This week's PubMed 26th November – 2nd December 2023: articles of interest n = 55

CPR AND COVID-19

1. J Am Coll Emerg Physicians Open. 2023 Nov 27;4(6):e13070. doi: 10.1002/emp2.13070. eCollection 2023 Dec.

Updated trends in the outcomes of out-of-hospital cardiac arrest from 2017-2021: Prior to and during the coronavirus disease (COVID-19) pandemic.

Fan CY(1), Sung CW(1)(2), Chen CY(3), Chen CH(1), Chen L(4), Chen YC(3), Chen JW(1), Chiang WC(2)(3)(5), Huang CH(2)(5), Huang EP(1)(2)(5).

ABSTRACT

OBJECTIVE: This study aims to describe out-of-hospital cardiac arrest (OHCA) characteristics and trends before and during the coronavirus disease-2019 (COVID-19) pandemic in Taiwan. METHODS: We conducted a retrospective cohort study using a 5-year interrupted time series analysis. Eligible adults with non-traumatic OHCAs from January 2017 to December 2021 in 3 hospitals (university medical center, urban second-tier hospital, and rural second-tier hospital) were retrospectively enrolled. Variables were extracted from the emergency medical service reports and medical records. The years 2020 and 2021 were defined as the COVID-19 pandemic period. Outcomes included survival to admission after a sustained return of spontaneous circulation, survival to hospital discharge, and good neurological outcomes (cerebral performance category score 1 or 2). RESULTS: We analyzed 2819 OHCA, including 1227 from a university medical center, 617 from an urban second-tier hospital, and 975 from a rural second-tier hospital. The mean age was 71 years old, and 60% of patients were males. During the COVID-19 pandemic period, video-assisted endotracheal tube intubation replaced the traditional direct laryngoscopy intubation. The trends of outcomes in the pre-pandemic and pandemic periods varied among different hospitals. Compared with the pre-pandemic period, the outcomes at the university medical center during the COVID-19 pandemic were significantly poorer in several respects. The survival rate on admission dropped from 44.6% to 39.4% (P = 0.037), and the survival rate to hospital discharge fell from 17.5% to 14.9% (P = 0.042). Additionally, there was a notable decrease in patients' good neurological outcomes, declining from 13.2% to 9.7% (P = 0.048). In contrast, the outcomes in urban and rural second-tier hospitals during the COVID-19 pandemic did not significantly differ from those in the pre-pandemic period. CONCLUSIONS: COVID-19 may alter some resuscitation management in OHCAs. There were no overall significant differences in outcomes before and during COVID-19 pandemic, but there were significant differences in outcomes when stratified by hospital types.

2. Am J Emerg Med. 2024 Jan;75:190-191. doi: 10.1016/j.ajem.2023.02.013. Epub 2023 Feb 13.

Improving survival and outcome in those suffering an out-of-hospital cardiac arrest in the post-COVID-19 era.

Rottenberg EM(1).

NO ABSTRACT AVAILABLE

3. Am J Emerg Med. 2023 Nov 21;76:75-81. doi: 10.1016/j.ajem.2023.11.025. Online ahead of print.

Chest compression quality comparing 1-min vs 2-min rotation of rescuers wearing N95 masks.

Mathew MJ(1), Kundra P(2), Vinayagam S(3).

ABSTRACT

BACKGROUND: During the COVID-19 pandemic, cardiopulmonary resuscitation (CPR) performed by rescuers wearing well-sealed respirators such as N95 masks, was associated with significant reduction in the chest compression rate and depth. This was attributed to fatigue during the

standard 2-min rescuer rotations. We hypothesized that in such situations, rotating rescuers every one minute, instead of the standard two minutes would improve CPR quality. AIM: To compare the quality of chest compressions when rescuers wearing N95 masks are rotated every one minute, instead of the standard practice of two-minute rotations. METHODS: A randomized, controlled, crossover trial was conducted, with the approval of the institutional Ethics Committee. Medical students who volunteered as rescuers were trained to perform high-quality chest compressions on a manikin, and then randomly allocated into pairs. Each pair was randomized to one of two trial groups viz. one-minute rotations crossed-over to two-minute rotations; and vice versa. Thus, each pair performed CPR with one-minute rotations, as well as two-minute rotations Each CPR session included chest compressions for a duration of 12 min. The outcome parameters included CPR quality, compression depth, compression rate, and chest compression fraction. Rescuer fatigue was measured before and after each study session using the modified Borg scale. RESULTS: Fifty-six participants completed the study. The overall CPR quality was statistically similar in the study arms (median 88% vs. 81%, p = 0.09). However, the minute-to-minute inter-arm comparison revealed significantly lower CPR quality in the 2-min rotation arm, at the end of minutes 4, 6, 8, 10 and 12 (respective p-values 0.03, 0.001, 0.008, 0.02, 0.002). A similar trend was observed in compression depth also. Rescuer fatigue score was significantly less with 1-min rotations compared to 2-min rotations ($p < 0.001$). Rescuer vital signs and cardiorespiratory parameters were not different with the two types of rotations. CONCLUSION: During CPR performed by rescuers wearing N95 masks, the quality of CPR appears to be superior with rescuers rotating at 1-min instead of 2-min intervals. More frequent rotation was also associated with less rescuer fatigue.

CPR/MECHANICAL CHEST COMPRESSION

No articles identified.

REGISTRIES, REVIEWS AND EDITORIALS

1. Crit Care. 2023 Dec 1;27(1):471. doi: 10.1186/s13054-023-04740-y.
Effects of lower versus higher oxygen targets on out-of-hospital cardiac arrest.
Zhao Y(1), Wang Q(2), Zang B(3
NO ABSTRACT AVAILABLE

2. Prehosp Emerg Care. 2023 Nov 28:1-31. doi: 10.1080/10903127.2023.2286621. Online ahead of print.
Outcomes with Tibial and Humeral Intraosseous Access Compared to Peripheral Intravenous Access in Out-of-Hospital Cardiac Arrest.
Benner C(1), Jui J(1), Neth MR(1), Sahni R(1), Thompson K(1), Smith J(1), Newgard C(1), Daya MR(1), Lupton JR(1).
ABSTRACT
BACKGROUND: The optimal initial vascular access strategy for out-of-hospital cardiac arrest (OHCA) remains unknown. Our objective was to evaluate the association between peripheral intravenous (PIV), tibial intraosseous (TIO), or humeral intraosseous (HIO) as first vascular attempt strategies and outcomes for patients suffering OHCA. METHOD: This was a secondary analysis of the Portland Cardiac Arrest Epidemiologic Registry, which included adult patients (≥18 years-old) with EMS-treated, non-traumatic OHCA from 2018-2021. The primary independent variable in our analysis was the initial vascular access strategy, defined as PIV, TIO, or HIO based on the first access attempt. The

primary outcome for this study was the return of spontaneous circulation (ROSC) at emergency department (ED) arrival (a palpable pulse on arrival to the hospital). Secondary outcomes included survival to: admission, discharge, and discharge with a favorable outcome (Cerebral Perfusion Category score of ≤2). We conducted multivariable logistic regressions, adjusting for confounding variables and for clustering using a mixed-effects approach, with prespecified subgroup analyses by initial rhythm. RESULTS: We included 2,993 patients with initial vascular access strategies of PIV (822 [27.5%]), TIO (1,171 [39.1%]), and HIO (1,000 [33.4%]). Multivariable analysis showed lower odds of ROSC at ED arrival (adjusted odds ratio [95% CI]) with TIO (0.79 [0.64-0.98]) or HIO (0.75 [0.60-0.93]) compared to a PIV-first strategy. These associations remained in stratified analyses for those with shockable initial rhythms (0.60 [0.41-0.88] and 0.53 [0.36-0.79]) but not in patients with asystole or pulseless electrical activity for TIO and HIO compared to PIV, respectively. There were no statistically significant differences in adjusted odds for survival to admission, discharge, or discharge with a favorable outcome for TIO or HIO compared to the PIV-first group in the overall analysis. Patients with shockable initial rhythms had lower adjusted odds of survival to discharge (0.63 [0.41-0.96] and 0.64 [0.41-0.99]) and to discharge with a favorable outcome (0.60 [0.39-0.93] and 0.64 [0.40-1.00]) for TIO and HIO compared to PIV, respectively. CONCLUSIONS: TIO or HIO as first access strategies in OHCA were associated with lower odds of ROSC at ED arrival compared to PIV.

3. Resuscitation. 2023 Nov 25:110060. doi: 10.1016/j.resuscitation.2023.110060. Online ahead of print.

Gender-related differences in adults concerning frequency, survival and treatment quality after out-of-hospital cardiac arrest (OHCA): an observational cohort study from the German Resuscitation Registry.

Böckler B(1), Preisner A(2), Bathe J(3), Rauch S(4), Ristau P(3), Wnent J(5), Gräsner JT(5), Seewald S(5), Lefering R(6), Fischer M(7).

ABSTRACT

BACKGROUND: In Germany approximately 20,500 women and 41,000 men were resuscitated after out-of-hospital cardiac arrest (OHCA) each year. We are currently experiencing a discussion about the possible undersupply of women in healthcare. The aim of the present study was to examine the prevalence of OHCA in Germany, as well as the outcome and quality of resuscitation care for both women and men. METHODS: We present a cohort study from the German Resuscitation Registry (2006 to 2022). The quality of care was assessed for both EMS and hospital care based on risk-adjusted survival rates with the endpoints: "hospital admission with return of spontaneous circulation" (ROSCadmission) for all patients and "discharge with favourable neurological recovery" (CPC1/2discharge) for all admitted patients. Risk adjustment was performed using logistic regression analysis (LRA). If sex was significantly associated with survival, a matched-pairs-analysis (MPA) followed to explore the frequency of guideline adherence. RESULTS: 58,798 patients aged ≥18 years with OHCA and resuscitation were included (men=65.2%, women=34.8%). In the prehospital phase the male gender was associated with lower ROSCadmission-rate (LRA: OR=0,79, CI=0.759-0.822). A total of 27,910 patients were admitted. During hospital care, men demonstrated a better prognosis (OR=1.10; CI=1.015-1.191). MPA revealed a more intensive therapy for men both during EMS and hospital care. Looking at the complete chain of survival, LRA revealed no difference for men and women concerning CPC1/2discharge (n=58,798; OR=0.95; CI=0.888-1.024). CONCLUSION: In Germany, 80% more men than women experience OHCA. The prognosis for CPC1/2discharge remains low (men=10.5%, women=7.1%), but comparable after risk adjustment. There is evidence of undersupply of care for women during hospital treatment, which could be associated with a worse prognosis. Further investigations are required to clarify these findings.

4. No Shinkei Geka. 2023 Nov;51(6):969-984. doi: 10.11477/mf.1436204844.
[Emergency Resuscitation Techniques: Airway, Breathing, and Circulation].
[Article in Japanese]
Onuki T(1).
ABSTRACT
Cardiac arrest causes cerebral anoxia, resulting in loss of consciousness within seconds and irreversible brain damage within 3-5 min. Emergency resuscitation is generally performed on patients in cardiopulmonary or near-cardiopulmonary arrest, i.e., life-threatening conditions, and requires rapid stabilization of the airway, breathing, and circulation (or "ABC") to maintain cerebral perfusion. Generally, the ABC approach represents the order of medical treatment for critically ill patients. It provides supportive care(resuscitation)after ensuring the flow of oxygen supply necessary to sustain life. The most important goal in emergency resuscitation is to ensure a secure airway, without which, resuscitation is hopeless. Clinicians should be prepared daily to avoid missing any opportunity to ensure a secure airway. Even in cardiac arrest, high-quality cardiopulmonary resuscitation is necessary to reduce the duration of cerebral anoxia. An algorithm for this high-quality cardiopulmonary resuscitation is described in this article.

