This week's PubMed 18th – 31st December 2022: articles of interest n = 59

CPR AND COVID-19

1. Anaesthesiologie. 2022 Dec 23:1-8. doi: 10.1007/s00101-022-01237-1. Online ahead of print.
State of implementation of the Corona-Virus-Disease-2019 resuscitation guidelines : An online-based survey one year after publication in Germany.
Jansen G(1)(2), Kappelhoff N(3), Flake F(4), Borgstedt R(5), Rehberg S(5), Scholz SS(5), Thies KC(5).
ABSTRACT
BACKGROUND: The present study evaluated the implementation of the European Resuscitation Council Corona-Virus-Disease 2019 (COVID-19) resuscitation guidelines in Germany 1 year after publication. AIM OF THE WORK: To evaluate the practical implementation of the COVID-19 resuscitation guidelines in Germany one year after their publication. MATERIAL AND METHODS: In an online survey between April and May 2021 participants were asked about awareness of COVID-19 resuscitation guidelines, corresponding training, the resuscitation algorithm used and COVID-19 infections of emergency medicine personnel associated with COVID-19 resuscitation. RESULTS: A total of 961 (8%) of the 11,000 members took part in the survey and 85% (818/961) of questionnaires were fully completed. While 577 (70%) of the respondents were aware of the COVID-19 guidelines, only 103 (13%) had received respective training. A specific COVID-19 resuscitation algorithm was used by 265 respondents (32%). Adaptations included personal protective equipment (99%), reduction of staff caring for the patient, or routine use of video laryngoscopy for endotracheal intubation (each 37%), securing the airway before rhythm analysis (32%), and pausing chest compressions during endotracheal intubation (30%). Respondents without a specific COVID-19 resuscitation algorithm were more likely to use mouth-nose protection (47% vs. 31%; $p < 0.001$), extraglottic airway devices (66% vs. 55%; $p = 0.004$) and have more than 4 team members close to the patient (45% vs. 38%; $p = 0.04$). Use of an Filtering-Face-Piece(FFP)-2 or FFP3 mask (89% vs. 77%; $p < 0.001$; 58% vs. 70%; $p \leq 0.001$) or performing primary endotracheal intubation (17% vs. 31%; $p < 0.001$) were found less frequently and 9% reported that a team member was infected with COVID-19 during resuscitation. CONCLUSION: The COVID-19 resuscitation guidelines are still insufficiently implemented 1 year after publication. Future publication strategies must ensure that respective guideline adaptations are implemented in a timely manner.

2. Int J Emerg Med. 2022 Dec 29;15(1):68. doi: 10.1186/s12245-022-00473-x.
The impact of COVID-19 on myocardial infarctions, strokes and out-of-hospital cardiopulmonary arrests: an observational retrospective study on time-sensitive disorders in the Friuli Venezia Giulia region (Italy).
Pegani C(1), Buttignon G(2), Tullio A(3), Naccarato M(2), Manganotti P(2), Rakar S(2), Fabris E(2), Nadalin F(4), Mione V(4), Gigli GL(3), Lorenzut S(3), Spedicato L(3), Passadore P(5), Pavan D(5), Lutman C(3), Andrian M(4), Borelli M(6), Novello S(5), Belfiore R(5), Daneluzzi C(5), Sinagra G(2), Peratoner A(2).
ABSTRACT
The COVID-19 global pandemic has changed considerably the way time-sensitive disorders are treated. Home isolation, people's fear of contracting the virus and hospital reorganisation have led to a significant decrease in contacts between citizens and the healthcare system, with an expected decrease in calls to the Emergency Medical Services (EMS) of the Friuli-Venezia Giulia (FVG) region. However, mortality in clinical emergencies like acute ST-elevation myocardial infarction (STEMI), stroke and out-of-hospital cardiopulmonary arrest (OHCA) remained high. An observational retrospective cross-sectional study was carried out in FVG, taking into account the period between

March 1, 2020, and May 31, 2020, the first wave of the COVID-19 pandemic, and comparing it with the same period in 2019. The flow of calls to the EMS was analysed and COVID-19 impact on time-sensitive disorders (STEMIs, ischemic strokes and OHCPAs) was measured in terms of hospitalisation, treatment and mortality. Despite a -8.01% decrease (p value <0.001) in emergency response, a 10.89% increase in calls to the EMS was observed. A lower number of advanced cardiopulmonary resuscitations (CPR) (75.8 vs 45.2%, p=0.000021 in April) and ROSC (39.1 vs 11.6%, p=0.0001 in April) was remarked, and survival rate dropped from 8.5 to 5%. There were less strokes (-27.5%, p value=0.002) despite a more severe onset of symptoms at hospitalisation with NHISS>10 in 38.47% of cases. Acute myocardial infarctions decreased as well (-20%, p value=0.05), but statistical significances were not determined in the variables considered and in mortality. Despite a lower number of emergency responses, the number of calls to the EMS was considerably higher. The number of cardiac arrests treated with advanced CPR (ALS) was lower, but mortality was higher. The number of strokes decreased as well, but at the time of hospitalisation the clinical picture of the patient was more severe, thus affecting the outcome when the patient was discharged. Finally, STEMI patients decreased; however, no critical issues were observed in the variables taken into account, neither in terms of response times nor in terms of treatment times.

3. J Microbiol Immunol Infect. 2022 Dec;55(6 Pt 1):1044-1051. doi: 10.1016/j.jmii.2022.07.009. Epub 2022 Aug 11.

Out-of-hospital cardiac arrest and in-hospital mortality among COVID-19 patients: A population-based retrospective cohort study.

Chan SY(1), Tsai YF(2), Yen MY(3), Yu WR(4), Hung CC(5), Kuo TL(5), Chen CC(6), Yen YF(7), Huang SH(8), Huang TC(9), Huang SJ(10).

ABSTRACT

BACKGROUND/PURPOSE: Predictors for out-of-hospital cardiac arrest (OHCA) in COVID-19 patients remain unclear. We identified the predictors for OHCA and in-hospital mortality among such patients in community isolation centers. METHODS: From May 15 to June 20, 2021, this cohort study recruited 2555 laboratory-confirmed COVID-19 patients admitted to isolation centers in Taiwan. All patients were followed up until death, discharge from the isolation center or hospital, or July 16, 2021. OHCA was defined as cardiac arrest confirmed by the absence of circulation signs and occurring outside the hospital. Multinomial logistic regressions were used to determine factors associated with OHCA and in-hospital mortality. RESULTS: Of the 37 deceased patients, 7 (18.9%) had OHCA and 30 (81.1%) showed in-hospital mortality. The mean (SD) time to OHCA was 6.6 (3.3) days from the symptom onset. After adjusting for demographics and comorbidities, independent predictors for OHCA included age ≥65 years (adjusted odds ratio [AOR]: 13.24, 95% confidence interval [CI]: 1.85-94.82), fever on admission to the isolation center (AOR: 12.53, 95% CI: 1.68-93.34), and hypoxemia (an oxygen saturation level below 95% on room air) (AOR: 26.54, 95% CI: 3.18-221.73). Predictors for in-hospital mortality included age ≥65 years (AOR: 10.28, 95% CI: 2.95-35.90), fever on admission to the isolation centers (AOR: 7.27, 95% CI: 1.90-27.83), and hypoxemia (AOR: 29.87, 95% CI: 10.17-87.76). CONCLUSIONS: Time to OHCA occurrence is rapid in COVID-19 patients. Close monitoring of patients' vital signs and disease severity during isolation is important, particularly for those with older age, fever, and hypoxemia.

CPR/MECHANICAL CHEST COMPRESSION

1. J Clin Med. 2022 Dec 9;11(24):7315. doi: 10.3390/jcm11247315.

Advanced and Invasive Cardiopulmonary Resuscitation (CPR) Techniques as an Adjunct to Advanced Cardiac Life Support.

Obermaier M(1), Katzenschlager S(1), Kofler O(1), Weilbacher F(1), Popp E(1).

ABSTRACT

BACKGROUND: Despite numerous promising innovations, the chance of survival from sudden cardiac arrest has remained virtually unchanged for decades. Recently, technological advances have been made, user-friendly portable devices have been developed, and advanced invasive procedures have been described that could improve this unsatisfactory situation. METHODS: A selective literature search in the core databases with a focus on randomized controlled trials and guidelines. RESULTS: Technical aids, such as feedback systems or automated mechanical cardiopulmonary resuscitation (CPR) devices, can improve chest compression quality. The latter, as well as extracorporeal CPR, might serve as a bridge to treatment (with extracorporeal CPR even as a bridge to recovery). Sonography may be used to improve thoracic compressions on the one hand and to rule out potentially reversible causes of cardiac arrest on the other. Resuscitative endovascular balloon occlusion of the aorta might enhance myocardial and cerebral perfusion. Minithoracostomy, pericardiocentesis, or clamshell thoracotomy might resolve reversible causes of cardiac arrest. CONCLUSIONS: It is crucial to identify those patients who may benefit from an advanced or invasive procedure and make the decision to implement the intervention in a timely manner. As with all infrequently performed procedures, sound education and regular training are paramount.

2. Bioengineering (Basel). 2022 Dec 14;9(12):802. doi: 10.3390/bioengineering9120802.

Mathematical Model of Blood Circulation with Compression of the Prototype's Mechanical CPR Waveform.

Xu X(1), Wang S(1)(2), Wang S(1), Liu G(1).

ABSTRACT

The waveform of chest compressions directly affects the blood circulation of patients with cardiac arrest. Currently, few pieces of research have focused on the influence of the cardiopulmonary resuscitation (CPR) device's mechanical waveform on blood circulation. This study investigates the effect of the mechanical waveform from a novel CPR prototype on blood circulation and explores the optimal compression parameters of the mechanical waveform to optimize blood circulation. A novel CPR prototype was designed and built to establish a kinetic model during compressions. The prototype's mechanical waveforms at various operating conditions were obtained for comparison with manual waveforms and the investigation of the optimal compression parameters. The novel CPR prototype can complete chest compressions quickly and stably. The cardiac output (CO), coronary perfusion pressure (CPP), and cerebral flow (CF) obtained by mechanical waveform compressions (1.22367 ± 0.00942 L/min, 30.95083 ± 0.24039 mmHg, 0.31992 ± 0.00343 L/min, respectively) were significantly better than those obtained by manual waveform compressions (1.10783 ± 0.03601 L/min, 21.39210 ± 1.42771 mmHg, 0.29598 ± 0.01344 L/min, respectively). With the compression of the prototype, the blood circulation can be optimized at the compression depth of 50 mm, approximately 0.6 duty cycle, and approximately 110 press/min, which is of guiding significance for the practical use of CPR devices to rescue patients with cardiac arrest.

3. Resuscitation. 2022 Dec 27:109680. doi: 10.1016/j.resuscitation.2022.109680. Online ahead of print.

Comparison of prehospital resuscitation quality during scene evacuation and early ambulance transport in out-of-hospital cardiac arrest between residential location and non-residential location.

Choi S(1), Han Kim T(2), Jeong Hong K(3), Gyung Won Lee S(4), Ho Park J(5), Sun Ro Y(6), Jun Song K(7), Do Shin S(8).

ABSTRACT

BACKGROUND: High-quality prehospital cardiopulmonary resuscitation (CPR) is important for out-of-hospital cardiac arrest (OHCA). We aimed to evaluate prehospital CPR quality during scene evacuation and early ambulance transport in patients with OHCA according to the type of cardiac arrest location. METHODS: This retrospective observational cohort study enrolled patients with non-traumatic adult OHCA in Seoul between July 2020 and March 2022. Prehospital CPR quality data extracted from defibrillators were merged with the national OHCA database. The location of cardiac arrest was categorized into two groups (residential and non-residential). CPR quality indices including no-flow (any pause > 1.5 sec) fraction were compared according to the type of arrest location at each minute of EMS scene evacuation and early ambulance transport (5 min prior to 5 min after ambulance departure). RESULTS: A total of 1,222 OHCAs were enrolled in the final analysis after serial exclusion. A total of 966 OHCAs (79.1%) occurred in the residential areas. The CPR quality deteriorated during the scene evacuation in both location type. The mean no-flow fractions were significantly higher in residential places than in non-residential places. The mean proportion of adequate compression depth and rate was lower in cardiac arrests in residential places. The discrepancy in EMS CPR quality during scene evacuation was more prominent when mechanical CPR devices were not used. CONCLUSION: Deterioration of CPR quality was observed just before and during early ambulance transport, especially when the cardiac arrest location was a residential area or when only manual CPR was provided.

REGISTRIES, REVIEWS AND EDITORIALS

1. Life (Basel). 2022 Nov 23;12(12):1958. doi: 10.3390/life12121958.

Effectiveness of CPR in Hypogravity Conditions-A Systematic Review.

Overbeek R(1), Schmitz J(1)(2)(3), Rehnberg L(4)(5), Benyoucef Y(6)(7), Dusse F(1), Russomano T(5), Hinkelbein J(1)(2)(3)(8).

ABSTRACT

(1) Background: Cardiopulmonary resuscitation (CPR), as a form of basic life support, is critical for maintaining cardiac and cerebral perfusion during cardiac arrest, a medical condition with high expected mortality. Current guidelines emphasize the importance of rapid recognition and prompt initiation of high-quality CPR, including appropriate cardiac compression depth and rate. As space agencies plan missions to the Moon or even to explore Mars, the duration of missions will increase and with it the chance of life-threatening conditions requiring CPR. The objective of this review was to examine the effectiveness and feasibility of chest compressions as part of CPR following current terrestrial guidelines under hypogravity conditions such as those encountered on planetary or lunar surfaces; (2) Methods: A systematic literature search was conducted by two independent reviewers (PubMed, Cochrane Register of Controlled Trials, ResearchGate, National Aeronautics and Space Administration (NASA)). Only controlled trials conducting CPR following guidelines from 2010 and after with advised compression depths of 50 mm and above were included; (3) Results: Four different publications were identified. All studies examined CPR feasibility in 0.38 G simulating the gravitational force on Mars. Two studies also simulated hypogravity on the Moon with a force of 0.17 G/0,16 G. All CPR protocols consisted of chest compressions only without ventilation. A compression rate above 100/s could be maintained in all studies and hypogravity conditions. Two studies showed a significant reduction of compression depth in 0.38 G (-7.2 mm/-8.71 mm) and 0.17 G (-12.6 mm/-9.85 mm), respectively, with nearly similar heart rates, compared to 1 G conditions. In the other two studies, participants with higher body weight could maintain a nearly adequate mean depth while effort measured by heart rate (+23/+13.85 bpm) and VO2max (+5.4 mL·kg-1·min-1) increased significantly; (4) Conclusions: Adequate CPR quality in hypogravity can only be achieved

under increased physical stress to compensate for functional weight loss. Without this extra effort, the depth of compression quickly falls below the guideline level, especially for light-weight rescuers. This means faster fatigue during resuscitation and the need for more frequent changes of the resuscitator than advised in terrestrial guidelines. Alternative techniques in the straddling position should be further investigated in hypogravity.

