This week's PubMed 23rd – 29th April 2023: articles of interest n = 48

CPR AND COVID-19

1. J Clin Med. 2023 Apr 10;12(8):2796. doi: 10.3390/jcm12082796.
Outcome of In-Hospital Cardiac Arrest among Patients with COVID-19: A Systematic Review and Meta-Analysis.
Shrestha DB(1), Sedhai YR(2), Dawadi S(3), Dhakal B(3), Shtembari J(1), Singh K(2), Acharya R(4), Basnyat S(5), Waheed I(2), Khan MS(6), Kazimuddin M(6), Patel NK(7), Kalahasty G(7), Bhave PD(8), Whalen P(8), Shantha G(8).
ABSTRACT
BACKGROUND: Outcomes following in-hospital cardiac arrest (IHCA) in patients with COVID-19 havebeen reported by several small single-institutional studies; however, there are no large studies contrasting COVID-19 IHCA with non-COVID-19 IHCA. The objective of this study was to compare the outcomes following IHCA between COVID-19 and non-COVID-19 patients. METHODS: We searched databases using predefined search terms and appropriate Boolean operators. All the relevant articles published till August 2022 were included in the analyses. The systematic review and meta-analysis were conducted as per Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) guidelines. An odds ratio with a 95% confidence interval (CI) was used to measure effects. RESULTS: Among 855 studies screened, 6 studies with 27,453 IHCA patients (63.84% male) with COVID-19 and 20,766 (59.7% male) without COVID-19 were included in the analysis. IHCA among patients with COVID-19 has lower odds of achieving return of spontaneous circulation (ROSC) (OR: 0.66, 95% CI: 0.62-0.70). Similarly, patients with COVID-19 have higher odds of 30-day mortality following IHCA (OR: 2.26, 95% CI: 2.08-2.45) and have 45% lower odds of cardiac arrest because of a shockable rhythm (OR: 0.55, 95% CI: 0.50-0.60) (9.59% vs. 16.39%). COVID-19 patients less commonly underwent targeted temperature management (TTM) or coronary angiography; however, they were more commonly intubated and on vasopressor therapy as compared to patients who did not have a COVID-19 infection. CONCLUSIONS: This meta-analysis showed that IHCA with COVID-19 has a higher mortality and lower rates of ROSC compared with non-COVID-19 IHCA. COVID-19 is an independent risk factor for poor outcomes in IHCA patients.

2. Circulation. 2023 Apr 25;147(17):1309-1311. doi: 10.1161/CIRCULATIONAHA.122.063753. Epub 2023 Apr 24.
No Association Between Out-of-Hospital Cardiac Arrest and COVID-19 Vaccination.
Paratz ED(1)(2), Nehme Z(2), Stub D(2)(3), La Gerche A(1).
NO ABSTRACT AVAILABLE

3. Eur J Intern Med. 2023 May;111:122-123. doi: 10.1016/j.ejim.2023.01.004. Epub 2023 Jan 5.
Outcomes of patients with cardiac arrest with and without COVID-19 in the United States.
Bansal A(1), Faisaluddin M(2), Nair R(3), Agarwal S(4).
NO ABSTRACT AVAILABLE

CPR/MECHANICAL CHEST COMPRESSION

No articles identified.

REGISTRIES, REVIEWS AND EDITORIALS

1. J Clin Med. 2023 Apr 20;12(8):3009. doi: 10.3390/jcm12083009.

Developments in Post-Resuscitation Care for Out-of-Hospital Cardiac Arrests in Adults-A Narrative Review.

Katzenschlager S(1), Popp E(1), Wnent J(2)(3)(4), Weigand MA(1), Gräsner JT(2)(3).

ABSTRACT

This review focuses on current developments in post-resuscitation care for adults with an out-of-hospital cardiac arrest (OHCA). As the incidence of OHCA is high and with a low percentage of survival, it remains a challenge to treat those who survive the initial phase and regain spontaneous circulation. Early titration of oxygen in the out-of-hospital phase is not associated with increased survival and should be avoided. Once the patient is admitted, the oxygen fraction can be reduced. To maintain an adequate blood pressure and urine output, noradrenaline is the preferred agent over adrenaline. A higher blood pressure target is not associated with higher rates of good neurological survival. Early neuro-prognostication remains a challenge, and prognostication bundles should be used. Established bundles could be extended by novel biomarkers and methods in the upcoming years. Whole blood transcriptome analysis has shown to reliably predict neurological survival in two feasibility studies. This needs further investigation in larger cohorts.

2. Lakartidningen. 2023 Apr 25;120:22142.

[Let »Do-Not-Attempt-Cardiopulmonary Resuscitation« decisions be well grounded].

[Article in Swedish]

Djärv T(1), Piscator E(2).

ABSTRACT

Ethical decisions such as "Do-Not-Attempt -Cardiopulmonary Resuscitation" (DNACPR) are much more common than actual resuscitation attempts of an in-hospital cardiac arrest (IHCA). Currently, no risk profiles for who will suffer an IHCA exit, neither has any published prediction model for survival after IHCA been accurate enough for clinical implementation. Swedish law implies that we should consult patients and/or relatives and a licensed colleague when making these decisions, which currently is fulfilled in a minority of the patients. Frailty has emerged as a strong predictor of outcome after IHCA. However, a recent study performed by the authors has shown preserved neurological function in 87% of frail patients suffering IHCA. This challenges the concept of identifying what lies in the best interest of the patient. Let DNACPR decisions be well-grounded with thorough assessment of prognosis, balanced against the patients' values and in consultation with another licenced caregiver.

3. Curr Opin Crit Care. 2023 Apr 25. doi: 10.1097/MCC.0000000000001051. Online ahead of print.

Public access defibrillation: challenges and new solutions.

Folke F(1)(2)(3), Shahriari P(1)(2), Hansen CM(1)(4), Gregers MCT(1)(2).

ABSTRACT

PURPOSE OF REVIEW: The purpose of this article is to review the current status of public access defibrillation and the various utility modalities of early defibrillation. RECENT FINDINGS: Defibrillation with on-site automated external defibrillators (AEDs) has been the conventional approach for public access defibrillation. This strategy is highly effective in cardiac arrests occurring in close proximity to on-site AEDs; however, only a few cardiac arrests will be covered by this strategy. During the last decades, additional strategies for public access defibrillation have developed, including volunteer responder programmes and drone assisted AED-delivery. These programs have increased chances of early defibrillation within a greater radius, which remains an important factor for survival after out-of-hospital cardiac arrest. SUMMARY: Recent advances in the

use of public access defibrillation show great potential for optimizing early defibrillation. With new technological solutions, AEDs can be transported to the cardiac arrest location reaching OHCAs in both public and private locations. Furthermore, new technological innovations could potentially identify and automatically alert the emergency medical services in nonwitnessed OHCA previously left untreated.

4. Resuscitation. 2023 Apr 21:109802. doi: 10.1016/j.resuscitation.2023.109802. Online ahead of print.

Long-term outcome in pediatric cardiac arrest survivors: not without a neuro-prognostication guideline and structured follow-up until young adulthood.

Hunfeld M(1), Buysse CMP(2).

NO ABSTRACT AVAILABLE

5. Resuscitation. 2023 Apr 21:109803. doi: 10.1016/j.resuscitation.2023.109803. Online ahead of print.

An unbroken ring of the chain of survival.

Norii T(1), Igarashi Y(2).

ABSTRACT

This is a commentary on the study conducted by Kennedy et al. from Victoria, Australia, that analyzed the cohort of all adult EMS-witnessed out-of-hospital cardiac arrest (OHCA) patients in the region and compared patients treated during the COVID-19 period to a historical comparator period. The commentary summarizes the study findings and discusses the importance of the study in the context of the chain of survival and changes in airway management for OHCA patients during the COVID-19 pandemic.

6. Resuscitation. 2023 Apr 21:109805. doi: 10.1016/j.resuscitation.2023.109805. Online ahead of print.

Use of healthcare services before and after out-of-hospital cardiac arrest.

Alm-Kruse K(1), Tjelmeland I(2), Reiner A(3), Kvåle R(4), Kramer-Johansen J(5).

ABSTRACT

INTRODUCTION: Knowledge about the use of healthcare services in patients experiencing out-of-hospital cardiac arrest (OHCA) is limited. We aimed to describe and compare the use of healthcare by OHCA survivors two years before and one year after cardiac arrest. METHODS: Adult patients with OHCA of medical cause, who survived >30 days, were identified in the Norwegian Cardiac Arrest Registry. The Norwegian Patient Registry, The Cause of Death Registry, and The Norwegian Registry for Primary Healthcare provided data on survival and the use of healthcare services. We investigated the use of primary, specialist and mental healthcare, as well as rehabilitation services. RESULTS: In 2015-2018, 13,112 OHCA cases were identified; 1435 (14%) patients survived >30 days (6.8/100,000 patients/year). The proportion of patients in the cohort that used primary healthcare each month increased form 43% before to 69% after OHCAto ($p<0.001$). We found a doubling of monthly healthcare contacts in both specialist healthcare (from 26% to 57%, $p<0.001$) and mental healthcare (from 3% to 8%, $p>0.001$). The observed increases in primary, specialist and mental healthcare use started two weeks, six months, and eight months before OHCA, respectively. Half of the patients had contact with primary healthcare services on the same day as the cardiac arrest. Two out of five patients were registered for rehabilitation after OHCA. CONCLUSION: The use of primary, specialist and mental healthcare services increased before OHCA and remained significantly higher the year after OHCA. Less than half of the patients surviving cardiac arrest were registered for rehabilitation.

