This week's PubMed 5th – 11th February 2023: articles of interest n = 49

CPR AND COVID-19

1. Int J Environ Res Public Health. 2023 Feb 3;20(3):2713. doi: 10.3390/ijerph20032713.
The Influence of the COVID-19 Pandemic on Emergency Medical Services to Out-of-Hospital Cardiac Arrests in a Low-Incidence Urban City: An Observational Epidemiological Analysis.
Liu CH(1)(2), Tsai MJ(1), Hsu CF(1), Tsai CH(3), Su YS(4), Cai DC(2).
ABSTRACT
The Emergency Medical Services (EMS) system faced overwhelming challenges during the coronavirus disease 2019 (COVID-19) pandemic. However, further information is required to determine how the pandemic affected the EMS response and the clinical outcomes of out-of-hospital cardiac arrest (OHCA) patients in COVID-19 low-incidence cities. A retrospective study was conducted in Chiayi, Taiwan, a COVID-19 low-incidence urban city. We compared the outcomes and rescue records before (2018-2019) and during (2020-2021) the COVID-19 pandemic. A total of 567 patients before and 497 during the pandemic were enrolled. Multivariate analysis revealed that the COVID-19 pandemic had no significant influence on the achievement of return of spontaneous circulation (ROSC) and sustained ROSC but was associated with lower probabilities of survival to discharge (aOR = 0.43, 95% CI: 0.21-0.89, p = 0.002) and discharge with favorable neurologic outcome among OHCA patients (aOR = 0.35, 95% CI: 0.16-0.77, p = 0.009). Patients' ages and OHCA locations were also discovered to be independently related to survival results. The overall impact of longer EMS rescue times on survival outcomes during the pandemic was not significant, with an exception of the specific group that experienced prolonged rescue times (total EMS time > 21 min).

2. Resuscitation. 2023 Feb 7:109722. doi: 10.1016/j.resuscitation.2023.109722. Online ahead of print.
Epidemic of the SARS-CoV-2 Omicron Variant in Shanghai, China in 2022: Transient and Persistent Effects on Out-of-hospital Cardiac Arrests.
Li G(1), Zhang W(2), Jia D(2), Rong J(2), Yu Z(2), Wu D(3).
ABSTRACT
OBJECTIVE: To investigate transient and persistent effects of the Shanghai Omicron epidemic in 2022 on the incidence, characteristics, and outcomes of out-of-hospital cardiac arrest (OHCA). METHODS: This retrospective study examined electronic records of patients admitted to the Shanghai Emergency Medical Center during five periods: pre-epidemic, 1 January 2018 to 31 December 2019; low COVID-19 incidence, 1 January 2020 to 27 March 2022; Omicron epidemic, 28 March to 31 May 2022; early post-epidemic, 1 June to 31 July 2022; and late post-epidemic, 1 August to 30 September 2022. Clinicodemographic characteristics and outcomes of OHCA cases were compared between the pre-epidemic and other periods. RESULTS: A total of 55,104 OHCAs were included. The monthly number of OHCAs in the Omicron epidemic was 2.1 times the number in the pre-epidemic (1702 vs 793), while the number in the early post-epidemic was 1.9 times the number in the pre-epidemic (1515 vs 793). Compared to the pre-epidemic, OHCA during or after the epidemic was more likely to involve individuals with hypertension, coronary artery disease, heart failure or stroke. The probability that circulation would spontaneously resume after OHCA was significantly lower during the epidemic than before it (aOR 0.61, 95% CI 0.41-0.90; P = 0.012). However, this difference disappeared by the early post-epidemic. CONCLUSION: The monthly number of OHCAs doubled during the Omicron epidemic in Shanghai, and it remained elevated for another two months. OHCA affected individuals with cardiovascular and cerebrovascular diseases more during and after the epidemic than before it.

CPR/MECHANICAL CHEST COMPRESSION

1. Prehosp Emerg Care. 2023 Feb 9:1-13. doi: 10.1080/10903127.2023.2177367. Online ahead of print.

Measuring the effect of off-balancing vectors on the delivery of high-quality CPR during ambulance transport: A proof of concept study.

Manoukian MAC(1), Mumma BE(1), Wagner JL(2), Linvill MT(1), Rose JS(1).

ABSTRACT

AIM: This study aims to demonstrate the feasibility of quantifying the off-balancing vectors experienced during ambulance transport and comparing them to high-quality cardiopulmonary resuscitation (HQ-CPR) metrics. METHODS: Ten participants completed a total of 20 evolutions of compression-only HQ-CPR in an ambulance driven in a manner that minimized or increased linear and angular off-balancing vectors. Linear and angular velocity, linear and angular acceleration, and linear jerk were recorded. HQ-CPR variables measured were compression fraction and proportion of compressions with depth >5 cm (depth%), rate 100-120 (rate%), full chest recoil (recoil%), and hand position (hand%). A composite score was calculated: [(depth% + rate% + recoil% + hand%)/4) * compression fraction]. Difficulty of HQ-CPR performance was measured with the Borg rating of perceived exertion (RPE) Scale. A series of mixed effects models were fitted regressing each HQ-CPR metric on each off-balancing vector. RESULTS: HQ-CPR data and vector quantity data were successfully recorded in all evolutions. Rate% was negatively associated with increasing linear velocity (slope = -3.82, standard error [SE] 1.12, p = 0.005), linear acceleration (slope = -5.52, SE 1.93, p = 0.013), linear jerk (slope = -17.60, SE 5.78, p = 0.007), angular velocity (slope = -75.74, SE 22.72, p = 0.004), and angular acceleration (slope = -152.5, SE 59.6, p = 0.022). Compression fraction was negatively associated with increasing linear velocity (slope = -1.35, SE 0.37, p = 0.004), linear acceleration (slope = -1.67, SE 0.48, p = 0.003), linear jerk (slope = -4.90, SE 1.86, p = 0.018), angular velocity (slope = -25.66, SE 6.49, p = 0.001), and angular acceleration (slope = -45.35, SE 18.91, p = 0.031). Recoil% was negatively associated with increasing linear velocity (slope = -5.80, SE 2.21, p =0.023) and angular velocity (slope = -116.98, SE 44.24, p = 0.019)). Composite score was negatively associated with increasing linear velocity (slope = -4.49, SE 1.45, p = 0.009) and angular velocity (slope = -86.13, SE 31.24, p = 0.014) and approached a negative association with increasing magnitudes of linear acceleration (slope -5.54, SE 3.37, p = 0.075), linear jerk (slope = -17.43, SE 12.39, p = 0.064), and angular acceleration (slope = -170.43, SE 114.11, p = 0.051). Borg RPE scale was positively associated with all off-balancing vectors. Depth%, hand%, mean compression depth, and mean compression rate were not correlated with any off-balancing vector. CONCLUSION: Off-balancing vector data can be successfully quantified during ambulance transport and compared with HQ-CPR performance parameters. Increasing off-balancing vectors experienced during ambulance transport are associated with worse HQ-CPR metrics and increased perceived physical exertion. These data may help guide future drive styles, ambulance design, or use of mechanical CPR devices to improve HQ-CPR delivery during selected patient transport scenarios.

REGISTRIES, REVIEWS AND EDITORIALS

1. EBioMedicine. 2023 Feb 9;89:104464. doi: 10.1016/j.ebiom.2023.104464. Online ahead of print.

Predicting survival and neurological outcome in out-of-hospital cardiac arrest using machine learning: the SCARS model.

Hessulf F(1), Bhatt DL(2), Engdahl J(3), Lundgren P(4), Omerovic E(5), Rawshani A(6), Helleryd E(7), Dworeck C(8), Friberg H(9), Redfors B(5), Nielsen N(10), Myredal A(8), Frigyesi A(11), Herlitz J(12), Rawshani A(13).

ABSTRACT

BACKGROUND: A prediction model that estimates survival and neurological outcome in out-of-hospital cardiac arrest patients has the potential to improve clinical management in emergency rooms. METHODS: We used the Swedish Registry for Cardiopulmonary Resuscitation to study all out-of-hospital cardiac arrest (OHCA) cases in Sweden from 2010 to 2020. We had 393 candidate predictors describing the circumstances at cardiac arrest, critical time intervals, patient demographics, initial presentation, spatiotemporal data, socioeconomic status, medications, and comorbidities before arrest. To develop, evaluate and test an array of prediction models, we created stratified (on the outcome measure) random samples of our study population. We created a training set (60% of data), evaluation set (20% of data), and test set (20% of data). We assessed the 30-day survival and cerebral performance category (CPC) score at discharge using several machine learning frameworks with hyperparameter tuning. Parsimonious models with the top 1 to 20 strongest predictors were tested. We calibrated the decision threshold to assess the cut-off yielding 95% sensitivity for survival. The final model was deployed as a web application. FINDINGS: We included 55,615 cases of OHCA. Initial presentation, prehospital interventions, and critical time intervals variables were the most important. At a sensitivity of 95%, specificity was 89%, positive predictive value 52%, and negative predictive value 99% in test data to predict 30-day survival. The area under the receiver characteristic curve was 0.97 in test data using all 393 predictors or only the ten most important predictors. The final model showed excellent calibration. The web application allowed for near-instantaneous survival calculations. INTERPRETATION: Thirty-day survival and neurological outcome in OHCA can rapidly and reliably be estimated during ongoing cardiopulmonary resuscitation in the emergency room using a machine learning model incorporating widely available variables.

2. Resuscitation. 2023 Feb 8:109725. doi: 10.1016/j.resuscitation.2023.109725. Online ahead of print.

AED applied, not recommending defibrillation - A validation study of the new variable AED in the Danish Cardiac Arrest Registry.

