (n = 296), kidney dysfunction 70% (n = 259), hepatic dysfunction 14% (n = 50). The median SOFA score on day 1 was 9 and the median APACHE II score was 34. Modeling was limited by missing data. Neurological dysfunction (i.e. GCS and seizures) and kidney injury were consistently correlated with the outcomes in the multivariable models. Severity of critical illness assessed by above scoring systems correlated with mortality (all ROC curves had an AUC ranging between 0.728 and 0.849). **CONCLUSIONS:** Multiorgan failure is common after ROSC (1-4). Therefore, the management of patients after ROSC may require advanced multidisciplinary care. Scores describing the severity of critical illness should be routinely reported in resuscitation research. Our unique setting where withdrawal of care is illegal, allows assessment of extremely ill patients and may assist in defining margins for futility.

2. Am J Emerg Med. 2023 Jul 23;73:20-26. doi: 10.1016/j.ajem.2023.07.031. Online ahead of print.

**Impact of the hybrid emergency room on resuscitation strategies and outcomes in ventricular fibrillation.**

Mitsuhara C(1), Umemura Y(2), Yamakawa K(3), Watanabe A(4), Ogura H(5), Fujimi S(6).

**ABSTRACT**

**BACKGROUND:** The Hybrid emergency room (ER) is a novel resuscitation room that includes a whole-body computed tomography scanner and angiography system, which enables physicians to seamlessly conduct resuscitation, diagnosis and therapeutic interventions without patient transfer. This study aimed to assess the impact of the Hybrid ER on mortality in patients with ventricular fibrillation cardiac arrest. **METHODS:** This was a retrospective cohort study conducted in a tertiary hospital in Japan. We consecutively included adult cardiac arrest patients who were transferred to the emergency departments from January 2007 to May 2020, and were confirmed to be in ventricular fibrillation within 10 min from patient arrival. The study population was divided into two groups: the conventional group (from January 2007 to July 2011) and the Hybrid ER group (from August 2011 to May 2020). The primary endpoint of this study was defined as all-cause in-hospital death. Secondary endpoints included the frequency of extracorporeal cardiopulmonary resuscitation (ECPR) and percutaneous coronary intervention (PCI), and door-to-balloon time and door-to-ECPR time. **RESULTS:** We included 115 patients in the conventional group and 185 patients in the Hybrid ER group. In-hospital mortality was significantly decreased in the Hybrid ER group (adjusted hazard ratio, 0.79; 95% confidence interval 0.64, 0.97; p = 0.026). Door-to-ECPR time was significantly shorter in the Hybrid ER group (p < 0.001, Gehan-Breslow-Wilcoxon test), as was door-to-balloon

time in this group ( $p = 0.004$ , Gehan-Breslow-Wilcoxon test). In interrupted time-series analyses, it was visually recognized that the ratio of patients who received ECPR and PCI increased, and door-to-ECPR time and door-to-balloon time were shortened from 2011 to 2012 (before and after installation of the Hybrid ER). **CONCLUSION:** Installation of the Hybrid ER was associated with a reduced time to ECPR and PCI and with a possible improvement in survival in patients with ventricular fibrillation cardiac arrest.

3. Eur Heart J. 2023 Aug 16;ehad492. doi: 10.1093/eurheartj/ehad492. Online ahead of print.

**Challenges in treatment of cardiac arrest in low- and low middle-income countries.**

Aleksic M(1).

**NO ABSTRACT AVAILABLE**

**TARGETED TEMPERATURE MANAGEMENT**

1. Circulation. 2023 Aug 16. doi: 10.1161/CIR.0000000000001164. Online ahead of print.

**Temperature Management for Comatose Adult Survivors of Cardiac Arrest: A Science Advisory From the American Heart Association.**

Perman SM, Bartos JA, Del Rios M, Donnino MW, Hirsch KG, Jentzer JC, Kudenchuk PJ, Kurz MC, Maciel CB, Menon V, Panchal AR, Rittenberger JC, Berg KM; American Heart Association Emergency Cardiovascular Care Committee, Council on Cardiovascular Surgery and Anesthesia; Council on Clinical Cardiology; Council on Cardiovascular and Stroke Nursing; Council on Peripheral Vascular Disease; Council on Cardiopulmonary, Critical Care, Perioperative and Resuscitation, and Stroke Council.