7. CJEM. 2023 Apr 23. doi: 10.1007/s43678-023-00501-6. Online ahead of print.
Does targeting a higher versus lower MAP improve survival following out-of-hospital cardiac arrest?
Wudwud A(1), Hendin A(2), Perry J(3).
NO ABSTRACT AVAILABLE

8. Medicine (Baltimore). 2023 Apr 21;102(16):e33029. doi: 10.1097/MD.0000000000033029.
Characteristics of sudden death by clinical criteria.
Sefton C(1), Keen S(2), Tybout C(3), Lin FC(4), Jiang H(4), Joodi G(5), Williams JG(6), Simpson RJ Jr(7).
ABSTRACT
Sudden death is a leading cause of deaths nationally. Definitions of sudden death vary greatly, resulting in imprecise estimates of its frequency and incomplete knowledge of its risk factors. The degree to which time-based and coronary artery disease (CAD) criteria impacts estimates of sudden death frequency and risk factors is unknown. Here, we apply these criteria to a registry of all-cause sudden death to assess its impact on sudden death frequency and risk factors. The sudden unexpected death in North Carolina (SUDDEN) project is a registry of out of-hospital, adjudicated, sudden unexpected deaths attended by Emergency Medical Services. Deaths were not excluded by time since last seen or alive or by prior symptoms or diagnosis of CAD. Common criteria for sudden death based on time since last seen alive (both 24 hours and 1 hour) and prior diagnosis of CAD were applied to the SUDDEN case registry. The proportion of cases satisfying each of the 4 criteria was calculated. Characteristics of victims within each restrictive set of criteria were measured and compared to the SUDDEN registry. There were 296 qualifying sudden deaths. Application of 24 hour and 1 hour timing criteria compared to no timing criteria reduced cases by 25.0% and 69.6%, respectively. Addition of CAD criteria to each timing criterion further reduced qualifying cases, for a total reduction of 81.8% and 90.5%, respectively. However, characteristics among victims meeting restrictive criteria remained similar to the unrestricted population. Timing and CAD criteria dramatically reduces estimates of the number of sudden deaths without significantly impacting victim characteristics.

9. Arterioscler Thromb Vasc Biol. 2023 May;43(5):793-795. doi: 10.1161/ATVBAHA.123.319136. Epub 2023 Mar 30.
Sudden Cardiac Death of an Unusual Kind: Spontaneous Coronary Artery Dissection in Young Women.
Lüscher TF(1).
NO ABSTRACT AVAILABLE

10. Radiology. 2023 May;307(3):e230323. doi: 10.1148/radiol.230323. Epub 2023 Mar 14.
Myocardial T1 Mapping to Identify Risk of Sudden Death in Heart Failure.
Sakuma H(1).
NO ABSTRACT AVAILABLE

IN-HOSPITAL CARDIAC ARREST

1. Eur J Emerg Med. 2023 Apr 28. doi: 10.1097/MEJ.0000000000001031. Online ahead of print.
The value of a machine learning algorithm to predict adverse short-term outcome during resuscitation of patients with in-hospital cardiac arrest: a retrospective study.
Dünser MW(1), Hirschl D, Weh B, Meier J, Tschoellitsch T.
ABSTRACT

Guidelines recommend that hospital emergency teams locally validate criteria for termination of cardiopulmonary resuscitation in patients with in-hospital cardiac arrest (IHCA). To determine the value of a machine learning algorithm to predict failure to achieve return of spontaneous circulation (ROSC) and unfavourable functional outcome from IHCA using only data readily available at emergency team arrival. This is a retrospective cohort study. Adults who experienced an IHCA were attended to by the emergency team. Demographic and clinical data typically available at the arrival of the emergency team were extracted from the institutional IHCA database. In addition, outcome data including the Cerebral Performance Category (CPC) score count at hospital discharge were collected. A model selection procedure for random forests with a hyperparameter search was employed to develop two classification algorithms to predict failure to achieve ROSC and unfavourable (CPC 3-5) functional outcomes. Six hundred thirty patients were included, of which 390 failed to achieve ROSC (61.9%). The final classification model to predict failure to achieve ROSC had an area under the receiver operating characteristic curve of 0.9 [95% confidence interval (CI), 0.89-0.9], a balanced accuracy of 0.77 (95% CI, 0.75-0.79), an F1-score of 0.78 (95% CI, 0.76-0.79), a positive predictive value of 0.88 (0.86-0.91), a negative predictive value of 0.61 (0.6-0.63), a sensitivity of 0.69 (0.66-0.72), and a specificity of 0.84 (0.8-0.88). Five hundred fifty-nine subjects experienced an unfavourable outcome (88.7%). The final classification model to predict unfavourable functional outcomes from IHCA at hospital discharge had an area under the receiver operating characteristic curve of 0.93 (95% CI, 0.92-0.93), a balanced accuracy of 0.59 (95% CI, 0.57-0.61), an F1-score of 0.94 (95% CI, 0.94-0.95), a positive predictive value of 0.91 (0.9-0.91), a negative predictive value of 0.57 (0.48-0.66), a sensitivity of 0.98 (0.97-0.99), and a specificity of 0.2 (0.16-0.24). Using data readily available at emergency team arrival, machine learning algorithms had a high predictive power to forecast failure to achieve ROSC and unfavourable functional outcomes from IHCA while cardiopulmonary resuscitation was still ongoing; however, the positive predictive value of both models was not high enough to allow for early termination of resuscitation efforts.

2. Intern Emerg Med. 2023 Apr 28. doi: 10.1007/s11739-023-03271-2. Online ahead of print.
Predicting the probability of good neurological outcome after in-hospital cardiac arrest based on prearrest factors: validation of the good outcome following attempted resuscitation 2 (GO-FAR 2) score.
Kim B(1), Hong SI(1), Kim YJ(1), Cho YJ(2), Kim WY(3).
ABSTRACT
The Good Outcome Following Attempted Resuscitation (GO-FAR) 2 score is a prognostic tool developed to support decision-making for do-not-attempt-resuscitation (DNAR) orders by predicting neurological outcomes after in-hospital cardiac arrest (IHCA) based on prearrest variables. However, this scoring system requires further validation. We aimed to validate the GO-FAR 2 score for predicting good neurological outcome in Korean patients with IHCA. A single-centre registry of adult patients with IHCA from 2013 to 2017 was analysed. The primary outcome was discharge with good neurological outcome (Cerebral Performance Category score of 1 or 2). The patients were divided into four categories according to the GO-FAR 2 score: very poor (≥ 5), poor (2-4), average (- 3 to 1), and above-average (< - 3) likelihood of good neurological outcome. Of 1,011 patients (median age, 65 years), 63.1% were men. The rate of good neurological outcome was 16.0%. The proportions of patients categorised as having very poor, poor, average, and above-average probability of good neurological outcome were 3.9%, 18.3%, 70.2%, and 7.6%, respectively. In each category, good neurological outcome was observed in 0%, 1.1%, 16.8%, and 53.2%, respectively. Among patients in below-average categories (very poor + poor, GO-FAR 2 score ≥ 2), only 0.9% had good outcome. GO-FAR 2 score ≥ 2 showed a sensitivity of 98.8% and a negative predictive value of 99.1% in predicting good neurological outcome. The GO-FAR 2 score can predict neurological outcome after IHCA. In particular, GO-FAR 2 score ≥ 2 may support decision-making for DNAR orders.

INJURIES AND CPR

No articles identified.

CAUSE OF THE ARREST

1. Eur Heart J Suppl. 2023 Apr 21;25(Suppl B):B16-B20. doi: 10.1093/eurheartjsupp/suad077. eCollection 2023 Apr.

Causes of sudden death.

De Gaspari M(1), Rizzo S(1), Thiene G(1), Basso C(1).

ABSTRACT

Sudden cardiac death (SCD) pathophysiological point of view can be either mechanical or electrical. In case of mechanical SCD, the most frequent causes are pulmonary thromboembolism and cardiac tamponade due to intrapericardial rupture (aortic dissection, heart rupture). This distinction is important because cardiac arrest retains survival potential through cardiopulmonary resuscitation and defibrillators only if the rhythm is shockable. The heart diseases that can cause SCD vary according to the age of the individual. In young people, primary electrical diseases ('ion channel diseases') and cardiomyopathies (particularly hypertrophic and arrhythmogenic), both genetically determined and therefore potentially recurred in the proband's family, as well as myocarditis and coronary anomalies prevail; in adult-elderly populations, coronary atherosclerosis with its complications and degenerative valve diseases (aortic stenosis and mitral valve prolapse) predominate. In this short text, the main structural heart diseases characterized by electrical instability at risk of SCD will be recalled, with a focus on coronary, myocardial, and valvular diseases.