5. Am J Emerg Med. 2023 Nov 24:S0735-6757(23)00634-4. doi: 10.1016/j.ajem.2023.11.021. Online ahead of print.
Letter to the Editor regarding: "The fallen athlete: Fellow athletes are not performing cardiopulmonary resuscitation when a teammate suffers sudden cardiac arrest".
Balthazaar SJT(1), Duguid R(2), Nightingale TE(3), Clift P(2).
NO ABSTRACT AVAILABLE

6. Resuscitation. 2023 Nov 22;194:110052. doi: 10.1016/j.resuscitation.2023.110052. Online ahead of print.
Corrigendum to "Temperature control after adult cardiac arrest: An updated systematic review and meta-analysis" [Resuscitation 191 (2023)109928].
Granfeldt A(1), Holmberg MJ(2), Nolan JP(3), Soar J(4), Andersen LW(5); International Liaison Committee on Resuscitation ILCOR Advanced Life Support Task Force.
NO ABSTRACT AVAILABLE

7. Medicina (Kaunas). 2023 Nov 10;59(11):1981. doi: 10.3390/medicina59111981.
Common Complications and Cardiopulmonary Resuscitation in Patients with Left Ventricular Assist Devices: A Narrative Review.
Zaloznik Djordjevic J(1), Özkan T(2), Göncz E(2), Ksela J(3), Möckel M(2), Strnad M(1).
ABSTRACT
Heart failure remains a major global burden regarding patients' morbidity and mortality and health system organization, logistics, and costs. Despite continual advances in pharmacological and resynchronization device therapy, it is currently well accepted that heart transplantation and mechanical circulatory support represent a cornerstone in the management of advanced forms of this disease, with the latter becoming an increasingly accepted treatment modality due to the ongoing shortage of available donor hearts in an ever-increasing pool of patients. Mechanical circulatory support strategies have seen tremendous advances in recent years, especially in terms of pump technology improvements, indication for use, surgical techniques for device implantation, exchange and explantation, and postoperative patient management, but not in the field of treatment of critically ill patients and those undergoing cardiac arrest. This contemporary review aims to summarize the collected knowledge of this topic with an emphasis on complications in

patients with left ventricular assist devices, their treatment, and establishing a clear-cut algorithm and the latest recommendations regarding out-of-hospital or emergency department management of cardiac arrest in this patient population.

8. Lancet Public Health. 2023 Dec;8(12):e908-e909. doi: 10.1016/S2468-2667(23)00208-6. Epub 2023 Sep 16.
Establishing an out-of-hospital cardiac arrest registry in China: a key first step to improving outcomes.
Mellett-Smith A(1), Couper K(2).
NO ABSTRACT AVAILABLE

IN-HOSPITAL CARDIAC ARREST

1. Front Cardiovasc Med. 2023 Nov 6;10:1247340. doi: 10.3389/fcvm.2023.1247340. eCollection 2023.
Clinical features and outcomes of in-hospital cardiac arrest in code blue events: a retrospective observational study.
Akatsuka M(1), Tatsumi H(1), Masuda Y(1).
ABSTRACT
BACKGROUND: In-hospital cardiac arrest (IHCA) is a critical medical event with outcomes less researched compared to out-of-hospital cardiac arrest. This retrospective observational study aimed to investigate key aspects of IHCA epidemiology and prognosis in patients with Code Blue activation. METHODS: This retrospective observational study enrolled patients with Code Blue events in our hospital between January 2010 and October 2019. Participant characteristics, including age and sex, and IHCA characteristics, including the time of cardiac arrest, witnessed event, bystander cardiopulmonary resuscitation (CPR), initial shockable rhythm, vital signs at 1 and 6 h before IHCA, survival to hospital discharge (SHD), and the cardiac arrest survival postresuscitation in-hospital (CASPRI) score were included in univariate and multivariate logistic regression analyses with SHD as the primary endpoint. RESULTS: From the 293 Code Blue events that were activated during the study period, 81 participants were enrolled. Overall, the SHD rate was 28.4%, the median CPR duration was 14 (interquartile range, 6-28) min, and the rate of initial shockable rhythm was 19.8%. There were significant intergroup differences between the SHD and non-SHD groups in the CPR duration, shockable rhythm, and CASPRI score on univariate logistic regression analysis. Multivariate logistic regression analysis showed that the CASPRI score was the most accurate predictive factor for SHD (OR = 0.98, p = 0.006). CONCLUSIONS: The CASPRI score is associated with SHD in patients with IHCA during Code Blue events. Therefore, the CASPRI score of IHCA patients potentially constitutes a simple, useful adjunctive tool for the management of post-cardiac arrest syndrome.

INJURIES AND CPR

No articles identified.

CAUSE OF THE ARREST

1. Minerva Med. 2023 Nov 30. doi: 10.23736/S0026-4806.23.08979-6. Online ahead of print.
Does PM 2.5 and PM 10-associated heavy metals affect short-term and long-term survival after out-of-hospital cardiac arrest? Four-year study based on regional registry.

Kaziród-Wolski K(1)(2), Sielski J(3)(4), Jóźwiak M(5), Wolska M(6), Bernardi M(7), Spadafora L(7), Biondi-Zoccai G(8)(9), Siudak Z(3), Versaci F(8)(10).

ABSTRACT

BACKGROUND: This study aims to investigate the effect of arsenic (As), cadmium (Cd), nickel (Ni) and lead (Pb) suspended on particulate matters (PM) 2.5 and PM 10 taking into account clinical factors on 30-day and one-year survival after out-of-hospital cardiac arrest (OHCA). METHODS: A retrospective 4-year study that involved patients hospitalized after OHCA. Patients' data were obtained from Emergency Medical Services dispatch cards and the National Health Fund. The concentration of air pollutants was measured by the Environmental Protection Inspectorate in Poland. RESULTS: Among the 948 patients after OHCA, only 225 (23.7%) survived for 30 days, and 153 (16.1%) survived for 1 year. Survivors were more commonly affected by OHCA in urban areas (85 [55.6%] vs. 355 [44.7%]; P=0.013) and had slightly higher one-year mean concentration of As (0.78 vs. 0.77; P=0.01), Cd (0.34 vs. 0.34; P=0.012), and Pb (11.13 vs. 10.20; P=0.015) with no differences in daily mean concentration. Significant differences in mean concentrations of heavy metals and PM 2.5 and PM 10 were observed among different quarters. However, survival analysis revealed no differences in long-term survival between quarters. Heavy metals, PM 2.5, and PM 10 did not affect short-term and long-term survival in multivariable logistic regression. CONCLUSIONS: The group of survivors showed slightly higher mean one-year concentrations of As, Cd and Pb, but they also experienced a higher incidence of OHCA in urban areas. There were no differences in long-term survival between patients who suffer OHCA in different quarters. Heavy metals did not independently affect survival.

2. Cardiol Rev. 2023 Nov 30. doi: 10.1097/CRD.0000000000000633. Online ahead of print.

Impact of Body Mass Index on Cardiac Arrest Outcomes: A Systematic Review and Meta-Analysis.

Xie W(1), Zhou J, Zhou H.

ABSTRACT

The influence of an individual's body mass index (BMI) on cardiac arrest outcomes remains uncertain. The aim of this study is to evaluate the impact of BMI categories (underweight, normal BMI, overweight, and obese) on mortality and neurological outcomes in patients experiencing cardiac arrest. We comprehensively searched standard electronic databases (PubMed, EMBASE, and Scopus) for relevant observational studies published in peer-reviewed journals written in English. We calculated pooled effect estimates using random-effects models and reported them as odds ratios (ORs) with 95% confidence intervals (CIs). We included 20 studies in our meta-analysis. Individuals with normal BMIs and those who were underweight had similar risks of in-hospital mortality (OR, 1.20; 95% CI, 0.90-1.60), mortality within 6 months of discharge (OR, 0.92; 95% CI, 0.59-1.42), mortality after the 1-year follow-up (OR, 2.42; 95% CI, 0.96-6.08), and odds of favorable neurological outcomes at hospital discharge (OR, 0.86; 95% CI, 0.53-1.39) and at the 6-month follow-up (OR, 0.73; 95% CI, 0.47-1.13). The risks of in-hospital mortality and mortality within 6 months of discharge in overweight and obese individuals were similar to those in individuals with normal BMIs. However, overweight (OR, 0.57; 95% CI, 0.35-0.92) and obese individuals (OR, 0.67; 95% CI, 0.51-0.89) had lower risks of mortality after their 1-year follow-ups. For overweight and obese subjects, the reduced risk of mortality after the 1 year of follow-up was noted only for those with in-hospital cardiac arrest and not for those with out-of-hospital cardiac arrest. The odds of favorable neurological outcomes in both overweight and obese individuals were similar to those with normal BMIs. BMI does not significantly impact short-term mortality or neurological outcomes. Overweight and obese individuals appear to have a lower risk of long-term mortality, but this differed by the place of arrest and needs to be confirmed by others.

3. Shock. 2023 Nov 22. doi: 10.1097/SHK.0000000000002272. Online ahead of print.

Differences in management and prognostication of Cardiogenic Shock patients in the presence and absence of Out-of-hospital Cardiac arrest.

Mieritz HB(1), Povlsen AL(1), Linde L(2), Beske RP(3), Helgestad OKL(2), Josiassen J(3), Hassager C(3), Schmidt H(1), Jensen LO, Holmvang L(3), Møller JE, Ravn HB.

ABSTRACT

BACKGROUND: The clinical spectrum of acute myocardial infarction complicated by cardiogenic shock (AMICS) varies. Out-of-hospital cardiac arrest (OHCA) can be the first sign of cardiac failure, whereas others present with various degrees of hemodynamic instability (non-OHCA). Aim of the present study was to explore differences in pre-hospital management and characteristics of survivors and non-survivors in AMICS patients with OHCA or non-OHCA. METHODS: Data analysis was based on patient data from the RETROSHOCK cohort comprising consecutive AMICS patients admitted to two tertiary cardiac centers between 2010-2017. RESULTS: 1,716 AMICS patients were included and 42% presented with OHCA. Mortality in OHCA patients was 47% versus 57% in the non-OHCA group. Almost all OHCA patients were intubated prior to admission (96%). In the non-OHCA group prehospital intubation (25%) was associated with a better survival ($p < 0.001$). Lactate level on admission demonstrated a linear relationship with mortality in OHCA patients. In non-OHCA probability of death was higher for any given lactate level < 12 mmol/L compared with OHCA. However, a lactate level > 7 mmol/L in non-OHCA did not increase mortality odds any further. CONCLUSION: Mortality was almost doubled for any admission lactate level up to 7 mmol/L in non-OHCA patients. Above this level, mortality remained unchanged in non-OHCA patients, but continued to increase in OHCA patients. Prehospital intubation was performed in almost all OHCA patients, but only in one of four patients without OHCA. Early intubation in non-OHCA patients was associated with a better outcome.

4. Heart Lung Circ. 2023 Nov 29:S1443-9506(23)04398-6. doi: 10.1016/j.hlc.2023.10.009. Online ahead of print.

Prevalence of Multiple Causes of Death Within Young and Middle-Aged People Experiencing Sudden Cardiac Arrest.

Paratz ED(1), Spanos C(2), Rowe S(3), Fahy L(3), Nehme Z(4), Stub D(5), Zentner D(6), James P(7), Pflaumer A(8), Connell V(9), Semsarian C(10), Ingles J(11), La Gerche A(12).

ABSTRACT

BACKGROUND: Multiple causes of death are increasingly reported, particularly in older populations. Rates of multiple causes of young sudden death have not been quantified. METHOD: The End Unexplained Cardiac Death (EndUCD) registry was utilised to identify cases of young sudden death (aged 1-50 years) referred for forensic assessment from April 2019 to April 2022. Causes of death were coded according to whether one or more underlying causes of death were identified. Patients were compared according to the number of causes of death, with significant predictors assessed using logistic regression analysis. RESULTS: 1,085 cases of sudden death were identified. 263 (24.2%) cases had more than one competing cause of their sudden death. The most common multi-causal associations identified were dual non-cardiac causes of the sudden death (n=68), cardiomyopathy with non-cardiac event (n=64) and coronary artery disease with non-cardiac cause (n=63). Multi-causal death was more common in those undergoing comprehensive autopsy examination (95.8% vs 77.6%, $p<0.0001$), and in the setting of higher body mass index (median 31.3 kg/m2 vs 29.9 kg/m2, $p=0.01$), older age (44.3 years vs 41.4 years, $p<0.0001$), non-ventricular cardiac arrest rhythm (93.2% vs 87.3%, $p=0.009$), and smoking (22.8% vs 14.2%, $p=0.001$). The strongest predictor of multiple pathologies was comprehensive autopsy examination compared with external inspection, full-body post-mortem computed tomography and review of ancillary documentation and investigations (odds

ratio 6.49, 95% confidence interval 3.47-12.14). CONCLUSIONS: One-quarter of young sudden deaths have more than one underlying cause, highlighting the value of comprehensive investigations including autopsy. Awareness of the complexity of young sudden death is important, along with multidisciplinary involvement to ensure all contributors to death are identified.