2. Resuscitation. 2022 Dec 16:S0300-9572(22)00742-0. doi: 10.1016/j.resuscitation.2022.12.007. Online ahead of print.

Drones delivering automated external defibrillators: a new strategy to improve the prognosis of out-of-hospital cardiac arrest.

Liu X(1), Yuan Q(1), Wang G(1), Bian Y(2), Xu F(3), Chen Y(4).

ABSTRACT

BACKGROUND: Out-of-hospital cardiac arrest (OHCA) is a serious threat to human life and health, characterized by high morbidity and mortality. However, given the limitations of the current emergency medical system (EMS), it is difficult to immediately treat patients who experience OHCA. It is well known that rapid defibrillation after cardiac arrest is essential for improving the survival rate of OHCA, yet automated external defibrillators (AED) are difficult to obtain in a timely manner. OBJECTIVE: This review illustrates the feasibility and advantages of AED delivery by drones by surveying current studies on drones, explains that drones are a new strategy in OHCA, and finally proposes novel strategies to address existing problems with drone systems. RESULTS: The continuous development of drone technology has been beneficial for patients who experience OHCA, as drones have demonstrated powerful capabilities to provide rapid delivery of AED. Drones have great advantages over traditional EMS, and the delivery of AED by drones for patients with OHCA is a new strategy. However, the application of this new strategy in real life still has many challenges. CONCLUSION: Drones are promising and innovative tools. Many studies have demonstrated that AED delivery by drones is feasible and cost-effective; however, as a new strategy to improve the survival rate of OHCA patients, there remain problems to be solved. In the future, more in-depth investigations need to be conducted.

3. Eur J Emerg Med. 2023 Feb 1;30(1):58-59. doi: 10.1097/MEJ.0000000000000939. Epub 2022 Dec 19.

Response to 'Effect of adrenaline dose on neurological outcome in out-of-hospital cardiac arrest: still difficult to conclude'.

Jaeger D(1)(2), Chouihed T(1)(2).

NO ABSTRACT AVAILABLE

4. Ann Intensive Care. 2022 Dec 19;12(1):114. doi: 10.1186/s13613-022-01091-9.

Sex and out-of-hospital cardiac arrest survival: a systematic review.

Lakbar I(1)(2)(3), Ippolito M(4)(5), Nassiri A(6)(7), Delamarre L(8)(9), Tadger P(10), Leone M(8)(9)(11), Einav S(12).

ABSTRACT

BACKGROUND: The literature is unresolved on whether female receive advanced cardiac life support less than do male and on whether female have a survival advantage over male after cardio-pulmonary resuscitation. METHODS: We systematically searched PubMed, Embase and Web of Science databases (from inception to 23-April-2022) for papers reporting outcomes in adult male and female after out-of-hospital cardiac arrest. The main study outcome was the rate of adjusted survival to hospital discharge or 30 days. Secondary outcomes included unadjusted survival to hospital discharge and favourable neurological outcome. RESULTS: A total of 28 studies were

included, involving 1,931,123 patients. Female were older than male, their cardiac arrests were less likely to be witnessed and less likely to present with a shockable rhythm. Unadjusted analysis showed that females had a lower likelihood of survival than males (OR 0.68 [0.62-0.74], I2 = 97%). After adjustment, no significant difference was identified between male and female in survival at hospital discharge/30 days (OR 1.01 [0.93-1.11], I2 = 87%). Data showed that male had a significantly higher likelihood of favorable neurological outcome in unadjusted analysis but this trend disappeared after adjustment. Both the primary outcome (adjusted for several variables) and the secondary outcomes were associated with substantial heterogeneity. The variables examined using meta-regression, subgroup and sensitivity analyses (i.e., study type, location, years, population, quality of adjustment, risk of bias) did not reduce heterogeneity. CONCLUSIONS: The adjusted rate of survival to hospital discharge/30 days was similar for male and female despite an initial seeming survival advantage for male. The validity of this finding is limited by substantial heterogeneity despite in-depth investigation of its causes, which raises concerns regarding latent inequalities in some reports nonetheless. Further study on this topic may require inclusion of factors not reported in the Utstein template and in-depth analysis of decision-making processes.

5. Resuscitation. 2022 Dec 26:109678. doi: 10.1016/j.resuscitation.2022.109678. Online ahead of print.

Predicting Recurrent Cardiac Arrest in Individuals Surviving Out-of-Hospital Cardiac Arrest.

Hellsén G(1), Rawshani A(2), Skoglund K(2), Bergh N(2), Råmunddal T(2), Myredal A(2), Helleryd E(2), Taha A(2), Mahmoud A(2), Hjärtstam N(2), Backelin C(2), Dahlberg P(2), Hessulf F(2), Herlitz J(3), Engdahl J(4), Rawshani A(2).

ABSTRACT

BACKGROUND: Despite improvements in short-term survival for Out-of-Hospital Cardiac Arrest (OHCA) in the past two decades, long-term survival is still not well studied. Furthermore, the contribution of different variables on long-term survival have not been fully investigated. AIM: Examine the 1-year prognosis of patients discharged from hospital after an OHCA. Furthermore, identify factors predicting re-arrest and/or death during 1-year follow-up. METHODS: All patients 18 years or older surviving an OHCA and discharged from the hospital were identified from the Swedish Register for Cardiopulmonary Resuscitation (SRCR). Data on diagnoses, medications and socioeconomic factors was gathered from other Swedish registers. A machine learning model was constructed with 886 variables and evaluated for its predictive capabilities. Variable importance was gathered from the model and new models with the most important variables were created. RESULTS: Out of the 5098 patients included, 902 (∼18%) suffered a recurrent cardiac arrest or death within a year. For the outcome death or re-arrest within 1 year from discharge the model achieved an ROC (receiver operating characteristics) AUC (area under the curve) of 0.73. A model with the 15 most important variables achieved an AUC of 0.69. CONCLUSIONS: Survivors of an OHCA have a high risk of suffering a re-arrest or death within 1 year from hospital discharge. A machine learning model with 15 different variables, among which age, socioeconomic factors and neurofunctional status at hospital discharge, achieved almost the same predictive capabilities with reasonable precision as the full model with 886 variables.

6. Sci Rep. 2022 Dec 27;12(1):22450. doi: 10.1038/s41598-022-27096-9.

The interaction effect of bystander cardiopulmonary resuscitation (CPR) and dispatcher CPR on outcomes after out-of-hospital cardiac arrest.

Sohn Y(1), Cho GC(#)(2), Cho Y(#)(1)(3).

ABSTRACT

This study aimed to evaluate the effects of bystander cardiopulmonary resuscitation (CPR) and dispatcher-assisted CPR (DA-CPR) on outcomes after out-of-hospital cardiac arrest (OHCA). We conducted a prospective observational study using the Korean Cardiac Arrest Research Consortium registry database and enrolled adults aged > 20 years who sustained OHCA. The study population comprised 13,864 patients from October 1, 2015, to June 30, 2021. All enrolled patients were transported to the emergency room and resuscitated by the emergency medical personnel. Patients with terminal illnesses, pregnancy, "do not resuscitate" cards, and insufficient recorded information were excluded. Good neurologic outcomes were noted in 6.5%, 9.9%, and 9.6% of patients in the "no bystander", "standard bystander", and "compression-only bystander" CPR groups, respectively, and differed significantly ($p < 0.001$). Survival to discharge differed significantly ($p < 0.001$) between groups at 10.8%, 13.1%, and 13.2%, respectively. In a multivariable model, the interaction between "compression-only" and DA-CPR showed a positive effect on good neurological outcomes and survival to discharge with an odds ratio of 1.93 (Confidence interval, CI 1.28-2.91, $p = 0.002$) and 1.74 (CI 1.24-2.44, $p = 0.001$), respectively. In conclusion, the interaction between compression-only CPR and DA-CPR is significantly associated with good neurological and survival outcomes after OHCA. Education for bystanders and dispatchers should adhere to the current guidelines to improve outcomes among OHCA victims.

7. Am J Cardiol. 2023 Feb 1;188:44-51. doi: 10.1016/j.amjcard.2022.11.019. Epub 2022 Dec 5.
Time Trend in Incidence of Sudden Cardiac Death After Percutaneous Coronary Intervention from 2009 to 2017 (from the Japanese Multicenter Registry).
Nakamaru R(1), Shiraishi Y(2), Niimi N(2), Ueda I(2), Ikemura N(2), Suzuki M(3), Noma S(4), Inohara T(2), Numasawa Y(5), Fukuda K(2), Kohsaka S(6).

ABSTRACT
The advances in the integrated management of patients with coronary artery disease undergoing percutaneous coronary intervention (PCI) have reduced subsequent cardiovascular events. Nonetheless, sudden cardiac death (SCD) remains a major concern. Therefore, we aimed to investigate the time trend in SCD incidence after PCI and to identify the clinical factors contributing to SCD. From a prospective, multicenter cohort registry in Japan, 8,723 consecutive patients with coronary artery disease undergoing PCI between 2009 and 2017 were included. We evaluated the SCD incidence 2 years after PCI; all death events were adjudicated, and SCD was defined as unexpected death without a noncardiovascular cause in a previously stable patient within 24 hours from the onset. The Fine and Gray method was used to identify the factors associated with SCD. Overall, the mean age of the patients was 68.3 ± 11.3 years, and 1,173 patients (13.4%) had heart failure (HF). During the study period, the use of second-generation drug-eluting stents increased. The 2-year cumulative incidence of all-cause mortality and SCD was 4.29% and 0.45%, respectively. All-cause mortality remained stable during the study period (p for trend = 0.98), whereas the crude incidence of SCD tended to decrease over the study period (p for trend = 0.052). HF was the strongest predictor associated with the risk of SCD (crude incidence [vs non-HF] 2.13% vs 0.19%; p <0.001). In conclusion, the incidence of SCD after PCI decreased over the last decade, albeit the high incidence of SCD among patients with HF remains concerning.

IN-HOSPITAL CARDIAC ARREST

1. JACC Cardiovasc Interv. 2022 Dec 26;15(24):2463-2471. doi: 10.1016/j.jcin.2022.10.045.
Variation in Survival After Cardiopulmonary Arrest in Cardiac Catheterization Laboratories in the United States.

Tripathi A(1), Chan PS(2), Albagdadi MS(3), Khan MS(1), Atti V(4), Saraswat A(1), Hirsch GA(5), Elmariah S(3), Drachman DE(3), Bhatt DL(6); American Heart Association's Get With the Guidelines Resuscitation Investigators.

ABSTRACT

BACKGROUND: In-hospital cardiac arrest during cardiac catheterization is not uncommon. The extent of variation in survival after cardiac arrest occurring in the cardiac catheterization laboratory (CCL) and underlying factors are not well known. OBJECTIVES: The aim of this study was to identify the factors associated with higher survival rates after an index cardiac arrest in the CCL. METHODS: Within the GWTG (Get With The Guidelines)-Resuscitation registry, patients ≥18 years of age who had index in-hospital cardiac arrest in the CCL between January 1, 2003, and December 31, 2017, were identified. Hierarchical models were used to adjust for demographics, comorbidities, and cardiac arrest characteristics to generate risk-adjusted survival rates (RASRs) to discharge for each hospital with ≥5 cases during the study period. Median OR was used to quantify the extent of hospital-level variation in RASR. RESULTS: The study included 4,787 patients from 231 hospitals. The median RASR was 36% (IQR: 21%) and varied from a median of 20% to 52% among hospitals in the lowest and highest tertiles of RASR, respectively. The median OR was 1.71 (95% CI: 1.52-1.87), suggesting that the odds of survival for patients with identical characteristics with in-hospital cardiac arrest in the CCL from 2 randomly chosen different hospitals varied by 71%. Hospitals with greater annual numbers of cardiac arrest cases in the CCL had higher RASRs. CONCLUSIONS: Even in controlled settings such as the CCL, there is significant hospital-level variation in survival after in-hospital cardiac arrest, which suggests an important opportunity to improve resuscitation outcomes in procedural areas.

2. Zhonghua Wei Zhong Bing Ji Jiu Yi Xue. 2022 Dec;34(12):1238-1242. doi: 10.3760/cma.j.cn121430-20220317-00256.

[Validation the clinical value of good outcome following attempted resuscitation scores in Chinese populations in predicting the prognosis of in-hospital cardiac arrest]. [Article in Chinese]

Ren Y(1)(2), Ye L(3), Huang X(1)(2), Gao X(1)(2), Yin G(1)(2), Wu X(1)(2), Huang W(1)(2), Cao L(1)(2), Xu P(1)(2).