2. PLoS One. 2023 Apr 20;18(4):e0284515. doi: 10.1371/journal.pone.0284515. eCollection 2023.

Causes and characteristics of unexpected sudden cardiac death in octogenarians/nonagenarians.

Puolitaival E(1), Vähätalo J(1), Holmström L(1), Haukilahti MAE(1), Pakanen L(2)(3), Ukkola OH(1), Junttila MJ(1), Huikuri HV(1), Perkiömäki JS(1).

ABSTRACT

INTRODUCTION: The risk for sudden cardiac death (SCD) increases with ageing. METHODS: We evaluated causes and characteristics of unexpected SCD in SCD victims aged ≥ 80 years in a consecutive series of 5,869 SCD victims in Northern Finland. All the victims underwent medico-legal autopsy as medico-legal autopsy is mandatory in cases of unexpected sudden death in Finland. All the non-cardiac deaths such as pulmonary embolism and cerebral hemorrhage were excluded from the study, as were unnatural deaths such as intoxications. RESULTS: Among SCD victims ≥ 80 years, 91.0% of SCDs were due to ischemic heart disease (IHD) determined in autopsy and 9.0% due to non-ischemic heart disease (NIHD), whereas among those < 80 years, only 72.6% of SCDs were due to IHD and 27.4% due to NIHD (P < .001). Severe fibrosis in myocardium was more common whereas heart weight and liver weight, body mass index and abdominal fat thickness, were lower among SCD victims aged ≥ 80 years than among victims aged < 80 years. In those with IHD as etiology of SCD, at least 75% stenosis in one or more major coronary vessels was more common in SCD victims aged ≥ 80 years than among victims aged < 80 years (P = .001). SCD victims 80 years or older were less likely to die during physical activity than those under 80 years old (5.6% vs. 15.9%, P < .001). Dying in sauna was more common among those ≥ 80 years than among those < 80 years (5.5% vs. 2.6%, P < .001). CONCLUSION: In victims of unexpected SCD aged ≥ 80 years, the autopsy-based etiology of SCD was more commonly IHD than in those aged < 80 years. In SCD victims aged ≥ 80 years, severe fibrosis in myocardium, representing arrhythmic substrate, was more common than in the younger ones.

3. Front Cardiovasc Med. 2023 Apr 11;10:1074432. doi: 10.3389/fcvm.2023.1074432. eCollection 2023.

Impact of sex and role of coronary artery disease in out-of-hospital cardiac arrest presenting with refractory ventricular arrhythmias.

Caputo ML(1), Baldi E(2), Krüll JD(1), Pongan D(1), Cresta R(3), Benvenuti C(3), Cianella R(4), Primi R(2), Currao A(2), Bendotti S(2), Compagnoni S(2)(5), Gentile FR(2)(5), Anselmi L(4), Savastano S(2), Klersy C(6), Auricchio A(1).

ABSTRACT

INTRODUCTION: There are limited data on sex-related differences in out-of hospital cardiac arrests (OHCAs) with refractory ventricular arrhythmias (VA) and, in particular, about their relationship with cardiovascular risk profile and severity of coronary artery disease (CAD). PURPOSE: Aim of this study was to characterize sex-related differences in clinical presentation, cardiovascular risk profile, CAD prevalence, and outcome in OHCA victims presenting with refractory VA. METHODS: All OHCAs with shockable rhythm that occurred between 2015 and 2019 in the province of Pavia (Italy) and in the Canton Ticino (Switzerland) were included. RESULTS: Out of 680 OHCAs with first shockable rhythm, 216 (33%) had a refractory VA. OHCA patients with refractory VA were younger and more often male. Males with refractory VA had more often a history of CAD (37% vs. 21%, p 0.03). In females, refractory VA were less frequent (M : F ratio 5 : 1) and no significant differences in cardiovascular risk factor prevalence or clinical presentation were observed. Male patients with refractory VA had a significantly lower survival at hospital admission and at 30 days as compared to males without refractory VA (45% vs. 64%, $p < 0.001$ and 24% vs. 49%, $p < 0.001$, respectively). Whereas in females, no significant survival difference was observed. CONCLUSIONS: In OHCA patients presenting with refractory VA the prognosis was significantly poorer for male patients. The refractoriness of arrhythmic events in the male population was probably due to a more complex cardiovascular profile and in particular due to a pre-existing CAD. In females, OHCA with refractory VA were less frequent and no correlation with a specific cardiovascular risk profile was observed.

END-TIDAL CO_2

1. Resuscitation. 2023 Apr 21:109807. doi: 10.1016/j.resuscitation.2023.109807. Online ahead of print.

Clinician-Reported Physiologic Monitoring of Cardiopulmonary Resuscitation Quality During Pediatric In-Hospital Cardiac Arrest: A Propensity-Weighted Cohort Study.

Kienzle MF(1), Morgan RW(2), Alvey JS(3), Reeder R(3), Berg RA(2), Nadkarni V(2), Topjian AA(2), Lasa JJ(4), Raymond TT(5), Sutton RM(2); American Heart Association's Get With The Guidelines®-Resuscitation Investigators.

ABSTRACT

AIMS: The primary objective was to determine the association between clinician-reported use of end-tidal CO2 (ETCO2) or diastolic blood pressure (DBP) to monitor cardiopulmonary resuscitation (CPR) quality during pediatric in-hospital cardiac arrest (pIHCA) and survival outcomes. DESIGN: A retrospective cohort study was performed in two cohorts: 1) Patients with an invasive airway in place at the time of arrest to evaluate ETCO2 use, and 2) patients with an arterial line in place at the time of arrest to evaluate DBP use. The primary exposure was clinician-reported use of ETCO2 or DBP. The primary outcome was return of spontaneous circulation (ROSC). Propensity-weighted logistic regression evaluated the association between monitoring and outcomes. SETTING: Hospitals reporting to the American Heart Association's Get With The Guidelines®- Resuscitation registry (2007-2021). PATIENTS: Children with index IHCA with an invasive airway or arterial line at the time of arrest. RESULTS: Between January 2007 and May 2021, there were 15,280 pediatric CPR events

with an invasive airway or arterial line in place at the time of arrest. Of 7159 events with an invasive airway, 6829 were eligible for analysis. Of 2978 events with an arterial line, 2886 were eligible. Clinicians reported using ETCO2 in 1335/6829 (20%) arrests and DBP in 1041/2886 (36%). Neither exposure was associated with ROSC. ETCO2 monitoring was associated with higher odds of 24-hour survival (aOR 1.17 [1.02, 1.35], p = 0.03). CONCLUSIONS: Neither clinician-reported ETCO2 monitoring nor DBP monitoring during pIHCA were associated with ROSC. Monitoring of ETCO2 was associated with 24-hour survival.

ORGAN DONATION

No articles identified.

FEEDBACK

No articles identified.

DRUGS

1. Am J Emerg Med. 2023 May;67:63-69. doi: 10.1016/j.ajem.2023.02.003. Epub 2023 Feb 7.
Epinephrine administration in adults with out-of-hospital cardiac arrest: A comparison between intraosseous and intravenous route.
Yang SC(1), Hsu YH(1), Chang YH(1), Chien LT(1), Chen IC(2), Chiang WC(3).
ABSTRACT
INTRODUCTION: The benefits and risks of the intraosseous (IO) route for vascular access in patients with out-of-hospital cardiac arrest (OHCA) remain controversial. This study compares the success rates of establishing the access route, epinephrine administration rates, and time-to-epinephrine between adult patients with OHCA with IO access and those with intravenous (IV) access established by paramedics in the prehospital setting. METHODS: This was a retrospective study conducted by the San-Min station of Taoyuan Fire Department. Data for IV access were collected between January 1, 2020, and December 31, 2020. Data for IO access were collected between January 1, 2021, and March 10, 2021. Inclusion criteria were adult patients with OHCA who received on-scene resuscitation attempts and in whom either IV or IO route access was established by paramedics. Exclusion criteria were missing data, return of spontaneous circulation before establishing vascular access, cardiac arrest en route to hospital, patients not resuscitated, and OHCA unidentified by the dispatcher. Exposure was defined as IV route vs. IO route (EZ-IO®). The outcome measurements were per-patient based success rates of route establishment (successes/attempts), administration rates of epinephrine (epinephrine administered per case/enrolled OHCAs), and odds ratios of IV versus IO on epinephrine administration. We used nonparametric Mann-Whitney rank sum tests for the analysis in continuous variables and Fisher's exact tests for the analysis of categorical variables and the outcomes. Firth logistic regression method was used for sparse data. Factors associated with epinephrine administration other than vascular access were also analyzed. Time-to-epinephrine (defined as time from paramedic arrival to epinephrine injection) was reviewed and calculated by two independent observers and the Kaplan-Meier method was used to compare the two access routes. RESULTS: A total of 112 adult patients were enrolled in the analysis, including 71 men and 41 women, with an average age of 67 years. There were 90 IV access cases and 22 IO access cases. The groups were compared for median success rates of route establishment (33% vs. 100%, P < 0.001) and administration rates of epinephrine (52% vs. 100%, P < 0.001). The adjusted

odds ratio of IO versus IV was 32.445, 95% confidence interval (CI) of 1.844-570.861. Time-to-epinephrine was significantly shorter in the cumulative time-event analysis by the Kaplan-Meier method (P < 0.001). CONCLUSION: The IO route was significantly associated with higher success rates of route establishment, epinephrine administration, and shorter time-to-epinephrine in the prehospital resuscitation of adult patients with OHCA.