**ABSTRACT**

Targeted temperature management has been a cornerstone of post-cardiac arrest care for patients remaining unresponsive after return of spontaneous circulation since the initial trials in 2002 found that mild therapeutic hypothermia improves neurological outcome. The suggested temperature range expanded in 2015 in response to a large trial finding that outcomes were not better with treatment at 33° C compared with 36° C. In 2021, another large trial was published in which outcomes with temperature control at 33° C were not better than those of patients treated with a strategy of strict normothermia. On the basis of these new data, the International Liaison Committee on Resuscitation and other organizations have altered their treatment recommendations for temperature management after cardiac arrest. The new American Heart Association guidelines on this topic will be introduced in a 2023 focused update. To provide guidance to clinicians while this focused update is forthcoming, the American Heart Association's Emergency Cardiovascular Care Committee convened a writing group to review the TTM2 trial (Hypothermia Versus Normothermia After Out-of-Hospital Cardiac Arrest) in the context of other recent evidence and to present an opinion on how this trial may influence clinical practice. This science advisory was informed by review of the TTM2 trial, consideration of other recent influential studies, and discussion between cardiac arrest experts in the fields of cardiology, critical care, emergency medicine, and neurology. Conclusions presented in this advisory statement do not replace current guidelines but are intended to provide an expert opinion on novel literature that will be incorporated into future guidelines and suggest the opportunity for reassessment of current clinical practice.

2. J Formos Med Assoc. 2023 Sep;122(9):890-898. doi: 10.1016/j.jfma.2023.01.005. Epub 2023 Feb 2.

**Prognostic value of neutrophil-lymphocyte ratio in out-of-hospital cardiac arrest patients receiving targeted temperature management: An observational cohort study.**

Huang YH(1), Lin YS(2), Wu CH(3), How CK(4), Chen CT(5).

**ABSTRACT**

**BACKGROUND:** Out-hospital cardiac arrest (OHCA) is a major cause of mortality and morbidity worldwide. The magnitude of the post-resuscitation inflammatory response is closely related to the severity of the circulatory dysfunction. Currently, targeted temperature management (TTM) has become an essential part of the post-resuscitation care for unconscious OHCA survivors. Some novel prognostic inflammatory markers may help predict outcomes of OHCA patients after TTM.

**METHODS:** A retrospective observational cohort study of 65 OHCA patients treated with TTM was conducted in a tertiary hospital in Taiwan. The primary outcome measure was in-hospital mortality. Baseline and post-TTM neutrophil to lymphocyte ratio (NLR), platelet to lymphocyte (PLR), and the systemic immune inflammation index (SII) were identified as potential predictors. **RESULTS:** These patients had a mean age of  $62.2 \pm 17.0$  years. Among the total sample, 53.8% had an initial shockable rhythm and 61.5% had a presumed cardiac etiology. The median resuscitation duration was 20 min (IQR 13.5-28.5) and 60% received subsequent percutaneous coronary intervention. The mean baseline NLR, PLR and SII were  $7.5 \pm 16.7$ ,  $118 \pm 207$ ,  $1395 \pm 3004$ , and the mean post-TTM NLR, PLR and SII were  $15.0 \pm 11.6$ ,  $206 \pm 124$ ,  $2369 \pm 2569$ , respectively. Using multiple logistic regression analysis, post-TTM NLR was one of the independent factors which predicted in-hospital mortality (adjusted odds ratio (aOR): 1.249, 95% confidence interval (CI): 1.040-1.501,  $p = 0.017$ ). **CONCLUSION:** Post-TTM NLR is a predictor of in-hospital mortality in OHCA patients who underwent TTM.