ABSTRACT

OBJECTIVE: To verify the clinical value of the good outcome following attempted resuscitation (GO-FAR) score in predicting the neurological status of patients with in-hospital cardiac arrest (IHCA) in the Chinese population. METHODS: The clinical data of patients with IHCA who were admitted to the Zigong Fourth People's Hospital from January 1 to December 31, 2020 were retrospectively analyzed. Used Glasgow-Pittsburgh cerebral performance category (CPC) score 1 point as the end point, the subjects were divided into 4 groups according to the score: ≤ 0 group, 1-8 group, 9-20 group and ≥ 21 group. Taken the group which GO-FAR score ≤ 0 as the reference group, the odds ratio (OR) of the other three groups compared with this group was calculated. The receiver operator characteristic curve (ROC curve) was performed to evaluate the predictive value of the GO-FAR score in favorable neurological outcome. A calibration curve was drawn for the Hosmer-Lemeshow test to analyze the degree of calibration of the GO-FAR score for predicting good neurological outcome. RESULTS: A total of 230 IHCA patients were enrolled in the study, including 130 males, aged 74 (65, 81) years old, and 23 case (10.0%) had good neurological prognosis. There were statistically significant differences in GO-FAR-related variables, including age, a normal neurological function on admitted, acute stroke, metastatic cancer, septicemia, medical noncardiac admission, hepatic insufficiency, hypotension, renal insufficiency or dialysis, respiratory insufficiency, pneumonia, etc (all $P < 0.05$). Taken the GO-FAR score ≤ 0 group as the reference group, the OR values of good neurological prognosis in the GO-FAR score 1-8 group were 0.54 [95% confidence interval (95%CI) was 0.17-1.53, $P = 0.250$], 9-20 group were 0.17 (95%CI was 0.02-0.67, $P = 0.009$) and ≥ 21 group were 0.25 (95%CI was 0.05-0.85, $P = 0.025$). The area under the ROC curve (AUC) of the GO-FAR score for predicting favorable neurological outcome in IHCA patients was 0.653 (95%CI was 0.529-

0.777, P = 0.015) and there was no significant difference in Hosmer-Lemeshow test (P = 0.311). All these suggested that there was no significant difference between the predicted value and the actual value. CONCLUSIONS: GO-FAR score can be applied to predict neurological prognosis of IHCA patients in Chinese population. It can help clinicians to predict the prognosis of cardio-pulmonary resuscitation (CPR) and propose critical recommendations in treatment for these patients or their families.

3. Heart Lung. 2022 Dec 24;58:191-197. doi: 10.1016/j.hrtlng.2022.12.008. Online ahead of print.
A more conservative test of sex differences in the treatment and outcome of in-hospital cardiac arrest.
Israelsson J(1), Carlsson M(2), Agerström J(3).
ABSTRACT
BACKGROUND: Studies investigating sex disparities related to treatment and outcome of in-hospital cardiac arrest (IHCA) have produced divergent findings and have typically been unable to adjust for outstanding confounding variables. OBJECTIVES: The aim was to examine sex differences in treatment and survival following IHCA, using a comprehensive set of control variables including e.g., age, comorbidity, and patient-level socioeconomic status. METHODS: This retrospective study was based on data from the Swedish Register of Cardiopulmonary Resuscitation and Statistics Sweden. In the primary analyses, logistic regression models and ordinary least square regressions were estimated. RESULTS: The study included 24,217 patients and the majority (70.4%) were men. In the unadjusted analyses, women had a lower chance of survival after cardiopulmonary resuscitation (CPR) attempt, at hospital discharge (with good neurological function) and at 30 days ($p<0.01$). In the adjusted regression models, female sex was associated with a higher chance of survival after the CPR attempt ($B = 1.09$, $p<0.01$) and at 30-days ($B = 1.09$, $p<0.05$). In contrast, there was no significant association between sex and survival to discharge with good neurological outcome. Except for treatment duration ($B=-0.07$, $p<0.01$), no significant associations between sex and treatment were identified. CONCLUSIONS: No signs of treatment disparities or discrimination related to sex were identified. However, women had a better chance of surviving IHCA compared to men. The finding that women went from having a survival disadvantage (unadjusted analysis) to a survival advantage (adjusted analysis) attests to the importance of including a comprehensive set of control variables, when examining sex differences.

4. Bull Emerg Trauma. 2022;10(4):141-156. doi: 10.30476/BEAT.2022.92465.1307.
Survival to Discharge Rate and Favorable Neurological Outcome Related to Gender, Duration of Resuscitation and First Document of Patients In-Hospital Cardiac Arrest: A Systematic Meta-Analysis.
Goodarzi A(1), Khatiban M(2), Abdi A(3), Oshvandi K(4).
ABSTRACT
OBJECTIVE: To investigate the relationship between outcomes and demographic-clinical variables in in-hospital cardiac arrest (IHCA). METHODS: The Medline database was searched along with Google Scholar, Scopus, Web of Science, and Persian language database without time limitation until January 6th, 2020. The inclusion criteria included papers published in journals or presented in English and Persian congress that reported the IHCA outcomes based on the Utstein criterion. All the descriptive, cross-sectional, and cohort studies on CPR were covered based on inclusion and exclusion criteria. Primary checks covered titles and abstracts followed by a full-text check of the remaining papers from the first screening stage. Data analysis was done using comprehensive meta-analysis (CMA) software version 2.0. The finding's heterogeneity was checked using Q and Cochran tests with heterogeneity >50% and the random-effects model was used to estimate survival and favorable neurological outcome (FNO) in the analysis. To detect the publication bias of studies, the subgroup test, meta-regression test, sensitivity analysis test, funnel plot, and Eagger's regression test were used. RESULTS: Survival to discharge was 19.1% (95% CI=16.8-21.7) and FNO in the survived to

discharge cases was 68.1% (95% CI=55.8-78.3). Survival to discharge and FNO were notably higher in men, CPR duration <15min, and shockable dysrhythmias. CONCLUSION: IHCA outcomes are poor in developing countries. The outcomes of IHCA in terms of gender were inconsistent with the result reported by other meta-analyses.

5. Zhonghua Wei Zhong Bing Ji Jiu Yi Xue. 2022 Dec;34(12):1248-1252. doi: 10.3760/cma.j.cn121430-20221017-00925.

[Construction of early warning indicators of in-hospital cardiac arrest in adult inpatients].

[Article in Chinese]

Wang Y(1), Zhang Z(2), Xia X(2), Yan P(3), Li W(4), Hui C(5).

ABSTRACT

OBJECTIVE: To establish early warning indicators for Chinese nurses to recognize in-hospital cardiac arrest (IHCA) of adult inpatients. METHODS: Computer retrieval of Chinese and English databases such as CNKI, Wanfang Database, VIP, National Medical Library of the United States PubMed Database, Web of Science, Embase Database of the Netherlands Medical Abstracts, Cochrane Library Database and other international guidelines collaboration network (GIN), National Institute for Health and Clinical Optimization (NICE), Scottish Intercollegiate Guidelines Network (SIGN), BMJ best clinical practice and other guidelines was performed. The retrieval time limit for respiratory and cardiac arrest early warning indicators or risk identification related content of the adult inpatient in the professional website was until June 30, 2020. After literature research and expert group analysis, the research group drew up an expert correspondence questionnaire, and selected 32 medical and nursing experts from Beijing, Tianjin, Jilin, Shandong, Shaanxi, Sichuan, Zhejiang and other grade three first-class general hospitals from July to September 2022. The Delphi method was used to conduct two rounds of expert correspondence, forming the final version of the early warning index of cardiac arrest in adult inpatients. RESULTS: Five first-level indicators, 23 second-level indicators and 41 third-level indicators including vital signs, consciousness and pupils, postoperative blood drainage volume, lab results and other five aspects were initially formed. The effective response rates of the two rounds of expert correspondence were 100% (32/32) and 93.75% (30/32), respectively, the Kendall coordination coefficients W of the first round and the second round were 0.340 and 0.462, respectively, the expert authority coefficients Cr were 0.88 and 0.89, respectively, the mean value of importance assignment was 3.94-5.00, 4.07-5.00, and the coefficient of variation was 0-0.16, 0-0.14, with statistically significant differences (all $P < 0.05$). Finally, 5 primary indicators, 23 secondary indicators and 43 tertiary indicators were formed, including five aspects of vital signs, consciousness and pupils, postoperative blood drainage, lab results, symptoms and chief complaints. CONCLUSIONS: The expert consultation on the early warning indicators of IHCA for adult patients tends to be consistent and scientific, which is applicable to help nurses detect the changes of patients' condition as early as possible.

INJURIES AND CPR

No articles identified.

CAUSE OF THE ARREST

1. Sci Total Environ. 2022 Nov 26:160554. doi: 10.1016/j.scitotenv.2022.160554. Online ahead of print.

Abnormal ambient temperature change increases the risk of out-of-hospital cardiac arrest: A systematic review and meta-analysis of exposure types, risk, and vulnerable populations.

Wu Q(1), Yang M(1), Wu K(1), Su H(1), Huang C(2), Xu Z(3), Ho HC(4), Zheng H(5), Zhang W(6), Tao J(1), Dang TA(7), Hossain MZ(8), Khan MA(9), Bogale D(10), Cheng J(11).

ABSTRACT
BACKGROUND: There is growing evidence in support of a short-term association between ambient temperature and cardiac arrest attacks that is a serious manifestation of cardiovascular disease and has a high incidence and low survival rate. However, it remains unrecognized about the hazardous temperature exposure types, exposure risk magnitude, and vulnerable populations. OBJECTIVES: We comprehensively summarize prior epidemiological studies looking at the short-term associations of out-of-hospital cardiac arrest (OHCA) with various temperature exposures among different populations. METHODS: We searched PubMed and Web of Science databases from inception to October 2021 for eligible English language. Temperature exposure was categorized into three types: heat (included high temperature, extreme heat, and heatwave), cold (included low temperature and extreme cold), and temperature variation (included diurnal temperature range and temperature change between two adjacent days). Meta-analysis weighted by inverse variance was used to pool effect estimates. RESULTS: This study included 15 studies from 8 countries, totaling around 1 million OHCA events. Extreme heat and extreme cold were significantly associated with an increased risk of OHCA, and the pooled relative risks (RRs) were 1.071 [95 % confidence interval (CI): 1.019-1.126] and 1.662 (95%CI: 1.138-2.427), respectively. The risk of OHCA was also elevated by heatwaves (RR = 1.248, 95%CI: 1.091-1.427) and more intensive heatwaves had a greater effect. Notably, the elderly and males seemed to be more vulnerable to the effects of heat and cold. However, we did not observe a significant association between temperature variation and the risk of OHCA (1.005, 95%CI: 0.999-1.012). CONCLUSION: Short-term exposure to heat and cold may be novel risk factors for OHCA. Considering available studies in limited regions, the temperature effect on OHCA should be urgently confirmed in different regions.

2. Yonsei Med J. 2023 Jan;64(1):48-53. doi: 10.3349/ymj.2022.0417.
Interactions between Sleep Apnea and Coronary Artery Disease on the Incidence of Sudden Cardiac Arrest: A Multi-Center Case-Control Study.
Jung E(1), Ryu HH(1)(2), Ro YS(3), Cha KC(4), Shin SD(5), Hwang SO(4).
ABSTRACT
PURPOSE: Sleep apnea (SA) is a risk factor for coronary artery disease (CAD), and SA and CAD increase the incidence of sudden cardiac arrest (SCA). This study aimed to investigate the effect of SA on the incidence of SCA and explore the effect of varying degrees of SA with or without CAD on the incidence of SCA. MATERIALS AND METHODS: This prospective multi-center, case-control study was performed using the phase II Cardiac Arrest Pursuit Trial with Unique Registry and Epidemiologic Surveillance (CAPTURES-II) database for SCA cases and community-based controls in Korea. The matching ratio of cases to controls was 1:1, and they were randomly matched within demographics, including age, sex, and residence. The primary variable was a history of SA, and the second variable was a history of CAD. We conducted a conditional logistic regression analysis to estimate the effect of SA and CAD on the SCA risk, and an interaction analysis between SA and CAD. RESULTS: SA was associated with an increased risk of SCA [adjusted odds ratio (AOR) (95% confidence interval, CI): 1.54 (1.16-2.03)], and CAD was associated with an increased risk of SCA [AOR (95% CI): 3.94 (2.50-6.18)]. SA was a risk factor for SCA in patients without CAD [AOR (95% CI): 1.62 (1.21-2.17)], but not in patients with CAD [AOR (95% CI): 0.56 (0.20-1.53)]. CONCLUSION: In the general population, SA is risk factor for SCA only in patients without CAD. Early medical intervention for SA, especially in populations without pre-existing CAD, may reduce the SCA risk.

END-TIDAL CO_2

No articles identified.

ORGAN DONATION

1. Crit Care Explor. 2022 Dec 22;4(12):e0812. doi: 10.1097/CCE.0000000000000812. eCollection 2022 Dec.

Organ Donation From Patients on Extracorporeal Membrane Oxygenation at the Time of Death.

Fainberg NA(1), Morrison WE(1), West S(2), Hasz R(2), Kirschen MP(1).

ABSTRACT

To describe the clinical characteristics and organ donation rate of patients supported by extracorporeal membrane oxygenation (ECMO) at the time of death. DESIGN: Retrospective observational study. Pearson chi-square and Fisher exact tests were used in statistical analyses. SETTING: One hundred twenty-seven acute care hospitals in New Jersey, Pennsylvania, and Delaware. PATIENTS: Adult and pediatric patients who were on ECMO at the time of referral to a large organ procurement organization (OPO) between 2016 and 2020. INTERVENTIONS: None. MEASUREMENTS AND MAIN RESULTS: Nineteen thousand nine hundred thirty patients were referred to the OPO between November 2016 and September 2020, of which 5,034 were medically suitable potential donors. Of this cohort, 143 patients were supported on ECMO at the time of OPO referral and 141 were included in analyses (median age 47 yr, 60% male). Thirty-three percent (46/141, median age 48 yr, 52% male) donated organs, compared with 50% of non-ECMO patients ($p \leq 0.0005$). ECMO and non-ECMO patients had organs recovered but not transplanted at similar rates (11% vs 10%, $p = 0.8$). There were no significant differences in sex ($p = 0.16$) or ethnicity ($p = 0.50$) between organ donor and nondonor groups. Fifty-one percent (21/41) of organ donors donated after circulatory death and 49% (20/41) after brain death. Patients declared dead by neurologic criteria were more likely to donate (51%) than those declared dead by circulatory criteria (21%, $p < 0.001$). Frequency of cardiac arrest prior to ECMO was similar between donors and nondonors ($p = 0.68$). Thirty-nine percent (16/41) of donors had an out-of-hospital cardiac arrest (OHCA) and 51% (21/41) were cannulated via extracorporeal cardiopulmonary resuscitation (ECPR). The most common reason patients were not donors was that family declined (57%). CONCLUSIONS: One-third of patients referred to the OPO on ECMO at the time of death donated organs. While donation occurred less frequently after ECMO, ECMO and non-ECMO patients had organs used rather than discarded at a similar rate. Patients successfully donated following OHCA and/or ECPR. Clinicians should not consider ECMO a barrier to organ donation.

FEEDBACK

No articles identified.