TRAUMA

No articles identified.

VENTILATION

1. Resuscitation. 2023 Apr 27:109812. doi: 10.1016/j.resuscitation.2023.109812. Online ahead of print.

A retrospective comparison of the King Laryngeal Tube and iGel supraglottic airway devices: a study for the CARES surveillance group.

Smida T(1), Menegazzi J(2), Scheidler J(3), Martin PS(3), Salcido D(2), Bardes J(4); CARES Surveillance Group.

ABSTRACT

OBJECTIVE: Supraglottic airway devices are increasingly used during the resuscitation of out-of-hospital cardiac arrest (OHCA) patients in the United States and worldwide. In this study, we aimed to compare the neurologic outcomes of OHCA patients managed with the King Laryngeal Tube (King LT) to the neurologic outcomes of patients managed with the iGel. METHODS: We used the Cardiac Arrest Registry to Enhance Survival (CARES) public use research dataset for our analysis. Non-traumatic OHCA cases with attempted EMS resuscitation enrolled from 2013-2021 were included. We used two-level mixed effects multivariable logistic regression analyses with treating EMS agency as the random effect to determine the association between supraglottic airway device and outcome. The primary outcome was survival with a Cerebral Performance Category (CPC) score of 1 or 2 at discharge. Secondary outcomes included survival to hospital admission and survival to hospital discharge. Age, sex, calendar year of OHCA, initial ECG rhythm, witnessed status (unwitnessed, bystander witnessed, 9-1-1 responder witnessed), bystander CPR, response interval, and OHCA location (private/home, public, institutional) were used as covariables. RESULTS: In comparison to use of the King LT, use of the iGel was associated with greater neurologically favorable survival (aOR: 1.45 [1.33, 1.58]). In addition, use of the iGel was associated with greater survival to hospital admission (1.07 [1.02, 1.12]) and survival to hospital discharge (1.35 [1.26, 1.46]). CONCLUSIONS: This study adds to the body of literature suggesting that use of the iGel during OHCA resuscitation is associated with better outcomes than use of the King LT.

2. Resuscitation. 2023 Apr 25:109811. doi: 10.1016/j.resuscitation.2023.109811. Online ahead of print.

Ventilation During CPR: A Challenge to Guidelines and a Call for Research on Lingering Scientific Gaps.

Gazmuri RJ(1), Ayoub I(2).

NO ABSTRACT AVAILABLE

CERERBRAL MONITORING

No articles identified.

ULTRASOUND AND CPR

1. Ann Emerg Med. 2023 May;81(5):523-531. doi: 10.1016/j.annemergmed.2022.12.002. Epub 2023 Feb 7.

Femoral Arterial Doppler Use During Active Cardiopulmonary Resuscitation.

Gaspari RJ(1), Lindsay R(2), Dowd A(2), Gleeson T(2).

ABSTRACT

STUDY OBJECTIVE: This study explored femoral arterial Doppler during active cardiopulmonary resuscitation (CPR) to identify and characterize the resumptions of cardiac activity without stopping CPR. METHODS: This was a proof-of-concept study exploring arterial Doppler during cardiac arrest. Patients in cardiac arrest undergoing active CPR were prospectively enrolled. Arterial Doppler of the common femoral artery was recorded during CPR and during pauses in CPR. CPR-induced arterial tracings and native cardiac-induced tracings were analyzed for rate and peak systolic velocity. Cardiac activity on echocardiogram during pause in CPR was classified as "absent," "disorganized," or "organized." Descriptive data and survival are presented as mean and 95% confidence intervals (CI), as well as sensitivity and specificity of Doppler during active CPR in detecting native cardiac pulsations. RESULTS: Sixteen patients with 48 paired Doppler recordings during active CPR, pause in CPR, and associated echocardiogram were enrolled. Native cardiac-induced tracings were visible during 39.6% of pauses in CPR (19 of 48) and during 18.8% of the periods of active CPR (9 of 48). Arterial pulsations were more frequently visualized with organized contractions by echocardiogram (10 of 14, 71%) than disorganized contractions (9 of 22, 41%). Arterial Doppler was 100% specific and 50% sensitive in detecting organized cardiac activity during active CPR. Patients with visible native cardiac pulsations during active CPR demonstrated 0% mortality compared with 67% mortality without visible arterial pulsations. CONCLUSION: Arterial Doppler tracings may identify the resumption of native cardiac activity during active CPR; however, more research is needed.

2. Cardiol J. 2023;30(2):237-246. doi: 10.5603/CJ.a2021.0044. Epub 2021 May 4.

Diagnostic performance of point-of-use ultrasound of resuscitation outcomes: A systematic review and meta-analysis of 3265 patients.

Dudek M(1), Szarpak L(2)(1), Peacock FW(3), Gasecka A(4)(5), Michalski T(6), Wroblewski P(7), Kaminska H(8), Borkowska G(9), Skrzypek E(10), Smereka A(11), Meyer-Szary J(12), Marciniak S(13), Malecka M(14)(1).

ABSTRACT

BACKGROUND: Echocardiography in the setting of resuscitation can provide information as to the cause of the cardiac arrest, as well as indicators of futility. This systematic review and meta-analysis were performed to determine the value of point-of-care ultrasonography (PoCUS) in the assessment of survival for adult patients with cardiac arrest. METHODS: This meta-analysis was performed in adherence to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. PubMed, EMBASE, Web of Science, Cochrane have been searched from databases inception until March 2nd 2021. The search was limited to adult patients with cardiac arrest and without publication dates or country restrictions. Papers were chosen if they met the required criteria relating to the sensitivity, specificity, accuracy, positive predictive value, and negative predictive value of this diagnostic technique concerning resuscitation outcomes. RESULTS: This systematic review identified 20 studies. Overall, for survival to hospital discharge, PoCUS was 6.2% sensitivity (95% confidence interval [CI] 4.7-8.0%) and 2.1% specific (95% CI 0.8-4.2%). PoCUS sensitivity and specificity for return of spontaneous circulation were 23.8% (95% CI 21.4-26.4%) and 50.7% (95% CI 45.8-55.7%) respectively, and for survival to admission 13.8% (95% CI 12.2-15.5%) and 20.1% (95% CI 16.2-24.3%), respectively. CONCLUSIONS: The results do not allow unambiguous

recommendation of PoCUS as a predictor of resuscitation outcomes and further studies based on a large number of patients with full standardization of operators, their training and procedures performed were necessary.

3. Ann Emerg Med. 2023 May;81(5):532-542. doi: 10.1016/j.annemergmed.2022.09.016. Epub 2022 Nov 2.
Managing Cardiac Arrest Using Ultrasound.
Gottlieb M(1), Alerhand S(2).
NO ABSTRACT AVAILABLE

ORGANISATION AND TRAINING

1. Ann Med Surg (Lond). 2023 Mar 16;85(4):684-688. doi: 10.1097/MS9.0000000000000273. eCollection 2023 Apr.
Basic life support knowledge among healthcare providers in Afghanistan: a cross-sectional study of current competencies and areas for improvement.
Nemat A(1)(2)(3), Nedaie MH(2), Essar MY(4), Ashworth H(5), Aminpoor H(4), Sediqi AW(1), Mowlabaccus WB(6), Ahmad S(7).
ABSTRACT
Basic life support (BLS) is a type of emergency care provided by healthcare workers and public safety professionals to individuals experiencing cardiac arrest, respiratory distress, or other cardio-pulmonary emergencies. Despite having a high burden of cardiovascular disease and trauma from conflict in Afghanistan, little is known about the level of BLS knowledge Afghani healthcare workers have. A cross-sectional study was conducted in Kabul, Afghanistan, to assess healthcare workers' training and knowledge of BLS. The study, which took place from March to June 2022 across multiple public and private hospitals, was approved by the institutional ethics committee of Ariana Medical Complex. The sample size was calculated using a nonprobability convenience sampling method, and the study population consisted of healthcare workers actively working in a health center who were willing to complete a questionnaire. The results of the study showed that most participants (71.3%) were in the 21-30-year-old age range, and a third (32.3%) were doctors. 95.3% of participants had poor knowledge of BLS, with a mean score of 4.47±1.58 out of 13. Additionally, it was evident from questionnaire responses that providers are not adequately performing BLS. These findings suggest that further work, including regular BLS courses, is necessary to improve the knowledge and practice of BLS by healthcare workers in Afghanistan.