Casarini E(1), Amalie Wolthers S(2), Bundgaard Ringgren K(3), Nikolaj Fasmer Blomberg S(1), Collatz Christensen H(1).

ABSTRACT

AIM: This study aimed to design and implement a new variable, theautomated external defibrillator (AED) variable, within the Danish Cardiac Arrest Registry. The introduction of the new variable aims to investigate and solve the challenges of reporting out-of-hospital cardiac arrests. METHODS: This validation study examined all patients with out-of-hospital cardiac arrest from 2016 to 2019. Their medical records were reviewed to establish a variable for AED. All patients with an AED applied were included, and comparative analyses were carried out. The primary outcome was 30-day survival, and the secondary outcome was the return of spontaneous circulation (ROSC) at any time. RESULTS: A total of 1576 cases were included; of those, 747 cases had an AED applied and received a shock, and in 829 cases, an AED was applied without delivering a shock. Most defibrillated patients were witnessed by bystanders n=541, (72%). They presented a higher number of ROSC (57%) and higher 30-day survival, (35,2%) compared to patients who were not defibrillated. Of this group, only 47% patients were witnessed; 18% survived more than 30 days, $p<0.001$. When comparing AED present with no AED present, the AED group were significantly more likely to be witnessed by bystanders and to have cardiopulmonary resuscitation by bystanders. No significant differences were

found regarding the initial rhythm between the two groups. 30-day survival rate was 20% in the AED group compared to 14% in the non-AED group, yielding an OR of 1.14 (95% CI 1.20 -1.66). CONCLUSION: This study highlights the differences between OHCA patients receiving defibrillation and those not receiving defibrillation after AED placement. These differences emphasise the need for uniform reporting of out-of-hospital cardiac arrest. This study showed improvement in the completeness of the registration of OHCA by implementing the AED variable. However, a future effort to improve registration completeness is needed.

3. Cardiovasc Revasc Med. 2023 Jan 27:S1553-8389(23)00023-4. doi: 10.1016/j.carrev.2023.01.021. Online ahead of print.
Cardiac arrest in infective endocarditis: An ounce of prevention is worth a pound of cure.
Medranda GA(1).
NO ABSTRACT AVAILABLE

4. Eur J Pediatr. 2023 Feb 11. doi: 10.1007/s00431-023-04868-7. Online ahead of print.
Correspondence to: A novel retraining strategy of chest compression skills for infant CPR results in high skill retention for longer.
de Raad T(1), Smal J(2), Turner NM(3).
NO ABSTRACT AVAILABLE

5. Int J Cardiol. 2023 Mar 1;374:42-50. doi: 10.1016/j.ijcard.2022.12.004. Epub 2022 Dec 7.
Registered prodromal symptoms of out-of-hospital cardiac arrest among patients calling the medical helpline services.
Zylyftari N(1), Lee CJ(2), Gnesin F(3), Møller AL(3), Mills EHA(4), Møller SG(5), Jensen B(6), Ringgren KB(7), Kragholm K(8), Christensen HC(9), Blomberg SNF(9), Tan HL(10), Folke F(11), Køber L(12), Gislason G(13), Torp-Pedersen C(14).
ABSTRACT
Background Early identification of warning symptoms among out-of-hospital cardiac arrest (OHCA) patients remains challenging. Thus, we examined the registered prodromal symptoms of patients who called medical helpline services within 30-days before OHCA. Methods Patients unwitnessed by emergency medical services (EMS) aged ≥18 years during their OHCA were identified from the Danish Cardiac Arrest Registry (2014-2018) and linked to phone records from the 24-h emergency helpline (1-1-2) and out-of-hours medical helpline (1813-Medical Helpline) in Copenhagen before the arrest. The registered symptoms were categorized into chest pain; breathing problems; central nervous system (CNS)-related/unconsciousness; abdominal/back/urinary; psychiatric/addiction; infection/fever; trauma/exposure; and unspecified (diverse from the beforementioned categories). Analyses were divided by the time-period of calls (0-7 days/8-30 days preceding OHCA) and call type (1-1-2/1813-Medical Helpline). Results Of all OHCA patients, 18% (974/5442) called helpline services (males 56%, median age 76 years[Q1-Q3:65-84]). Among these, 816 had 1145 calls with registered symptoms. The most common symptom categories (except for unspecified, 33%) were breathing problems (17%), trauma/exposure (17%), CNS/unconsciousness (15%), abdominal/back/urinary (12%), and chest pain (9%). Most patients (61%) called 1813-Medical Helpline, especially for abdominal/back/urinary (17%). Patients calling 1-1-2 had breathing problems (24%) and CNS/ unconsciousness (23%). Nearly half of the patients called within 7 days before their OHCA, and CNS/unconsciousness (19%) was the most registered. The unspecified category remained the most common during both time periods (32%;33%) and call type (24%;39%). Conclusions Among patients who called medical helplines services up to 30-days before their OHCA, besides symptoms being

highly varied (unspecified (33%)), breathing problems (17%) were the most registered symptom-specific category.

6. Clin Res Cardiol. 2023 Feb;112(2):323-324. doi: 10.1007/s00392-022-02097-w. Epub 2022 Sep 13.
Reply to: association between stress hyperglycemia on admission and unfavorable neurological outcome in OHCA patients receiving ECPR
Bemtgen X(1), Wengenmayer T(2), Staudacher DL(2).
NO ABSTRACT AVAILABLE

IN-HOSPITAL CARDIAC ARREST

1. Resuscitation. 2023 Feb;183:109686. doi: 10.1016/j.resuscitation.2022.109686. Epub 2023 Jan 4.
Updating the model for Risk-Standardizing survival for In-Hospital cardiac arrest to facilitate hospital comparisons.
Chan PS(1), Kennedy KF(2), Girotra S(3); American Heart Association's Get With The Guidelines®-Resuscitation Investigators.
ABSTRACT
BACKGROUND: Risk-standardized survival rates (RSSR) for in-hospital cardiac arrest (IHCA) have been widely used for hospital benchmarking and research. The novel coronavirus 2019 (COVID-19) pandemic has led to a substantial decline in IHCA survival as COVID-19 infection is associated with markedly lower survival. Therefore, there is a need to update the model for computing RSSRs for IHCA given the COVID-19 pandemic. METHODS: Within Get With The Guidelines®-Resuscitation, we identified 53,922 adult patients with IHCA from March, 2020 to December, 2021 (the COVID-19 era). Using hierarchical logistic regression, we derived and validated an updated model for survival to hospital discharge and compared the performance of this updated RSSR model with the previous model. RESULTS: The survival rate was 21.0% and 20.8% for the derivation and validation cohorts, respectively. The model had good discrimination (C-statistic 0.72) and excellent calibration. The updated parsimonious model comprised 13 variables-all 9 predictors in the original model as well as 4 additional predictors, including COVID-19 infection status. When applied to data from the pre-pandemic period of 2018-2019, there was a strong correlation (r = 0.993) between RSSRs obtained from the updated and the previous models. CONCLUSION: We have derived and validated an updated model to risk-standardize hospital rates of survival for IHCA. The updated model yielded RSSRs that were similar to the initial model for IHCAs in the pre-pandemic period and can be used for supporting ongoing efforts to benchmark hospitals and facilitate research that uses data from either before or after the emergence of COVID-19.

2. Resuscitation. 2023 Feb;183:109664. doi: 10.1016/j.resuscitation.2022.12.002. Epub 2022 Dec 12.
Characteristics, therapies, and outcomes of In-Hospital vs Out-of-Hospital cardiac arrest in patients presenting to cardiac intensive care units: From the critical care Cardiology trials network (CCCTN).
Carnicelli AP(1), Keane R(2), Brown KM(3), Loriaux DB(3), Kendsersky P(4), Alviar CL(5), Arps K(3), Berg DD(6), Bohula EA(6), Burke JA(7), Dixson JA(3), Gerber DA(8), Goldfarb M(9), Granger CB(3), Guo J(6), Harrison RW(3), Kontos M(10), Lawler PR(11), Miller PE(12), Nativi-Nicolau J(13), Newby LK(3), Racharla L(7), Roswell RO(14), Shah KS(15), Sinha SS(16), Solomon MA(17), Teuteberg J(8), Wong G(18), van Diepen S(19), Katz JN(3), Morrow DA(6).
ABSTRACT
BACKGROUND: Cardiac arrest (CA) is a common reason for admission to the cardiac intensive care unit (CICU), though the relative burden of morbidity, mortality, and resource use between admissions with in-hospital (IH) and out-of-hospital (OH) CA is unknown. We compared characteristics, care patterns, and outcomes of admissions to contemporary CICUs after IHCA or OHCA. METHODS: The Critical Care Cardiology Trials Network is a multicenter network of tertiary

CICUs in the US and Canada. Participating centers contributed data from consecutive admissions during 2-month annual snapshots from 2017 to 2021. We analyzed characteristics and outcomes of admissions by IHCA vs OHCA. RESULTS: We analyzed 2,075 admissions across 29 centers (50.3% IHCA, 49.7% OHCA). Admissions with IHCA were older (median 66 vs 62 years), more commonly had coronary disease (38.3% vs 29.7%), atrial fibrillation (26.7% vs 15.6%), and heart failure (36.3% vs 22.1%), and were less commonly comatose on CICU arrival (34.2% vs 71.7%), $p < 0.001$ for all. IHCA admissions had lower lactate (median 4.3 vs 5.9) but greater utilization of invasive hemodynamics (34.3% vs 23.6%), mechanical circulatory support (28.4% vs 16.8%), and renal replacement therapy (15.5% vs 9.4%); $p < 0.001$ for all. Comatose IHCA patients underwent targeted temperature management less frequently than OHCA patients (63.3% vs 84.9%, $p < 0.001$). IHCA admissions had lower unadjusted CICU (30.8% vs 39.0%, $p < 0.001$) and in-hospital mortality (36.1% vs 44.1%, $p < 0.001$). CONCLUSION: Despite a greater burden of comorbidities, CICU admissions after IHCA have lower lactate, greater invasive therapy utilization, and lower crude mortality than admissions after OHCA.