DRUGS

1. Eur J Emerg Med. 2023 Feb 1;30(1):58. doi: 10.1097/MEJ.0000000000000938. Epub 2022 Dec 19.

Effect of adrenaline dose on neurological outcome in out-of-hospital cardiac arrest: still difficult to conclude.

Cazes N(1), Galant J, Boutillier du Retail C.

NO ABSTRACT AVAILABLE

2. Crit Care. 2022 Dec 20;26(1):393. doi: 10.1186/s13054-022-04275-8.

A prospective observational study on impact of epinephrine administration route on acute myocardial infarction patients with cardiac arrest in the catheterization laboratory (iCPR study).
Aldujeli A(#)(1)(2), Haq A(#)(3), Tecson KM(4), Kurnickaite Z(5), Lickunas K(5), Bailey S(6), Tatarunas V(7), Braukyliene R(8), Baksyte G(5), Aldujeili M(9), Khalifeh H(10), Briedis K(5), Ordiene R(5), Unikas R(5), Hamadeh A(11), Brilakis ES(3).

ABSTRACT
BACKGROUND: Epinephrine is routinely utilized in cardiac arrest; however, it is unclear if the route of administration affects outcomes in acute myocardial infarction patients with cardiac arrest. OBJECTIVES: To compare the efficacy of epinephrine administered via the peripheral intravenous (IV), central IV, and intracoronary (IC) routes. METHODS: Prospective two-center pilot cohort study of acute myocardial infarction patients who suffered cardiac arrest in the cardiac catheterization laboratory during percutaneous coronary intervention. We compared the outcomes of patients who received epinephrine via peripheral IV, central IV, or IC. RESULTS: 158 participants were enrolled, 48 (30.4%), 50 (31.6%), and 60 (38.0%) in the central IV, IC, and peripheral IV arms, respectively. Peripheral IV epinephrine administration route was associated with lower odds of achieving return of spontaneous circulation (ROSC, odds ratio = 0.14, 95% confidence interval = 0.05-0.36, $p < 0.0001$) compared with central IV and IC administration. (There was no difference between central IV and IC routes; $p = 0.9343$.) The odds of stent thrombosis were significantly higher with the IC route (IC vs. peripheral IV OR = 4.6, 95% CI = 1.5-14.3, $p = 0.0094$; IC vs. central IV OR = 6.0, 95% CI = 1.9-19.2, $p = 0.0025$). Post-ROSC neurologic outcomes were better for central IV and IC routes when compared with peripheral IV. CONCLUSION: Epinephrine administration via central IV and IC routes was associated with a higher rate of ROSC and better neurologic outcomes compared with peripheral IV administration. IC administration was associated with a higher risk of stent thrombosis.

3. Resuscitation. 2022 Dec 21:109673. doi: 10.1016/j.resuscitation.2022.109673. Online ahead of print.

Calcium Use during Paediatric In-hospital Cardiac Arrest is Associated with Worse Outcomes.
Cashen K(1), Sutton RM(2), Reeder RW(3), Ahmed T(4), Bell MJ(5), Berg RA(2), Burns C(6), Carcillo JA(7), Carpenter TC(8), Michael Dean J(3), Wesley Diddle J(5), Federman M(9), Fink EL(7), Franzon D(10), Frazier AH(11), Friess SH(12), Graham K(2), Hall M(13), Hehir DA(2), Horvat CM(7), Huard LL(9), KirkpatrickN T(9), Maa T(13), Manga A(12), McQuillen PS(10), Morgan RW(2), Mourani PM(14), Nadkarni VM(2), NaimCE MY(2), Notterman D(15), Page K(3), Pollack MM(5), Qunibi D(13), Sapru A(9), Schneiter C(8), Sharron MP(5), Srivastava N(9), Viteri S(11), Wessel D(5), Wolfe HA(2), Yates AR(13), Zuppa AF(2), Meert KL(16).

ABSTRACT
AIM: To evaluate associations between calcium administration and outcomes among children with in-hospital cardiac arrest and among specific subgroups in which calcium use is hypothesized to provide clinical benefit. METHODS: This is a secondary analysis of observational data collected prospectively as part of the ICU-RESUScitation project. Children 37 weeks post-conceptual age to 18 years who received chest compressions in one of 18 intensive care units from October 2016-March 2021 were eligible. Data included child and event characteristics, pre-arrest laboratory values, pre- and intra-arrest haemodynamics, and outcomes. Outcomes included sustained return of spontaneous circulation (ROSC), survival to hospital discharge, and survival to hospital discharge with favourable neurologic outcome. A propensity score weighted cohort was used to evaluate associations between calcium use and outcomes. Subgroups included neonates, and children with hyperkalaemia, sepsis, renal insufficiency, cardiac surgery with cardiopulmonary bypass, and calcium-avid cardiac diagnoses. RESULTS: Of 1,100 in-hospital cardiac arrests, median age was 0.63 years (IQR 0.19, 3.81); 450 (41%) received calcium. Among the weighted cohort, calcium use was not

associated with sustained ROSC (aOR, 0.87; CI95 0.61-1.24; p=0.445), but was associated with lower rates of both survival to hospital discharge (aOR, 0.68; CI95 0.52-0.89; p=0.005) and survival with favourable neurologic outcome at hospital discharge (aOR, 0.75; CI95 0.57-0.98; p=0.038). Among subgroups, calcium use was associated with lower rates of survival to hospital discharge in children with sepsis and renal insufficiency. CONCLUSIONS: Calcium use was common during paediatric in-hospital cardiac arrest and associated with worse outcomes at hospital discharge.

4. PLoS One. 2022 Dec 30;17(12):e0279776. doi: 10.1371/journal.pone.0279776. eCollection 2022.
Association between insulin administration method and six-month neurological outcome in survivors of out-of-hospital cardiac arrest who underwent targeted temperature management.
Lee DH(1), Lee BK(1)(2), Cho YS(1), Jung YH(1)(2), Lee HY(2)(3), Jeung KW(1)(2), Youn CS(4), Kim SH(4); Korean Hypothermia Network Investigators.
ABSTRACT
We investigated the association of insulin administration method with the achievement of mean glucose ≤ 180 mg/dL and neurological outcomes in out-of-hospital cardiac arrest (OHCA) survivors who had hyperglycemia after the return of spontaneous circulation. From a multicenter prospective registry, we extracted the data of adult OHCA survivors who underwent targeted temperature management (TTM) between 2015 and 2018. Blood glucose levels every 4 h after initiating TTM were obtained for 72 h. We divided insulin administration methods into three categories: subcutaneous (SQI), intravenous bolus (IBI), and continuous intravenous (CII). We calculated the mean glucose and standard deviation (SD) of glucose. The primary outcome was the achievement of mean glucose ≤ 180 mg/dL. The secondary outcomes were the 6-month neurological outcome based on the Cerebral Performance Category (CPC) scale (good, CPC 1-2; poor, CPC 3-5), mean glucose, and SD of glucose. Of the 549 patients, 296 (53.9%) achieved mean glucose ≤ 180 mg/dL, and 438 (79.8%) had poor neurological outcomes, 134 (24.4%), 132 (24.0), and 283 (51.5%) were in the SQI, IBI, and CII groups, respectively. The SQI (adjusted odds ratio [aOR], 0.848; 95% confidence intervals [CIs], 0.493-1.461) and IBI (aOR, 0.673; 95% CIs, 0.415-1.091) groups were not associated with mean glucose ≤ 180 mg/dL and the SQI (aOR, 0.660; 95% CIs, 0.335-1.301) and IBI (aOR, 1.757; 95% CIs, 0.867-3.560) groups were not associated with poor neurological outcomes compared to the CII group. The CII (168 mg/dL [147-202]) group had the lowest mean glucose than the SQI (181 mg/dL [156-218]) and IBI (184 mg/dL [162-216]) groups. The CII (45.0[33.9-63.5]) group had a lower SD of glucose than the IBI (50.8 [39.1-72.0]) group. The insulin administration method was not associated with achieving mean glucose ≤ 180 mg/dL and 6-month neurological outcomes.

5. Resuscitation. 2022 Dec 26:109674. doi: 10.1016/j.resuscitation.2022.109674. Online ahead of print.
Sodium Bicarbonate Therapy during Out-of-Hospital Cardiac Arrest: Is presenting rhythm the key to benefit?
Neth MR(1), Daya MR(2).
NO ABSTRACT AVAILABLE

6. Resuscitation. 2022 Dec 23:109676. doi: 10.1016/j.resuscitation.2022.109676. Online ahead of print.
Modulation of inflammation by treatment with tocilizumab after out-of-hospital cardiac arrest and associations with clinical status, myocardial- and brain injury.
Abild Stengaard Meyer M(1), Bjerre M(2), Wiberg S(1), Grand J(1), Emil Roelsgaard Obling L(1), Sina Pettersson Meyer A(1), Josiassen J(1), Frydland M(1), Hartvig Thomsen J(1), Frikke-Schmidt R(3), Kjaergaard J(4), Hassager C(4).

ABSTRACT
AIM: To investigate how the inflammatory response after out-of-hospital cardiac arrest (OHCA) is modulated by blocking IL-6-mediated signalling with tocilizumab, and to relate induced changes to clinical status, myocardial- and brain injury. METHODS: This is a preplanned substudy of the IMICA trial (ClinicalTrials.gov, NCT03863015). Upon admission 80 comatose OHCA patients were randomized to infusion of tocilizumab or placebo. Inflammation was characterized by a cytokine assay, CRP, and leukocyte differential count; myocardial injury by TnT and NT-proBNP; brain injury by neuron-specific enolase (NSE) and Neurofilament Light chain (NFL), while sequential organ assessment (SOFA) score and Vasopressor-Inotropic Score (VIS) represented overall clinical status. RESULTS: Cytokine responses for IL-5, IL-6, IL-17, and neutrophil as well as monocyte counts were affected by tocilizumab treatment (all $p<0.05$), while there was no effect on levels of NFL. IL-5 and IL-6 were substantially increased by tocilizumab, while IL-17 was lowered. Neutrophils and monocytes were lower at 24 and 48 hours for the tocilizumab group compared to placebo. Multiple correlations were identified for markers of organ injury and clinical status versus inflammatory markers; this included correlations of neutrophils and monocytes with TnT, NSE, NFL, SOFA- and VIS score for the tocilizumab but not the placebo group. NT-proBNP, NFL and SOFA score correlated with CRP in both groups. CONCLUSIONS: Treatment with tocilizumab after OHCA modulated the inflammatory responses with notable increases for IL-5, IL-6, and decreases for neutrophils and monocytes, as well as reduced vasopressor requirements.

TRAUMA

No articles identified.

VENTILATION

1. Resusc Plus. 2022 Dec 16;13:100340. doi: 10.1016/j.resplu.2022.100340. eCollection 2023 Mar.
A comparative study of Video laryngoscope vs Macintosh laryngoscope for prehospital tracheal intubation in Hiroshima, Japan.
Santou N(1), Ueta H(1), Nakagawa K(2), Hata K(2)(3), Kusunoki S(4), Sadamori T(5), Takyu H(2), Tanaka H(1)(2).
ABSTRACT
BACKGROUND: In Japan, there are no studies comparing endotracheal intubation performed by emergency medical technicians (EMTs) during out-of-hospital cardiac arrest (OHCA) using a Macintosh laryngoscope and a video laryngoscope. OBJECTIVE: The purpose of this study was to compare the success rate, complication rate, return of spontaneous circulation (ROSC), neurological prognosis (CPC1-2) and regional differences between Video laryngoscope (VL) and Macintosh laryngoscope (ML) for OHCA patients. METHOD: This study is a retrospective cohort study using 10,067 OHCA data extracted from the national Utstein Form and emergency medical transport data. The primary endpoint was the success rate of tracheal intubation and the complication rate and the secondary endpoints were the incidence of ROSC and CPC1-2. RESULTS: A total of 885 tracheal Intubated OHCA patients were enrolled in this study. The success rate was 94.1% (490/521) in the VL group and 89.3% (325/364) in the ML group (RR, 1.05; 95%CI, 1.01-1.10, P = 0.01), the VL group shows significantly higher success rate than that of the ML group. In the complication rates, oesophageal intubation occurred in 0.2% (1/521) of in the VL group and in 6.0% (22/364) in the ML group, Indicating significantly higher complication rates in the ML group compared with the VL group (RR, 1.06; 95% CI, 1.03-1.09, P < 0.001). The ROSC rate and CPC1-2 rate are similar among the groups. CONCLUSION: Our data suggest that using VL had a little advantage with a higher success

rate and lower complication rate. Further discussion is necessary for the future development of Emergency Medical Services (EMS) intubation devices.

2. Am J Emerg Med. 2022 Dec 22;65:24-30. doi: 10.1016/j.ajem.2022.12.021. Online ahead of print.
Association between prehospital airway type and oxygenation and ventilation in out-of-hospital cardiac arrest.
Song SR(1), Kim KH(2), Park JH(3), Song KJ(3), Shin SD(4).
ABSTRACT
OBJECTIVES: This study aimed to evaluate the association between prehospital airway type and oxygenation and ventilation in out-of-hospital cardiac arrest (OHCA). METHODS: This retrospective observational study included OHCA patients who visited the emergency departments (EDs) between October 2015 and June 2021. The study groups were categorized according to the prehospital airway type: endotracheal intubation (ETI), supraglottic airway (SGA), or bag-valve-mask ventilation (BVM). The primary outcome was good oxygenation: partial pressure of oxygen (PaO_2) ≥ 60 mmHg on the first arterial blood gas (ABG) test. The secondary outcome was good ventilation: partial pressure of carbon dioxide ($PaCO_2$) ≤ 45 mmHg. Multivariate logistic regression was conducted to calculate the adjusted odds ratio (AOR) and 95% confidence interval (CI). RESULTS: A total of 7,372 patients were enrolled during the study period: 1,819 patients treated with BVM, 706 with ETI, and 4,847 who underwent SGA. In multivariable logistic regression analysis for good oxygenation outcomes, the ETI group showed a higher AOR than the BVM group (AOR [95% CIs]: 1.30 [1.06-1.59] in ETI and 1.05 [0.93-1.20] in SGA groups). Regarding good ventilation, the ETI group showed a higher AOR, and the SGA group showed a lower AOR compared to the BVM group (AOR [95% CIs] 1.33 [1.02-1.74] in the ETI and 0.83 (0.70-0.99) in the SGA groups). There was no significant difference in survival to discharge. CONCLUSIONS: ETI was significantly associated with good oxygenation and good ventilation compared to BVM in patients with OHCA, particularly during longer transports. This should be taken into consideration when deciding the prehospital advanced airway management in patients with OHCA.