2. Arq Bras Cardiol. 2023 Apr 21;120(4):e20220411. doi: 10.36660/abc.20220411. eCollection 2023.
Cardiac Magnetic Resonance as an Etiological Diagnosis Tool in Recovered Sudden Cardiac Death or Unstable Ventricular Arrhythmia Patients.
Marçal PC(1), Braggion-Santos MF(1), Wada DT(2), Santos MK(2), Moreira HT(1), Volpe GJ(1), Schmidt A(1).
ABSTRACT
BACKGROUND: Cardiac magnetic resonance (CMR) has an increasing diagnostic relevance in survivors of sudden cardiac death (SCD) or unstable ventricular arrhythmia (UVA) in developed countries. OBJECTIVE: To evaluate retrospectively the additional role of CMR in a developing country where few resources are available, and should be used more effectively. METHODS: The study included SCD or UVA survivors admitted between 2009 and 2019 at a tertiary academic institution referred to CMR. Demographic, clinical, and laboratory data were collected from the medical records. CMR images and reports were reviewed and their impact on the final etiological diagnosis

was determined. A descriptive analysis was performed and p<0.05 established as significant. RESULTS: Sixty-four patients, 54.9±15.4 years old, and 42 (71.9%) males. Most events (81.3%) were out of the hospital and ventricular tachycardia was the most common rhythm. Cardiovascular medications were previously used by 55 patients, and beta-blockers were the most used medications (37.5%). Electrocardiogram had electrical inactive areas in 21.9% and all of them had fibrosis at CMR. Mean left ventricular ejection fraction (LVEF) was 44±14%, with 60.9% ≤50% and only 29.7% ≤35%. Late gadolinium enhancement was identified in 71.9%, with a transmural pattern in 43.8%. Chagas cardiomyopathy was the most common etiology (28.1%), followed by ischemic cardiomyopathy (17.2%). Among 26 without a previously identified etiology, CMR could define it (15 patients - 57%). CONCLUSION: In accordance with previous studies in developed countries, CMR was capable of increasing etiological diagnosis and identifying the arrhythmogenic substrate, allowing better care in half of the underdiagnosed patients.

3. Resusc Plus. 2023 Apr 7;14:100384. doi: 10.1016/j.resplu.2023.100384. eCollection 2023 Jun.
Automated external defibrillator delivery by drone in mountainous regions to support basic life support - A simulation study.
Fischer P(1), Rohrer U(1), Nürnberger P(2), Manninger M(1), Scherr D(1), von Lewinski D(1), Zirlik A(1), Wankmüller C(2)(3), Kolesnik E(1)(2).
ABSTRACT
BACKGROUND: Out-of-hospital cardiac arrest (OHCA) is associated with poor survival rates. Factors that may enable survival include cardiopulmonary resuscitation (CPR) initiated by bystanders and early use of an automated external defibrillator (AED). This explorative simulation study was conceptualized to test the feasibility of a semi-autonomously operating drone that delivers an AED to a remote emergency location and its bystander-use. METHODS: Ten paramedics and nineteen laypersons were confronted with a manikin simulating an OHCA as single bystanders within a field test located in a mountainous region between Austria and Slovenia. The scenario included a mock-call to the local emergency response center that dispatched a drone towards the caller's GPS coordinates and supported the ongoing CPR. The outcomes were the successful delivery of the AED, the time to the first shock, hands-off times, and the overall performance of the CPR. RESULTS: The AED was delivered by drone and used in all 29 scenarios without serious adverse events. The flight time of the drone was in median 5:20 (range: 1:35-8:19) minutes. The paramedics delivered the first shock after a mean of 12:15 ± 2:03 min and hands-off times were 50 ± 22 s. The laypersons delivered the first shock after 14:04 ± 2:10 min and hands-off times were 2:11 ± 0:39 min. All participants felt confident in the handling of the delivered AED. CONCLUSION: The delivery and usage of an AED via a semi-autonomously flying drone in a remote region is feasible. This approach can lead to early administration of shocks.

4. Heliyon. 2023 Apr 10;9(4):e15430. doi: 10.1016/j.heliyon.2023.e15430. eCollection 2023 Apr.
Attitudes and willingness toward out-of-hospital CPR and AED: A questionnaire study among Chinese middle school students.
Li Y(1), Xiong D(1), Xu L(2), Jin X(1).
ABSTRACT
OBJECTIVES: This study's purpose was to assess the attitudes and willingness of middle school students to perform cardiopulmonary resuscitation (CPR) and to use automated external defibrillator (AED) in emergencies, and to evaluate the overall effects of first aid training. RESULTS: Middle school students demonstrated a high willingness to learn CPR (95.87%) and AED (77.90%). However, the rate of CPR (9.87%) and AED (3.51%) training was relatively low. These trainings could improve their confidence while facing emergencies. Their main concerns were "Lack of first aid

knowledge", "Lack of confidence in rescue skills" and "Fear of hurting the patient". CONCLUSIONS: Chinese middle school students are willing to learn CPR and AED skills, but relative trainings are insufficient and should be reinforced.

POST-CARDIAC ARREST TREATMENTS

1. Acta Anaesthesiol Scand. 2023 Apr 28. doi: 10.1111/aas.14257. Online ahead of print.
Ubiquitin C-terminal hydrolase L1 after out-of-hospital cardiac arrest.
Wihersaari L(1)(2), Reinikainen M(1)(2), Tiainen M(3), Bendel S(1), Kaukonen KM(4)(5), Vaahersalo J(6), Romppanen J(7), Pettilä V(8), Skrifvars MB(9); FINNRESUSCI Study Group.
ABSTRACT
BACKGROUND: We studied the prognostic ability of serum ubiquitin C-terminal hydrolase L1 (UCH-L1) after out-of-hospital cardiac arrest (OHCA), compared to that of neuron-specific enolase (NSE). METHODS: In this post-hoc analysis of the FINNRESUSCI study, we measured serum concentrations of UCH-L1 in 249 OHCA patients treated in 21 Finnish intensive care units in 2010-2011. We evaluated the ability of UCH-L1 to predict unfavourable outcome at 12 months (defined as cerebral performance category 3-5) by assessing the area under the receiver operating characteristic curve (AUROC), in comparison with NSE. RESULTS: The concentrations of UCH-L1 were higher in patients with unfavourable outcome than for those with favourable outcome: median concentration 10.8 ng/mL (interquartile range, 7.5-18.5 ng/mL) versus 7.8 ng/mL (5.9-11.8 ng/mL) at 24 h ($p < .001$), and 16.2 ng/mL (12.2-27.7 ng/mL) versus 11.5 ng/mL (9.0-17.2 ng/mL) ($p < .001$) at 48 h after OHCA. For UCH-L1 as a 12-month outcome predictor, the AUROC was 0.66 (95% confidence interval, 0.60-0.73) at 24 h and 0.66 (0.59-0.74) at 48 h. For NSE, the AUROC was 0.66 (0.59-0.73) at 24 h and 0.72 (0.65-0.80) at 48 h. The prognostic ability of UCH-L1 was not different from that of NSE at 24 h ($p = .82$) and at 48 h ($p = .23$). CONCLUSION: Concentrations of UCH-L1 in serum were higher in patients with unfavourable outcome than in those with favourable outcome. However, the ability of UCH-L1 to predict unfavourable outcome after OHCA was only moderate and not superior to that of NSE.

2. Arch Cardiovasc Dis. 2023 Apr 14:S1875-2136(23)00078-5. doi: 10.1016/j.acvd.2023.03.003. Online ahead of print.
Intracoronary imaging in addition to coronary angiography for patients with out-of-hospital cardiac arrest: More information for better care?
Brami P(1), Picard F(1), Seret G(2), Fischer Q(2), Pham V(2), Varenne O(3).
ABSTRACT
About 70% of out-of-hospital cardiac arrests are related to an ischaemic heart disease in Western countries. Percutaneous coronary intervention has been shown to improve the prognosis of survivors when an unstable coronary lesion is identified as the potential cause of the cardiac arrest. Acute complete coronary occlusion is often demonstrated among patients with ST-segment elevation on electrocardiogram after the return of spontaneous circulation. In patients without ST-segment elevation, routine coronary angiography has been shown to be not superior to conservative management. However, an electrocardiogram-based decision to perform immediate coronary angiography could be insufficient to identify unstable coronary lesions, which are frequently associated with intermediate coronary stenosis. Intracoronary imaging can be helpful to detect plaque rupture or erosion and intracoronary thrombus, but could also lead to better stent implantation, and help to reduce the risk of stent thrombosis. In patients with coronary lesions without the instability characteristic, conservative management should be the default strategy, and a search for another cause of the cardiac arrest should be systematic. In the present review, we sought to describe the potential benefit of intracoronary imaging in patients with out-of-hospital cardiac arrest.

3. J Clin Med. 2023 Apr 20;12(8):3006. doi: 10.3390/jcm12083006.

Diagnostic Value of Serum Lactate Dehydrogenase Level Measured in the Emergency Department in Predicting Clinical Outcome in Out-of-Hospital Cardiac Arrest: A Multicenter, Observational Study.