3. Clin Res Cardiol. 2023 Feb;112(2):258-269. doi: 10.1007/s00392-022-02084-1. Epub 2022 Aug 17.
Clinical characteristics, causes and predictors of outcomes in patients with in-hospital cardiac arrest: results from the SURVIVE-ARREST study.
Hannen LEM(#)(1), Toprak B(#)(1)(2), Weimann J(1), Mahmoodi B(1), Fluschnik N(1), Schrage B(1)(2), Roedl K(3), Söffker G(3), Kluge S(3), Issleib M(4), Blankenberg S(1)(2), Kirchhof P(1)(2)(5), Clemmensen P(1)(2)(6), Sinning C(1)(2)(7), Zengin-Sahm E(#)(1)(7), Becher PM(#)(8)(9).
ABSTRACT
INTRODUCTION: In-hospital cardiac arrest (IHCA) is acutely life-threatening and remains associated with high mortality and morbidity. Identifying predictors of mortality after IHCA would help to guide acute therapy. METHODS: We determined patient characteristics and independent predictors of 30-day in-hospital mortality, neurological outcome, and discharge/referral pathways in patients experiencing IHCA in a large tertiary care hospital between January 2014 and April 2017. Multivariable Cox regression model was fitted to assess predictors of outcomes. RESULTS: A total of 368 patients with IHCA were analysed (median age 73 years (interquartile range 65-78), 123 (33.4%) women). Most patients (45.9%) had an initial non-shockable rhythm and shockable rhythms were found in 20.9%; 23.6% of patients suffered from a recurrent episode of cardiac arrest. 172/368 patients died within 30 days (46.7%). Of 196/368 patients discharged alive after IHCA, the majority (72.9%, n = 143) had a good functional neurological outcome (modified Rankin Scale ≤ 3 points). In the multivariable analysis, return of spontaneous circulation without mechanical circulatory support (hazard ratio (HR) 0.36, 95% confidence interval (CI) 0.21-0.64), invasive coronary angiography and/or percutaneous intervention (HR 0.56, 95% CI 0.34-0.92), and antibiotic therapy (HR 0.87, 95% CI 0.83-0.92) were associated with a lower risk of 30-day in hospital mortality. CONCLUSION: In the present study, IHCA was survived in ~ 50% in a tertiary care hospital, although only a minority of patients presented with shockable rhythms. The majority of IHCA survivors (~ 70%) had a good neurological outcome. Recovery of spontaneous circulation and presence of treatable acute causes of the arrest are associated with better survival. Clinical Characteristics, Causes and Predictors of Outcomes in Patients with In-Hospital Cardiac Arrest: Results from the SURVIVE-ARREST Study.

INJURIES AND CPR

No articles identified.

CAUSE OF THE ARREST

1. J Clin Med. 2023 Jan 22;12(3):882. doi: 10.3390/jcm12030882.

Multidisciplinary Management of Opioid Use-Related Infective Endocarditis: Treatment, QTc Values, and Cardiac Arrests due to Ventricular Fibrillation.

Rosenfeld LE(1), Jain S(2), Amabile A(3), Geirsson A(3), Krane M(3), Weimer MB(4).

ABSTRACT

(1) Background: The opioid epidemic has led to an increase in cardiac surgery for infective endocarditis (IE-CS) related to injection use of opioids (OUD) and other substances and a call for a coordinated approach to initiate substance use disorder treatment, including medication for OUD (MOUD), during IE-CS hospitalizations. We sought to determine the effects of the initiation of a multi-disciplinary endocarditis evaluation team (MEET) on MOUD use, electrocardiographic QTc measurements and cardiac arrests due to ventricular fibrillation (VF) in patients with OUD. (2) Methods and Results: A historical group undergoing IE-CS at Yale-New Haven Hospital prior to MEET initiation, Group I (43 episodes of IE-CS, 38 patients) was compared to 24 patients undergoing IE-CS after MEET involvement (Group II). Compared to Group l, Group II patients were more likely to receive MOUD (41.9 vs. 95.8%, $p < 0.0001$), predominantly methadone (41.9 vs. 79.2%, $p = 0.0035$) at discharge. Both groups had similar QTcs: approximately 30% of reviewed electrocardiograms had QTcs ≥ 470 ms and 17%, QTcs ≥ 500 ms. Cardiac arrests due to VF were not uncommon: Group I: 9.3% vs. Group II: 8.3%, $p = 0.8914$. Half occurred in the 1-2 months after surgery and were contributed to by pacemaker malfunction/ management and half were related to opioid use. (3) Conclusions: MEET was associated with increased MOUD (predominantly methadone) use during IE-CS hospitalizations without an increase in QTc prolongation or cardiac arrest due to VF compared to Group I, but events occurred in both groups. These arrests were associated with pacemaker issues or a return to opioid use. Robust follow-up of IE-CS patients is essential, as is further research to clarify the longer-term effects of MEET on outcomes.

2. Open Heart. 2023 Feb;10(1):e002088. doi: 10.1136/openhrt-2022-002088.

Risk of out-of-hospital cardiac arrest in patients with sarcoidosis: a Danish nationwide nested case-control study.

Eroglu TE(1), Folke F(2)(3)(4), Coronel R(5), Torp-Pedersen C(6)(7), Gislason GH(2)(8).

ABSTRACT

Objective Sarcoidosis is over-represented among victims of cardiac arrest. We aimed to establish whether sarcoidosis is associated with out-of-hospital cardiac arrest (OHCA) in the general population. Methods We conducted a nested case-control study in a nationwide cohort of individuals between 1 June 2001 and 31 December 2015 in Denmark. OHCA cases from presumed cardiac causes were matched 1:10 by sex and age on OHCA date with non-OHCA controls from the general population. The association between sarcoidosis and OHCA was assessed using Cox regression by calculating HR and 95% CIs. Models were adjusted for cardiovascular disease. Finally, stratified analyses were performed according to sex, heart failure and ischaemic heart disease. RESULTS: We identified 35 195 OHCA cases and 351 950 matched controls without OHCA (median age 72 years and 66.8% male). Patients with sarcoidosis had higher rate of OHCA compared with the general population after adjustments for common OHCA risk factors (HR 1.51, 95% CI 1.19 to 1.92). This increased OHCA rate occurred in women (HR 2.11, 95% CI 1.42 to 3.12) but not in men (HR 1.27, 95% CI 0.93 to 1.72; p value interaction=0.033), and was larger in patients with than without heart failure (HRheart failure: 2.59, 95% CI 1.42 to 4.73; HRno heart failure: 1.33, 95% CI 1.01 to 1.74; p value interaction: 0.007). The HR associated with sarcoidosis did not vary by the presence of ischaemic heart disease. CONCLUSION: Patients with sarcoidosis have a higher OHCA rate than the general population. This increased OHCA rate occurred in women but not in men, and was larger in patients with than without heart failure.

3. Int J Legal Med. 2023 Mar;137(2):345-351. doi: 10.1007/s00414-023-02951-0. Epub 2023 Jan 25.
Reevaluation of ambiguous genetic variants in sudden unexplained deaths of a young cohort.
Martinez-Barrios E(1)(2)(3), Sarquella-Brugada G(1)(2)(3)(4), Perez-Serra A(5)(6), Fernandez-Falgueras A(5)(6), Cesar S(1)(2)(3), Alcalde M(5)(6), Coll M(5)(6), Puigmulé M(5)(6), Iglesias A(5)(6), Ferrer-Costa C(5)(6), Del Olmo B(5)(6), Picó F(5)(6), Lopez L(5)(6), Fiol V(1)(2)(3), Cruzalegui J(1)(2)(3), Hernandez C(1)(2)(3), Arbelo E(2)(6)(7), Díez-Escuté N(7), Cerralbo P(1)(2)(3), Grassi S(8)(9), Oliva A(9), Toro R(10), Brugada J(1)(2)(3)(6)(7), Brugada R(11)(12)(13)(14), Campuzano O(15)(16)(17).
ABSTRACT
Sudden death cases in the young population remain without a conclusive cause of decease in almost 40% of cases. In these situations, cardiac arrhythmia of genetic origin is suspected as the most plausible cause of death. Molecular autopsy may reveal a genetic defect in up to 20% of families. Most than 80% of rare variants remain classified with an ambiguous role, impeding a useful clinical translation. Our aim was to update rare variants originally classified as of unknown significance to clarify their role. Our cohort included fifty-one post-mortem samples of young cases who died suddenly and without a definite cause of death. Five years ago, molecular autopsy identified at least one rare genetic alteration classified then as ambiguous following the American College of Medical Genetics and Genomics' recommendations. We have reclassified the same rare variants including novel data. About 10% of ambiguous variants change to benign/likely benign mainly because of improved population frequencies. Excluding cases who died before one year of age, almost 21% of rare ambiguous variants change to benign/likely benign. This fact makes it important to discard these rare variants as a cause of sudden unexplained death, avoiding anxiety in relatives' carriers. Twenty-five percent of the remaining variants show a tendency to suspicious deleterious role, highlighting clinical follow-up of carriers. Periodical reclassification of rare variants originally classified as ambiguous is crucial, at least updating frequencies every 5 years. This action aids to increase accuracy to enable and conclude a cause of death as well as translation into the clinic.