3. Resuscitation. 2022 Dec 23:109679. doi: 10.1016/j.resuscitation.2022.109679. Online ahead of print.
Methods for Calculating Ventilation Rates During Resuscitation from Out-of-Hospital Cardiac Arrest.
Wang H(1), Jaureguibeitia X(2), Aramendi E(3), Nassal M(4), Panchal A(5), Alonso E(6), Nichol G(7), Aufderheide T(8), Daya MR(9), Carlson J(10), Idris A(11).
ABSTRACT
OBJECTIVE: Ventilation control is important during resuscitation from out-of-hospital cardiac arrest (OHCA). We compared different methods for calculating ventilation rates (VR) during OHCA. METHODS: We analyzed data from the Pragmatic Airway Resuscitation Trial, identifying ventilations through capnogram recordings. We determined VR by: 1) counting the number of breaths within a time epoch ("counted" VR), and 2) calculating the mean of the inverse of measured time between breaths within a time epoch ("measured" VR). We repeated the VR estimates using different time epochs (10, 20, 30, 60 seconds). We defined hypo- and hyperventilation as VR <6 and >12 breaths/min, respectively. We assessed differences in estimated hypo- and hyperventilation with each VR measurement technique. RESULTS: Of 3,004 patients, data were available for 1,010. With the counted method, total hypoventilation increased with longer time epochs ([10-second epoch: 75 seconds hypoventilation] to [60-second epoch: 97 seconds hypoventilation]). However, with the measured method, total hypoventilation decreased with longer time epochs ([10-second epoch: 223 seconds hypoventilation] to [60-second epoch: 150 seconds hypoventilation]). With the counted method, the total duration of hyperventilation decreased with longer time epochs ([10-second epochs: 35 seconds hyperventilation] to [60-second epoch: 0 seconds hyperventilation]). With the measured method, total hyperventilation decreased with longer time epochs ([10-second epoch: 78

seconds hyperventilation] to [60-second epoch: 0 seconds hyperventilation]). Differences between the measured and counted estimates were smallest with a 60-second time epoch. CONCLUSIONS: Quantifications of hypo- and hyperventilation vary with the applied measurement methods. Measurement methods are important when characterizing ventilation rates in OHCA.

CERERBRAL MONITORING

1. Resusc Plus. 2022 Dec 8;12:100332. doi: 10.1016/j.resplu.2022.100332. eCollection 2022 Dec.
The association of brainstem and motor recovery with awakening after out-of-hospital cardiac arrest.
I Cardi A(1), Drohan CM(2), Elmer J(3)(4), Callaway CW(3), X Guyette F(3), Doshi AA(3), Rittenberger JC(3)(5).

ABSTRACT
BACKGROUND: Coma is common following resuscitation from cardiac arrest. Few data describe the trajectory of recovery the first days following resuscitation. The objective of this study is to describe the evolution in neurological examination during the first 5 days after resuscitation and test if subjects who go on to awaken have different patterns of early recovery. METHODS: Prospective study of adult subjects resuscitated from out-of-hospital cardiac arrest. We abstracted demographic information and trained clinicians completed daily neurologic examinations using the Glasgow Coma Scale (GCS) and Full Outline of UnResponsiveness brainstem (FOUR-B) and motor (FOUR-M) scores during daily sedation interruption. The change in scores between Day 1 and Day 5 was analyzed using the Kruskal-Wallis Test and logistic regression models. The relationship of FOUR-B, FOUR-M, and GCS with time to death was estimated by fitting cox proportional hazard models. RESULTS: FOUR-M and GCS did not differ over time ($p = 0.10$; $p = 0.07$). FOUR B increased over time ($p < 0.01$). Time to recovery of brainstem or motor function differed between those treated at 33 °C and 36 °C ($p = 0.0023$ and $p = 0.0032$, respectively). FOUR-B, FOUR-M, and GCS differed between survivors and non-survivors ($p < 0.01$). Time to recovery of brainstem and motor function differed between survivors and non-survivors. FOUR-M and FOUR-B differed between those with good outcome and poor outcome. CONCLUSIONS: The brainstem clinical examination improved during the first 5 days following resuscitation. Brainstem recovery was common in entire cohort and did not differentiate between survivors and non-survivors. Recovery of motor function, however, was associated with survival.

ULTRASOUND AND CPR

No articles identified.

ORGANISATION AND TRAINING

1. J Womens Health (Larchmt). 2022 Dec;31(12):1800-1804. doi: 10.1089/jwh.2021.0399. Epub 2022 Feb 28.
Does Physician Gender and Gender Composition of Clinical Teams Affect Guideline Concordance and Patient Outcomes in Out-of-Hospital Cardiac Arrest?
Becker L(1), Siry-Bove BJ(2), Shelton SK(2), McDaniel K(3), Nelson JL(4), Perman SM(2).

ABSTRACT
Objective: Prior literature has shown improved outcomes in morbidity and mortality for admitted patients cared for by female physicians. One theory is that female physicians adhere closely to

guideline recommendations. We sought to determine whether patients who have out-of-hospital cardiac arrest (OHCA) experience more guideline-concordant postcardiac arrest care and potentially better outcomes based on the gender of their treating physician and gender distribution of the treatment teams. Methods: This study is a retrospective cohort study from the Colorado Cardiac Arrest Registry, local registry of OHCA patients treated at one academic urban tertiary care hospital. We analyzed adult OHCA patients who survived to hospital admission but were comatose. Patient demographic data and arrest characteristics were abstracted for subjects, and the gender of the provider was abstracted from the medical record. Results: Patients were admitted by a female attending in 28.5% of the cohort. The difference in guideline-concordant care between male and female providers was not significant. No statistical difference was found between all-male or mixed gender teams in adherence to guideline-concordant care. No patient was cared for by an all-female team. Neither gender of the admitting physician nor gender of the physician who led the family meeting to discuss prognosis was associated with a survival difference. Conclusions: Prior literature has described differences in outcome based on gender of the treating physician. Our analysis targeted a similar question in a cohort of OHCA patients with survival to hospital admission. We determined that there was no difference in postcardiac arrest guideline concordance and survival to hospital discharge based on treating physician gender. This finding differs from the prior literature and supports the importance of diverse clinical teams in medicine.

2. Am J Emerg Med. 2023 Jan;63:29-37. doi: 10.1016/j.ajem.2022.10.011. Epub 2022 Oct 14.
Evaluation of optimal scene time interval for out-of-hospital cardiac arrest using a deep neural network.
Shin SJ(1), Bae HS(1), Moon HJ(2), Kim GW(3), Cho YS(3), Lee DW(3), Jeong DK(3), Kim HJ(3), Lee HJ(3).
ABSTRACT
AIM: This study aims to develop a cardiac arrest prediction model using deep learning (CAPD) algorithm and to validate the developed algorithm by evaluating the change in out-of-hospital cardiac arrest patient prognosis according to the increase in scene time interval (STI). METHODS: We conducted a retrospective cohort study using smart advanced life support trial data collected by the National Emergency Center from January 2016 to December 2019. The smart advanced life support data were randomly partitioned into derivation and validation datasets. The performance of the CAPD model using the patient's age, sex, event witness, bystander cardiopulmonary resuscitation (CPR), administration of epinephrine, initial shockable rhythm, prehospital defibrillation, provision of advanced life support, response time interval, and STI as prediction variables for prediction of a patient's prognosis was compared with conventional machine learning methods. After fixing other values of the input data, the changes in prognosis of the patient with respect to the increase in STI was observed. RESULTS: A total of 16,992 patients were included in this study. The area under the receiver operating characteristic curve values for predicting prehospital return of spontaneous circulation (ROSC) and favorable neurological outcomes were 0.828 (95% confidence interval 0.826-0.830) and 0.907 (0.914-0.910), respectively. Our algorithm significantly outperformed other artificial intelligence algorithms and conventional methods. The neurological recovery rate was predicted to decrease to 1/3 of that at the beginning of cardiopulmonary resuscitation when the STI was 28 min, and the prehospital ROSC was predicted to decrease to 1/2 of its initial level when the STI was 30 min. CONCLUSION: The CAPD exhibits potential and effectiveness in identifying patients with ROSC and favorable neurological outcomes for prehospital resuscitation.

3. Healthcare (Basel). 2022 Dec 17;10(12):2564. doi: 10.3390/healthcare10122564.

Competencies in Basic Life Support after a Course with or without Rescue Ventilation: Historical Cohort Study.

Castillo J(1), González-Marrón A(1), Llongueras A(2), Camós L(2), Montané M(2), Rodríguez-Higueras E(1).

ABSTRACT

BACKGROUND: Simplifying the international guidelines to improve skills after training and their retention over time has been one of the top priorities in recent years. The objective of our study was to compare the results of the practical skills learned during training in basic life support with and without pulmonary ventilation. METHODS: This was a comparative study of historical cohorts consisting of undergraduate students in health sciences. In one cohort, rescue breathing was performed, and in the other, it was not. The same data collection instruments were used for both cohorts: a test type examination of knowledge, data from a smart mannequin and an instructor observation grid. The means of knowledge and practical skills scores collected by the mannequin were compared using independent sample t-tests. RESULTS: 497 students were recruited without significant differences between the two cohorts. The mean scores for knowledge and skills determined by the instructor and the mannequin were statistically higher in the cohort that did not perform rescue breathing. CONCLUSION: Students who participated in basic life support training that did not include rescue breathing scored better than those who participated in training that included this skill. Training with only compressions simplifies the guidelines and increases learning and content retention.

4. Adv Simul (Lond). 2022 Dec 28;7(1):43. doi: 10.1186/s41077-022-00239-8.

Rapid-cycle deliberate practice versus after-event debriefing clinical simulation in cardiopulmonary resuscitation: a cluster randomized trial.

de Castro LT(1), Coriolano AM(2), Burckart K(2), Soares MB(2), Accorsi TAD(2), Rosa VEE(3), de Santis Andrade Lopes AS(3), Couto TB(2).

ABSTRACT

INTRODUCTION: Rapid-cycle deliberate practice (RCDP) is a simulation-based educational strategy that consists of repeating a simulation scenario a number of times to acquire a planned competency. When the objective of a cycle is achieved, a new cycle initiates with increased skill complexity. There have been no previous randomized studies comparing after-event debriefing clinical manikin-based simulation to RCDP in adult cardiopulmonary resuscitation (CPR). METHODS: We invited physicians from the post-graduate program on Emergency Medicine of the Hospital Israelita Albert Einstein. Groups were randomized 1:1 to RCDP or after-event debriefing simulation prior to the first station of CPR training. During the first 5 min of the pre-intervention scenario, both groups participated in a simulated case of an out-of-hospital cardiac arrest without facilitator interference; after the first 5 min, each scenario was then facilitated according to group allocation (RCDP or after-event debriefing). In a second scenario of CPR later in the day with the same participants, there was no facilitator intervention, and the planned outcomes were evaluated. The primary outcome was the chest compression fraction during CPR in the post-intervention scenario. Secondary outcomes comprised time for recognition of the cardiac arrest, time for first verbalization of the cardiac arrest initial rhythm, time for first defibrillation, and mean pre-defibrillation pause. RESULTS: We analyzed data of three courses conducted between June 2018 and July 2019, with 76 participants divided into 9 teams. Each team had a median of 8 participants. In the post-intervention scenario, the RCDP teams had a significantly higher chest compression fraction than the after-event debriefing group (80.0% vs 63.6%; p = 0.036). The RCDP group also demonstrated a significantly lower time between recognition of the rhythm and defibrillation (6 vs 25 s; p value = 0.036). CONCLUSION: RCDP

simulation strategy is associated with significantly higher manikin chest compression fraction during CPR when compared to an after-event debriefing simulation.

5. Eur Heart J Acute Cardiovasc Care. 2022 Dec 27:zuac165. doi: 10.1093/ehjacc/zuac165. Online of print.

Smartphone Activated Volunteer Responders and Bystander Defibrillation for Out-of-Hospital Cardiac Arrest in Private Homes and Public Locations.

Andelius L(1)(2), Hansen CM(1)(3), Jonsson M(4), Gerds TA(5)(6), Rajan S(7), Torp-Pedersen C(8)(9), Claesson A(4), Lippert F(1), Gregers MCT(1)(2), Berglund E(4), Gislason GH(7)(5), Køber L(3), Hollenberg J(4), Ringh M(4), Folke F(1)(7)(2).

ABSTRACT

AIM: To investigate the association between arrival of smartphone activated volunteer responders before the Emergency Medical Services (EMS) and bystander defibrillation in out-of-hospital cardiac arrest (OHCA) at home and public locations. METHODS AND RESULTS: A retrospective study (September 1, 2017-May 14, 2019) from the Stockholm Region of Sweden and the Capital Region of Denmark. We included 1271 OHCAs, of which 1029 (81.0%) occurred in private homes and 242 (19.0%) in public locations. Main outcome was bystander defibrillation. At least one volunteer responder arrived before EMS in 381 (37.0%) of OHCAs at home and 84 (34.7%) in public. More patients received bystander defibrillation when a volunteer responder arrived before EMS at home (15.5% vs 2.2%, P < 0.001) and in public locations (32.1% vs 19.6%, P = 0.030). Similar results were found among the 361 patients with an initial shockable heart rhythm (52.7% vs 11.5%, P < 0.001 at home and 60.0% vs 37.8%, P = 0.025 in public). The standardized probability of receiving bystander defibrillation increased with longer EMS response times in private homes. 30-day survival was not significantly higher when volunteer responders arrived before EMS (9.2% vs 7.7% in private homes, P = 0.41 and 40.5% vs 35.4% in public locations, P = 0.44). CONCLUSIONS: Bystander defibrillation was significantly more common in private homes and public locations when a volunteer responder arrived before the EMS. The standardized probability of bystander defibrillation increased with longer EMS response times in private homes. Our findings support activation of volunteer responders, and suggest that volunteer responders could increase bystander defibrillation, particularly in private homes.

6. Health Justice. 2022 Dec 27;10(1):37. doi: 10.1186/s40352-022-00202-9.

CPR in correctional facilities: a missed opportunity?