## **ELECTROPHYSIOLOGY AND DEFIBRILLATION**

No articles identified.

## **PEDIATRICS AND CHILDREN**

1. Heart Rhythm. 2023 Aug 17:S1547-5271(23)02584-5. doi: 10.1016/j.hrthm.2023.08.014. Online ahead of print.

**Pediatric Out-of-Hospital Cardiac Arrest: Robust Dataset Shows Sobering Reality but Provides Clues to Improvement.**

Burns KM(1).

**NO ABSTRACT AVAILABLE**

2. Resusc Plus. 2023 Aug 5;15:100442. doi: 10.1016/j.resplu.2023.100442. eCollection 2023 Sep.

**Epidemiology of paediatric out-of-hospital cardiac arrest in Ontario, Canada.**

Tijssen JA(1)(2)(3)(4)(5), McClean M(1)(2)(3)(4), Lam M(5), Le B(5), To T(5)(6).

### **ABSTRACT**

**BACKGROUND:** There are no Canadian epidemiological studies of Paediatric Out-of-Hospital Cardiac Arrest (POHCA) for  $\geq 20$  years. Understanding the epidemiology of POHCA is key to prevention, education, and management strategies. **METHODS:** We applied a validated algorithm to hospital administrative databases to describe paediatric (age 1 day to  $\leq 18$  years) atraumatic OHCA in Ontario from 2004-2020. **RESULTS:** The cohort included 1,839 paediatric patients with atraumatic POHCA occurring at a median (IQR) age of 2 (0-12) years with 721 (39.2%) POHCA events in <1-year-olds. Males accounted for 71.1% ( $n = 1123$ ) of the cohort. Crude incidence of children with POHCA who were transported to an Emergency Department was 4.2/100,000 with an increase annually over the study period ( $p = 0.0065$ ). Thirty percent ( $n = 560$ ) lived in a neighbourhood with the lowest income quintile, while 13.6% ( $n = 251$ ) lived in a neighbourhood with the highest income quintile, 78.6% ( $n = 1444$ ) presented to a non-academic hospital, and the majority ( $n = 1533$ , 83.4%) did not have

significant comorbidities. Survival to hospital discharge was achieved in 167 (9.1%). Less than 6 (<3.6%) patients had a repeat POHCA in the year following the index event. CONCLUSIONS: This is the largest Canadian POHCA cohort and the first to describe its incidence, comorbidities, and sociodemographic characteristics. We found an increase in annual crude incidence, POHCA mostly occurred in healthy children, and survival was similar to other cohorts. There were more than double the number of POHCA events in children living in the lowest income quintile neighborhoods compared to the highest. Most children presented to non-academic hospitals first.

3. Resuscitation. 2023 Aug 11:109936. doi: 10.1016/j.resuscitation.2023.109936. Online ahead of print.

**Impaired Echocardiographic Left Ventricular Global Longitudinal Strain after Pediatric Cardiac Arrest Children is Associated with Mortality.**

Gardner MM(1), Wang Y(2), Himebauch AS(3), Conlon TW(3), Graham Mlas K(3), Morgan RW(3), Feng R(4), Berg RA(3), Yehya N(3), Mercer-Rosa L(2), Topjian AA(3).