4. J Clin Med. 2023 Jan 30;12(3):1075. doi: 10.3390/jcm12031075.
Atrial Fibrillation and the Risk of Ventricular Arrhythmias and Cardiac Arrest: A Nationwide Population-Based Study.
Fawzy AM(1), Bisson A(2)(3), Bodin A(2), Herbert J(2), Lip GYH(1)(4), Fauchier L(2).
ABSTRACT
BACKGROUND: Atrial fibrillation (AF) has been linked to an increased risk of ventricular arrhythmias (VAs) and sudden death. We investigated this association in hospitalised patients in France. METHODS: All hospitalised patients from 2013 were identified from the French National database and included if they had at least 5 years of follow-up data. RESULTS: Overall, 3,381,472 patients were identified. After excluding 35,834 with a history of VAs and cardiac arrest, 3,345,638 patients were categorised into two groups: no AF (n = 3,033,412; mean age 57.2 ± 21.4; 54.3% female) and AF (n = 312,226; 78.1 ± 10.6; 44.0% female). Over a median follow-up period of 5.4 years (interquartile range (IQR) 5.0-5.8 years), the incidence (2.23%/year vs. 0.56%/year) and risk (hazard ratio (HR) 3.657 (95% confidence interval (CI) 3.604-3.711)) of VAs and cardiac arrest were significantly higher in AF patients compared to non-AF patients. This was still significant after adjusting for confounders, with a HR of 1.167 (95% CI 1.111-1.226) and in the 1:1 propensity score-matched analysis (n = 289,332 per group), with a HR of 1.339 (95% CI 1.313-1.366). In the mediation analysis, the odds of cardiac arrest were significantly mediated by AF-associated VAs, with an OR of 1.041 (95% CI 1.040-1.042). CONCLUSION: In hospitalised French patients, AF was associated with an increased risk of VAs and sudden death.

END-TIDAL CO_2

No articles identified.

ORGAN DONATION

1. Resuscitation. 2023 Feb 3;184:109720. doi: 10.1016/j.resuscitation.2023.109720. Online ahead of print.

Donors brain-dead after successful resuscitation of cardiac arrest: Early outcome and postoperative complications of lung recipients.

Atchade E(1), Arsène A(2), Jean-Baptiste S(2), Tran Dinh A(3), Tanaka S(4), Stern J(5), Lortat-Jacob B(2), Rosencwajg S(5), Goletto T(6), Mal H(7), Ben Adballah I(8), Castier Y(9), de Tymowski C(10), Montravers P(11).

ABSTRACT

BACKGROUND: The outcomes of lung transplantation (LT) recipients who received a graft from a brain-dead donor after successful resuscitation from cardiac arrest (CA donors) have been poorly described. This study compared the one-year survival of LT recipients depending on the CA status of the donor. METHODS: This prospective observational single-centre study analysed all consecutive patients who underwent LT at Bichat Claude Bernard Hospital, Paris, between January 2016 and December 2020. All donors who experienced CA prior to organ donation, regardless of rhythm or duration, were considered CA donors. The postoperative complications and outcomes of LT recipients were analysed. The one-year survival was compared using Kaplan-Meier curves and log-rank tests. Independent risk factors for one-year mortality were assessed using multivariate analysis ($p < 0.05$ was considered significant). The Paris North Hospitals Institutional Review Board approved the study. RESULTS: A total of 236 LT recipients were analysed and 66 (28%) received a graft from a CA donor. The median durations of no/low flow were 4 [0-10]/20 [15-30] minutes, respectively. Shockable and non-shockable rhythms were observed in 11 (17%) and 47 (72%) of the CA donors, respectively. The characteristics of the grafts and early postoperative complications were not different in the CA and non-CA groups. Receiving a graft from a CA donor was not an independent risk factor for recipient one-year mortality. CONCLUSION: Receiving a graft from a CA donor did not worsen the outcome of LT recipients. Acceptation of these grafts must be systematically considered to increase the pool of available grafts.

FEEDBACK

No articles identified.

DRUGS

No articles identified.

TRAUMA

No articles identified.

VENTILATION

1. Resuscitation. 2023 Feb 8:109726. doi: 10.1016/j.resuscitation.2023.109726. Online ahead of print.

First Attempt Success with Continued versus Paused Chest Compressions During Cardiac Arrest in the Emergency Department.

Robinson AE(1), Driver BE(2), Prekker ME(2), Reardon RF(2), Horton G(3), Stang JL(2), Collins JD(3), Carlson JN(4).

ABSTRACT

AIM: Tracheal intubation is associated with interruption in cardiopulmonary resuscitation (CPR). Current knowledge of tracheal intubation during active CPR focuses on the out-of-hospital environment. We aim to describe characteristics of tracheal intubation during active CPR in the emergency department (ED) and determine whether first attempt success was associated with CPR being continued vs. paused. Measurements We reviewed overhead video from adult ED patients receiving chest compressions at the start of the orotracheal intubation attempt. We recorded procedural detail including method of CPR, whether CPR was continued vs. paused, and first attempt intubation success (primary outcome). We performed logistic regression to determine whether continuing CPR was associated with first attempt success. RESULTS: We reviewed 169 instances of tracheal intubation, including 143 patients with continued CPR and 26 patients with paused CPR. Those with paused CPR were more likely to be receiving manual rather than mechanical chest compressions. Video laryngoscopy and bougie use were common. First attempt success was higher in the continued CPR group (87%, 95% CI 81% to 92%) than the interrupted CPR group (65%, 95% CI 44% to 83%, difference 22% [95% CI 3% to 41%]). The multivariable model demonstrated an adjusted odds ratio of 0.67 (95% CI 0.17 to 2.60) for first attempt intubation success when CPR was interrupted vs continued. CONCLUSIONS: It was common to continue CPR during tracheal intubation, with success comparable to that achieved in patients without cardiac arrest. It is reasonable to attempt tracheal intubation without interrupting CPR, pausing only if necessary.

2. PLoS One. 2023 Feb 9;18(2):e0281186. doi: 10.1371/journal.pone.0281186. eCollection 2023.

Airway management during ongoing chest compressions-direct vs. video laryngoscopy. A randomised manikin study.

Steffen R(1)(2), Hischier S(1), Roten FM(1), Huber M(1), Knapp J(1)(3)(4).

ABSTRACT

BACKGROUND: Tracheal intubation is used for advanced airway management during cardiac arrest, particularly when basic airway techniques cannot ensure adequate ventilation. However, minimizing interruptions of chest compressions is of high priority. Video laryngoscopy has been shown to improve the first-pass success rate for tracheal intubation in emergency airway management. We aimed to compare first-pass success rate and time to successful intubation during uninterrupted chest compression using video laryngoscopy and direct laryngoscopy. METHODS: A total of 28 anaesthetists and 28 anaesthesia nurses with varied clinical and anaesthesiological experience were recruited for the study. All participants performed a tracheal intubation on a manikin simulator during ongoing chest compressions by a mechanical resuscitation device. Stratified randomisation (physicians/nurses) was performed, with one group using direct laryngoscopy and the other using video laryngoscopy. RESULTS: First-pass success rate was 100% (95% CI: 87.9% - 100.0%) in the video laryngoscopy group and 67.8% (95% CI: 49.3% - 82.1%) in the direct laryngoscopy group [difference: 32.2% (95% CI: 17.8% - 50.8%), p<0.001]. The median time for intubation was 27.5 seconds (IQR: 21.8-31.0 seconds) in the video laryngoscopy group and 30.0 seconds (IQR: 26.5-36.5 seconds) in the direct laryngoscopy group (p = 0.019). CONCLUSION: This manikin study on tracheal intubation during ongoing chest compressions demonstrates that video laryngoscopy had a higher first-pass success rate and shorter time to successful intubation compared to direct laryngoscopy. Experience in airway management and professional group were not significant predictors. A clinical randomized controlled trial appears worthwhile.

CERERBRAL MONITORING

1. Diagnostics (Basel). 2023 Jan 28;13(3):479. doi: 10.3390/diagnostics13030479.
Elevated Initial Serum Phosphate Levels Predict Higher Mortality and Impaired Neurological Outcome in Cardiac Arrest Patients with Return of Spontaneous Circulation.
Duse DA(1), Gröne M(1), Kramser N(1), Ortkemper M(1), Quast C(1), Voß F(1), Heramvand N(1), Kostev K(2), Kelm M(1)(3), Horn P(1), Jung C(1), Erkens R(1).
ABSTRACT
Purpose: Although a moderate proportion of cardiac arrest (CA) patients achieve a return of spontaneous circulation (ROSC), few survive to discharge, mostly with poor neurological development. As serum phosphate levels were described as elevated after cardiopulmonary resuscitation (CPR), we asked whether these elevations would predict a higher risk of mortality and impaired neurological outcome in CA patients following ROSC. Methods: Initial serum phosphate levels, survival, and neurologic status at discharge of 488 non-traumatic CA patients treated at a single German hospital after achieving ROSC were analyzed. The cut-off value of phosphate for mortality prediction was determined using the receiver operator characteristic (ROC) curve, and patients were divided accordingly for comparison. Results were validated by analyzing phosphate levels in a multi-centric cohort containing 3299 CA patients from the eICU database of the United States. Results: In the German cohort, ROC analysis showed a 90% specificity for phosphate levels >2.7 mmol/L to predict mortality (AUC: 0.76, $p < 0.0001$), and phosphate level elevations were associated with higher in-hospital mortality (crude odds ratio 3.04, 95% CI 2.32 to 4.08). Patients with initial phosphate levels >2.7 mmol/L had significantly higher mortality in both analyzed collectives ($p < 0.0001$). Similarly, patients from the German cohort who initially had higher phosphate levels also showed a higher proportion of impaired neurological status at discharge and morphological signs of brain injury. Conclusions: In CA patients following ROSC, initial serum phosphate levels >2.7 mmol/L predict higher mortality and impaired neurological outcome. Our data suggests that phosphate determination might improve the preciseness of the overall and neurologic prognostication in patients after CPR following ROSC.