Kim J(1), Kim YW(1), Kim TY(1).

ABSTRACT

INTRODUCTION: Out-of-hospital cardiac arrest (OHCA) is complex, and risk stratification tools have the potential to include components other than clinical risk indicators, thus requiring extensive studies. Simple and accurate biomarkers for OHCA patients with poor prognoses are still needed. Serum lactate dehydrogenase (LDH) has been identified as a risk factor in patients with various diseases, such as cancer, liver disease, severe infections, and sepsis. The primary aim of this study was to assess the accuracy of LDH values at initial presentation in the emergency department (ED) in predicting the clinical outcome in OHCA. METHODS: This retrospective multicenter observational study was performed in the ED of two tertiary university hospitals and one general hospital between January 2015 and December 2021. All patients with OHCA who visited the ED were included. The primary outcome was the sustained return of spontaneous circulation (ROSC; >20 min) after advanced cardiac life support (ACLS). The secondary outcome was survival to discharge (including home care and nursing care discharge) among patients with ROSC. The neurological prognosis was considered a tertiary outcome in patients who survived to discharge. RESULTS: In total, 759 patients were enrolled in the final analysis. The median LDH level in the ROSC group was 448 U/L (range: 112-4500), which was significantly lower than that in the no-ROSC group ($p < 0.001$). The median LDH level in the survival-to-discharge group was 376 U/L (range: 171-1620), which was significantly lower than that in the death group ($p < 0.001$). Using the adjusted model, the odds ratio of the LDH value (≤634 U/L) for primary outcomes was 2.418 (1.665-3.513) and the odds ratio of LDH value (≤553 U/L) for secondary outcomes was 4.961 (2.184-11.269). CONCLUSIONS: In conclusion, the serum LDH levels of patients with OHCA measured in the ED can potentially serve as a predictive marker for clinical outcomes such as ROSC and survival to discharge, although it may be difficult to predict neurological outcomes.

4. Resusc Plus. 2023 Apr 4;14:100381. doi: 10.1016/j.resplu.2023.100381. eCollection 2023 Jun.

Early versus deferred coronary angiography following cardiac arrest. A systematic review and meta-analysis.

Goel V(1), Bloom JE(2)(3)(4)(5), Dawson L(2)(3)(4), Shirwaiker A(3), Bernard S(2)(3)(5), Nehme Z(5)(6), Donner D(4), Hauw-Berlemont C(7), Vilfaillot A(8), Chan W(1)(3)(4), Kaye DM(3)(4), Spaulding C(9), Stub D(2)(3)(4)(5)(6).

ABSTRACT

AIM: The role of early coronary angiography (CAG) in the evaluation of patients presenting with out of hospital cardiac arrest (OHCA) and no ST-elevation myocardial infarction (STE) pattern on electrocardiogram (ECG) has been subject to considerable debate. We sought to assess the impact of early versus deferred CAG on mortality and neurological outcomes in patients with OHCA and no STE. METHODS: OVID MEDLINE, EMBASE, Web of Science and Cochrane Library Register were searched according to Preferred Reporting Items for Systematic Reviews and Meta-Analysis guidelines from inception until July 18, 2022. Randomized clinical trials (RCTs) of patients with OHCA without STE that compared early CAG with deferred CAG were included. The primary endpoint was 30-day mortality. Secondary endpoints included mortality at discharge or 30-days, favourable neurology at 30-days, major bleeding, renal failure and recurrent cardiac arrest. RESULTS: Of the 7,998 citations, 5 RCTs randomizing 1524 patients were included. Meta-analysis showed no difference in 30-day mortality with early versus deferred CAG (OR 1.17, CI 0.91 - 1.49, $I2 = 27\%$). There was no difference in favourable neurological outcome at 30 days (OR 0.88, CI 0.52 - 1.49, $I2 = 63\%$), major bleeding (OR 0.94, CI 0.33 - 2.68, $I2 = 39\%$), renal failure (OR 1.14, CI 0.77 - 1.69,

I2 = 0%), and recurrent cardiac arrest (OR 1.39, CI 0.79 - 2.43, I2 = 0%). CONCLUSIONS: Early CAG was not associated with improved survival and neurological outcomes among patients with OHCA without STE. This meta-analysis does not support routinely performing early CAG in this select patient cohort.

TARGETED TEMPERATURE MANAGEMENT

1. Int J Cardiol Heart Vasc. 2023 Apr 18;46:101207. doi: 10.1016/j.ijcha.2023.101207. eCollection 2023 Jun.

The role of targeted temperature management in 30-day hospital readmissions in cardiac arrest survivors: A national population-based study.

Mark J(1), Lopez J(2), Wahood W(1), Dodge J(1), Belaunzaran M(1), Losiniecki F(3), Santos-Roman Y(4), Danckers M(4).

ABSTRACT

BACKGROUND: Targeted temperature management (TTM) implementation following resuscitation from cardiac arrest is controversial. Although prior studies have shown that TTM improves neurological outcomes and mortality, less is known about the rates or causes of readmission in cardiac arrest survivors within 30 days. We aimed to determine whether the implementation of TTM improves all-cause 30-day unplanned readmission rates in cardiac arrest survivors. METHODS: Using the Nationwide Readmissions Database, we identified 353,379 adult cardiac arrest index hospitalizations and discharges using the International Classification of Diseases, 9th and 10th codes. The primary outcome was 30-day all-cause unplanned readmissions following cardiac arrest discharge. Secondary outcomes included 30-day readmission rates and reasons, including impacts on other organ systems. RESULTS: Of 353,379 discharges for cardiac arrest with 30-day readmission, 9,898 (2.80%) received TTM during index hospitalization. TTM implementation was associated with lower 30-day all-cause unplanned readmission rates versus non-recipients (6.30% vs. 9.30%, $p < 0.001$). During index hospitalization, receiving TTM was also associated with higher rates of AKI (41.12% vs. 37.62%, $p < 0.001$) and AHF (20.13% vs. 17.30%, $p < 0.001$). We identified an association between lower rates of 30-day readmission for AKI (18.34% vs. 27.48%, $p < 0.05$) and trend toward lower AHF readmissions (11.32% vs. 17.97%, $p = 0.05$) among TTM recipients. CONCLUSIONS: Our study highlights a possible negative association between TTM and unplanned 30-day readmission in cardiac arrest survivors, thereby potentially reducing the impact and burden of increased short-term readmission in these patients. Future randomized studies are warranted to optimize TTM use during post-arrest care.

2. Am J Respir Crit Care Med. 2023 Apr 27. doi: 10.1164/rccm.202211-2142CP. Online ahead of print.

Changes in Practice of Controlled Hypothermia After Cardiac Arrest in the Past 20 Years - A Critical Care Perspective.

Nielsen N(1), Friberg H(2).

ABSTRACT

For 20 years induced hypothermia and targeted temperature management (TTM) have been recommended to mitigate brain injury and increase survival after cardiac arrest. Based on animal research and small clinical trials the International Liaison Committee on Resuscitation strongly advocated hypothermia at 32-34°C for 12-24 hours for comatose out-of-hospital cardiac arrest patients with initial rhythm ventricular fibrillation or non-perfusing ventricular tachycardia. The intervention was implemented world-wide. The last decade hypothermia and TTM have been investigated in larger clinical randomized trials with focus on target temperature depth, target

temperature duration, pre-hospital initiation versus in-hospital initiation, in non-shockable rhythms, and in in-hospital cardiac arrests. Systematic reviews suggest little or no effect of delivering the intervention based on the summary of evidence and ILCOR today recommends to only treat fever and keep temperatures below 37.5°C (weak recommendation, low certainty evidence). Here we describe the evolution of temperature management for cardiac arrest patients during the last 20 years and how the accrued evidence has influenced not only the recommendations but also the guideline process. We also discuss possible paths forward in this field, both bringing up whether fever management at all is beneficial for cardiac arrest patients, and which knowledge gaps future clinical trials in temperature management should address.

3. Anesth Analg. 2023 Apr 28. doi: 10.1213/ANE.0000000000006503. Online ahead of print.
Overview of Hypothermia, Its Role in Neuroprotection, and the Application of Prophylactic Hypothermia in Traumatic Brain Injury.
Trieu C(1), Rajagopalan S(1), Kofke WA(2)(3), Cruz Navarro J(2)(4).
ABSTRACT
The current standard of practice is to maintain normothermia in traumatic brain injury (TBI) patients despite the theoretical benefits of hypothermia and numerous animal studies with promising results. While targeted temperature management or induced hypothermia to support neurological function is recommended for a select patient population postcardiac arrest, similar guidelines have not been instituted for TBI. In this review, we will examine the pathophysiology of TBI and discuss the benefits and risks of induced hypothermia in this patient population. In addition, we provide an overview of the largest randomized controlled trials testing-induced hypothermia. Our literature review on hypothermia returned a myriad of studies and trials, many of which have inconclusive results. The aim of this review was to recognize the effects of hypothermia, summarize the latest trials, address the inconsistencies, and discuss future directions for the study of hypothermia in TBI.