5. Europace. 2023 Nov 28:euad353. doi: 10.1093/europace/euad353. Online ahead of print.
Association Between Accelerometer-derived Physical Activity and Incident Cardiac Arrest.
Qiu S(1)(2), Xing Z(1)(2).
ABSTRACT
BACKGROUND: Studies on objectively measured physical activity (PA) have investigated acute cardiovascular outcomes but not cardiac arrest (CA). Our study aimed to investigate the dose-response relationship between accelerometer-measured PA and CA by intensity of PA. METHODS: This prospective cohort study included 98,893 UK Biobank participants whose PA data were measured using wrist-worn accelerometers. Total PA volume was measured using the average overall acceleration. Minutes per week of light PA (LPA), moderate PA (MPA), and vigorous PA (VPA) were recorded. The incident CA was identified using diagnostic codes linked to hospital encounters and death records. Cox proportional hazard models with restricted cubic splines were used to study the associations, including sex differences. RESULTS: During the follow-up period (median: 7.31 years; interquartile range: 6.78-7.82 years), 282 incident CAs (0.39 per 1,000 person-years) occurred. Total PA was inversely related to CA risk. The CA risk decreased sharply until the time spent in MPA or VPA reached approximately 360 min or 20 min per week, respectively, after which it was relatively flat. LPA was not associated with CA risk. Subgroup analyses showed a more pronounced association between PA and a reduced risk of CA in women compared to men. CONCLUSIONS: Accelerometer-measured PA, particularly MPA and VPA, was associated with a lower CA risk. Furthermore, a stronger association was observed in women than men.

END-TIDAL CO_2

No articles identified.

ORGAN DONATION

No articles identified.

FEEDBACK

No articles identified.

DRUGS

1. J Intensive Care Med. 2023 Nov 30:8850666231214754. doi: 10.1177/08850666231214754. Online ahead of print.
Thrombolytics in Cardiac Arrest from Pulmonary Embolism: A Systematic Review and Meta Analysis.
Feltes J(1), Popova M(1), Hussein Y(1), Pierce A(1), Yamane D(1)(2).
ABSTRACT

BACKGROUND: During cardiopulmonary resuscitation, intravenous thrombolytics are commonly used for patients whose underlying etiology of cardiac arrest is presumed to be related to pulmonary embolism (PE). METHODS: We performed a systematic review and meta-analysis of the existing literature that focused on the use of thrombolytics for cardiac arrest due to presumed or confirmed PE. Outcomes of interest were return of spontaneous circulation (ROSC), survival to hospital discharge, neurologically-intact survival, and bleeding complications. RESULTS: Thirteen studies with a total of 803 patients were included in this review. Most studies included were single-armed and retrospective. Thrombolytic agent and dose were heterogeneous between studies. Among those with control groups, intravenous thrombolysis was associated with higher rates of ROSC (OR 2.55, 95% CI = 1.50-4.34), but without a significant difference in survival to hospital discharge (OR 1.41, 95% CI = 0.79-2.41) or bleeding complications (OR 2.21, 0.95-5.17). CONCLUSIONS: Use of intravenous thrombolytics in cardiac arrest due to confirmed or presumed PE is associated with increased ROSC but not survival to hospital discharge or change in bleeding complications. Larger randomized studies are needed. Currently, we recommend continuing to follow existing consensus guidelines which support use of thrombolytics for this indication.

2. Sci Rep. 2023 Nov 27;13(1):20796. doi: 10.1038/s41598-023-48350-8.
Association of intraosseous and intravenous access with patient outcome in out-of-hospital cardiac arrest.
Nilsson FN(1), Bie-Bogh S(2), Milling L(1)(3), Hansen PM(1)(4), Pedersen H(1), Christensen EF(5)(6), Knudsen JS(4)(7), Christensen HC(8)(9)(10), Folke F(11)(12), Høen-Beck D(13), Væggemose U(14)(15), Brøchner AC(1)(7), Mikkelsen S(16)(17)(18).
ABSTRACT
Here we report the results of a study on the association between drug delivery via intravenous route or intraosseous route in out-of-hospital cardiac arrest. Intraosseous drug delivery is considered an alternative option in resuscitation if intravenous access is difficult or impossible. Intraosseous uptake of drugs may, however, be compromised. We have performed a retrospective cohort study of all Danish patients with out-of-hospital cardiac arrest in the years 2016-2020 to investigate whether mortality is associated with the route of drug delivery. Outcome was 30-day mortality, death at the scene, no prehospital return of spontaneous circulation, and 7- and 90-days mortality. 17,250 patients had out-of-hospital cardiac arrest. 6243 patients received no treatment and were excluded. 1908 patients had sustained return of spontaneous circulation before access to the vascular bed was obtained. 2061 patients were unidentified, and 286 cases were erroneously registered. Thus, this report consist of results from 6752 patients. Drug delivery by intraosseous route is associated with increased OR of: No spontaneous circulation at any time (OR 1.51), Death at 7 days (OR 1.94), 30 days (2.02), and 90 days (OR 2.29). Intraosseous drug delivery in out-of-hospital cardiac arrest is associated with overall poorer outcomes than intravenous drug delivery.

3. Am J Emerg Med. 2024 Jan;75:111-118. doi: 10.1016/j.ajem.2023.10.031. Epub 2023 Oct 30.
Efficacy and safety of corticosteroid therapy in patients with cardiac arrest: A meta-analysis of randomized controlled trials.
Zhou FW(1), Liu C(2), Li DZ(3), Zhang Y(4), Zhou FC(5).
ABSTRACT
BACKGROUND: The clinical benefits of steroid therapy during cardiac arrest (CA) are unclear. Several recent clinical trials have shown that administering corticosteroid therapy during CA may improve patient outcomes. The purpose of the present study was to determine whether providing corticosteroids improves outcomes for patients following CA. METHODS: We searched the PubMed, Embase, Cochrane Library, Web of Science and CNKI databases for randomized controlled trials

comparing corticosteroid therapy to placebo during CA. RESULTS: Eleven relevant studies involving a total of 2273 patients were included in the meta-analysis. The statistical analysis showed that corticosteroid treatment during CA was significantly associated with an increased rate of sustained return of spontaneous circulation (ROSC) (OR: 2.05, 95% CI: 1.24 to 3.37, P < 0.01). Corticosteroid treatment during CA did not show a significant benefit in favorable neurological outcomes (OR: 1.13, 95% CI: 0.81 to 1.58, P = 0.49) or overall survival rate at hospital discharge (OR: 1.29, 95% CI: 0.74 to 2.26, P = 0.38). However, in the subgroup analysis, we found that patients had a significantly increased survival rate and ROSC if the dose of corticosteroid therapy above 100 mg methylprednisolone. The statistical analysis revealed no significant differences in adverse events. CONCLUSION: High-dose corticosteroid treatment (above 100 mg methylprednisolone) is associated with better overall survival rate at hospital discharge and ROSC outcomes. However, there is uncertainty regarding whether this treatment results in a benefit or harm to the favorable neurological outcomes at hospital discharge.

TRAUMA

1. Prehosp Emerg Care. 2023 Nov 28:1-14. doi: 10.1080/10903127.2023.2285390. Online ahead of print.

The impact of out-of-hospital time and prehospital intubation on return of spontaneous circulation following resuscitative thoracotomy in traumatic cardiac arrest.

Radulovic N(1), Hillier M(1)(2), Nisenbaum R(3)(4), Turner L(5), Nolan B(1)(3)(6).

ABSTRACT

Introduction: Resuscitative thoracotomy (RT) is a critical procedure performed in certain trauma patients in extremis, with extremely low survival rates. Currently, there is a paucity of data pertaining to prehospital variables and their predictive role in survival outcomes in traumatic cardiac arrest (TCA) patients requiring RT. The aim of the study was to determine the impact of prehospital intubation and out-of-hospital time (OOHT) on return of spontaneous circulation (ROSC) and survival in TCA requiring RT. Methods: This was a retrospective cohort study of trauma patients presenting to two level-1 trauma centers, St. Michael's Hospital and Sunnybrook Health Sciences Center, in Toronto, Canada (January 1, 2005-December 31, 2020). Our exposures of interest were any prehospital intubation attempt and OOHT. Primary and secondary outcome measures were ROSC post-RT and survival to hospital discharge, respectively, and data analysis was performed using univariate logistic regression.Results: A total of 195 patients were included, of which 86% were male, and the mean age was 33 years. ROSC and survival to hospital discharge were achieved in 30% and 5% of patients, respectively. Of those who survived to discharge, 89% sustained penetrating trauma. There was no association between OOHT and ROSC (OR = 1.00, 95% CI 0.97-1.03) or survival (OR = 0.99, 95% CI 0.94-1.05). The odds of ROSC were lower in penetrating trauma in the presence of any prehospital intubation attempt (OR = 0.39, 95% CI 0.19-0.82, p = 0.01). ROSC was less likely among all patients with no prehospital signs of life (SOL) compared to those who had prehospital SOL (OR = 0.30, 95% CI 0.13-0.69, p < 0.01). Conclusions: There was a significant association between prehospital intubation and lower likelihoods of ROSC in the penetrating TCA population requiring RT, as well as with the absence of prehospital SOL in all patients. OOHT did not appear to significantly impact ROSC or survival.

VENTILATION

No articles identified.

CERERBRAL MONITORING

No articles identified.

ULTRASOUND AND CPR

1. Intensive Care Med. 2023 Nov 6. doi: 10.1007/s00134-023-07249-8. Online ahead of print.
How I use ultrasound in cardiac arrest.
Wong A(1), Vignon P(2), Robba C(3)(4).
NO ABSTRACT AVAILABLE

ORGANISATION AND TRAINING

1. Resusc Plus. 2023 Nov 16;16:100495. doi: 10.1016/j.resplu.2023.100495. eCollection 2023 Dec.
Out-of-hospital cardiac arrest in residential aged care facilities is independently associated with lower survival in Perth, Australia.
Talikowska M(1), Ball S(1)(2), Majewski D(1), Belcher J(1)(2), Brits R(2), Gallant S(1), Finn L(1), Finn J(1)(2)(3)(4).
ABSTRACT
AIM: To compare out-of-hospital cardiac arrest (OHCA) characteristics and outcomes between people aged ≥ 65 years who arrested in a residential aged care facility (RACF) versus a private residence in Perth, Australia. METHODS: We undertook a retrospective cohort study of OHCA cases attended by emergency medical services (EMS) in Perth, January 2018-December 2021. OHCA patient and event characteristics and survival outcomes were compared via univariate analysis. Multivariable logistic regression was used to investigate the relationship between residency type and (i) return of spontaneous circulation (ROSC) at emergency department (ED) and (ii) 30-day survival. RESULTS: A total of 435 OHCA occurred in RACFs versus 3,395 in private residences. RACF patients were significantly older (median age: 86 [IQR 79, 91] vs 78 [71, 85] years; $p < 0.001$), more commonly female (50.1% vs 36.8%; $p < 0.001$), bystander-witnessed arrests (34.9% vs 21.5%; $p < 0.001$), received bystander cardiopulmonary resuscitation (42.1% vs 28.6%; $p < 0.001$), had less shockable first monitored rhythms (4.0% vs 8.1%; $p = 0.002$) and more frequently had a "do not resuscitate" order identified (46.0% vs 13.6%; <0.001). Among those with EMS-attempted resuscitation or with defibrillation before EMS arrival, ROSC at ED and 30-day survival were significantly lower in the RACF group (6.2% vs 18.9%; $p < 0.001$ and 1.9% vs 7.7%; $p < 0.001$). The adjusted odds of ROSC at ED (aOR: 0.22 [95%CI: 0.10, 0.46]) and 30-day survival (aOR: 0.20 [95%CI 0.05, 0.92]) were significantly lower for RACF residents. CONCLUSION: RACF residency was an independent predictor of lower survival from OHCA, highlighting the importance of end-of-life planning for RACF residents.