2. Curr Opin Crit Care. 2023 Feb 10. doi: 10.1097/MCC.0000000000001023. Online ahead of print.
Brain monitoring after cardiac arrest.
Sandroni C(1)(2), Skrifvars MB(3)(4), Taccone FS(5).
ABSTRACT
PURPOSE OF REVIEW: To describe the available neuromonitoring tools in patients who are comatose after resuscitation from cardiac arrest because of hypoxic-ischemic brain injury (HIBI). RECENT FINDINGS: Electroencephalogram (EEG) is useful for detecting seizures and guiding antiepileptic treatment. Moreover, specific EEG patterns accurately identify patients with irreversible HIBI. Cerebral blood flow (CBF) decreases in HIBI, and a greater decrease with no CBF recovery indicates poor outcome. The CBF autoregulation curve is narrowed and right-shifted in some HIBI patients, most of whom have poor outcome. Parameters derived from near-infrared spectroscopy (NIRS), intracranial pressure (ICP) and transcranial Doppler (TCD), together with brain tissue oxygenation, are under investigation as tools to optimize CBF in patients with HIBI and altered autoregulation. Blood levels of brain biomarkers and their trend over time are used to assess the severity of HIBI in both the research and clinical setting, and to predict the outcome of postcardiac arrest coma. Neuron-specific enolase (NSE) is recommended as a prognostic tool for HIBI in the current postresuscitation guidelines, but other potentially more accurate biomarkers, such as neurofilament light chain (NfL) are under investigation. SUMMARY: Neuromonitoring provides essential

information to detect complications, individualize treatment and predict prognosis in patients with HIBI.

ULTRASOUND AND CPR

1. Ann Emerg Med. 2023 Feb 6:S0196-0644(22)01326-9. doi: 10.1016/j.annemergmed.2022.12.002. Online ahead of print.

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.

ORGANISATION AND TRAINING

1. Resuscitation. 2023 Feb 9:109730. doi: 10.1016/j.resuscitation.2023.109730. Online ahead of print.

Influence of population characteristics and use of emergency medical systems on the rate of asystolic out-of-hospital cardiac arrest for which resuscitation is attempted.

Larribau R(1), Payot C(2), Lardi C(3), Suppan L(4), Alain Fehlmann C(5).

NO ABSTRACT AVAILABLE

2. Indian J Crit Care Med. 2023 Jan;27(1):26-31. doi: 10.5005/jp-journals-10071-24382.

Factors Related to Resuscitation Success and Prognosis of Cardiopulmonary Arrest Cases.

Tekin FC(1), Köylü R(1), Köylü Ö(2), Kunt M(3).

ABSTRACT

BACKGROUND: In cases where return of spontaneous circulation (ROSC) is provided in the Emergency Department (ED) after cardiopulmonary arrest (CA), it is important to investigate the parameters affecting ROSC rates, to determine the factors affecting the survival status and prognosis in the short and medium term, and to determine to what extent these factors affect the prognosis.

MATERIALS AND METHODS: This is a cross-sectional study that retrospectively investigates the factors affecting the success of resuscitation over a 5-year period in out-of-hospital cardiac arrest (OHCA) cases. RESULTS: We determined that ROSC was achieved in 26.1% of 1616 adult cardiopulmonary arrest cases, 14.8% survived the first 24 hours, and 3.8% were discharged from the hospital. CONCLUSION: We determined that ROSC decreased by 21% with a 1-mg increase in the amount of adrenaline used, by 98% with a 1 mmol/L increase in HCO3 (std) value, by 27% with a 1 mmol/L increase in BE (B) value, and by 15% with a 1 mmol/L increase in lactate value. In terms of short-term survival, we found that a 1 mmol/L increase in lactate value reduced the probability of survival by 12%, and a 1 mEq/L increase in K value decreased the probability by 29%. With regard to the probability of survival in the medium term, we determined that the growth in age by 1 year decreased the probability by 4%, and the increase in K value by 1 mEq/L decreased the probability by 35%.

3. Europace. 2023 Feb 8;25(1):199-210. doi: 10.1093/europace/euac114.
European Society of Cardiology quality indicators for the management of patients with ventricular arrhythmias and the prevention of sudden cardiac death.
Aktaa S(1)(2)(3), Tzeis S(4), Gale CP(1)(2)(3), Ackerman MJ(5), Arbelo E(6)(7)(8), Behr ER(9)(10), Crotti L(11)(12), d'Avila A(13), de Chillou C(14), Deneke T(15), Figueiredo M(16), Friede T(17), Leclercq C(18), Merino JL(19), Semsarian C(20)(21)(22), Verstrael A(23), Zeppenfeld K(24), Tfelt-Hansen J(25)(26), Reichlin T(27).
ABSTRACT
To develop a suite of quality indicators (QIs) for the management of patients with ventricular arrhythmias (VA) and the prevention of sudden cardiac death (SCD). The Working Group comprised experts in heart rhythm management including Task Force members of the 2022 European Society of Cardiology (ESC) Clinical Practice Guidelines for the management of patients with VA and the prevention of SCD, members of the European Heart Rhythm Association, international experts, and a patient representative. We followed the ESC methodology for QI development, which involves (i) the identification of the key domains of care for the management of patients with VA and the prevention of SCD by constructing a conceptual framework of care, (ii) the development of candidate QIs by conducting a systematic review of the literature, (iii) the selection of the final set of QIs using a modified-Delphi method, and (iv) the evaluation of the feasibility of the developed QIs. We identified eight domains of care for the management of patients with VA and the prevention of SCD: (i) structural framework, (ii) screening and diagnosis, (iii) risk stratification, (iv) patient education and lifestyle modification, (v) pharmacological treatment, (vi) device therapy, (vii) catheter ablation, and (viii) outcomes, which included 17 main and 4 secondary QIs across these domains. Following a standardized methodology, we developed 21 QIs for the management of patients with VA and the prevention of SCD. The implementation of these QIs will improve the care and outcomes of patients with VA and contribute to the prevention of SCD.

4. Crit Care Med. 2023 Feb 8. doi: 10.1097/CCM.0000000000005790. Online ahead of print.
Time to Awakening and Self-Fulfilling Prophecies After Cardiac Arrest.
Elmer J(1)(2)(3), Kurz MC(4)(5)(6), Coppler PJ(1), Steinberg A(1)(2)(3), DeMasi S(7), De-Arteaga M(8), Simon N(9), Zadorozhny VI(10), Flickinger KL(1), Callaway CW(1); University of Pittsburgh Post-Cardiac Arrest Service.
ABSTRACT
OBJECTIVES: Withdrawal of life-sustaining therapies for perceived poor neurologic prognosis (WLST-N) is common after resuscitation from cardiac arrest and may bias outcome estimates from models trained using observational data. We compared several approaches to outcome prediction with the

goal of identifying strategies to quantify and reduce this bias. DESIGN: Retrospective observational cohort study. SETTING: Two academic medical centers ("UPMC" and "University of Alabama Birmingham" [UAB]). PATIENTS: Comatose adults resuscitated from cardiac arrest. INTERVENTION: None. MEASUREMENTS AND MAIN RESULTS: As potential predictors, we considered clinical, laboratory, imaging, and quantitative electroencephalography data available early after hospital arrival. We followed patients until death, discharge, or awakening from coma. We used penalized Cox regression with a least absolute shrinkage and selection operator penalty and five-fold cross-validation to predict time to awakening in UPMC patients and then externally validated the model in UAB patients. This model censored patients after WLST-N, considering subsequent potential for awakening to be unknown. Next, we developed a penalized logistic model predicting awakening, which treated failure to awaken after WLST-N as a true observed outcome, and a separate logistic model predicting WLST-N. We scaled and centered individual patients' Cox and logistic predictions for awakening to allow direct comparison and then explored the difference in predictions across probabilities of WLST-N. Overall, 1,254 patients were included, and 29% awakened. Cox models performed well (mean area under the curve was 0.93 in the UPMC test sets and 0.83 in external validation). Logistic predictions of awakening were systematically more pessimistic than Cox-based predictions for patients at higher risk of WLST-N, suggesting potential for self-fulfilling prophecies to arise when failure to awaken after WLST-N is considered as the ground truth outcome. CONCLUSIONS: Compared with traditional binary outcome prediction, censoring outcomes after WLST-N may reduce potential for bias and self-fulfilling prophecies.

5. Cureus. 2023 Jan 8;15(1):e33506. doi: 10.7759/cureus.33506. eCollection 2023 Jan.
Knowledge, Attitudes, and Perceptions Regarding CPR Among Non-medical Staff at a Medical School in South Africa.
Jarghon S(1), Molokoane K(1), Laher AE(1), Motara F(1).
ABSTRACT
Background Sudden cardiac arrest can occur unexpectedly in any person and at any place including at medical schools. Improved outcomes after cardiac arrest are dependent on the initiation of early first responder high-quality cardiopulmonary resuscitation (CPR) and rapid defibrillation. There is a lack of data pertaining to the knowledge, attitudes, and perceptions of non-medical staff at medical schools regarding CPR. The aim of this study was to determine the knowledge, attitudes, and perceptions of non-medical staff employed at a medical school in South Africa regarding CPR. Methods In this cross-sectional survey study, a paper-based questionnaire was administered to non-medical staff (i.e., all staff without a medical [MBBCh or equivalent] or nursing degree) employed at the medical school. Data were collected between August 1 and October 25, 2020. Results The final study sample comprised 150 participants. Of these, 103 (68.7%) were female, 109 (72.7%) were ≤ 40 years old, 62 (41.3%) had a postgraduate university degree, 72 (48.0%) had witnessed a medical emergency at the medical school premises and 46 (30.7%) had previously undertaken first aid or CPR training. The mean (SD) knowledge score was 4.4 ± 1.6 out of 10 with only 25 (16.7%) participants knowing what the first thing was to look out for during a medical emergency and 28 (18.7%) participants knowing the location of the automated external defibrillator. Most participants (n=136, 90.7%) indicated that CPR training should be mandatory for all employees. Conclusion Non-medical staff surveyed displayed suboptimal knowledge but positive attitudes and perceptions toward CPR. Although this was a single-center study, these results can be used to motivate CPR training of non-medical staff at all medical schools.