4. Med Klin Intensivmed Notfmed. 2023 Apr 27. doi: 10.1007/s00063-023-01008-9. Online ahead of print.
[Temperature management after cardiac arrest-a survey of clinical practice in Germany].
[Article in German]
Roedl K(1), Kluge S(2).
NO ABSTRACT AVAILABLE

ELECTROPHYSIOLOGY AND DEFIBRILLATION

1. Intensive Care Med. 2023 Apr;49(4):455-457. doi: 10.1007/s00134-023-06993-1. Epub 2023 Feb 8.
Double sequential external defibrillation for refractory ventricular fibrillation.
Cheskes S(1)(2), McLeod S(3)(4), Scales DC(5)(6).
NO ABSTRACT AVAILABLE

PEDIATRICS AND CHILDREN

1. Pediatr Crit Care Med. 2023 Apr 28. doi: 10.1097/PCC.0000000000003241. Online ahead of print.
Inappropriate Shock Delivery Is Common During Pediatric In-Hospital Cardiac Arrest.
Gray JM(1)(2), Raymond TT(3), Atkins DL(4), Tegtmeyer K(1)(5), Niles DE(6), Nadkarni VM(6), Pandit SV(7), Dewan M(1)(5); pediRES-Q Investigators.
ABSTRACT

OBJECTIVES: To characterize inappropriate shock delivery during pediatric in-hospital cardiac arrest (IHCA). DESIGN: Retrospective cohort study. SETTING: An international pediatric cardiac arrest quality improvement collaborative Pediatric Resuscitation Quality [pediRES-Q]. PATIENTS: All IHCA events from 2015 to 2020 from the pediRES-Q Collaborative for which shock and electrocardiogram waveform data were available. INTERVENTIONS: None. MEASUREMENTS AND MAIN RESULTS: We analyzed 418 shocks delivered during 159 cardiac arrest events, with 381 shocks during 158 events at 28 sites remaining after excluding undecipherable rhythms. We classified shocks as: 1) appropriate (ventricular fibrillation [VF] or wide complex ≥ 150/min); 2) indeterminate (narrow complex ≥ 150/min or wide complex 100-149/min); or 3) inappropriate (asystole, sinus, narrow complex < 150/min, or wide complex < 100/min) based on the rhythm immediately preceding shock delivery. Of delivered shocks, 57% were delivered appropriately for VF or wide complex rhythms with a rate greater than or equal to 150/min. Thirteen percent were classified as indeterminate. Thirty percent were delivered inappropriately for asystole (6.8%), sinus (3.1%), narrow complex less than 150/min (11%), or wide complex less than 100/min (8.9%) rhythms. Eighty-eight percent of all shocks were delivered in ICUs or emergency departments, and 30% of those were delivered inappropriately. CONCLUSIONS: The rate of inappropriate shock delivery for pediatric IHCA in this international cohort is at least 30%, with 23% delivered to an organized electrical rhythm, identifying opportunity for improvement in rhythm identification training.

EXTRACORPOREAL LIFE SUPPORT

1. JAMA. 2023 Apr 27. doi: 10.1001/jama.2023.5585. Online ahead of print.
Extracorporeal Cardiopulmonary Resuscitation for Cardiac Arrest.
Granfeldt A(1)(2), Holmberg MJ(1), Andersen LW(1)(2)(3).
ABSTRACT
Plain Language Summary: This JAMA Insights Clinical Update discusses the newer treatment option of extracorporeal cardiopulmonary resuscitation, particularly for patients with cardiac arrest who are not responsive to initial treatment.

2. J Clin Med. 2023 Apr 21;12(8):3015. doi: 10.3390/jcm12083015.
Effect of Hemolysis Regarding the Characterization and Prognostic Relevance of Neuron Specific Enolase (NSE) after Cardiopulmonary Resuscitation with Extracorporeal Circulation (eCPR).
Haertel F(1), Babst J(1), Bruening C(1), Bogoviku J(1), Otto S(1), Fritzenwanger M(1), Gecks T(1), Ebelt H(2)(3), Moebius-Winkler S(1), Schulze PC(1), Pfeifer R(1).
ABSTRACT
BACKGROUND: Hemolysis, a common adverse event associated with veno-arterial extracorporeal membrane oxygenation (VA-ECMO), may affect neuron-specific enolase (NSE) levels and potentially confound its prognostic value in predicting neurological outcomes in resuscitated patients without return of spontaneous circulation (ROSC) that require extracorporeal cardiopulmonary resuscitation (eCPR). Therefore, a better understanding of the relationship between hemolysis and NSE levels could help to improve the accuracy of NSE as a prognostic marker in this patient population. METHODS: We retrospectively analyzed the records of patients who received a VA-ECMO for eCPR between 2004 and 2021 and were treated in the medical intensive care unit (ICU) of the University Hospital Jena. The outcome was measured clinically by using the Cerebral Performance Category Scale (CPC) four weeks after eCPR. The serum concentration of NSE (baseline until 96 h) was analyzed by enzyme-linked immunosorbent assay (ELISA). To evaluate the ability of individual NSE measurements to discriminate, receiver operating characteristic (ROC) curves were calculated. Serum-free hemoglobin (fHb, baseline until 96 h) served as a marker for identifying a confounding effect of parallel hemolysis. RESULTS: 190 patients were included in our study. A total of 86.8% died

within 4 weeks after ICU admission or remained unconscious (CPC 3-5), and 13.2% survived with a residual mild to moderate neurological deficit (CPC 1-2). Starting 24h after CPR, NSE was significantly lower and continued to decrease in patients with CPC 1-2 compared to the group with an unfavorable outcome of CPC 3-5. In addition, when evaluating on the basis of receiver operating characteristic curves (ROC), relevant and stable area under the curve (AUC) values for NSE could be calculated (48 h: 0.85 // 72 h: 0.84 // 96 h: 0.80; $p < 0.01$), and on the basis of a binary logistic regression model, relevant odds ratios for the NSE values were found even after adjusting for fHb regarding the prediction of an unfavorable outcome of CPC 3-5. The respective adjusted AUCs of the combined predictive probabilities were significant (48 h: 0.79 // 72 h: 0.76 // 96 h: 0.72; $p \leq 0.05$). CONCLUSIONS: Our study confirms NSE as a reliable prognostic marker for poor neurological outcomes in resuscitated patients receiving VA-ECMO therapy. Furthermore, our results demonstrate that potential hemolysis during VA-ECMO does not significantly impact NSE's prognostic value. These findings are crucial for clinical decision making and prognostic assessment in this patient population.

EXPERIMENTAL RESEARCH

1. J Clin Med. 2023 Apr 18;12(8):2923. doi: 10.3390/jcm12082923.

Differences in Cerebral Oxygenation in Cardiogenic and Respiratory Cardiac Arrest Before, During, and After Cardiopulmonary Resuscitation.

Koyama Y(1), Ouchi A(2), Shimojo N(3), Inoue Y(3).

ABSTRACT

We compared the changes in cerebral oxygen saturation (ScO2) levels during cardiac arrest (CA) events using porcine models of ventricular fibrillation CA (VF-CA) and asphyxial CA (A-CA). Twenty female pigs were randomly divided into VF-CA and A-CA groups. We initiated cardiopulmonary resuscitation (CPR) 4 min after CA and measured the cerebral tissue oxygenation index (TOI) using near-infrared spectroscopy (NIRS) before, during, and after CPR. In both groups, the TOI was the lowest at 3-4 min after pre-CPR phase initiation (VF-CA group: 3.4 min [2.8-3.9]; A-CA group: 3.2 min [2.9-4.6]; $p = 0.386$). The increase in TOI differed between the groups in the CPR phase ($p < 0.001$); it increased more rapidly in the VF-CA group (16.6 [5.5-32.6] vs. 1.1 [0.6-3.3] %/min; $p < 0.001$). Seven pigs surviving for 60 min after the return of spontaneous circulation in the VF-CA group recovered limb movement, whereas only one in the A-CA group ($p = 0.023$) achieved movement recovery. The increase in the TOI did not differ significantly between the groups in the post-CPR phase ($p = 0.341$). Therefore, it is better to monitor ScO2 concomitantly with CPR initiation using NIRS to assess the responsiveness to CPR in clinical settings.

2. Exp Ther Med. 2023 Mar 17;25(5):196. doi: 10.3892/etm.2023.11895. eCollection 2023 May.

Calpain inhibitor MDL28170 alleviates cerebral ischemia-reperfusion injury by suppressing inflammation and autophagy in a rat model of cardiac arrest.