Sampson CS(1), Stilley JAW(2), Kendrick E(2), Riel K(2).

ABSTRACT

In the incarcerated population, the largest ethnic and racial group is Black people. Heart disease is known as the leading causes of death in the United States which can lead to cardiac arrest. Layperson cardiopulmonary resuscitation (CPR) has been shown to provide a benefit and increase likelihood of return of spontaneous circulation (ROSC). Recent research shows that in witnessed out of hospital cardiac arrests, the likelihood of receiving bystander CPR was found to be less among Black or Hispanic people when compared to White persons. One neglected area for layperson CPR training are these correctional facilities. This population is known to have higher rates of diabetes, high blood pressure and coronary artery disease, all of which contribute to an increased risk of acute coronary syndrome.A search was performed of the NEMSIS database. When comparing witnessed cardiac arrest, incidents without bystander interventions occurred more frequently than expected if the arrest was witnessed by a family member or other lay person. These interventions included bystander CPR or AED placement with or without defibrillation.The data presented shows that there

is an unmet need of additional lay person CPR training in correctional facilities which could be implemented for little cost.

7. Eur Heart J Acute Cardiovasc Care. 2022 Dec 27:zuac164. doi: 10.1093/ehjacc/zuac164. Online ahead of print.
Corrigendum to: Management of comatose survivors of out-of-hospital cardiac arrest in Europe: current treatment practice and adherence to guidelines. A joint survey by the Association for Acute CardioVascular Care (ACVC) of the ESC, the European Resuscitation Council (ERC), the European Society for Emergency Medicine (EUSEM), and the European Society of Intensive Care Medicine (ESICM).
[No authors listed]
NO ABSTRACT AVAILABLE

8. Resuscitation. 2022 Dec 28:109683. doi: 10.1016/j.resuscitation.2022.109683. Online ahead of print.
The "four-fingers ruler" as a novel, simple and easy technique for hands placement during CPR training.
Nk N(1), Ic S(2), Mm C(2), Jl P(2), Bw B(3).
NO ABSTRACT AVAILABLE

9. Front Psychol. 2022 Dec 7;13:1020124. doi: 10.3389/fpsyg.2022.1020124. eCollection 2022.
Team leadership assessment after advanced life support courses comparing real teams vs. simulated teams.
Nabecker S(1)(2)(3)(4), Huwendiek S(5), Roten FM(2), Theiler L(6), Greif R(2)(3)(7).
ABSTRACT
AIM: Effective team leadership is essential during cardiopulmonary resuscitation (CPR) and is taught during international advanced life support (ALS) courses. This study compared the judgement of team leadership during summative assessments after those courses using different validated assessment tools while comparing two different summative assessment methods. METHODS: After ALS courses, twenty videos of simulated team assessments and 20 videos of real team assessments were evaluated and compared. Simulated team assessment used an instructor miming a whole team, whereas real team assessment used course participants as a team that acted on the team leader's commands. Three examiners individually evaluated each video on four different validated team leadership assessment tools and on the original European Resuscitation Council's (ERC) scenario test assessment form which does not assess leadership. The primary outcome was the average performance summary score between all three examiners for each assessment method. RESULTS: The average performance summary score for each of the four assessment tools was significantly higher for real team assessments compared to simulated team assessments (all p-values < 0.01). The summary score of the ERC's scenario test assessment form was comparable between both assessment methods ($p = 0.569$), meaning that participants of both assessments performed equally. CONCLUSION: Team leadership performance is rated significantly higher in real team summative assessments after ALS courses compared to simulated team assessments by four leadership assessment tools but not by the standard ERC's scenario test assessment form. These results suggest that summative assessments in ALS courses should integrate real team assessments, and a new assessment tool including an assessment of leadership skills needs to be developed.

10. Resuscitation. 2022 Dec 23:109675. doi: 10.1016/j.resuscitation.2022.109675. Online ahead of print.

Kids Save Lives: a blended learning approach to improve engagement of schoolchildren.
Semeraro F(1), Del Giudice D(2), Imbriaco G(2), Monesi A(3), Gordini G(3).
NO ABSTRACT AVAILABLE

POST-CARDIAC ARREST TREATMENTS

1. Eur Heart J Acute Cardiovasc Care. 2022 Dec 26:zuac159. doi: 10.1093/ehjacc/zuac159. Online ahead of print.
Global myocardial oedema in resuscitated out-of-hospital cardiac arrest patients assessed by cardiac magnetic resonance - a pilot study.
Klein A(1), Grand J(1), Meyer M(1), Wiberg S(1), Mogelvang R(1)(2), Vejlstrup N(1), Schousboe B(3), Gjedsted J(2)(4), Oestergaard M(4), Wanscher M(4), Kjaergaard J(1), Hassager C(1)(2).
ABSTRACT
BACKGROUND: Myocardial dysfunction is well described after out-of-hospital cardiac arrest (OHCA), however, the underlying mechanisms are not yet understood. We hypothesised that this dysfunction is associated to a global myocardial oedema. Using cardiac magnetic resonance (CMR), we assessed the presence of such oedema early after successful resuscitation from OHCA. METHODS: Comatose patients resuscitated from OHCA and admitted to the cardiac intensive care unit were consecutively included and underwent CMR in general anaesthesia within 36 hours after cardiac arrest with anaesthetic support. To assess global myocardial oedema, T1 and T2 segmented maps were generated from three representative short axis slices, and values from each segment were then used to determine a mean global T1 and T2 time for each patient. Healthy subjects were used as controls. RESULTS: CMR was obtained in 16 patients and compared to 9 controls. The OHCA patients were 60 ± 9 years old, and acute myocardial infarction was diagnosed in 6 cases. On admission, left ventricular ejection fraction assessed by transthoracic echocardiography was 35 ± 15%, and this improved significantly to 43 ± 14% during hospitalisation ($p < 0.05$). Mean global T1 and T2 time was significantly higher in OHCA patients compared to the control group (1071 ms vs. 999 ms, $p = 0.002$, and 52 ms vs. 46 ms, $p < 0.001$, respectively), and this difference remained significant when segments involved in the myocardial infarction were excluded. CONCLUSION: Assessed with CMR, we for the first time document an early global myocardial oedema in patients successfully resuscitated from OHCA.

2. Zhonghua Wei Zhong Bing Ji Jiu Yi Xue. 2022 Dec;34(12):1253-1257. doi: 10.3760/cma.j.cn121430-20220117-00068.
[Predictive value of sequential organ failure assessment on 28-day mortality in patients with post-cardiac arrest syndrome]. [Article in Chinese]
Lin L(1), Pan K, Wei X, Chen L.
ABSTRACT
OBJECTIVE: To evaluate the predictive value of sequential organ failure assessment (SOFA) for 28-day mortality in patients with post-cardiac arrest syndrome (PCAS). METHODS: Retrospective analysis of 125 patients with PCAS who were treated in Emergency Intensive Care Unit (EICU) of Wenzhou People's Hospital from July 2016 to July 2021. Clinical data were collected, including age, gender, underlying diseases, acute physiology and chronic health evaluation II (APACHE II), SOFA score on admission to EICU and 28-day mortality. Univariate and multivariate Logistic regression model was constructed to analyze the influencing factors of PCAS patients, which was used to examine the independent correlation between SOFA score and 28-day mortality. Receiver operator characteristic curve (ROC curve) was used to determine the best predictive value of SOFA score and 28-day mortality in PCAS patients. RESULTS: Among the 125 PCAS patients, there were 91 males and 34 females with an average age of (58.7±15.1) years old, and 97 died and 28 survived within 28 days. The overall SOFA score ranged from 7 to 15 points, with an average of 10.9 (10.0, 12.0) points. The

SOFA score of non-survival group was significantly higher than that of the survival group [points: 11.0 (10.0, 12.0) vs. 9.5 (9.0, 10.0), P < 0.05]. This difference between SOFA score mainly caused by the neurological and cardiovascular systems. After excluding neurological factors, the SOFA score of the non-survival group was still significantly higher than that of the survival group [points: 8.0 (6.0, 8.0) vs. 6.5 (6.0, 7.0), P < 0.05]. SOFA score was found to be an independent risk factor for 28-day mortality in PCAS patients by multifactorial Logistic regression analysis [odds ratio (OR) = 1.97, 95% confidence interval (95%CI) was 1.24-3.04]. The correlation between neurological score and mortality was the highest in subgroups (OR = 3.47, 95%CI was 1.04-11.52). The area under the ROC curve (AUC) predicted by SOFA score was 0.81 (95%CI was 0.73-0.89). When SOFA score cut-off value was 10.5 points (10 or 11 points), the sensitivity and specificity of SOFA score for predicting 28-day mortality in patients with PCAS were 67.0% and 82.1%, respectively. CONCLUSIONS: The SOFA score is quite accurate in predicting 28-day mortality in patients with PCAS.

TARGETED TEMPERATURE MANAGEMENT

No articles identified.

ELECTROPHYSIOLOGY AND DEFIBRILLATION

1. Resuscitation. 2022 Dec 19:S0300-9572(22)00745-6. doi: 10.1016/j.resuscitation.2022.12.010. Online ahead of print.

Annual improvement trends in resuscitation outcome of patients defibrillated by laypersons after out-of-hospital cardiac arrests and compression-only resuscitation of laypersons.

Yoshimoto H(1), Fukui K(1), Nishimoto Y(1), Kuboyama K(1), Oishi Y(1), Sekine K(1), Hiraide A(2).

ABSTRACT

AIM: We aimed to investigate the effect of compression-only cardiopulmonary resuscitation (CPR) with conventional CPR in patients who were defibrillated by laypersons. METHODS: This is a population-based, nationwide observational study. Adult and children who sustained a witnessed out-of-hospital cardiac arrest and defibrillated by laypersons between 2005 to 2019 were identified on the national database. The study used trend analyses, multivariate logistic regression and inverse probability weighting using propensity score to explore changes in one-month survival and survival with a good neurological outcome over time and the influence of compression-only CPR compared to conventional CPR. RESULTS: In total 11,402 patients defibrillated by laypersons were enrolled in this study. Percentages of compression-only resuscitation increased dramatically and beyond 50% from 2012 (P<0.001). The percentages of cases with favorable resuscitation outcomes also increased annually (P<0.001). By regression analysis, favorable outcomes were associated with recent years, male sex, younger age, and shorter resuscitation start time. In addition, adjusted odds ratio of compression-only CPR to conventional CPR was 1.23 with a 95% confident interval 1.13-1.34. By inverse probability weighting, compression-only CPR was superior to conventional CPR for the favorable outcomes (P<0.001). The adjusted outcomes in each year were better in compression-only resuscitation in most of years. Overall relative risk reduction and number needed to treat for compression-only resuscitation compared to conventional resuscitation were 7.6% and 22.1, respectively. CONCLUSIONS: In Japan, outcomes of out-of-hospital cardiac arrest patients who were defibrillated by laypersons were considerably better in compression-only resuscitation of laypersons every year.

2. Circ J. 2022 Dec 23;87(1):139-149. doi: 10.1253/circj.CJ-22-0322. Epub 2022 Aug 31.

Exploring the Risk Factors of Sudden Cardiac Death Using an Electrocardiography and Medical Ultrasonography for the General Population Without a History of Coronary Artery Disease or Left Ventricular Ejection Fraction <35% and Aged >35 Years - A Novel Point-Based Prediction Model Based on the Chin-Shan Community Cardiovascular Cohort.

Chen YY(1)(2), Chung FP(2)(3), Lin YJ(2)(3), Chien KL(1), Chang WT(4).

ABSTRACT

BACKGROUND: Most of the factors and prediction models of sudden cardiac death (SCD) have been developed without considering the Asia population. The purpose of this study is to construct a point-based prediction model for the general population in Asia. Methods and Results: Chin-Shan Community Cardiovascular Cohort (CCCC) is a community-based longitudinal cohort initiated between 1990 and 1991, enrolling participants aged ≥35 years and following them up until 2005. Participants with coronary artery disease (CAD) or a left ventricular ejection fraction (LVEF) of 35% were excluded from this study. The Framingham risk score function was used to derive a simple point-based prediction model. Based on bootstrapping, a novel model (CCCC-SCD-Score) was validated. A total of 2,105 participants were analyzed. The incidence rate of SCD was 0.406 per 1,000 person-years. The CCCC-SCD-Score score was calculated using age groups (maximal points=4), left ventricular hypertrophy, hypertension, left ventricular ejection fraction <40%, aortic flow rate >190 cm/s, and carotid plaque scores ≥5 (point=1 for each risk factor). The C-index of the CCCC-SCD-Score in predicting SCD risks was 0.888 (95% confidence interval: 0.807-0.969). CONCLUSIONS: For the general Asian population without a history of CAD or a LVEF <35% and who are aged >35 years, the novel model-based scoring system effectively identifies the risk for SCD using the clinical factors, electrocardiographic and echocardiographic data.

PEDIATRICS AND CHILDREN

1. Healthcare (Basel). 2022 Dec 5;10(12):2451. doi: 10.3390/healthcare10122451.

Impact of Two Resuscitation Sequences on Alveolar Ventilation during the First Minute of Simulated Pediatric Cardiac Arrest: Randomized Cross-Over Trial.

Suppan L(1), Jampen L(2), Siebert JN(3), Zünd S(4), Stuby L(5), Ozainne F(2).

ABSTRACT

The International Liaison Committee on Resuscitation regularly publishes a Consensus on Science with Treatment Recommendations, but guidelines can nevertheless differ when knowledge gaps persist. In case of pediatric cardiac arrest, the American Heart Association recommends following the adult resuscitation sequence, i.e., starting with chest compressions. Conversely, the European Resuscitation Council advocates the delivery of five initial rescue breaths before starting chest compressions. This was a superiority, randomized cross-over trial designed to determine the impact of these two resuscitation sequences on alveolar ventilation in a pediatric model of cardiac arrest. The primary outcome was alveolar ventilation during the first minute of resuscitation maneuvers according to the guidelines used. A total of 56 resuscitation sequences were recorded (four sequences per team of two participants). The ERC approach enabled higher alveolar ventilation volumes (370 mL [203-472] versus 276 mL [140-360], p < 0.001) at the cost of lower chest compression fractions (57% [54;64] vs. 66% [59;68], p < 0.001). Although statistically significant, the differences found in this simulation study may not be clinically relevant. Therefore, and because of the importance of overcoming barriers to resuscitation, advocating a pediatric-specific resuscitation algorithm may not be an appropriate strategy.