6. An Pediatr (Engl Ed). 2023 Feb 3:S2341-2879(23)00020-0. doi: 10.1016/j.anpede.2023.01.006. Online ahead of print.

RCParvulari training: A basic life support training methodology applied to 5-year-old students: Effectiveness in a cluster-randomized clinical trail.

Pedrazas-López D(1), de Pablo-Márquez B(2), Cunillera-Puértolas O(3), Almeda-Ortega J(3); Grupo de Investigación RCParvulari.

ABSTRACT

INTRODUCTION: Basic life support training in school age is a topical issue because, with adequate training, any person can help save a life. METHODS: Cluster clinical trial with data collection through an ad hoc self-administered, semi-structured questionnaire. The target population encompassed the students aged 4-6 years enrolled in 49 educational centres. The centres were randomly allocated to the intervention or control group. The intervention group was trained with the RCParvulari® methodology, consisting of theoretical and practical training on the first link of the chain of survival. The control group only received theoretical training. We evaluated participants before and immediately after the intervention and between 3 and 12 months post intervention by means of the questionnaire. We assessed the acquisition and retention over time of the knowledge and skills covered in the training compared to previous trainings in both groups. RESULTS: A total of 1327 schoolchildren (79% of the target population) participated. The level of knowledge acquired immediately after training and after 3-12 months compared to baseline was significantly better ($P < .001$) in the intervention group than in the control group, both in early recognition and contacting of emergency services (112) and in remembering the "mouth-nose-eyes" mnemonic. CONCLUSIONS: The RCParvulari® methodology significantly contributed to an improved ability to recognize a possible medical emergency, start the chain of survival by alerting an adult and call the 112 emergency number in students in the last year of preschool education.

7. Resuscitation. 2023 Feb;183:109689. doi: 10.1016/j.resuscitation.2023.109689. Epub 2023 Jan 9.

When the machine is wrong. Characteristics of true and false predictions of Out-of-Hospital Cardiac arrests in emergency calls using a machine-learning model.

Nikolaj Blomberg S(1), Jensen TW(2), Porsborg Andersen M(3), Folke F(4), Kjær Ersbøll A(5), Torp-Petersen C(6), Lippert F(7), Collatz Christensen H(8).

ABSTRACT

BACKGROUND: A machine-learning model trained to recognize emergency calls regarding Out-of-Hospital Cardiac Arrest (OHCA) was tested in clinical practice at Copenhagen Emergency Medical Services (EMS) from September 2018 to December 2019. We aimed to investigate emergency call characteristics where the machine-learning model failed to recognize OHCA or misinterpreted a call as being OHCA. METHODS: All emergency calls were linked to the dispatch database and verified OHCAs were identified by linkage to the Danish Cardiac Arrest Registry. Calls with either false negative or false positive predictions of OHCA were evaluated by trained auditors. Descriptive analyses were performed with absolute numbers and percentages reported. RESULTS: The machine-learning model processed 169,236 calls to Copenhagen EMS and suspected 5,811 (3.4%) of the calls as OHCA, resulting in 84.5% sensitivity and 97.1% specificity. Among OHCAs not recognised by machine-learning model, a condition completely different from OHCA was presented by caller in 31% of the cases. In 28% of unrecognised calls, patient was reported breathing normally, and language barriers were identified in 23% of the cases. Among falsely suspected OHCA, the patient was reported unconscious in 28% of the cases, and in 13% of the false positive cases the machine-learning model interpreted calls regarding dead patients with irreversible signs of death as OHCA. CONCLUSION: Continuous optimization of the language model is needed to improve the prediction of OHCA and thereby improve sensitivity and specificity of the machine-learning model on recognising OHCA in emergency telephone calls.

POST-CARDIAC ARREST TREATMENTS

1. Am J Emerg Med. 2023 Feb 5:S0735-6757(23)00064-5. doi: 10.1016/j.ajem.2023.02.001. Online ahead of print.
TEE and REBOA for non-traumatic cardiac arrest.
Chih-Hsuan C(1), Chen J(2), Jeng-Tang S(2), Hsieh CY(3), Sheng-En C(2), Hsieh CC(4).
NO ABSTRACT AVAILABLE

2. Emerg Med J. 2023 Feb 8:emermed-2022-212459. doi: 10.1136/emermed-2022-212459. Online ahead of print.
Ratio of optic nerve sheath diameter to eyeball transverse diameter in cardiac arrest survivors.
Ling DA(1), Chen JY(1), Chen YC(2), Ko YC(1), Chang CH(1), Lien WC(3), Chang WT(1), Huang CH(1).
NO ABSTRACT AVAILABLE

3. Front Public Health. 2023 Jan 20;11:1112623. doi: 10.3389/fpubh.2023.1112623. eCollection 2023.
Association between prothrombin time-international normalized ratio and prognosis of post-cardiac arrest patients: A retrospective cohort study.
Tang Y(1), Sun J(1), Yu Z(1), Liang B(1), Peng B(1), Ma J(1), Zeng X(1), Feng Y(1), Chen Q(1), Zha L(1)(2).
ABSTRACT
BACKGROUND: Cardiac arrest (CA) can activate blood coagulation. This study aimed to explore the potential prognostic value of prothrombin time-international normalized ratio (INR) in post-CA patients. METHODS: The clinical data of eligible subjects diagnosed with CA was extracted from the MIMIC-IV database as the training cohort. Restricted cubic spline (RCS), Kaplan-Meier (K-M) survival curve, and Cox regression analyses were conducted to elucidate the association between the INR and all-cause mortality of post-CA patients. Subgroup analysis, propensity score matching (PSM), and inverse probability of treatment (IPTW) were also conducted to improve stability and reliability. Data of the validation cohort were collected from the eICU database, and logistic-regression analyses were performed to verify the findings of the training cohort. RESULTS: A total of 1,324 subjects were included in the training cohort. A linear correlation existed between INR and the risk of all-cause death of post-CA patients, as shown in RCS analysis, with a hazard ratio (HR) >1 when INR exceeded 1.2. K-M survival curve preliminarily indicated that subjects with INR ≥ 1.2 presented lower survival rate and shorter survival time, and the high level of INR was independently associated with 30-day, 90-day, 1-year, and in-hospital mortalities, with multivariate-adjusted HR of 1.44 (1.20, 1.73), 1.46 (1.23, 1.74), 1.44 (1.23, 1.69), and 1.37 (1.14, 1.64), respectively. These findings were consistent and robust across the subgroup analysis, PSM and IPTW analyses, and validation cohort. CONCLUSIONS: We systematically and comprehensively demonstrated that elevated INR was associated with increased short- and long-term all-cause mortality of post-CA patients. Therefore, elevated INR may be a promising biomarker with prognosis significance.

4. Resuscitation. 2023 Feb;183:109691. doi: 10.1016/j.resuscitation.2023.109691. Epub 2023 Jan 13.
Introducing novel insights into the postresuscitation clinical course and care of cardiac arrest.
Mentzelopoulos SD(1), Chalkias A(2).
NO ABSTRACT AVAILABLE

5. Int J Legal Med. 2023 Feb 11. doi: 10.1007/s00414-023-02966-7. Online ahead of print.
Blood taken immediately after fatal resuscitation attempts yields higher quality DNA for genetic studies as compared to autopsy samples.

Stanasiuk C(#)(1), Milting H(#)(2), Homm S(3), Persson J(3), Holtz L(4), Wittmer A(5), Fox H(6), Laser T(7), Knöll R(8), Pohl GM(1), Paluszkiewicz L(6), Jakob T(9)(10), Bachmann-Mennenga B(3), Henzler D(9), Grautoff S(4), Veit G(3), Klingel K(11), Hori E(12), Kellner U(12), Karger B(13), Schlepper S(13), Pfeiffer H(13), Gummert J(6), Gärtner A(1), Tiesmeier J(1)(14).

ABSTRACT

BACKGROUND: The out-of-hospital cardiac arrest (OHCA) in the young may be associated with a genetic predisposition which is relevant even for genetic counseling of relatives. The identification of genetic variants depends on the availability of intact genomic DNA. DNA from autopsy may be not available due to low autopsy frequencies or not suitable for high-throughput DNA sequencing (NGS). The emergency medical service (EMS) plays an important role to save biomaterial for subsequent molecular autopsy. It is not known whether the DNA integrity of samples collected by the EMS is better suited for NGS than autopsy specimens. MATERIAL AND METHODS: DNA integrity was analyzed by standardized protocols. Fourteen blood samples collected by the EMS and biomaterials from autopsy were compared. We collected 172 autopsy samples from different tissues and blood with postmortem intervals of 14-168 h. For comparison, DNA integrity derived from blood stored under experimental conditions was checked against autopsy blood after different time intervals. RESULTS: DNA integrity and extraction yield were higher in EMS blood compared to any autopsy tissue. DNA stability in autopsy specimens was highly variable and had unpredictable quality. In contrast, collecting blood samples by the EMS is feasible and delivered comparably the highest DNA integrity. CONCLUSIONS: Isolation yield and DNA integrity from blood samples collected by the EMS is superior in comparison to autopsy specimens. DNA from blood samples collected by the EMS on scene is stable at room temperature or even for days at 4 °C. We conclude that the EMS personnel should always save a blood sample of young fatal OHCA cases died on scene to enable subsequent genetic analysis.