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ABSTRACT

Cerebral ischemia-reperfusion injury (CIRI) is associated with a poor neurological prognosis in patients who have experienced cardiac arrest (CA) and cardiopulmonary resuscitation (CPR). The aim of the current study was to investigate the potential role of a calpain inhibitor in CIRI using a rat model of CA. CA was induced in adult male Sprague-Dawley rats, and MDL28170 (a calpain inhibitor) was administered to the rats within 30 min after the return of spontaneous circulation. Differences

between groups were evaluated by measuring survival rate, CPR duration and neurological deficit score. Hematoxylin-eosin staining and Nissl staining were performed to assess cerebral injury, and microstructure and autophagy were assessed by transmission electron microscopy. The levels of calpain-1, calpain-2, calpastatin, interleukin (IL)-1β, tumor necrosis factor (TNF)-α, P62, beclin-1 and LC3 in the brain tissues were determined using western blotting and double immunofluorescence staining. There was no significant difference in CPR duration or survival rate among the groups. At 24 h after CPR, the CA group demonstrated damaged tissue morphology; decreased neurological deficit scores, and P62 expression; and upregulated calpain-2, IL-1βp17, TNF-α, beclin-1 and LC3 levels in the cortex. However, MDL28170 improved neuronal function and suppressed inflammation and autophagy by inhibiting calpain-2 level, but there were no differences in the calpain-1 and calpastatin levels. These results suggest that calpain-2, inflammation and autophagy are involved in CA-induced CIRI. MDL28170 inhibited calpain-2 expression, inflammation and autophagy, which suggests its potential efficacy in treating post-CA nerve damage.

CASE REPORTS

1. Cureus. 2023 Mar 26;15(3):e36695. doi: 10.7759/cureus.36695. eCollection 2023 Mar.
Acute Viral Pericarditis Complicated by Cardiac Tamponade as a Result of COVID-19.
Singh I(1), Swisher J(2), Gidda H(1), Nashed B(1), Rodriguez D(2).

ABSTRACT
Severe acute respiratory syndrome coronavirus 2 (SARS-Cov-2) and coronavirus disease 2019 (COVID-19) predominantly cause respiratory symptoms but cardiovascular complications from COVID-19 have been documented in the literature. Acute pericarditis has been known to be caused by COVID-19 but severe cardiac complications, such as cardiac tamponade, have rarely been reported. Early diagnosis and treatment with pericardiocentesis are imperative, as this can improve patient outcomes. A 56-year-old female presented with chest pain and recurrent episodes of presyncope. The patient tested positive for SARS-Cov-2 through a polymerase chain reaction (PCR) test. The patient was hypotensive on arrival and the initial workup with electrocardiogram was significant for sinus tachycardia with low voltage QRS complexes in the precordial and limb leads. A transthoracic echocardiogram was also done and showed a large circumferential pericardial effusion with chamber collapse of the right atrium and right ventricle during diastole indicative of tamponade physiology. The patient's clinical course was complicated by pulseless electrical activity cardiac arrest during which a pericardiocentesis was done. One hundred (100) mL of serous pericardial fluid was drained and a return of spontaneous circulation was obtained after roughly 10 minutes of cardiopulmonary resuscitation. Further infectious and noninfectious workups, including malignant and rheumatologic etiologies for acute pericarditis, were negative. The patient was subsequently treated with high-dose non-steroidal anti-inflammatory drugs (NSAIDs) and colchicine for viral pericarditis. The patient's clinical course improved, and the patient was subsequently discharged after a prolonged hospital course to a subacute rehabilitation facility to undergo physical therapy.

2. Cureus. 2023 Mar 24;15(3):e36632. doi: 10.7759/cureus.36632. eCollection 2023 Mar.
Cardiac Arrest Secondary to Inferior ST-Segment-Elevation Myocardial Infarction in Patient with Paroxysmal Nocturnal Hemoglobinuria and COVID-19 Infection.
Mohamed MS(1), Mahmoud A(1), Hashem A(1), Abdelhay A(1), Balmer-Swain M(2).

ABSTRACT
Patients with paroxysmal nocturnal hemoglobinuria (PNH) have transient attacks of complement-mediated hemolysis and thrombosis that can be spontaneous or secondary to precipitating factors such as infections. We present a case of a 63-year-old male patient with a medical history of PNH

who presented with typical chest pain, fever, cough, jaundice, and dark-colored urine. On examination, he was hemodynamically stable but had conjunctival icterus. A few minutes after presentation, the patient suffered a ventricular fibrillation cardiac arrest and then achieved a return of spontaneous circulation after receiving two defibrillator shocks. EKG showed inferior wall ST-segment elevation myocardial infarction. Labs showed hemoglobin of 6.4 g/dl, elevated cardiac markers, serum lactate dehydrogenase, and indirect bilirubin. Serum haptoglobin was < 1 mg/dl. His COVID-19 polymerase chain reaction test was positive. Immediately, the patient received 2 units of packed RBCs and underwent a coronary angiogram (CA), which revealed total proximal occlusion of the right coronary artery. He underwent successful percutaneous coronary intervention (PCI), and two drug-eluting stents were placed. His peripheral blood immunophenotyping and flow cytometry showed loss of glycosylphosphatidylinositol-linked antigens and decreased expression of CD 59/14/24. He was started on ravulizumab, a humanized monoclonal antibody complement five inhibitor. Both PNH and COVID-19 increase the risk of thrombosis. Endothelial injury and cytokine storm increase the risk of thrombosis in COVID-19 patients, whereas the activation of the coagulation system and the impairment of the fibrinolytic system by complement cascade leads to thrombosis in PNH patients. Regardless of which pathway leads to coronary artery thrombosis, CA and PCI can be life-saving.

3. Int J Neurosci. 2023 Apr 26:1-5. doi: 10.1080/00207454.2023.2208280. Online ahead of print.
Cortical Blindness As A Sign of Delayed Post-Hypoxic Encephalopathy: A Case Report.
Aloizou AM(1), Labedi A(1), Richter D(1), Ceylan U(1), Schroeder C(1), Lukas C(2), Gold R(1), Krogias C(1).
ABSTRACT
We present a case of a 67-year-old female patient, who presented with acute cortical blindness five days after a successful resuscitation from cardiac arrest. The magnetic resonance tomography revealed a mild FLAIR signal increase of the bilateral occipital cortex. A lumbar puncture revealed considerably elevated tau protein levels, in the presence of normal phospho-tau, as a marker of brain injury, whilst neuron-specific enolase levels were normal. The diagnosis of delayed post-hypoxic encephalopathy was set. We hereby describe a rare clinical manifestation after initially successful resuscitation and encourage the studying of tau protein as a potential marker of this disease entity.

4. Cureus. 2023 Mar 22;15(3):e36527. doi: 10.7759/cureus.36527. eCollection 2023 Mar.
Spontaneous Coronary Dissection Induced Cardiac Arrest During Posterior Instrumentation in Prone Position: A Case Report.
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ABSTRACT
Intraoperative cardiac arrest (ICA) is a crucial property of morbidity and mortality for patients undergoing surgical operations. Spontaneous coronary artery dissection (SCAD) is an important cause of ICA and perioperative myocardial infarction, especially in young women. In this case report, we presented the successful management of SCAD-induced ICA in a 46-year-old female patient who underwent posterior spinal instrumentation in the prone position due to lumbar intervertebral disc extrusion.

5. Eur Heart J Case Rep. 2023 Apr 10;7(4):ytad174. doi: 10.1093/ehjcr/ytad174. eCollection 2023 Apr.
Fulminant myocarditis in a young woman with mixed connective tissue disease: a case report.
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ABSTRACT

BACKGROUND: Although cardiac involvement is relatively common in mixed connective tissue disease (MCTD), few reports on MCTD-associated fulminant myocarditis are available. CASE SUMMARY: A 22-year-old woman diagnosed with MCTD was admitted to our institution for cold-like symptoms and chest pain. Echocardiography revealed that the left ventricular ejection fraction (LVEF) had rapidly decreased from 50 to 20%. Because endomyocardial biopsy revealed no significant lymphocytic infiltration, immunosuppressant drugs were not started initially; however, steroid pulse therapy (methylprednisolone, one1000 mg/day) was initiated due to prolonged symptoms and unimproved haemodynamics. Despite strong immunosuppressant therapy, the LVEF did not improve, and severe mitral regurgitation appeared. Three days after steroid pulse therapy initiation, she experienced a sudden cardiac arrest; thus, venoarterial extracorporeal membrane oxygenation (VA-ECMO) and intra-aortic balloon pumping (IABP) were initiated. Subsequent immunosuppressant therapy was continued with prednisolone (100 mg/day) and intravenous cyclophosphamide (1000 mg). Six days after steroid therapy initiation, the LVEF improved to 40% and then recovered to near-normal levels. After successful weaning off of VA-ECMO and IABP, she was discharged. Thereafter, a detailed histopathological examination revealed multi-focal signs of ischaemic micro-circulatory injury and diffuse HLA-DR in the vascular endothelium, suggesting an autoimmune inflammatory response. DISCUSSION: We report a rare case of fulminant myocarditis in a patient with MCTD who recovered with immunosuppressive treatment. Despite the absence of significant lymphocytic infiltration findings on histopathological examination, patients with MCTD may experience a dramatic clinical course. Although it is unclear whether myocarditis is triggered by viral infections, certain autoimmune mechanisms may lead to its development.