2. Resusc Plus. 2023 Nov 10;16:100503. doi: 10.1016/j.resplu.2023.100503. eCollection 2023 Dec.
Characteristics, survival and neurological outcome in out-of-hospital cardiac arrest in young adults in Sweden: A nationwide study.
Gustafsson L(1)(2), Rawshani A(1)(3)(4), Råmunddal T(1)(3), Redfors B(1)(3), Petursson P(1)(3), Angerås O(1)(3), Hirlekar G(1)(3), Omerovic E(1)(3), Dworeck C(1)(3), Völz S(1)(3), Herlitz J(4), Hjalmarsson C(1)(3), Holmqvist LD(1)(2), Myredal A(1)(3).
ABSTRACT

AIM: The aim of this study was to present a comprehensive overview of out-of-hospital cardiac arrests (OHCA) in young adults. METHODS: The data set analyzed included all cases of OHCA from 1990 to 2020 in the age-range 16-49 years in the Swedish Registry of Cardiopulmonary Resuscitation (SRCR). OHCA between 2010 and 2020 were analyzed in more detail. Clinical characteristics, survival, neurological outcomes, and long-time trends in survival were studied. Logistic regression was used to study 30-days survival, neurological outcomes and Utstein determinants of survival. RESULTS: Trends were assessed in 11,180 cases. The annual increase in 30-days survival during 1990-2020 was 5.9% with no decline in neurological function among survivors. Odds ratio (OR) for heart disease as the cause was 0.55 (95% CI 0.44 to 0.67) in 2017-2020 compared to 1990-1993. Corresponding ORs for overdoses and suicide attempts were 1.61 (95% CI 1.23-2.13) and 2.06 (95% CI 1.48-2.94), respectively. Exercise related OHCA was noted in roughly 5%. OR for bystander CPR in 2017-2020 vs 1990-1993 was 3.11 (95% CI 2.57 to 3.78); in 2020 88 % received bystander CPR. EMS response time increased from 6 to 10 minutes. CONCLUSION: Survival has increased 6% annually, resulting in a three-fold increase over 30 years, with stable neurological outcome. EMS response time increased with 66% but the majority now receive bystander CPR. Cardiac arrest due to overdoses and suicide attempts are increasing.

3. Trauma Surg Acute Care Open. 2023 Nov 14;8(1):e001132. doi: 10.1136/tsaco-2023-001132. eCollection 2023.

Methodological analysis of a community-based training initiative using the EPIS framework: an ongoing initiative to empower 10 million bystanders in CPR and bleeding control.

Merchant AAH(1), Hassan S(2), Baig N(2)(3), Atiq H(2)(3), Mahmood S(4), Doll A(5), Naseer R(6), Haq ZU(7), Shehnaz D(6), Haider AH(1)(8), Razzak J(2)(9).

ABSTRACT

BACKGROUND: Out-of-hospital cardiac arrest (OHCA) and life-threatening bleeding from trauma are leading causes of preventable mortality globally. Early intervention from bystanders can play a pivotal role in increasing the survival rate of victims. While great efforts for bystander training have yielded positive results in high-income countries, the same has not been replicated in low and middle-income countries (LMICs) due to resources constraints. This article describes a replicable implementation model of a nationwide program, aimed at empowering 10 million bystanders with basic knowledge and skills of hands-only cardiopulmonary resuscitation (CPR) and bleeding control in a resource-limited setting. METHODS: Using the EPIS (Exploration, Preparation, Implementation and Sustainment) framework, we describe the application of a national bystander training program, named 'Pakistan Life Savers Programme (PLSP)', in an LMIC. We discuss the opportunities and challenges faced during each phase of the program's implementation and identify feasible and sustainable actions to make them reproducible in similar low-resource settings. RESULTS: A high mortality rate owing to OHCA and traumatic life-threatening bleeding was identified as a national issue in Pakistan. After intensive discussions during the exploration phase, PLSP was chosen as a potential solution. The preparation phase oversaw the logistical administration of the program and highlighted avenues using minimal resources to attain maximum outreach. National implementation of bystander training started as a pilot in suburban schools and expanded to other institutions, with 127 833 bystanders trained to date. Sustainability of the program was targeted through its addition in a single national curriculum taught in schools and the development of a cohesive collaborative network with entities sharing similar goals. CONCLUSION: This article provides a methodological framework of implementing a national intervention based on bystander response. Such programs can increase bystander willingness and confidence in performing CPR and bleeding control, decreasing preventable deaths in countries having a high mortality burden.

4. Contemp Nurse. 2023 Nov 29:1-13. doi: 10.1080/10376178.2023.2287075. Online ahead of print.
Effectiveness of an educational intervention on first-year nursing students' knowledge and confidence to perform basic life support: a quasi-experimental study.
George B(1), Hampton K(1)(2), Elliott M(1).

ABSTRACT
BACKGROUND: Knowing how to respond effectively to an acutely deteriorating patient is a National Safety and Quality Health Service Standard and a requirement for nurse registration with the Australian Health Practitioner Regulatory Authority. Literature has highlighted that a lack of knowledge, skills and confidence in healthcare professionals to perform basic life support may be a contributing factor to the high mortality and morbidity rates associated with cardiac arrest in the hospital setting. AIM: To explore first-year nursing students' knowledge and confidence to perform basic life support according to the Australian Resuscitation Council guidelines before and after watching an online video lecture. METHOD: A quantitative quasi-experimental pre- and post-test design to measure changes, if any, in first-year nursing students' knowledge and confidence to perform basic life support at an Australian university in 2021. FINDINGS: The collected data were analysed using Stata, a statistical software for data sciences. Participants' mean knowledge score increased from 9.3 (SD: 2.5) in the pre-test to 13.9 (SD: 3) ($p < 0.001$) in the post-test (maximum possible score: 19). Participants' mean confidence score increased from 17.0 (SD: 6.3) in the pre-test to 24.5 (SD: 4.4) ($p < 0.001$) in the post-test (maximum possible score: 30; $p < 0.001$). DISCUSSION: most significant improvement in knowledge was observed in chest compression rate, breathing/ ventilation and checking patient response. The study found that the video lecture is an effective teaching method to increase students' confidence to perform basic life support. CONCLUSION: An online video-recorded lecture can increase undergraduate student nurses' knowledge and confidence to perform basic life support. This is one educational strategy that universities can use to improve students' knowledge and confidence to perform this essential skill for practice.

5. Resusc Plus. 2023 Nov 10;16:100507. doi: 10.1016/j.resplu.2023.100507. eCollection 2023 Dec.
Treatment patterns and clinician stress related to care of out-of-hospital cardiac arrest patients with a do not attempt resuscitation order.
Tanabe R(1), Hongo T(1), Obara T(1), Nojima T(1), Nakao A(1), Elmer J(2)(3)(4), Naito H(1), Yumoto T(1).

ABSTRACT
OBJECTIVE: This research investigated treatment patterns for out-of-hospital cardiac arrest patients with Do Not Attempt Resuscitation orders in Japanese emergency departments and the associated clinician stress. METHODS: A cross-sectional survey was conducted at 9 hospitals in Okayama, Japan, targeting emergency department nurses and physicians. The questionnaire inquired about the last treated out-of-hospital cardiac arrest patient with a Do Not Attempt Resuscitation. We assessed emotional stress on a 0-10 scale and moral distress on a 1-5 scale among clinicians. RESULTS: Of 208 participants, 107 (51%) had treated an out-of-hospital cardiac arrest patient with a Do Not Attempt Resuscitation order in the past 6 months. Of these, 65 (61%) clinicians used a "slow code" due to perceived futility in resuscitation (42/65 [65%]), unwillingness to terminate resuscitation upon arrival (38/65 [59%]), and absence of family at the time of patient's arrival (35/65 [54%]). Female clinicians had higher emotional stress (5 vs. 3; $P = 0.007$) and moral distress (3 vs. 2; $P = 0.002$) than males. Nurses faced more moral distress than physicians (3 vs. 2; $P < 0.001$). Adjusted logistic regression revealed that having performed a "slow code" (adjusted odds ratio, 5.09 [95% CI, 1.68-17.87]) and having greater ethical concerns about "slow code" (adjusted odds ratio, 0.35 [95% CI, 0.19-0.58]) were associated with high stress levels. CONCLUSIONS: The prevalent use of "slow code"

for out-of-hospital cardiac arrest patients with Do Not Attempt Resuscitation orders underscores the challenges in managing these patients in clinical practice.

6. Resuscitation. 2023 Nov 25:110059. doi: 10.1016/j.resuscitation.2023.110059. Online ahead of print.

Survival and Neurological Outcome after Bystander versus Lay Responder Defibrillation in Out-of-Hospital Cardiac Arrest: A Sub-study of the BOX trial.

Sarkisian L(1), Abdi Isse Y(2), Gerke O(3), Emil Roelsgaard Obling L(4), Paulin Beske R(5), Grand J(6), Schmidt H(7), Frederiksen Højgaard H(8), Abild Stengaard Meyer M(9), Borregaard B(10), Hassager C(11), Kjaergaard J(12), Eifer Møller J(13).

ABSTRACT

BACKGROUND & AIM: Bystander defibrillation is associated with increased survival with good neurological outcome after out-of-hospital cardiac arrest (OHCA). Dispatch of lay responders could increase defibrillation rates, however, survival with good neurological outcome in these remain unknown. The aim was to compare long-term survival with good neurological outcome in bystander versus lay responder defibrillated OHCAs. METHODS: This is a sub-study of the BOX trial, which included OHCA patients from two Danish tertiary cardiac intensive care units from March 2017 to December 2021. The main outcome was defined as 3-month survival with good neurological performance (Cerebral Performance Category of 1or 2, on a scale from 1 (good cerebral performance) to 5 (death or brain death)). For this study EMS witnessed OHCAs were excluded. RESULTS: Of the 715 patients, a lay responder arrived before EMS in 125 cases (16%). In total, 81 patients were defibrillated by a lay responder (11%), 69 patients by a bystander (10%) and 565 patients by the EMS staff (79%). Three-month survival with good neurological outcome was 65% and 81% in the lay responder and bystander defibrillated groups, respectively (P=0.03). CONCLUSION: In patients with OHCA, 3-month survival with good neurological outcome was higher in bystander defibrillated patients compared with lay responder defibrillated patients.

7. Pediatr Emerg Care. 2023 Dec 1;39(12):940-944. doi: 10.1097/PEC.0000000000002941. Epub 2023 Apr 21.

Self-Efficacy in the Cannulation Technique for Intraosseous Access in Pediatric Cardiac Arrest: Egg Versus Bone.

Márquez-Hernández VV, Gutiérrez-Puertas L, García-Viola A(1), Garrido-Molina JM(2), Gutiérrez-Puertas V(3), Aguilera-Manrique G, Rodríguez-García MC.

ABSTRACT

OBJECTIVES: The use of intraosseous (IO) access is recommended in cardiac arrest when peripheral venous access is not accessible. Various methodologies exist that are used for teaching and learning about cannulation of the IO route both in education and in research. The purpose of the present study was to compare self-efficacy in the cannulation technique for IO access through different techniques. METHODS: A randomized comparative study was conducted. A total of 118 nursing students participated. The participants were randomly distributed into 2 intervention groups: chicken bone and egg. A checklist was used for data collection to evaluate the IO cannulation technique in nursing students and another to analyze self-efficacy. RESULTS: The average total score of self-efficacy for all participants was 8.84 (standard deviation (SD) = 0.98). No statistically significant differences were found when comparing the total self-efficacy score and the intervention group (U = 1604.500; z = -0.733; P = 0.463). No statistically significant differences were found between both groups for the average total score of the procedure (U = 6916.500; z = -0.939; P = 0.348). The egg group carried out the IO cannulation procedure in a significantly less amount of time (M = 126.88, SD = 82.18) than the chicken bone group (M = 183.77, SD = 108.28), finding statistically

significant differences (U = 4983.500; z = -5.326; P < 0.001). CONCLUSIONS: Using an egg to teach and learn about IO access could be considered a methodology that is equally effective as using a chicken bone, with the advantage of achieving IO access in a lesser amount of time.