TARGETED TEMPERATURE MANAGEMENT

No articles identified.

ELECTROPHYSIOLOGY AND DEFIBRILLATION

1. Europace. 2023 Feb 8;25(1):164-174. doi: 10.1093/europace/euac121.

Prognostic value of P-wave morphology in general population.

Laitinen I(1), Kenttä TV(1), Passi J(1), Haukilahti MAE(1), Eranti A(2), Holkeri A(3), Aro AL(3), Kerola T(4), Noponen K(5), Seppänen T(5), Rissanen H(6), Knekt P(6), Heliövaara M(6), Ukkola OH(1), Junttila MJ(1), Huikuri HV(1), Perkiömäki JS(1).

ABSTRACT

AIMS: To evaluate the prognostic significance of novel P-wave morphology descriptors in general population. METHODS AND RESULTS: Novel P-wave morphology variables were analyzed from orthogonal X-, Y-, Z-leads of the digitized electrocardiogram using a custom-made software in 6906 middle-aged subjects of the Mini-Finland Health Survey. A total of 3747 (54.3%) participants died during the follow-up period of 24.3 ± 10.4 years; 379 (5.5%) of the study population succumbed to sudden cardiac death (SCD), 928 (13.4%) to non-SCD (NSCD) and 2440 (35.3%) patients to non-cardiac death (NCD). In univariate comparisons, most of the studied P-wave morphology parameters had a significant association with all modes of death (P from <0.05 to <0.001). After relevant adjustments in the Cox multivariate hazards model, P-wave morphology dispersion (PMD) still tended to predict SCD [hazard ratio (HR): 1.006, 95% confidence interval (CI): 1.000-1.012, P = 0.05)

but not NSCD (HR: 0.999, 95% CI: 0.995-1.003, P = 0.68) or NCD (HR: 0.999, 95% CI: 0.997-1.001, P = 0.44). The P-wave maximum amplitude in the lead Z (P-MaxAmp-Z) predicted SCD even after multivariate adjustments (HR: 1.010, 95% CI: 1.005-1.015, P = 0.0002) but also NSCD (HR: 1.005, 95% CI: 1.002-1.009, P = 0.0005) and NCD (HR: 1.002, 95% CI: 1.000-1.005, P = 0.03). CONCLUSION: Abnormalities of P-wave morphology are associated with the risk of all modes of death in general population. After relevant adjustments, PMD was still closely associated with the risk of SCD but not with NSCD or NCD. P-MaxAmp-Z predicted SCD even after adjustments, however, it also retained its association with NSCD and NCD.

2. Intensive Care Med. 2023 Feb 8:1-3. doi: 10.1007/s00134-023-06993-1. Online ahead of print.
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. Resuscitation. 2023 Feb 8:109727. doi: 10.1016/j.resuscitation.2023.109727. Online ahead of print.
Multicentric Validation of a Prognostic Tool for Predicting Brain Death Following Out-of-Hospital Cardiac Arrest in Children.
Henry M(1), Filipp SL(2), Yuksel Aydin E(3), Chiriboga N(4), Zelinka K(5), Espinosa Smith L(6), Gurka MJ(2), Irazuzta J(3), Fonseca Y(7), Winter MC(8), Pringle C(9); Pediatric Acute Lung Injury, Sepsis Investigators PALISI Network.
ABSTRACT
AIM: Out-of-hospital cardiac arrest (OHCA) in pediatric patients is associated with high rates of mortality and neurologic injury, with no definitive evidence-based method to predict outcomes available. A prognostic scoring tool for adults, The Brain Death After Cardiac Arrest (BDCA) score, was recently developed and validated. We aimed to validate this score in pediatric patients. METHODS: Retrospective cohort study of pediatric patients admitted to 5 PICUs after OHCA between 2011-2021. We extracted BDCA score elements for those who survived at least 24 hours but died as a result of their OHCA. We assessed score discrimination for the definitive outcome of brain death. Subgroup analysis was performed for infants <12mo versus children ≥12mo, those who likely had brain death but had withdrawal of life sustaining therapy (WLST) prior to declaration, and by etiology and duration of arrest. RESULTS: 389 subjects were identified across 5 institutions, with 282 meeting inclusion criteria. 169 (59.9%) were formally declared brain dead; 58 (20.6%) had findings consistent with brain death but had withdrawal of life sustaining therapies prior to completion of formal declaration. Area under the receiver operating characteristic curve for the age ≥12mo cohort was 0.82 [95% CI 0.75,0.90], which mirrored the adult subject AUCs of 0.82 [0.77,0.86] and 0.81 [0.76,0.86] in the development and validation cohorts. Scores demonstrated worse discrimination in the infant cohort (AUC = 0.61). CONCLUSIONS: The BDCA score shows promise in children ≥12mo following OHCA and may be considered in conjunction with existing multimodal prognostication approaches.

2. JAMA Netw Open. 2023 Feb 1;6(2):e2256178. doi: 10.1001/jamanetworkopen.2022.56178.
Trends in In-Hospital Cardiac Arrest and Mortality Among Children With Cardiac Disease in the Intensive Care Unit: A Systematic Review and Meta-analysis.
Sperotto F(1), Daverio M(2), Amigoni A(2), Gregori D(3), Dorste A(4), Allan C(1), Thiagarajan RR(1).
ABSTRACT

IMPORTANCE: Data on trends in incidence and mortality for in-hospital cardiac arrest (IHCA) in children with cardiac disease in the intensive care unit (ICU) are lacking. Additionally, there is limited information on factors associated with IHCA and mortality in this population. OBJECTIVE: To investigate incidence, trends, and factors associated with IHCA and mortality in children with cardiac disease in the ICU. DATA SOURCES: A systematic review was conducted using PubMed, Web of Science, EMBASE, and CINAHL, from inception to September 2021. STUDY SELECTION: Observational studies on IHCA in pediatric ICU patients with cardiac disease were selected (age cutoffs in studies varied from age ≤18 y to age ≤21 y). DATA EXTRACTION AND SYNTHESIS: Quality of studies was assessed using the National Institutes of Health Quality Assessment Tools. Data on incidence, mortality, and factors associated with IHCA or mortality were extracted by 2 independent observers. Random-effects meta-analysis was used to compute pooled proportions and pooled ORs. Metaregression, adjusted for type of study and diagnostic category, was used to evaluate trends in incidence and mortality. MAIN OUTCOMES AND MEASURES: Primary outcomes were incidence of IHCA and in-hospital mortality. Secondary outcomes were proportions of patients who underwent extracorporeal membrane oxygenation (ECMO) cardiopulmonary resuscitation (ECPR) and those who did not achieve return of spontaneous circulation (ROSC). RESULTS: Of the 2574 studies identified, 25 were included in the systematic review (131 724 patients) and 18 in the meta-analysis. Five percent (95% CI, 4%-6%) of children with cardiac disease in the ICU experienced IHCA. The pooled in-hospital mortality among children who experienced IHCA was 51% (95% CI, 42%-59%). Thirty-nine percent (95% CI, 29%-51%) did not achieve ROSC; in centers with ECMO, 22% (95% CI, 14%-33%) underwent ECPR, whereas 22% (95% CI, 12%-38%) were unable to be resuscitated. Both incidence of IHCA and associated in-hospital mortality decreased significantly in the last 20 years (both P for trend < .001), whereas the proportion of patients not achieving ROSC did not significantly change (P for trend = .90). Neonatal age, prematurity, comorbidities, univentricular physiology, arrhythmias, prearrest mechanical ventilation or ECMO, and higher surgical complexity were associated with increased incidence of IHCA and mortality odds. CONCLUSIONS AND RELEVANCE: This systematic review and meta-analysis found that 5% of children with cardiac disease in the ICU experienced IHCA. Decreasing trends in IHCA incidence and mortality suggest that education on preventive interventions, use of ECMO, and post-arrest care may have been effective; however, there remains a crucial need for developing resuscitation strategies specific to children with cardiac disease.

3. Arch Phys Med Rehabil. 2023 Feb 7:S0003-9993(23)00094-1. doi: 10.1016/j.apmr.2023.01.018. Online ahead of print.

Functional Recovery during Inpatient Rehabilitation in Children with Anoxic or Hypoxic Brain Injury.

Gray JM(1), Kramer ME(2), Suskauer SJ(3), Slomine BS(4).