**ABSTRACT**

**BACKGROUND:** Global longitudinal strain (GLS) is an echocardiographic method to identify left ventricular (LV) dysfunction after cardiac arrest that is less sensitive to loading conditions. We aimed to identify the frequency of impaired GLS following pediatric cardiac arrest, and its association with hospital mortality. **METHODS:** This is a retrospective single-center cohort study of children <18 years of age treated in the pediatric intensive care unit (PICU) after in- or out-of-hospital cardiac arrest (IHCA and OHCA), with echocardiogram performed within 24 hours of initiation of post-arrest PICU care between 2013-2020. Patients with congenital heart disease, post-arrest extracorporeal support, or inability to measure GLS were excluded. Echocardiographic LV ejection fraction (EF) and shortening fraction (SF) were abstracted from the chart. GLS was measured post hoc; impaired strain was defined as LV GLS  $\geq 2$  SD worse than age-dependent normative values. Demographics and pre-arrest, arrest, and post-arrest characteristics were compared between subjects with normal versus impaired GLS. Correlation between GLS, SF and EF were calculated with Pearson comparison. Logistic regression tested the association of GLS with mortality. Area under the receiver operator curve (AUROC) was calculated for discriminative utility of GLS, EF, and SF with mortality. **RESULTS:** GLS was measured in 124 subjects; impaired GLS was present in 46 (37.1%). Subjects with impaired GLS were older (median 7.9 vs. 1.9 years,  $p < 0.001$ ), more likely to have ventricular tachycardia/fibrillation as initial rhythm (19.6% versus 3.8%,  $p = 0.017$ ) and had higher peak troponin levels in the first 24 hours post-arrest (median 2.5 vs. 0.5,  $p = 0.002$ ). There were no differences between arrest location or CPR duration by GLS groups. Subjects with impaired GLS compared to normal GLS had lower median EF (42.6% versus 62.3%) and median SF (23.3% versus 36.6%), all  $p < 0.001$ , with strong inverse correlation between GLS and EF ( $\rho = -0.76$ ,  $p < 0.001$ ) and SF ( $\rho = -0.71$ ,  $p < 0.001$ ). Patients with impaired GLS had higher rates of mortality (60% vs. 32%,  $p = 0.009$ ). GLS was associated with mortality when controlling for age and initial rhythm [aOR 1.17 per 1% increase in GLS (95% CI 1.09-1.26),  $p < 0.001$ ]. GLS, EF and SF had similar discrimination for mortality: GLS AUROC 0.69 (95% CI 0.60-0.79); EF AUROC 0.71 (95% CI 0.58-0.88); SF AUROC 0.71 (95% CI 0.61-0.82),  $p = 0.101$ . **CONCLUSIONS:** Impaired LV function as measured by GLS after pediatric cardiac arrest is associated with hospital mortality. GLS is a novel complementary metric to traditional post-arrest echocardiography that correlates strongly with EF and SF and is associated with mortality. Future large prospective studies of post-cardiac arrest care should investigate the prognostic utilities of GLS, alongside SF and EF.

4. Pediatr Cardiol. 2023 Aug 16. doi: 10.1007/s00246-023-03251-5. Online ahead of print.

### **Early Functional Status Change After Cardiopulmonary Resuscitation in a Pediatric Heart Center: A Single-Center Retrospective Study.**

Batsis M(1), Dryer R(2), Scheel AM(2), Basu M(3), Figueroa J(4), Clarke S(1), Shaw FR(5), Wolf MJ(1), Beshish AG(6).

#### **ABSTRACT**

Children with cardiac disease are at significantly higher risk for in-hospital cardiac arrest (CA) compared with those admitted without cardiac disease. CA occurs in 2-6% of patients admitted to a pediatric intensive care unit (ICU) and 4-6% of children admitted to the pediatric cardiac-ICU. Treatment of in-hospital CA with cardiopulmonary resuscitation (CPR) results in return of spontaneous circulation in 43-64% of patients and survival rate that varies from 20 to 51%. We aimed to investigate the change in functional status of survivors who experienced an in-hospital CA using the functional status scale (FSS) in our heart center by conducting a retrospective study of all patients 0-18 years who experienced CA between June 2015 and December 2020 in a free-standing university-affiliated quaternary children's hospital. Of the 165 CA patients, 61% (n = 100) survived to hospital discharge. The non-survivors had longer length from admission to CA, higher serum lactate levels peri-CA, and received higher number of epinephrine doses. Using FSS, of the survivors, 26% developed new morbidity, and 9% developed unfavorable outcomes. There was an association of unfavorable outcomes with longer CICU-LOS and number of epinephrine doses given. Sixty-one percent of CA patients survived to hospital discharge. Of the survivors, 26% developed new morbidity and 91% had favorable outcomes. Future multicenter studies are needed to help better identify modifiable risk factors for development of poor outcomes and help improve outcomes of this fragile patient population.