8. Resusc Plus. 2023 Nov 14;16:100506. doi: 10.1016/j.resplu.2023.100506. eCollection 2023 Dec.
Comparison of paediatric basic life support guidelines endorsed by member councils of Resuscitation Council of Asia.
Ong GY(1)(2), Kurosawa H(3), Ikeyama T(4)(5), Park JD(6), Katanyuwong P(7), Reyes OCF(8), Wu ET(9), Hon KLE(10)(11), Maconochie IK(12), Shepard LN(13), Nadkarni VM(13), Ng KC(1)(2).
ABSTRACT
BACKGROUND: Paediatric cardiac arrest outcomes, especially for infants, remain poor. Due to different training, resource differences, and historical reasons, paediatric cardiac arrest algorithms for various Asia countries vary. While there has been a common basic life support algorithm for adults by the Resuscitation Council of Asia (RCA), there is no common RCA algorithm for paediatric life support.We aimed to review published paediatric life support guidelines from different Asian resuscitation councils. METHODS: Pubmed and Google Scholar search were performed for published paediatric basic and advanced life support guidelines from January 2015 to June 2023. Paediatric representatives from the Resuscitation Council of Asia were sought and contacted to provide input from September 2022 till June 2023. RESULTS: While most of the components of published paediatric life support algorithms of Asian countries are similar, there are notable variations in terms of age criteria for recommended use of adult basic life support algorithms in the paediatric population less than 18 years old, recommended paediatric chest compression depth targets, ventilation rates post-advanced airway intra-arrest, and first defibrillation dose for shockable rhythms in paediatric cardiac arrest. CONCLUSION: This was an overview and mapping of published Asian paediatric resuscitation algorithms. It highlights similarities across paediatric life support guidelines in Asian countries. There were some differences in components of paediatric life support which highlight important knowledge gaps in paediatric resuscitation science. The minor differences in the paediatric life support guidelines endorsed by the member councils may provide a framework for prioritising resuscitation research and highlight knowledge gaps in paediatric resuscitation.

9. SAGE Open Nurs. 2023 Nov 23;9:23779608231216809. doi: 10.1177/23779608231216809. eCollection 2023 Jan-Dec.
Nurses' Knowledge, Attitudes, and Practice of Cardiopulmonary Resuscitation at a Selected Training Hospital in Namibia: A Cross-Sectional Survey.
Tomas N(1), Kachekele ZA(1).
ABSTRACT
BACKGROUND: Nurses play a key role in cases of cardiopulmonary arrest by promptly attending to and initiating cardiopulmonary resuscitation. Effective cardiopulmonary resuscitation thus requires nurses to possess appropriate attitudes, competencies, and adherence to the best nursing practice. Cardiac arrests are a prevalent cause of fatalities, being responsible for approximately 30% of deaths worldwide. Despite this statistic, however, research in this specific field is lacking in Namibia. OBJECTIVE: The objective of this research was to examine registered nurses' knowledge, attitudes toward, and practice with regard to cardiopulmonary resuscitation at a selected teaching hospital in Namibia. METHODS: A cross-sectional survey design using a self-administered questionnaire was utilized to purposively recruit 158 registered nurses from the inpatient and outpatient departments of a teaching hospital in Namibia. Descriptive and chi-square tests were performed using SPSSv26. RESULTS: The results of the study indicate that a significant percentage of nurses have limited knowledge (14.7 ± 1.50), negative attitudes (36.2 ± 4.8), and poor practice (11.16 ± 1.18) when it

comes to cardiopulmonary resuscitation. Their poor knowledge is strongly associated with poor practice ($\chi 2 = 9.162$, $P = .002$). The study further revealed a significant correlation between the departments in which the nurses worked and their practice of cardiopulmonary resuscitation, suggesting that the work environment is a crucial factor in determining a nurse's approach to emergency care. CONCLUSION: The findings of study indicate that the cardiopulmonary resuscitation practice in the selected hospital is unsafe due to the registered nurses' poor knowledge and negative attitudes. It is strongly recommended that hospital managers and policy-makers take steps toformulate guidelines that mandate regular cardiopulmonary resuscitation training at predetermined times.

10. Resusc Plus. 2023 Nov 16;16:100505. doi: 10.1016/j.resplu.2023.100505. eCollection 2023 Dec.
Wolf Creek XVII Part 2: The origin, evolution, and impact of the Wolf Creek Conference.
Neumar RW(1), Tang W(1).

ABSTRACT

The Wolf Creek Conference is a seminal meeting of resuscitation researchers that has significantly influenced scientific advances and patient care in the field of cardiac arrest resuscitation over nearly half a century. Originating in 1975 at the Wolf Creek Lodge in Georgia, the conference was founded by Drs. James Elam, James Jude, and Peter Safar with the aim of improving clinical practices in cardiopulmonary resuscitation (CPR) by stimulating laboratory and clinical research. Over 17 conferences to date, the scope has broadened to encompass the growing field of resuscitation science, participation has expanded to include thought leaders and scientists from both academia and industry, and the proceedings have catalyzed numerous innovations in field. This narrative review highlights the genesis, objectives, proceedings, and impact of the Wolf Creek Conference from 1975 to the present.

11. J Am Heart Assoc. 2023 Dec 1:e031530. doi: 10.1161/JAHA.123.031530. Online ahead of print.
The Latest in Resuscitation Research: Highlights From the 2022 American Heart Association's Resuscitation Science Symposium.
Stancati JA(1), Owyang CG(2)(3), Araos JD(4), Agarwal S(5), Grossestreuer AV(6), Counts CR(7), Johnson NJ(7)(8), Morgan RW(9), Moskowitz A(10), Perman SM(11), Sawyer KN(12), Yuriditsky E(13), Horowitz JM(13), Kaviyarasu A(14), Palasz J(2), Abella BS(14), Teran F(2).

ABSTRACT

BACKGROUND: Every year the American Heart Association's Resuscitation Science Symposium (ReSS) brings together a community of international resuscitation science researchers focused on advancing cardiac arrest care. METHODS AND RESULTS: The American Heart Association's ReSS was held in Chicago, Illinois from November 4th to 6th, 2022. This annual narrative review summarizes ReSS programming, including awards, special sessions and scientific content organized by theme and plenary session. CONCLUSIONS: By exploring both the science of resuscitation and important related topics including survivorship, disparities, and community-focused programs, this meeting provided important resuscitation updates.

12. Emerg Med Int. 2023 Nov 21;2023:6780941. doi: 10.1155/2023/6780941. eCollection 2023.
Prediction Models for Return of Spontaneous Circulation in Patients with Cardiac Arrest: A Systematic Review and Critical Appraisal.
Cheng P(1), Yang P(2), Zhang H(2)(3), Wang H(1).

ABSTRACT

OBJECTIVES: Prediction models for the return of spontaneous circulation (ROSC) in patients with cardiac arrest play an important role in helping physicians evaluate the survival probability and

providing medical decision-making reference. Although relevant models have been developed, their methodological rigor and model applicability are still unclear. Therefore, this study aims to summarize the evidence for ROSC prediction models and provide a reference for the development, validation, and application of ROSC prediction models.METHODS: PubMed, Cochrane Library, Embase, Elsevier, Web of Science, SpringerLink, Ovid, CNKI, Wanfang, and SinoMed were systematically searched for studies on ROSC prediction models. The search time limit was from the establishment of the database to August 30, 2022. Two reviewers independently screened the literature and extracted the data. The PROBAST was used to evaluate the quality of the included literature. RESULTS: A total of 8 relevant prediction models were included, and 6 models reported the AUC of 0.662-0.830 in the modeling population, which showed good overall applicability but high risk of bias. The main reasons were improper handling of missing values and variable screening, lack of external validation of the model, and insufficient information of overfitting. Age, gender, etiology, initial heart rhythm, EMS arrival time/BLS intervention time, location, bystander CPR, witnessed during sudden arrest, and ACLS duration/compression duration were the most commonly included predictors. Obvious chest injury, body temperature below 33°C, and possible etiologies were predictive factors for ROSC failure in patients with TOHCA. Age, gender, initial heart rhythm, reason for the hospital visit, length of hospital stay, and the location of occurrence in hospital were the predictors of ROSC in IHCA patients. CONCLUSION: The performance of current ROSC prediction models varies greatly and has a high risk of bias, which should be selected with caution. Future studies can further optimize and externally validate the existing models.

13. Lancet Digit Health. 2023 Dec;5(12):e862-e871. doi: 10.1016/S2589-7500(23)00161-9.
Drone delivery of automated external defibrillators compared with ambulance arrival in real-life suspected out-of-hospital cardiac arrests: a prospective observational study in Sweden.
Schierbeck S(1), Nord A(2), Svensson L(3), Ringh M(2), Nordberg P(2), Hollenberg J(2), Lundgren P(4), Folke F(5), Jonsson M(2), Forsberg S(2), Claesson A(2).

ABSTRACT

BACKGROUND: A novel approach to improve bystander defibrillation for out-of-hospital cardiac arrests is to dispatch and deliver an automated external defibrillator (AED) directly to the suspected cardiac arrest location by drone. The aim of this study was to investigate how often a drone could deliver an AED before ambulance arrival and to measure the median time benefit achieved by drone deliveries. METHODS: In this prospective observational study, five AED-equipped drones were placed within two separate controlled airspaces in Sweden, covering approximately 200 000 inhabitants. Drones were dispatched in addition to standard emergency medical services for suspected out-of-hospital cardiac arrests and flight was autonomous. Alerts concerning children younger than 8 years, trauma, and emergency medical services-witnessed cases were not included. Exclusion criteria were air traffic control non-approval of flight, unfavourable weather conditions, no-delivery zones, and darkness. Data were collected from the dispatch centres, ambulance organisations, Swedish Registry for Cardiopulmonary Resuscitation, and the drone operator. Core outcomes were the percentage of cases for which an AED was delivered by a drone before ambulance arrival, and the median time difference (minutes and seconds) between AED delivery by drone and ambulance arrival. Explorative outcomes were percentage of attached drone-delivered AEDs before ambulance arrival and the percentage of cases defibrillated by a drone-delivered AED when it was used before ambulance arrival. FINDINGS: During the study period (from April 21, 2021 to May 31, 2022), 211 suspected out-of-hospital cardiac arrest alerts occurred, and in 72 (34%) of those a drone was deployed. Among those, an AED was successfully delivered in 58 (81%) cases, and the major reason for non-delivery was cancellation by dispatch centre because the case was not an out-of-hospital cardiac arrest. In cases for which arrival times for both drone and ambulance were available (n=55), AED delivery by

drone occurred before ambulance arrival in 37 cases (67%), with a median time benefit of 3 min and 14 s. Among these cases, 18 (49%) were true out-of-hospital cardiac arrests and a drone-delivered AED was attached in six cases (33%). Two (33%) had a shockable first rhythm and were defibrillated by a drone-delivered AED before ambulance arrival, with one person achieving 30-day survival. No adverse events occurred. AED delivery (not landing) was made within 15 m from the patient or building in 91% of the cases. INTERPRETATION: AED-equipped drones dispatched in cases of suspected out-of-hospital cardiac arrests delivered AEDs before ambulance arrival in two thirds of cases, with a clinically relevant median time benefit of more than 3 min. This intervention could potentially decrease time to attachment of an AED, before ambulance arrival.

14. Resusc Plus. 2023 Nov 13;16:100508. doi: 10.1016/j.resplu.2023.100508. eCollection 2023 Dec.
Frequency of resuscitation attempts with dying nursing home residents. A full survey in an urban district in Germany based on registry data from 2018-2021.
Günther A(1)(2), Schmid S(2), Weidlich-Wichmann U(3), Czaputa E(3), Hasseler M(3), Weber J(4).
ABSTRACT
AIM: The realities of emergency care and resuscitation research involving nursing home (NH) residents suggest an overuse of resuscitation attempts in NHs. A complete analysis of all NH resident deaths is needed to provide a complementary perspective of potential underuse. The present research investigated whether residents of different NH homes died at the NH during attempted resuscitation or after transfer to hospital. METHODS: A full survey of resuscitation attempts and deaths among NH residents, via retrospective analysis of data from the death registry and the German Resuscitation Registry for the years 2018 to 2021. RESULTS: Over the 4-year study period, 14,598 individuals died, of whom 3,288 (22.5%) were residents of 31 different NHs. The mean age of the deceased NH residents was 87 years (±8.6); 2,196 (66.8%) were female, 118 (3.6%) underwent a resuscitation attempt, and 58.5% died at the NH. NH averages were as follows: deaths per NH: 106 (±51; min-max: 36-292); number of beds: 102 (±39; 34-210); deaths per bed per year 0.27 (±0.07; 0.15-0.51); resuscitation attempts per 1,000 beds per year: 9.5 (±5.5; 0-21.1); and ratio of futile resuscitation attempts to deaths: 6.0% (0-12.5%). Considering the entire study region before and during the COVID-19 pandemic, a slight underuse of resuscitation attempts with female NH residents emerged. On a facility level, substantial disparities and opposing trends were found. The incidence of deaths and resuscitation attempts, as well as the place of death and the ratio of futile resuscitation attempts to deaths, varied considerably. CONCLUSION: Resuscitation attempts are rarely administered to dying NH residents. However, their frequency varies considerably between NHs.