2. Crit Care Med. 2023 Jan 1;51(1):91-102. doi: 10.1097/CCM.0000000000005715. Epub 2022 Nov 9.

Diastolic Blood Pressure Threshold During Pediatric Cardiopulmonary Resuscitation and Survival Outcomes: A Multicenter Validation Study.

Berg RA(1), Morgan RW(1), Reeder RW(2), Ahmed T(3), Bell MJ(4), Bishop R(5), Bochkoris M(6), Burns C(7), Carcillo JA(6), Carpenter TC(5), Dean JM(2), Diddle JW(4), Federman M(8), Fernandez R(9), Fink EL(6), Franzon D(10), Frazier AH(11)(12), Friess SH(13), Graham K(1), Hall M(9), Hehir DA(1), Horvat CM(6), Huard LL(8), Maa T(9), Manga A(13), McQuillen PS(10), Meert KL(3), Mourani PM(5)(14), Nadkarni VM(1), Naim MY(1), Notterman D(15), Palmer CA(2), Pollack MM(4), Sapru A(8), Schneiter C(5), Sharron MP(4), Srivastava N(8), Tabbutt S(10), Tilford B(3), Viteri S(11)(12), Wessel D(4), Wolfe HA(1), Yates AR(9), Zuppa AF(1), Sutton RM(1).

ABSTRACT

OBJECTIVES: Arterial diastolic blood pressure (DBP) greater than 25 mm Hg in infants and greater than 30 mm Hg in children greater than 1 year old during cardiopulmonary resuscitation (CPR) was associated with survival to hospital discharge in one prospective study. We sought to validate these potential hemodynamic targets in a larger multicenter cohort. DESIGN: Prospective observational study. SETTING: Eighteen PICUs in the ICU-RESUScitation prospective trial from October 2016 to March 2020. PATIENTS: Children less than or equal to 18 years old with CPR greater than 30 seconds and invasive blood pressure (BP) monitoring during CPR. INTERVENTIONS: None. MEASUREMENTS AND MAIN RESULTS: Invasive BP waveform data and Utstein-style CPR data were collected, including prearrest patient characteristics, intra-arrest interventions, and outcomes. Primary outcome was survival to hospital discharge, and secondary outcomes were return of spontaneous circulation (ROSC) and survival to hospital discharge with favorable neurologic outcome. Multivariable Poisson regression models with robust error estimates evaluated the association of DBP greater than 25 mm Hg in infants and greater than 30 mm Hg in older children with these outcomes. Among 1,129 children with inhospital cardiac arrests, 413 had evaluable DBP data. Overall, 85.5% of the patients attained thresholds of mean DBP greater than or equal to 25 mm Hg in infants and greater than or equal to 30 mm Hg in older children. Initial return of circulation occurred in 91.5% and 25% by placement on extracorporeal membrane oxygenator. Survival to hospital discharge occurred in 58.6%, and survival with favorable neurologic outcome in 55.4% (i.e. 94.6% of survivors had favorable neurologic outcomes). Mean DBP greater than 25 mm Hg for infants and greater than 30 mm Hg for older children was significantly associated with survival to discharge (adjusted relative risk [aRR], 1.32; 1.01-1.74; p = 0.03) and ROSC (aRR, 1.49; 1.12-1.97; p = 0.002) but did not reach significance for survival to hospital discharge with favorable neurologic outcome (aRR, 1.30; 0.98-1.72; p = 0.051). CONCLUSIONS: These validation data demonstrate that achieving mean DBP during CPR greater than 25 mm Hg for infants and greater than 30 mm Hg for older children is associated with higher rates of survival to hospital discharge, providing potential targets for DBP during CPR.

3. Resuscitation. 2022 Dec 28:109684. doi: 10.1016/j.resuscitation.2022.109684. Online ahead of print.

Application of Adult Prehospital Resuscitation Rules to Pediatric Out of Hospital Cardiac Arrest.

Matsui S(1), Kitamura T(2), Kurosawa H(3), Kiyohara K(4), Tanaka R(5), Sobue T(2), Nitta M(6).

ABSTRACT

BACKGROUND: Prehospital termination of resuscitation (TOR) rules can be recommended for adults with out-of-hospital cardiac arrests (OHCAs). This study aimed to investigate whether adult basic life support (BLS) and advanced life support (ALS) TOR rules can predict neurologically unfavorable one-month outcome for pediatric OHCA patients. METHODS: From a nationwide population-based observational cohort study, we extracted data of consecutive pediatric OHCA patients (0-17 years old) from January 1, 2005, to December 31, 2011. The BLS TOR rule has three criteria, whereas the ALS TOR rule includes two additional criteria. We selected pediatric OHCA patients that met all

criteria for each TOR rule and calculated the specificity and positive predictive value (PPV) of each TOR rule for identifying pediatric OHCA patients who did not have neurologically favorable one-month outcome. RESULTS: Of the 12,740 pediatric OHCA patients eligible for the evaluation of the BLS TOR rule, 10,803 patients met the BLS TOR rule, with a specificity of 0.785 and a PPV of 0.987 for predicting a lack of neurologically favorable one-month survival. Of the 2,091 for the ALS TOR rule, 381 patients met the ALS TOR rule, with a specificity of 0.986 and a PPV of 0.997 for predicting neurologically unfavorable one-month outcome. CONCLUSIONS: The adult BLS and ALS TOR rules had a high PPV for predicting pediatric OHCA patients without a neurologically favorable survival at one month after onset.

4. Front Pediatr. 2022 Dec 7;10:1067971. doi: 10.3389/fped.2022.1067971. eCollection 2022.
Five vs. two initial rescue breaths during infant basic life support: A manikin study using bag-mask-ventilation.
Geerts A(1), Herbelet S(1), Borremans G(1), Coppens M(1), Christiaens-Leysen E(2), Van de Voorde P(1)(2)(3).
ABSTRACT
BACKGROUND AND OBJECTIVES: Children are more likely to suffer a hypoxic-ischaemic cause for cardiac arrest. Early ventilation may provide an advantage in outcome during paediatric cardiopulmonary resuscitation [CPR]. European Resuscitation Council guidelines recommend five initial rescue breaths [IRB] in infants, stemming from the hypothesis that rescuers might need 5 attempts in order to deliver 2 effective ventilations. This study aimed to verify this hypothesis. METHODS: Participants (n = 112, convenience sample) were medical students from the Faculty of Medicine and Health Sciences Ghent University, Belgium. Students were divided into duos and received a 15 min just-in-time training regarding the full CPR-cycle using BMV. Participants then performed five cycles of 2-person CPR. The IRB were given by 1-person BMV, as opposed to a 2-persons technique during the further CPR-cycle. Correct ventilations for the infant were defined as tidal volumes measured (Laerdal® Q-CPR) between 20 and 60 ml, with n = 94 participants included in the analysis. The primary outcome consisted of the difference in the % of medical student duos providing at least 2 effective IRB between 2 and 5 attempts. RESULTS: Off all duos, 55,3% provided correct volumes during their first 2 initial ventilations. An increase up to 72,4% was noticed when allowing 5 ventilations. The proportional difference between 2 and 5 IRB allowed was thus significant [17,0%, 95% confidence interval (5.4; 28.0)]. CONCLUSION: In this manikin study, 5 IRB attempts during infant CPR with BMV increased the success rate in delivering 2 effective ventilations. Besides, students received training emphasizing the need for 5 initial rescue breaths. This study provides evidence supporting European Resuscitation Council guidelines.

EXTRACORPOREAL LIFE SUPPORT

1. Resusc Plus. 2022 Dec 10;12:100339. doi: 10.1016/j.resplu.2022.100339. eCollection 2022 Dec.
In-hospital extracorporeal cardiopulmonary resuscitation for patients with an out-of-hospital cardiac arrest in a semi-rural setting: An observational study on the implementation of a helicopter emergency medical services pathway.
Ter Avest E(1)(2), Tunnicliff M(1)(3), Griggs J(1), Griffiths D(1), Cody D(4), Nelson M(1)(4), Hurst T(5)(6), Lyon RM(1)(7).
ABSTRACT
AIM: In this study, we aimed to investigate the efficacy of a helicopter emergency medical service (HEMS) facilitated pathway for in-hospital extracorporeal cardiopulmonary resuscitation (ECPR) for patients with an out of hospital cardiac arrest (OHCA) in a semi-rural setting. METHODS: We

retrospectively reviewed all patients with an OHCA attended by a UK HEMS service between 1 January 2018 and 20 September 2021, when a dedicated ECPR pathway was in effect to facilitate transport of eligible patients to the nearest ECLS centre. The primary endpoint was the number of patients meeting ECPR eligibility criteria at three pre-defined time points: at HEMS dispatch, during on-scene evaluation and upon arrival in hospital. RESULTS: During the study period, 162 patients attended met ECPR pathway dispatch criteria. After on-scene evaluation, 74 patients (45%) had a return of spontaneously circulation before arrival of HEMS, 60 (37%) did not meet eligibility criteria regarding initial rhythm or etiology of the OHCA, and 15 (9%) had deteriorated (mainly into asystole) and were no longer suitable candidates upon arrival of HEMS. Eleven patients were eligible for ECPR and transported to hospital in arrest, and a further two patients were transported for post-ROSC ECLS. Nine patients deteriorated during transport and were no longer suitable ECPR candidates upon arrival. ECLS was successfully initiated in two patients (one intra-arrest, and one post-ROSC). CONCLUSION: In-hospital ECPR is of limited value for patients with refractory OHCA in a semi-rural setting, even when a dedicated pathway is in place. Potentially eligible patients often cannot be transported within an appropriate timeframe and/or deteriorate before arrival in hospital.

2. Resuscitation. 2022 Dec 19:S0300-9572(22)00744-4. doi: 10.1016/j.resuscitation.2022.12.009. Online ahead of print.

Extracorporeal cardiopulmonary resuscitation (eCPR) and cerebral perfusion: A narrative review.

Justice CN(1), Halperin HR(2), Vanden Hoek TL(1), Geocadin RG(3).

ABSTRACT

Extracorporeal cardiopulmonary resuscitation (eCPR) is emerging as an effective, lifesaving resuscitation strategy for select patients with prolonged or refractory cardiac arrest. Currently, a paucity of evidence-based recommendations is available to guide clinical management of eCPR patients. Despite promising results from initial clinical trials, neurological injury remains a significant cause of morbidity and mortality. Neuropathology associated with utilization of an extracorporeal circuit may interact significantly with the consequences of a prolonged low-flow state that typically precedes eCPR. In this narrative review, we explore current gaps in knowledge about cerebral perfusion over the course of cardiac arrest and resuscitation with a focus on patients treated with eCPR. We found no studies which investigated regional cerebral blood flow or cerebral autoregulation in human cohorts specific to eCPR. Studies which assessed cerebral perfusion in clinical eCPR were small and limited to near-infrared spectroscopy. Furthermore, no studies prospectively or retrospectively evaluated the relationship between epinephrine and neurological outcomes in eCPR patients. In summary, the field currently lacks a comprehensive understanding of how regional cerebral perfusion and cerebral autoregulation are temporally modified by factors such as pre-eCPR low-flow duration, vasopressors, and circuit flow rate. Elucidating these critical relationships may inform future strategies aimed at improving neurological outcomes in patients treated with lifesaving eCPR.

EXPERIMENTAL RESEARCH

1. Children (Basel). 2022 Nov 28;9(12):1838. doi: 10.3390/children9121838.

Chest Compression Rates of 90/min versus 180/min during Neonatal Cardiopulmonary Resuscitation: A Randomized Controlled Animal Trial.

Bruckner M(1)(2)(3), Neset M(1)(2), Garcia-Hidalgo C(1)(2), Lee TF(1)(2), O'Reilly M(1)(2), Cheung PY(2), Schmölzer GM(1)(2).

ABSTRACT

BACKGROUND: To compare chest compression (CC) rates of 90/min with 180/min and their effect on the time to return of spontaneous circulation (ROSC), survival, hemodynamic, and respiratory parameters. We hypothesized that asphyxiated newborn piglets that received CC at 180/min vs.

90/min during cardiopulmonary resuscitation would have a shorter time to ROSC. METHODS: Newborn piglets (n = 7/group) were anesthetized, intubated, instrumented and exposed to 45 min normocapnic hypoxia followed by asphyxia and cardiac arrest. Piglets were randomly allocated to a CC rate of 180/min or 90/min. CC was performed using an automated chest compression machine using CC superimposed with sustained inflation. Hemodynamic and respiratory parameters and applied compression force were continuously measured. RESULTS: The mean (SD) time to ROSC was 91 (34) and 256 (97) s for CC rates of 180/min and 90/min, respectively (p = 0.08). The number of piglets that achieved ROSC was 7 (100%) and 5 (71%) with 180/min and 90/min CC rates, respectively (p = 0.46). Hemodynamic parameters (i.e., diastolic and mean blood pressure, carotid blood flow, stroke volume, end-diastolic volume, left ventricular contractile function) and respiratory parameters (i.e., minute ventilation, peak inflation and peak expiration flow) were all improved with a CC rate of 180/min. CONCLUSION: Time to ROSC and hemodynamic and respiratory parameters were not statistical significant different between CC rates of 90/min and 180/min. Higher CC rates during neonatal resuscitation warrant further investigation.