### **EXTRACORPOREAL LIFE SUPPORT**

1. Ned Tijdschr Geneeskd. 2023 Aug 10;167:D7363.

#### **[Extracorporeal cardiopulmonary resuscitation in out-of-hospital resuscitation].**

[Article in Dutch]

Kuiper MA(1)(2).

#### **ABSTRACT**

If an out-of-hospital cardiac arrest (OHCA) takes longer than 15 minutes, the chances of survival are greatly reduced. With a shockable rhythm (VF/VT), there is often a treatable underlying cause, which most often can only be treated in a hospital. The patient can be transported, and circulation can be restored in the hospital, using extracorporeal cardiopulmonary resuscitation (ECPR) to gain time to treat the underlying problem. There are observational studies and one single-centre study that support the use of ECPR in refractory OHCA. However, two recent larger trials could not establish a significant benefit for ECPR. As many of these patients in refractory cardiac arrest will ultimately not survive, we will need solid cost-benefit analyses to evaluate the value of ECPR. We also need to explore the possibility of starting ECPR on scene, to reduce low-flow time even more, and hopefully improve the outcome of out-of-hospital cardiac arrest patients.

2. Resuscitation. 2023 Aug 11:109935. doi: 10.1016/j.resuscitation.2023.109935. Online ahead of print.

#### **Serum Lactate in Refractory Out-of-Hospital Cardiac Arrest: Post-hoc Analysis of the Prague OHCA Study.**

Dusik M(1), Rob D(1), Smalcova J(1), Havranek S(1), Karasek J(1), Smid O(1), Lahoda Brodska H(2), Kavalkova P(1), Huptych M(3), Bakker J(4), Belohlavek J(5).

#### **ABSTRACT**

**BACKGROUND:** The severity of tissue hypoxia is routinely assessed by serum lactate. We aimed to determine whether early lactate levels predict outcomes in refractory out-of-hospital cardiac arrest (OHCA) treated by conventional and extracorporeal cardiopulmonary resuscitation (ECPR). **METHODS:** This study is a post-hoc analysis of a randomized Prague OHCA study (NCT01511666) assessing serum lactate levels in refractory OHCA treated by ECPR (the ECPR group) or conventional resuscitation with prehospital achieved return of spontaneous circulation (the ROSC group). Lactate concentrations measured on admission and every 4 hours (h) during the first 24 h were used to determine their relationship with the neurological outcome (the best Cerebral Performance Category score within 180 days post-cardiac arrest). **RESULTS:** In the ECPR group (92 patients, median age 58.5 years, 83% male) 26% attained a favorable neurological outcome. In the ROSC group (82 patients, median age 55 years, 83% male) 59% achieved a favorable neurological outcome. In ECPR patients lactate concentrations could discriminate favorable outcome patients, but not consistently in the ROSC group. On admission, serum lactate >14.0 mmol/L for ECPR (specificity 87.5%, sensitivity 54.4%) and >10.8 mmol/L for the ROSC group (specificity 83%, sensitivity 41.2%) predicted an unfavorable outcome. **CONCLUSION:** In refractory OHCA serum lactate concentrations measured anytime during the first 24 h after admission to the hospital were found to correlate with the outcome in patients treated by ECPR but not in patients with prehospital ROSC. A single lactate measurement is not enough for a reliable outcome prediction and cannot be used alone to guide treatment.

3. *J Cardiothorac Vasc Anesth.* 2023 Jul 24:S1053-0770(23)00517-7. doi: 10.1053/j.jvca.2023. 07.025. Online ahead of print.

**Lower Limb Ischemia in Surgical Femoral Venous-Arterial Extracorporeal Membrane Oxygenation.**

Dragulescu R(1), Armoiry X(2), Jacquet-Lagrèze M(3), Portran P(3), Schweizer R(3), Fellahi JL(3), Grinberg D(1), Obadia JF(1), Pozzi M(4).