POST-CARDIAC ARREST TREATMENTS

1. Resuscitation. 2023 Nov 27:110062. doi: 10.1016/j.resuscitation.2023.110062. Online ahead of print.
Cardiac Power Output is associated with cardiovascular related mortality in the ICU in post-cardiac arrest patients.
Magni F(1), Soloperto R(2), Farinella A(3), Bogossian E(4), Halenarova K(4), Pletschette Z(4), Gozza M(4), Labbe' V(4), Ageno W(5), Silvio Taccone F(4), Annoni F(6).
ABSTRACT
AIM: Although brain injury is the main determinant of poor outcome following cardiac arrest (CA), cardiovascular failure is the leading cause of death within the first days after CA. However, it remains unclear which hemodynamic parameter is most suitable for its early recognition. We investigated the association of cardiac power output (CPO) with early mortality in intensive care unit(ICU) after CA and with mortality related to post-CA cardiovascular failure. METHODS: Retrospective analysis of

adult comatose survivors of CA admitted to the ICU of a University Hospital. Exclusion criteria were treatment with extracorporeal cardiopulmonary resuscitation, ECMO or intra-aortic balloon pump. We retrieved CA characteristics; we recorded mean arterial pressure, cardiac output, CPO (as derived parameter) and the vasoactive-inotropic score for the first 72 hours after ROSC, at intervals of 8 hours. ICU death was defined as related to post-CA cardiovascular failure when death occurred as a direct consequence of shock, secondary CA or fatal arrhythmia, or related to neurological injury if this led to withdrawalof life-sustaining therapy or brain death. RESULTS: Among the 217 patients (median age 66 years, 65% male, 61.8% out-of-hospital CA), 142 (65.4%) died in ICU: 99 (69.7%) patients died from neurological injury and 43 (30.3%) from cardiovascular-related causes. Comparing the evolution over time of CPO between survivors and non-survivors, a statistically significant difference was found only at + 8 hours after CA (p=0.0042). In multivariable analysis, CPO at 8-hour was significantly associated with cardiovascular-related mortality (p=0.007). CONCLUSIONS: In post-CA patients, the 8-hour CPO is an independent factor associated with ICU cardiovascular-related mortality.

2. No Shinkei Geka. 2023 Nov;51(6):1079-1088. doi: 10.11477/mf.1436204854.
[Managing Post Cardiac Arrest Syndrome]. [Article in Japanese]
Sakurai A(1).
ABSTRACT
Four conditions occur after cardiac arrest resuscitation and are referred to as the post-cardiac arrest syndrome. Moreover, post-cardiac arrest brain injury has the greatest impact on outcomes. Brain injury can be primary as a result of global cerebral ischemia during cardiac arrest. It may be secondary (reperfusion injury) after initiation of cardiopulmonary resuscitation. After cardiac arrest resuscitation, the patient must be managed in the intensive care unit, and it is recommended to avoid hypotension (MAP<65 mmHg), hypoxemia, and hyperoxemia. Oxygen saturation should be maintained at 94%-98%, normal ventilation (35 mmHg-45 mmHg), and body temperature below 37.5℃ for 72 h after resuscitation. The administration of anticonvulsants for abnormal electroencephalograms did not significantly affect the outcome. Prognosis should be predicted within 24 h to 72 h combining physical examination, biomarkers, electrophysiology, and imaging being predictive of poor outcomes.

3. Crit Care. 2023 Dec 1;27(1):472. doi: 10.1186/s13054-023-04715-z.
Dysnatremia at ICU admission and functional outcome of cardiac arrest: insights from four randomised controlled trials.
Lascarrou JB(1)(2)(3)(4), Ermel C(5), Cariou A(6)(7)(8), Laitio T(9), Kirkegaard H(10), Søreide E(11), Grejs AM(12)(13), Reinikainen M(14)(15), Colin G(6)(16), Taccone FS(6)(17), Le Gouge A(18), Skrifvars MB(19).
ABSTRACT
PURPOSE: To evaluate the potential association between early dysnatremia and 6-month functional outcome after cardiac arrest. METHODS: We pooled data from four randomised clinical trials in post-cardiac-arrest patients admitted to the ICU with coma after stable return of spontaneous circulation (ROSC). Admission natremia was categorised as normal (135-145 mmol/L), low, or high. We analysed associations between natremia category and Cerebral Performance Category (CPC) 1 or 2 at 6 months, with and without adjustment on the modified Cardiac Arrest Hospital Prognosis Score (mCAHP). RESULTS: We included 1163 patients (581 from HYPERION, 352 from TTH48, 120 from COMACARE, and 110 from Xe-HYPOTHECA) with a mean age of 63 ± 13 years and a predominance of males (72.5%). A cardiac cause was identified in 63.6% of cases. Median time from collapse to ROSC was 20 [15-29] minutes. Overall, mean natremia on ICU admission was 137.5 ± 4.7 mmol/L; 211 (18.6%) and 31 (2.7%) patients had hyponatremia and hypernatremia, respectively. By univariate analysis, CPC 1 or 2 at 6 months was significantly less common in the group with hyponatremia (50/211 [24%] vs. 363/893 [41%]; P = 0.001); the mCAHP-adjusted odds ratio was 0.45 (95%CI 0.26-

0.79, p = 0.005). The number of patients with hypernatremia was too small for a meaningful multivariable analysis. CONCLUSIONS: Early hyponatremia was common in patients with ROSC after cardiac arrest and was associated with a poorer 6-month functional outcome. The mechanisms underlying this association remain to be elucidated in order to determine whether interventions targeting hyponatremia are worth investigating.

4. Neurocrit Care. 2023 Dec 1. doi: 10.1007/s12028-023-01871-6. Online ahead of print.
Critical Care Management of Patients After Cardiac Arrest: A Scientific Statement from the American Heart Association and Neurocritical Care Society.
Hirsch KG(1), Abella BS(2), Amorim E(3), Bader MK(4), Barletta JF(5), Berg K(6), Callaway CW(7), Friberg H(8), Gilmore EJ(9), Greer DM(10), Kern KB(11), Livesay S(12), May TL(13), Neumar RW(14), Nolan JP(15)(16), Oddo M(17), Peberdy MA(18), Poloyac SM(19), Seder D(13), Taccone FS(20), Uzendu A(21), Walsh B(22), Zimmerman JL(23), Geocadin RG(24); American Heart Association, Neurocritical Care Society.
ABSTRACT
The critical care management of patients after cardiac arrest is burdened by a lack of high-quality clinical studies and the resultant lack of high-certainty evidence. This results in limited practice guideline recommendations, which may lead to uncertainty and variability in management. Critical care management is crucial in patients after cardiac arrest and affects outcome. Although guidelines address some relevant topics (including temperature control and neurological prognostication of comatose survivors, 2 topics for which there are more robust clinical studies), many important subject areas have limited or nonexistent clinical studies, leading to the absence of guidelines or low-certainty evidence. The American Heart Association Emergency Cardiovascular Care Committee and the Neurocritical Care Society collaborated to address this gap by organizing an expert consensus panel and conference. Twenty-four experienced practitioners (including physicians, nurses, pharmacists, and a respiratory therapist) from multiple medical specialties, levels, institutions, and countries made up the panel. Topics were identified and prioritized by the panel and arranged by organ system to facilitate discussion, debate, and consensus building. Statements related to postarrest management were generated, and 80% agreement was required to approve a statement. Voting was anonymous and web based. Topics addressed include neurological, cardiac, pulmonary, hematological, infectious, gastrointestinal, endocrine, and general critical care management. Areas of uncertainty, areas for which no consensus was reached, and future research directions are also included. Until high-quality studies that inform practice guidelines in these areas are available, the expert panel consensus statements that are provided can advise clinicians on the critical care management of patients after cardiac arrest.

5. ESC Heart Fail. 2023 Nov 29. doi: 10.1002/ehf2.14602. Online ahead of print.
Relationship between initial red cell distribution width and ΔRDW and mortality in cardiac arrest patients.
Zhong L(1)(2), Zhang ZY(3), Ji XW(1), Wang HL(4), Xie B(1), Yang XH(2).
ABSTRACT
AIMS: There has been a lack of research examining the relationship between red cell distribution width (RDW) and the prognosis of cardiac arrest (CA) patients. The prognostic value of the changes in RDW during intensive care unit (ICU) hospitalization for CA patients has not been investigated. This study aims to investigate the correlation between RDW measures at ICU admission and RDW changes during ICU hospitalization and the prognosis of CA patients and then develop a nomogram that predicts the risk of mortality of these patients. METHODS AND RESULTS: A retrospective cohort study is used to collect clinical characteristics of CA patients (>18 years) that are on their first admission to ICU with RDW data measured from the Medical Information Mart for Intensive Care IV Version 2.0 database. Patients are randomly divided into a development cohort (75%) and a validation cohort (25%). The primary outcome is 30 and 360 day all-cause mortality. ΔRDW is

defined as the RDW on ICU discharge minus RDW on ICU admission. A multivariate Cox regression model is applied to test whether the RDW represents an independent risk factor that affects the all-cause mortality of these patients. Meanwhile, the dose-response relationship between the RDW and the mortality is described by restricted cubic spine (RCS). A prediction model is constructed using a nomogram, which is then assessed using receiver operating characteristic curves, calibration curves, and decision curve analysis (DCA). A total of 1278 adult CA patients are included in this study. We found that non-survivors have a higher level of RDW and ΔRDW compared with survivors, and the mortality rate is higher in the high RDW group than in the normal RDW group. The Kaplan-Meier survival curve indicates that patients in the normal RDW group had a higher cumulative survival rate at 30 and 360 days than those in the high RDW group (log-rank test, $\chi 2 = 36.710$, $\chi 2 = 54.960$, both P values <0.05). The multivariate Cox regression analysis shows that elevated RDW at ICU admission (>15.50%) is an independent predictor of 30 [hazard ratio = 1.451, 95% confidence interval (CI) = 1.181-1.782, P < 0.001] and 360 day (hazard ratio = 1.393, 95% CI = 1.160-1.671, P < 0.001) all-cause mortality among CA patients, and an increase in RDW during ICU hospitalization (ΔRDW ≥ 0.4%) can serve as an independent predictor of mortality among these patients. A non-linear relationship between the RDW measured at ICU admission and the increased risk of mortality rate of these patients is shown by the RCS. This study established and validated a nomogram based on six variables, anion gap, first-day Sequential Organ Failure Assessment score, cerebrovascular disease, malignant tumour, norepinephrine use, and RDW, to predict mortality risk in CA patients. The consistency indices of 30 and 360 day mortality of CA patients in the validation cohort are 0.721 and 0.725, respectively. The nomogram proved to be well calibrated in the validation cohort. DCA curves indicated that the nomogram provided a higher net benefit over a wide, reasonable range of threshold probabilities for predicting mortality in CA patients and could be adapted for clinical decision-making. CONCLUSIONS: Elevated RDW levels on ICU admission and rising RDW during ICU hospitalization are powerful predictors of all-cause mortality for CA patients at 30 and 360 days, and they can be used as potential clinical biomarkers to predict the bad prognosis of these patients. The newly developed nomogram, which includes RDW, demonstrates high efficacy in predicting the mortality of CA patients.