2. Eur J Pharmacol. 2023 Jan 5;938:175431. doi: 10.1016/j.ejphar.2022.175431. Epub 2022 Dec 1.
Ginsenoside-Rg1 mitigates cardiac arrest-induced cognitive damage by modulating neuroinflammation and hippocampal plasticity.
Wu Z(1), Huang J(1), Bai X(1), Wang Q(2), Wang F(3), Xu J(1), Tang H(4), Yin C(5), Wang Y(1), Yu F(6), Zhang H(7).
ABSTRACT
Ginsenoside-Rg1 can effectively ameliorate mental disorders, but whether ginsenoside-Rg1 plays a neuroprotective role in cardiac arrest and cardiopulmonary resuscitation (CA/CPR)-induced cognitive impairment remains unclear. In this study, a 5-min asphyxia-based CA/CPR rat model was established to explore the mechanisms underlying the effects of ginsenoside-Rg1 (40 mg·kg-1·d-1, ip, 14 days) on its cognitive alterations. These CA/CPR rats displayed spatial learning and memory impairment in the Morris water maze, as reflected in the compromised basal synaptic transmission and long-term potentiation (LTP) at the Schaffer collateral of hippocampal CA1 area in vivo electrophysiology, whereas the ginsenoside-Rg1 remarkably mitigated these alterations. Next, we found that ginsenoside-Rg1 inhibited hippocampal neuroinflammation by alleviating the CA/CPR-induced hippocampal activation of microglia and astrocytes and the overexpression of related proinflammatory cytokines interleukin-1β (IL-1β) and tumour necrosis factor-α (TNF-α). In addition, ginsenoside-Rg1 improved CA/CPR-induced hippocampal neuronal apoptosis, dendritic spines and synaptic ultrastructure defects as associated with the upregulation of the key synaptic regulatory proteins. Furthermore, ginsenoside-Rg1 could ameliorate CA/CPR-induced aberrant expression of the key regulators of hippocampal glutamate signaling pathways, excitatory amino acid transporter 2 (EAAT2), excitatory amino acid transporter 1 (EAAT1), Glutamine Synthetase (GS), GluN2B, and glutamate. In conclusion, ginsenoside-Rg1 exerts its neuroprotective effects by ameliorating hippocampus-dependent neuroglia activation-mediated neuroinflammation and neuroplasticity deficits, shedding new light on the therapeutic intervention of CA/CPR-related cognitive disorders.

3. BMC Cardiovasc Disord. 2022 Dec 29;22(1):573. doi: 10.1186/s12872-022-02996-w.
Establishment of a nonshockable rhythm cardiac arrest model caused by asphyxia.
Zhang C(#)(1)(2)(3), Zhan H(#)(1)(3), Zhou D(3)(4), Li T(5), Zhang Q(3)(4), Liu C(3)(4), Wei H(1)(3), Hu C(6)(7).
ABSTRACT
OBJECTIVE: Cardiac arrest (CA) is caused by a nonshockable rhythm with a low success rate of return of spontaneous circulation (ROSC) and a poor prognosis. This study intended to establish a

nonshockable rhythm CA model caused by asphyxia. MATERIALS AND METHODS: Healthy adult male Wistar rats were injected with vecuronium bromide to induce CA. After the CA duration reached the target time point, cardiopulmonary resuscitation was performed. The survival status and neurological and cardiac function were evaluated after ROSC. Brain histopathology, including hematoxylin staining, Nissl staining and Terminal dUTP nick-end labeling (TUNEL) staining, was performed to evaluate the surviving cells and apoptotic cells. Apoptosis-related proteins after ROSC for 72 h were analyzed by western blot. RESULTS: CA was successfully induced in all animals. The time for the three groups of animals to PEA was 320 ± 22 s in the CA-8 group, 322 ± 28 s in the CA-12 group and 320 ± 18 s in the CA-15 group. The time to asystole was 436 ± 54 s in the CA-8 group, 438 ± 62 s in the CA-12 group and 433 ± 56 s in the CA-15 group. The NDS of rats in the CA group was significantly decreased after ROSC for 24 h. The NDS in the CA-15 group was 5-16 points, while it was 58-67 points and 15-43 points in the CA-8 and CA-12 groups, respectively. The cardiac function of animals in the CA group was impaired after ROSC, and the ejection fraction, fractional shortening, stroke volume and cardiac output, were all significantly decreased. Brain histopathology showed that the number of surviving neurons was decreased, and the number of apoptotic cells was increased in CA group, the longer the CA duration, the more apoptotic cells increased. The expression of the proapoptotic protein Bax and the apoptotic executive protein caspase3 in the hippocampus of CA rats was significantly increased, while the expression of the antiapoptotic protein Bcl-2 was significantly reduced. CONCLUSIONS: The use of vecuronium can successfully induce CA caused by nonshockable rhythm in rats, which will help to further study the patho-physiological changes after CA by nonshockable rhythm.

4. Zhonghua Wei Zhong Bing Ji Jiu Yi Xue. 2022 Dec;34(12):1285-1290. doi: 10.3760/cma.j.cn121430-20210115-00068.

[Effect of electroacupuncture at Baihui ameliorated neurologic deficit and hemodynamic stability in rat model of post-cardiac arrest syndrome]. [Article in Chinese]

Zeng R(1), Zhong Y(1), Wu Y(1), Wang P(2), Lai C(1), Liu X(3), Duan Y(4), Li Z(5), Yu T(2), Ding B(1).

ABSTRACT

OBJECTIVE: To observe the results of electroacupuncture (EA) on the resuscitation of a rat model of asphyxia cardiac arrest (CA). And to explore its effect on the neurologic deficits and hemodynamic instability of post-cardiac arrest syndrome (PCAS). METHODS: A total of 107 male SD rats were randomly divided into sham, CA, and EA groups. Each group received arterial catheterization and tracheal intubation. The sham group was not induced asphyxia. Asphyxial cardiac arrest was established by endotracheal tube clamping. Rats in the CA group received basic respiratory support and fluid resuscitation in return of spontaneous circulation (ROSC) and rats in the EA group received EA at Baihui based on the treatment of CA group after ROSC, with a dense-dispersed wave at frequencies of 4-20 Hz, while the current intensity was adjusted minimum to induce a twitch of the scalp, the course of treatment was 30 minutes. The baseline data, hemodynamics after ROSC, neurological deficit score (NDS), pathological changes of brain tissue, and levels of serum biomarker were recorded and compared among the three groups. The 72-hour survival of rats was analyzed by Kaplan-Meier survival curve. Hematoxylin-eosin (HE) staining was used to observe the pathological changes of necrotic neurons in the hippocampal CA1 region of rat brain. Meanwhile, Nissl staining and TdT-mediated dUTP nick-end labeling (TUNEL) were used to detect cell apoptosis and injury. RESULTS: Compared with the CA group, the mean arterial pressure (MAP) in the EA group increased significantly at 15 minutes after ROSC [mmHg (1 mmHg ≈ 0.133 kPa): 125.00 (94.00, 136.25) vs. 92.00 (72.00, 122.50), $P < 0.05$]. There was no significant difference in the NDS score between the EA group and the sham group. Still, the NDS score of the rats in the CA group at 6 hours after ROSC were significantly lower than that in the sham group (46.00±10.61 vs. 80.00±0.00, $P < 0.05$). Kaplan-

Meier survival curve analysis showed that EA did not improve the 72-hour survival rate of rats (100% in the sham group, 25% in the CA group, and 30% in the EA group, P > 0.05). The analysis by TUNEL showed that the apoptosis rate of neurons in CA1 region of the hippocampus in EA group at 6 hours after ROSC was significantly lower than that in CA group [(62.84±2.67)% vs. (71.29±3.70)%, P < 0.05]. Compared with the CA group, the level of serum S100 calcium binding protein B (S100B) in the EA group at 6 hours after ROSC was significantly lower (ng/L: 19.30±13.87 vs. 132.28±31.67, P < 0.05), but there were no significant differences in the levels of tumor necrosis factor-α (TNF-α) and interleukin-6 (IL-6) between these two groups. CONCLUSIONS: In the present study, EA at Baihui can stabilize the hemodynamic, moreover, it has a particular neuroprotective effect on PCAS rats. Still, EA at Baihui does not reduce the systemic inflammatory response and improve the survival rate of rats, and its mechanism remains to be verified in further research.

5. Zhonghua Wei Zhong Bing Ji Jiu Yi Xue. 2022 Dec;34(12):1280-1284. doi: 10.3760/cma.j.cn121430-20220411-00355.

[Role of caspase-8 in stem cell transplantation alleviates rat cerebral cortex apoptosis after cardiopulmonary resuscitation]. [Article in Chinese]

Lu E(1)(2), Zhuo Q(1)(2), Chen F(1)(2), Lin Q(1)(2), Wang X(2)(3).

ABSTRACT

OBJECTIVE: To explore the effects and the possible mechanism of bone marrow mesenchymal stem cell (BMMSC) transplantation on apoptosis in rats cerebral cortex after cardiac arrest/ cardiopulmonary resuscitation (CA/CPR). METHODS: The BMMSC of 2 Sprague-Dawley (SD) rats aged 4-5weeks was extracted, and the 3rd passage was used in experimental study. Eighteen Sprague-Dawley (SD) rats were divided into sham group, model group (CA/CPR group) and intervention group (BMMSC group) according to random number table method, with 6 rats in each group. CPR was performed 6 minutes after asphyxia induced CA. In sham group, CA was not induced except performing general surgical procedure. At 1 hour after return of spontaneous circulation (ROSC), 0.5 mL phosphate buffered saline (PBS) was injected through tail vein in CA/CPR group. 2×109/L green fluorescence protein (GFP)-labeled BMMSC was injected through tail vein 1 hour after ROSC in BMMSC group. Neurological deficit score (NDS) were assessed in every group at 72 hours after CPR. Serum S100 calcium binding protein B (S100B) levels were assayed by enzyme linked immunosorbent assay (ELISA). Distribution of BMMSC in brain was observed under a fluorescent microscope. Apoptosis rate in cerebral cortex was assayed by TdT-mediated dUTP nick-end labeling (TUNEL). Western blotting was performed to measure the expression levels of active aspartic acid specific cysteine proteinase (caspase-8 and caspase-9) in cerebral cortex. RESULTS: At 3 days after CPR, compared with sham group, the apoptosis of cerebral cortex cells was increased and brain damage was obvious, NDS score was decreased significantly (56.6±5.5 vs. 80.0±0.0, P < 0.05), and serum S100B was increased markedly (ng/L: 45.1±4.7 vs. 19.1±1.4, P < 0.05), apoptosis rate of cerebral cortex cells increased significantly [(52.9±11.8)% vs. (10.1±1.5)%, P < 0.05], the level of active caspase-8 expression in cerebral cortex was significantly higher (caspase-8/GAPDH: 0.689±0.047 vs. 0.330±0.108, P < 0.05), and there was no significant difference in active caspase-9 protein expression (caspase-9/GAPDH: 0.428±0.014 vs. 0.426±0.021, P > 0.05) in CA/CPR group. After BMMSC transplantation, GFP-labeled BMMSC were primarily detected in cerebral cortex, compared with CA/CPR group, the apoptosis of cerebral cortex cells and brain injury were significantly improved in BMMSC group, NDS score increased significantly (70.6±2.1 vs. 56.6±5.5, P < 0.05), serum S100B levels in BMMSC group were lower (ng/L: 32.0±3.2 vs. 45.1±4.7, P < 0.05), apoptosis rate of cerebral cortex cells decreased significantly [(31.1±3.4)% vs. (52.9±11.8)%, P < 0.05], and the active caspase-8 expression in cerebral cortex in BMMSC group was significantly decreased (caspase-8/GAPDH: 0.427±0.067 vs. 0.689±0.047, P < 0.05). The active caspase-9

expression in cerebral cortex in BMMSC group and CA/CPR group were not significantly different (caspase-9/GAPDH: 0.431±0.022 vs. 0.428±0.014, P > 0.05). CONCLUSIONS: BMMSC transplantation can alleviate rat brain damage after CA/CPR possibly by inhibiting the death receptor mediated apoptotic pathway to inhibit the apoptosis of brain cells.

CASE REPORTS

1. Am J Emerg Med. 2023 Jan;63:182.e1-182.e3. doi: 10.1016/j.ajem.2022.10.012. Epub 2022 Oct 13.
Challenges of remotely witnessed emergencies - A case of international out-of-hospital cardiac arrest recognition via video call.
Beger SB(1), Mejia E(2), Bobrow BJ(3).
ABSTRACT
We present the first report, to our knowledge, of an Out-of-hospital cardiac arrest (OHCA) witnessed during a remote international video meeting. We report an emergency system activation and OHCA resuscitation initiated after an OHCA in a 41-year-old otherwise healthy female in Houston, Texas witnessed by a co-worker in Australia during a 1-on-1 Zoom video call. Remotely witnessed emergencies such as OHCA present unique challenges to successful cardiac resuscitation and will likely become significantly more common in the future as remote video calls increase.

2. BMJ Case Rep. 2022 Dec 23;15(12):e245834. doi: 10.1136/bcr-2021-245834.
Nicorandil and ranolazine overdose management.
Rashid A(1), Movio G(2), Lee GC(3).
ABSTRACT
A man in his 60s was admitted to the emergency department with chest pain following an intentional overdose of nicorandil and ranolazine. He was known to have an extensive cardiac history and had taken his prescribed medication with suicidal ideation. On presentation, he was hypotensive with a blood pressure of 70/50 mm Hg despite fluid resuscitation. He was commenced on vasopressor support and transferred to the intensive care unit. Despite an adequate blood pressure on vasopressors, he suffered a ventricular fibrillation cardiac arrest. Return of spontaneous circulation with a Glasgow Coma Score of 15 was achieved following cardiopulmonary resuscitation and three direct current shocks. Following subsequent continuous overnight significant vasopressor dependence, a dose of glucagon was given, and within 2 hours, his vasopressor requirement ceased, maintaining an unsupported normal blood pressure. He remained stable and was subsequently discharged to the coronary care unit for monitoring.

3. Cureus. 2022 Dec 21;14(12):e32768. doi: 10.7759/cureus.32768. eCollection 2022 Dec.
Acute Myocardial Infarction During the Last Part of a Triathlon: A Case Report.
Yamaguchi S(1)(2), Shimabukuro M(1).
ABSTRACT
Triathlon has a risk of sudden cardiac death (SCD) for athletes. Most SCDs during endurance sports in adult athletes are due to coronary artery disease but often lack signs during working out. Here, we report the acute myocardial infarction subsequent to the plaque rapture while running, the last part of a triathlon. A 44-year-old Asian athlete hardly worked out for the triathlon. An annual medical checkup did not reveal any abnormalities. He experienced ventricular fibrillation while running, the last part of a triathlon. The other athletes provided immediate cardiopulmonary resuscitation. Coronary artery angiography revealed acute myocardial infarction in the left anterior descending artery. Stenting was performed. He was discharged without any neurological complications on the 14th day of hospitalization. Athletes should be aware of the risk of SCD during endurance sports and

educate themselves to provide basic life support when they encounter other athlete suffering from sudden cardiac attacks.