**ABSTRACT**

**OBJECTIVES:** To analyze the incidence, clinical impact on survival, and risk factors of lower limb ischemia (LLI) of surgical peripheral femoral venoarterial extracorporeal membrane oxygenation (VA ECMO) in the current era. **DESIGN:** A retrospective analysis of the authors' institutional database of VA ECMO was performed. Patients were divided into 2 groups according to the occurrence of LLI. The primary endpoint was survival to hospital discharge. Risk factors of LLI were searched with multivariate analyses. **SETTING:** University hospital. **PARTICIPANTS:** Adult patients receiving peripheral VA ECMO for refractory cardiogenic shock and cardiac arrest. **INTERVENTIONS:** None. **MEASUREMENTS AND MAIN RESULTS:** From January 2018 to December 2021, 188 patients (mean age: 52.0 ± 14.1 years; 63.8% male, 36.2% female) received peripheral VA ECMO. Male sex was more prevalent in the group without LLI (65.9% v 33.3%; p = 0.031). Twelve (6.4%) patients developed LLI during VA ECMO support (n = 6) or after VA ECMO removal (n = 6). Survival to hospital discharge was not statistically different between patients with and without LLI (50.0% v 48.3%; p = 0.571). Female sex patients were at increased risk for LLI (odds ratio 4.38, 95% CI 1.21-15.81; p = 0.024). **CONCLUSIONS:** Peripheral femoral VA ECMO through a surgical approach is associated with a low LLI rate, which does not increase the risk of in-hospital mortality. The female sex is an independent risk factor for LLI.

**EXPERIMENTAL RESEARCH**

No articles identified.

**CASE REPORTS**

1. *BMJ Case Rep.* 2023 Aug 16;16(8):e254649. doi: 10.1136/bcr-2023-254649.

**Surviving cardiac arrest from severe metformin-associated lactic acidosis using extracorporeal membrane oxygenation and double continuous venovenous haemodialysis.**

Akkaoui KK(1), Andersen LV(2), Nørgaard MA(3), Andreasen JB(4).

**ABSTRACT**

Metformin-associated lactic acidosis (MALA) is a serious condition with high mortality. This case describes a man in the mid-60s with diabetes mellitus type 2 treated with metformin developing MALA 4 days after coronary stenting for non-ST-elevation myocardial infarction. He presented acutely with severe abdominal pain, a lactate of 19 mmol/L and pH 6.74. Despite treatment for MALA, he went into refractory cardiac arrest and was connected to venoarterial extracorporeal membrane oxygenation (VA-ECMO). He suffered a massive haemothorax due to perforation of the right atrial appendage. It was repaired through a sternotomy while being given massive blood transfusions. The following days, he was on VA-ECMO and double continuous venovenous haemodialysis (CVVHD). He survived with only mild paresis of the left hand. VA-ECMO should be considered a rescue therapy alongside treatment with CVVHD in case of cardiac arrest due to severe MALA.

2. Acta Cardiol. 2023 Aug 15:1-2. doi: 10.1080/00015385.2023.2243062. Online ahead of print.

**What lies behind the extensive ST-segment changes in cardiac arrest?**

Sonsöz MR(1), Şişman A(1), Güler A(1).

**ABSTRACT**

Interpretation of electrocardiographic changes after cardiac arrest is critical. If the electrocardiogram is consistent with ST-segment elevation myocardial infarction, primary coronary angiography is indicated. However, the presence of ST-segment depression in eight or more surface leads, together with ST-segment elevation in the aVR and/or V1, could be a sign of multivessel ischaemia or left main coronary artery disease if haemodynamic instability is present. However, acute neurological disorders may mimic electrocardiographic changes of acute coronary syndromes. Here we report a young man with cardiac arrest, extensive ST-segment changes in the electrocardiogram and normal coronary arteries.