6. Medicina (Kaunas). 2023 Nov 11;59(11):1989. doi: 10.3390/medicina59111989.
Dynamics of Capillary Lactate Levels in Patients with Out-of-Hospital Cardiac Arrest.
Vujanović V(1), Borovnik Lesjak V(1), Mekiš D(2)(3), Strnad M(1)(4)(5).
ABSTRACT
Background and Objectives: An effective strategy for cardiopulmonary resuscitation should be based on tissue perfusion. Our primary aim was to determine the association between capillary lactate values and initial rhythm as well as the probability of the return of spontaneous circulation in out-of-hospital cardiac arrest patients. Materials and Methods: This prospective observational cohort study included all patients with non-traumatic out-of-hospital cardiac arrest, older than 18 years, resuscitated by a prehospital emergency medical team between April 2020 and June 2021. Capillary lactate samples were collected at the time of arrival and every 10 min after the first measurement until the time of the return of spontaneous circulation (ROSC) or, if ROSC was not achieved, at the time of declaring death on the scene. Results: In total, 83 patients were enrolled in the study. ROSC was achieved in 28 patients (33.7%), 21 were admitted to hospital (26.3%), and 6 (7.23%) of them were discharged from hospital. At discharge, all patients had Cerebral Performance Category Scale 1 or 2. Initial capillary lactate values were significantly higher in patients with a non-shockable rhythm compared to the group with a shockable rhythm (9.19 ± 4.6 versus 6.43 ± 3.81; p = 0.037). A significant difference also persisted in a second value taken 10 min after the initial value (10.03 ± 5,19 versus 5.18 ± 3.47; p = 0.019). Capillary lactate values were higher in the ROSC group and non-ROSC group at the time of restored circulation (11.10 ± 6.59 and 6.77 ± 4.23, respectively; p = 0.047).

Conclusions: Capillary lactate values are significantly higher in patients with a non-shockable first rhythm in out-of-hospital cardiac arrest (OHCA). There is also a significantly different rise in capillary lactate levels in patients with ROSC.

7. Air Med J. 2023 Nov-Dec;42(6):471-476. doi: 10.1016/j.amj.2023.09.003. Epub 2023 Sep 23.
Higher Prehospital Blood Glucose Levels Associated With Return of Spontaneous Circulation in Out-of-Hospital Non-traumatic Cardiac Arrests.
Shehadeh A(1), Feng J(1), Selde W(2), Billian J(3), Mastenbrook J(4).
ABSTRACT
OBJECTIVE: Cardiac arrest leads to an array of metabolic disturbances. We aimed to investigate the association between prehospital blood glucose levels (BGLs) and rates of return of spontaneous circulation (ROSC) in non-traumatic out-of-hospital cardiac arrests (OHCAs). METHODS: A retrospective analysis of adult non-traumatic OHCAs within Kalamazoo County, MI, from January 2018 to May 2020 using the Michigan Emergency Medical Services Information System database was performed. Demographic data, Utstein variables, and BGLs (hypoglycemia < 70 mg/dL, euglycemia 70-120 mg/dL, and hyperglycemia >120 mg/dL) were abstracted. Chi-square and Wilcoxon rank sum tests were used to evaluate the relationship between BGL and ROSC. RESULTS: In total, 314 patients met the inclusion criteria. The mean age was 62.9 years. ROSC was achieved in 147 (46.8%) patients. Fifty (15.9%), 75 (23.9%), and 189 (60.2%) patients were hypoglycemic, euglycemic, and hyperglycemic, respectively. An association was found between the glycemic group and ROSC (P < .0001), with an estimated odds of ROSC being 77% lower (95% confidence interval, 46%-90%) for hypoglycemic than euglycemic or hyperglycemic patients. The point difference between median ROSC-yes BGL (median [interquartile range] = 160 mg/dL [110-225 mg/dL]) was 33 mg/dL (95% CI, 13-51 mg/dL) greater than the ROSC-no group (median [interquartile range] = 127 mg/dL [75-190 mg/dL], P = .001). CONCLUSION: Non-traumatic OHCA patients achieving ROSC had a significantly higher prehospital BGL than the ROSC-no group. Further study is warranted to investigate the role intra-arrest BGL may have as a prognostic marker for ROSC.

TARGETED TEMPERATURE MANAGEMENT

1. Acta Cardiol Sin. 2023 Nov;39(6):831-840. doi: 10.6515/ACS.202311_39(6).20230529B.
The Identification of Subsequent Events Following Out-of-Hospital Cardiac Arrests with Targeted Temperature Management.
Lee CC(1), Cheuh HY(2), Chang SN(2).
ABSTRACT
BACKGROUND: Out-of-hospital cardiac arrest (OHCA) is a critical issue due to poor neurological outcomes and high mortality rate. Severe ischemia and reperfusion injury often occur after cardiopulmonary resuscitation (CPR) and return of spontaneous circulation (ROSC). Targeted temperature management (TTM) has been shown to reduce neurological complications among OHCA survivors. However, it is unclear how "time-to-cool" influences clinical outcomes. In this study, we investigated the optimal timing to reach target temperature after cardiac arrest and ROSC. METHODS: A total of 568 adults with OHCA and ROSC were admitted for targeted hypothermia assessment. Several events were predicted, including pneumonia, septic shock, gastrointestinal (GI) bleeding, and death. RESULTS: One hundred and eighteen patients [70 men (59.32%); 48 women (40.68%)] were analyzed for clinical outcomes. The duration of CPR after ROSC was significantly associated with pneumonia, septic shock, GI bleeding, and mortality after TTM (all $p < 0.001$). The duration of CPR was also positively correlated with poor outcomes on the Elixhauser score ($p = 0.001$), APACHE II score ($p = 0.008$), Cerebral Performance Categories (CPC) scale ($p < 0.001$), and Glasgow Coma Scale (GCS) score ($p < 0.001$). There was a significant association between the duration of CPR and time-to-cool of TTM after ROSC (Pearson value = 0.447, $p = 0.001$). Pneumonia,

septic shock, GI bleeding, and death were significantly higher in the patients who underwent TTM with a time-to-cool exceeding 360 minutes (all $p < 0.001$). CONCLUSIONS: For cardiac arrest patients, early cooling has clear benefits in reducing clinical sequelae. Clinical outcomes could be improved by improving the time to reach target temperature and feasibility for critically ill patients.

2. Shock. 2023 Nov 22. doi: 10.1097/SHK.0000000000002276. Online ahead of print.
Treatment of comatose survivors of in-hospital cardiac arrest with extended endovascular cooling method for 72 h: a propensity score-matched analysis.
Jiang L, Bian Y, Liu W, Zheng W, Zheng J, Li C, Lv R, Pan Y, Zheng Z, Wang M, Sang S(1), Pan C, Wang C, Liu R, Cheng K, Zhang J, Ma J, Chen Y, Xu F.
ABSTRACT
AIMS: Targeted temperature management (TTM) is recommended for at least 24 h in comatose survivors of in-hospital cardiac arrest (IHCA) after the return of spontaneous circulation (ROSC); however, whether an extension for 72 h leads to better neurological outcomes is uncertain. METHODS: We included data from the Qilu Hospital of Shandong University between July 20, 2019 and June 30, 2022. Unconscious patients who had ROSC lasting >20 consecutive min and received endovascular cooling (72 h) or normothermia treatment were compared in terms of survival-to-discharge and favorable neurological survival. Propensity score matching was employed to formulate balanced 1:3 matched patients. RESULTS: In total, 2,084 patients were included. Sixteen patients received extended endovascular cooling and 48 matched controls received normothermia therapy. Compared with the normothermia group, patients who received prolonged endovascular cooling had a higher survival-to-discharge rate. However, good neurological outcomes did not differ significantly. Before matching, Cox regression analysis, using mortality as the event, showed that extended endovascular cooling independently affected the survival of IHCA patients. CONCLUSIONS: Among comatose patients who had been resuscitated from IHCA, the use of endovascular cooling for 72 h might confer a benefit on survival-to-discharge.

3. Crit Care Nurse. 2023 Dec 1;43(6):77-79. doi: 10.4037/ccn2023253.
Hypothermia for Neuroprotection in Adults After Cardiac Arrest.
Cooper AS(1).
NO ABSTRACT AVAILABLE

ELECTROPHYSIOLOGY AND DEFIBRILLATION

1. Resusc Plus. 2023 Nov 16;16:100500. doi: 10.1016/j.resplu.2023.100500. eCollection 2023 Dec.
Wolf Creek XVII Part 5: Mobile AEDs.
Brent CM(1), Cheskes S(2)(3), Castrén M(4)(5), Brooks S(6).
ABSTRACT
INTRODUCTION: Millions of out-of-hospital cardiac arrests (OHCA) occur globally each year. Survival after OHCA can be improved with the use of automated external defibrillators (AED). The main strategy for facilitating bystander defibrillation has been fixed-location public access defibrillators (PADs). New strategies of mobile AEDs depart from the model of static PADs and have the potential to address known barriers to early defibrillation and improve outcomes. METHODS: Mobile AEDs was one of six focus topics for the Wolf Creek XVII Conference held on June 14-17, 2023, in Ann Arbor, Michigan, USA. Conference invitees included international thought leaders and scientists in the field of cardiac arrest resuscitation from academia and industry. Participants submitted via online survey knowledge gaps, barriers to translation and research priorities for each focus topic. Expert panels used the survey results and their own perspectives and insights to create and present

a preliminary unranked list for each category that was debated, revised, and ranked by all attendees to identify the top 5 for each category. RESULTS: Top knowledge gaps center around understanding the impact of mobile AEDs on OHCA outcomes in various settings and the impact of novel AED technologies. Top barriers to translation include questionable public comfort/acceptance, financial/ regulatory constraints, and a lack of centralized accountability. Top research priorities focus on understanding the impact of the mobile AED strategies and technologies on time to defibrillation and OHCA outcomes. CONCLUSION: This work informs research agendas, funding priorities and policy decisions around using mobile AEDs to optimize prehospital response to OHCA.

PEDIATRICS AND CHILDREN

No articles identified.

EXTRACORPOREAL LIFE SUPPORT

1. Resusc Plus. 2023 Nov 9;16:100497. doi: 10.1016/j.resplu.2023.100497. eCollection 2023 Dec.
Association between body mass index and clinical outcomes in patients with out-of-hospital cardiac arrest undergoing extracorporeal cardiopulmonary resuscitation: A multicenter observational study.
Kojima M(1), Mochida Y(1), Shoko T(1), Inoue A(2), Hifumi T(3), Sakamoto T(4), Kuroda Y(5); SAVE-J II study group.
ABSTRACT
BACKGROUND: We examined the association between body mass index (BMI) and outcomes in patients with out-of-hospital cardiac arrest (OHCA) undergoing extracorporeal cardiopulmonary resuscitation (ECPR). METHODS: We retrospectively analyzed the database of an observational multicenter cohort in Japan. Adult patients with OHCA of cardiac etiology who received ECPR between 2013 and 2018 were categorized as follows: underweight, BMI < 18.5; normal weight, BMI = 18.5-24.9; overweight, BMI = 25-29.9; and obese, BMI ≥ 30 kg/m2. The primary outcome was in-hospital mortality; secondary outcomes were unfavorable neurological outcomes at discharge (cerebral performance category ≥ 3) and ECPR-related complications. BMI's association with outcomes was assessed using a logistic regression model adjusted for age, sex, comorbidities, witness/bystander CPR, initial rhythm, prehospital return of spontaneous circulation, and low-flow time. RESULTS: In total, 1,044 patients were analyzed. Their median age was 61 (IQR, 49-69) years; the median BMI was 24.2 (21.5-26.9) kg/m2. The overall rates of in-hospital mortality, unfavorable neurological outcome, and ECPR-related complications were 62.2%, 79.9%, and 31.7%, respectively. In multivariate analysis, the overweight and obese groups had higher in-hospital mortality odds than the normal BMI group (odds ratio [95%CI], 1.37 [1.02-1.85], p = 0.035; and 2.09 [1.31-3.39], p < 0.001, respectively). The odds ratio for unfavorable neurological outcomes increased more in the obese than in the normal BMI group (3.17 [1.69-6.49], p < 0.001). ECPR-related complications were not significantly different among groups. CONCLUSIONS: In OHCA patients undergoing ECPR, a BMI ≥ 25 kg/m2 was associated with increased in-hospital mortality, and a BMI ≥ 30 kg/m2 was also associated with a worse neurological outcome.

2. Expert Rev Respir Med. 2023 Nov 27:1-15. doi: 10.1080/17476348.2023.2288160. Online ahead of print.
Extracorporeal membrane oxygenation for cardiac arrest: what, when, why, and how.
Brandorff M(1), Owyang CG(1)(2), Tonna JE(3)(4).
ABSTRACT

INTRODUCTION: Extracorporeal membrane oxygenation (ECMO) facilitated resuscitation was first described in the 1960s, but only recently garnered increased attention with large observational studies and randomized trials evaluating its use. AREAS COVERED: In this comprehensive review of extracorporeal cardiopulmonary resuscitation (ECPR), we report the history of resuscitative ECMO, terminology, circuit configuration and cannulation considerations, complications, selection criteria, implementation and management, and important considerations for the provider. We review the relevant guidelines, different approaches to cannulation, postresuscitation management, and expected outcomes, including neurologic, cardiac, and hospital survival. Finally, we advocate for the participation in national/international Registries in order to facilitate continuous quality improvement and support scientific discovery in this evolving area. EXPERT OPINION: ECPR is the most disruptive technology in cardiac arrest resuscitation since high-quality CPR itself. ECPR has demonstrated that it can provide up to 30% increased odds of survival for refractory cardiac arrest, in tightly restricted systems and for select patients. It is also clear, though, from recent trials that ECPR will not confer this high survival when implemented in less tightly protocoled settings and within lower volume environments. Over the next 10 years, ECPR research will explore the optimal initiation thresholds, best practices for implementation, and postresuscitation care.

EXPERIMENTAL RESEARCH

1. Front Vet Sci. 2023 Nov 3;10:1276588. doi: 10.3389/fvets.2023.1276588. eCollection 2023.
A ventricular fibrillation cardiac arrest model with extracorporeal cardiopulmonary resuscitation in rats: 8 minutes arrest time leads to increased myocardial damage but does not increase neuronal damage compared to 6 minutes.
Stommel AM(1), Högler S(2), Mueller M(1), Magnet IAM(1), Kodajova P(2), Ullram B(1), Szinovatz A(1), Panzer FP(1), Engenhart-Seyrl A(1), Kaschmekat J(2), Schütz T(3), Holzer M(1), Weihs W(1).
ABSTRACT
INTRODUCTION: Extracorporeal cardiopulmonary resuscitation (ECPR) is an emerging strategy in highly selected patients with refractory cardiac arrest (CA). Animal models can help to identify new therapeutic strategies to improve neurological outcome and cardiac function after global ischemia in CA. Aim of the study was to establish a reproducible ECPR rat model of ventricular fibrillation CA (VFCA) that leads to consistent neuronal damage with acceptable long-term survival rates, which can be used for future research. MATERIALS AND METHODS: Male Sprague Dawley rats were resuscitated with ECPR from 6 min (n = 15) and 8 min (n = 16) VFCA. Animals surviving for 14 days after return of spontaneous resuscitation (ROSC) were compared with sham operated animals (n = 10); neurological outcome was assessed daily until day 14. In the hippocampal cornu ammonis 1 region viable neurons were counted. Microglia and astrocyte reaction was assessed by Iba1 and GFAP immunohistochemistry, and collagen fibers in the myocardium were detected in Azan staining. QuPath was applied for quantification. RESULTS: Of the 15 rats included in the 6 min CA group, all achieved ROSC (100%) and 10 (67%) survived to 14 days; in the 8 min CA group, 15 (94%) achieved ROSC and 5 (31%) reached the endpoint. All sham animals (n = 10) survived 2 weeks. The quantity of viable neurons was significantly decreased, while the area displaying Iba1 and GFAP positive pixels was significantly increased in the hippocampus across both groups that experienced CA. Interestingly, there was no difference between the two CA groups regarding these changes. The myocardium in the 8 min CA group exhibited significantly more collagen fibers compared to the sham animals, without differences between 6- and 8-min CA groups. However, this significant increase was not observed in the 6 min CA group. CONCLUSION: Our findings indicate a uniform occurrence of neuronal damage in the hippocampus across both CA groups. However, there was a decrease in survival following an 8-min CA. Consequently, a 6-min duration of CA resulted in predictable neurological damage without significant cardiac damage and ensured adequate survival

rates up to 14 days. This appears to offer a reliable model for investigating neuroprotective therapies.

2. Shock. 2023 Nov 22. doi: 10.1097/SHK.0000000000002283. Online ahead of print.
Comparison between active abdominal compression-decompression cardiopulmonary resuscitation and standard cardiopulmonary resuscitation in asphyctic cardiac arrest rats with multiple rib fractures.
Dai Z(1), Zhang S, Wang H, He L(2), Liao J(3), Wu X(3).
ABSTRACT
BACKGROUND: Active abdominal compression-decompression cardiopulmonary resuscitation (AACD-CPR) is potentially more effective for cardiac arrest with multiple rib fractures. However, its impact on survival rates and neurological outcomes remains unknown. This study aimed to assess if AACD-CPR improves survival rates and neurological outcomes in a rat model of asphyctic cardiac arrest with multiple rib fractures. METHODS: Adult male Sprague-Dawley rats were randomized into 3 groups: AACD group (n = 15), standard cardiopulmonary resuscitation (STD-CPR) group (n = 15), and sham group (n = 10), after bilateral rib fractures were surgically created and endotracheal intubation was performed. AACD-CPR and STD-CPR groups underwent 8 minutes of asphyxia followed by different CPR techniques. The sham group had venous catheterization only. Physiological variables and arterial blood gases were recorded at baseline and during a 4-hour monitoring period. Neurological deficit scores (NDS) and cumulative survival rates were assessed at 24 h, 48 h, and 72 h. NDS, serum biomarkers and hippocampal neuron analysis were used to evaluate neurological outcomes. RESULTS: No statistical differences were observed in the return of spontaneous circulation (ROSC), 24-hour, 48-hour, and 72-hour survival rates between the AACD-CPR and STD-CPR groups. AACD-CPR rats had lower serum levels of neuron-specific enolase (NSE) and S100B at 72 hours post-ROSC, and higher NDS at 72 hours post-ROSC compared to STD-CPR animals. Cellular morphology analysis, H&E staining, and TUNEL/DAPI assays showed more viable neurons and fewer apoptotic neurons in the AACD-CPR group than in the STD-CPR group. CONCLUSIONS: AACD-CPR can achieve similar survival rates and better neurologic outcome after asphyxial cardiac arrest in rats with multiple rib fractures when compared to STD-CPR.

3. Intensive Care Med Exp. 2023 Nov 25;11(1):81. doi: 10.1186/s40635-023-00568-6.
Ultra-low tidal volume ventilation during cardiopulmonary resuscitation shows no mitigating effect on pulmonary end-organ damage compared to standard ventilation: insights from a porcine model.
Mohnke K(1), Conzelmann P(2), Renz M(2), Riedel J(2), Rissel R(2), Urmann A(2), Hain J(2), Duenges B(2), Ziebart A(2), Ruemmler R(2).
ABSTRACT
OBJECTIVE: This study aimed to determine whether ultra-low tidal volume ventilation (ULTVV) applied during cardiopulmonary resuscitation (CPR) compared with standard ventilation (intermittent positive pressure ventilation, IPPV) can reduce pulmonary end-organ damage in the post-resuscitation period. METHODS: A prospective, randomized trial was conducted using a porcine model (n = 45). The animals were divided into three groups: IPPV, ULTVV, and a sham control group. Juvenile male pigs underwent CPR after inducing ventricular fibrillation and received the designated ventilation intervention [IPPV: tidal volume 6-8 ml per kilogram body weight (ml/kg BW), respiratory rate 10/min, FiO2 1.0; ULTVV: tidal volume 2-3 ml/kg BW, respiratory rate 50/min, FiO2 1.0]. A 20-h observation period followed if return of spontaneous circulation was achieved. Histopathological examination using the diffuse alveolar damage scoring system was performed on postmortem lung

tissue samples. Arterial and venous blood gas analyses and ventilation/perfusion measurements via multiple inert gas elimination technique (MIGET) were repeatedly recorded during the experiment. RESULTS: Out of the 45 experiments conducted, 28 animals were excluded based on predefined criteria. Histopathological analysis showed no significant differences in lung damage between the ULTVV and IPPV groups. ULTVV demonstrated adequate oxygenation and decarboxylation. MIGET measurements during and after resuscitation revealed no significant differences between the intervention groups. CONCLUSION: In the short-term follow-up phase, ULTVV demonstrated similar histopathological changes and functional pulmonary parameters compared to standard ventilation. Further research is needed to investigate the long-term effects and clinical implications of ULTVV in resuscitation settings.

CASE REPORTS

1. Clin Exp Emerg Med. 2023 Nov 29. doi: 10.15441/ceem.23.084. Online ahead of print.
A case report of point-of-care ultrasound directed thrombectomy: a reversible cause of cardiac arrest managed with extracorporeal membrane oxygenation cannulation.
Hoffer M(1), Aziz S(2), Boniface K(1), Aziz JE(3), Pourmand A(1).
ABSTRACT
Extracorporeal membrane oxygenation (ECMO) has been increasingly employed in the emergency department for patients with a potentially reversible cause of cardiac arrest. We present the case of a young female patient with an in-hospital cardiac arrest who was found to have severe right heart strain on point-of-care ultrasound (POCUS), suggesting a massive pulmonary embolism. Rapid bedside diagnosis using ultrasound expedited bedside cannulation and initiation of ECMO as a bridge to surgical thrombectomy, and ultimately the patient survived with full neurologic function. With its ready availability and increasing acceptance by consultants, POCUS should be incorporated into cardiac arrest algorithms as the standard of care to rule in thrombotic and obstructive causes of cardiac arrest.

2. Front Cardiovasc Med. 2023 Nov 3;10:1240189. doi: 10.3389/fcvm.2023.1240189. eCollection 2023.
Case Report: Hypertrophic cardiomyopathy with recurrent episodes of ventricular fibrillation and concurrent sinus arrest.
Hamidi J(1), Winter J(2), Weber R(2), Dittmann S(1), Schulze-Bahr E(1).
ABSTRACT
BACKGROUND: Hypertrophic cardiomyopathy (HCM) is a serious hereditary cardiomyopathy. It is characterized morphologically by an increased left ventricular wall thickness and mass and functionally by enhanced global chamber function and myocellular contractility, diastolic dysfunction, and myocardial fibrosis development. Typically, patients with HCM experience atrial fibrillation (AF), syncope, and ventricular fibrillation (VF), causing severe symptoms and cardiac arrest. In contrast, sinoatrial node (SAN) arrest in the setting of HCM is uncommon. In particular, during VF, it has not been described so far. CASE SUMMARY: In this study, we report an 18-year-old woman patient with sudden cardiac arrest due to VF and successful cardiopulmonary resuscitation as the first clinical manifestation of non-obstructive HCM. Subsequently, a subcutaneous implantable cardioverter-defibrillator (ICD) was implanted for secondary VF prophylaxis. However, additional episodes of VF occurred. During these, device interrogation revealed a combined occurrence of VF, bradycardia, and SAN arrest, requiring a device exchange into a dual-chamber ICD. A heterozygous, pathogenic variant of the MYH7 gene (c.2155C>T; p.Arg719Trp) was identified as causative for HCM. DISCUSSION: First published in 1994, the particular MYH7 variant (p.Arg719Trp)

was described in HCM patients with a high incidence of premature cardiac death and a reduced life expectancy. Electrophysiological studies on HCM patients are mainly performed to treat AF and ventricular tachycardia. Further extraordinary arrhythmic phenotypes were reported only in a few HCM patients. Taken together, the present case with documented co-existing VF and SAN arrest is rare and also emphasizes addressing the presence of SAN arrest (in particular, during VF episodes) in HCM patients when a distinct ICD device is considered for implantation.

3. Clin Case Rep. 2023 Nov 27;11(12):e8203. doi: 10.1002/ccr3.8203. eCollection 2023 Dec.
Venoarterial extracorporeal membrane oxygenation in combination with Levosimendan as a bridge to recovery for a case of severe yew intoxication in a 13-year-old patient.
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ABSTRACT
In an adolescent patient with severe yew intoxication and consecutive cardiac arrest, non-responsive to conventional resuscitation necessitating extracorporeal life support, Levosimendan has been implemented in the early acute phase of hemodynamic stabilization, without obvious side effects. However, the additive value of this treatment in severe yew intoxication remains speculative.