ABSTRACT

OBJECTIVES: To (1) describe characteristics of children with anoxic or hypoxic brain injuries (AnHBI) who presented to an inpatient rehabilitation unit, (2) explore functional outcomes of children with AnHBI at discharge, and (3) examine differences between children with AnHBI associated with cardiac arrest (CA) versus those with respiratory arrest (RA) only. DESIGN: Retrospective cohort study. SETTING: Pediatric inpatient rehabilitation hospital in the northeast United States. PARTICIPANTS: A total of 46 children and adolescents ages 11 months to 18 years admitted to an inpatient rehabilitation brain injury unit (1994-2018) for a first inpatient admission after AnHBI. INTERVENTIONS: Not applicable. MAIN OUTCOME MEASURES: Pediatric Cerebral Performance Category Scale (PCPC), Pediatric Overall Performance Category (POPC), and Functional Independence Measure for Children Developmental Quotients (WeeFIM DFQs) total and subscale

scores. RESULTS: Most children had no disability prior to injury (PCPC=normal, n=37/46) and displayed significant functional impairments at admission to inpatient rehabilitation (PCPC=normal/mild, n=1/46). WeeFIM and PCPC scores improved significantly during inpatient rehabilitation (WeeFIM DFQ Total, p=.003; PCPC, p<.001), though many children continued to demonstrate significant impairments at discharge (PCPC=normal/mild, n=5/46). Functioning was better for the RA-only group relative to the CA group at admission (WeeFIM DFQ Total, p=.006) and discharge (WeeFIM DFQ Total, p <.001). Ongoing gains in functioning were noted 3-months after discharge compared to discharge (WeeFIM DFQ Cognitive, p=.008). CONCLUSIONS: In this group of children with AnHBI who received inpatient rehabilitation, functional status improves significantly between rehabilitation admission and discharge. By discharge, many children continued to display significant impairments, a minority of children had favorable neurologic outcomes, and children with CA have worse outcomes than those with RA-only. Given the small sample size, future research should examine functional recovery during inpatient rehabilitation in a larger, multi-site cohort and include longer term follow-up to examine recovery patterns over time.

4. Pediatr Crit Care Med. 2023 Feb 8. doi: 10.1097/PCC.0000000000003206. Online ahead of print.
Association of Prehospital Physician Presence During Pediatric Out-of-Hospital Cardiac Arrest With Neurologic Outcomes.
Obara T(1), Yumoto T(1), Nojima T(1), Hongo T(1), Tsukahara K(1), Matsumoto N(2), Yorifuji T(2), Nakao A(1), Elmer J(3)(4)(5), Naito H(1).
ABSTRACT
OBJECTIVES: To examine the association of prehospital physician presence with neurologic outcomes of pediatric patients with out-of-hospital cardiac arrest (OHCA). DESIGN: Retrospective cohort study. SETTING: Data from the Japanese Association for Acute Medicine-OHCA Registry. INTERVENTIONS: None. PATIENTS: Pediatric patients (age 17 yr old or younger) registered in the database between June 2014 and December 2019. MEASUREMENT AND MAIN RESULTS: We used logistic regression models with stabilized inverse probability of treatment weighting (IPTW) to estimate the associated treatment effect of a prehospital physician with 1-month neurologically intact survival. Secondary outcomes included in-hospital return of spontaneous circulation (ROSC) and 1-month survival after OHCA. A total of 1,187 patients (276 in the physician presence group and 911 in the physician absence group) were included (median age 3 yr [interquartile range 0-14 yr]; 723 [61%] male). Comparison of the physician presence group, versus the physician absence, showed 1-month favorable neurologic outcomes of 8.3% (23/276) versus 3.6% (33/911). Physician presence was associated with greater odds of 1-month neurologically intact survival after stabilized IPTW adjustment (adjusted odds ratio [aOR] 1.98, 95% CI 1.08-3.66). We also found an association in the secondary outcome between physician presence, opposed to absence, and in-hospital ROSC (aOR 1.48, 95% CI 1.08-2.04). However, we failed to identify an association with 1-month survival (aOR 1.49, 95% CI 0.97-2.88). CONCLUSIONS: Among pediatric patients with OHCA, prehospital physician presence, compared with absence, was associated almost two-fold greater odds of 1-month favorable neurologic outcomes.

EXTRACORPOREAL LIFE SUPPORT

1. J Cardiothorac Vasc Anesth. 2023 Jan 9:S1053-0770(23)00006-X. doi: 10.1053/j.jvca.2023.01.007. Online ahead of print.
Regional Cerebral Oxygen Saturation to Predict Favorable Outcome in Extracorporeal Cardiopulmonary Resuscitation: A Systematic Review and Meta-Analysis.

Bertini P(1), Marabotti A(2), Paternoster G(3), Landoni G Prof(4), Sangalli F(5), Peris A(6), Bonizzoli M(6), Scolletta S Prof(7), Franchi F Prof(8), Rubino A(9), Nocci M(10), Castellani Nicolini N(11), Guarracino F(1).

ABSTRACT

OBJECTIVE: This systematic review and meta-analysis aimed to investigate the role of regional cerebral oxygen saturation (rSO2) in predicting survival and neurologic outcomes after extracorporeal cardiopulmonary resuscitation (ECPR). DESIGN: The study authors performed a systematic review and meta-analysis of all available literature. SETTING: The authors searched relevant databases (Pubmed, Medline, Embase) for studies measuring precannulation rSO2 in patients undergoing ECPR and reporting mortality and/or neurologic outcomes. PARTICIPANTS: The authors included both in-hospital and out-of-hospital cardiac arrest patients receiving ECPR. They identified 3 observational studies, including 245 adult patients. INTERVENTIONS: The authors compared patients with a low precannulation rSO2 (≤15% or 16%) versus patients with a high (>15% or 16%) precannulation rSO2. In addition, the authors carried out subgroup analyses on out-of-hospital cardiac arrest (OHCA) patients. MEASUREMENTS AND MAIN RESULTS: A high precannulation rSO2 was associated with an overall reduced risk of mortality in ECPR recipients (98 out of 151 patients [64.9%] in the high rSO2 group, v 87 out of 94 patients [92.5%] in the low rSO2 group, risk differences [RD] -0.30; 95% CI -0.47 to -0.14), and in OHCA (78 out of 121 patients [64.5%] v 82 out of 89 patients [92.1%], RD 0.30; 95% CI -0.48 to -0.12). A high precannulation rSO2 also was associated with a significantly better neurologic outcome in the overall population (42 out of 151 patients [27.8%] v 2 out of 94 patients [2.12%], RD 0.22; 95% CI 0.13-0.31), and in OHCA patients (33 out of 121 patients [27.3%] v 2 out of 89 patients [2.25%] RD 0.21; 95% CI 0.11-0.30). CONCLUSIONS: A low rSO2 before starting ECPR could be a predictor of mortality and survival with poor neurologic outcomes.

2. Emerg Med J. 2023 Feb 9:emermed-2021-212138. doi: 10.1136/emermed-2021-212138. Online ahead of print.

Long-term outcomes and prognostic factors of extracorporeal cardiopulmonary resuscitation in patients older than 75 years: a single-centre retrospective study.

Kikuta S(#)(1), Inoue A(#)(2), Ishihara S(2), Takahashi R(2), Ijuin S(2), Matsuyama S(2), Nakayama S(2).

ABSTRACT

BACKGROUND: Few studies have assessed older adult patients who received extracorporeal cardiopulmonary resuscitation (ECPR) after cardiac arrest, and outcomes and prognostic factors of ECPR in this population remain unclear. This study aimed to assess the long-term outcomes and prognostic factors among patients older than 75 years who received ECPR after experiencing cardiac arrest. METHODS: This is a single-centre, retrospective case-control study conducted between August 2010 and July 2019. Consecutive patients older than 75 years who had in-hospital (IHCA) or out-of-hospital cardiac arrest (OHCA) and received ECPR at the Emergency Department in the Hyogo Emergency Medical Center, Hyogo, Japan, were included. The primary outcome was a favourable neurological outcome, defined as a Cerebral Performance Category score of 1-2 at 1 year after the event. Univariate logistic regression was used to determine the association between variables and patient outcomes. RESULTS: Of the 187 patients with cardiac arrest who received ECPR, 30 were older than 75 years and 28 (15% of the cohort receiving ECPR) were examined in this study. The median age of the patients was 79 years (IQR 77-82), and there were 13 (46%) male patients. Neurological outcomes were favourable for seven (25%) patients, five of whom had IHCA and two with out-of-hospital OHCA. On univariate analysis, patients with a favourable outcome had a shorter median total collapse time (TCT) than those with an unfavourable outcome (favourable: 18.0 min (IQR 13.0-33.5) vs unfavourable: 44.0 min (IQR 25.0-53.0); p=0.049). CONCLUSION: In selected patients older than 75 years, ECPR could be beneficial by providing a shorter TCT, which may

contribute to favourable neurological outcomes. Nevertheless, further studies are needed to validate these findings.

3. Semin Thromb Hemost. 2023 Feb 7. doi: 10.1055/s-0043-1761488. Online ahead of print.
The History of Extracorporeal Membrane Oxygenation and the Development of Extracorporeal Membrane Oxygenation Anticoagulation.
Bartlett R(1), Arachichilage DJ(2)(3), Chitlur M(4), Hui SR(5), Neunert C(6), Doyle A(7), Retter A(7), Hunt BJ(7), Lim HS(8), Saini A(5), Renné T(9)(10)(11), Kostousov V(5), Teruya J(5).
ABSTRACT
Extracorporeal membrane oxygenation (ECMO) was first started for humans in early 1970s by Robert Bartlett. Since its inception, there have been numerous challenges with extracorporeal circulation, such as coagulation and platelet activation, followed by consumption of coagulation factors and platelets, and biocompatibility of tubing, pump, and oxygenator. Unfractionated heparin (heparin hereafter) has historically been the defacto anticoagulant until recently. Also, coagulation monitoring was mainly based on bedside activated clotting time and activated partial thromboplastin time. In the past 50 years, the technology of ECMO has advanced tremendously, and thus, the survival rate has improved significantly. The indication for ECMO has also expanded. Among these are clinical conditions such as postcardiopulmonary bypass, sepsis, ECMO cardiopulmonary resuscitation, and even severe coronavirus disease 2019 (COVID-19). Not surprisingly, the number of ECMO cases has increased according to the Extracorporeal Life Support Organization Registry and prolonged ECMO support has become more prevalent. It is not uncommon for patients with COVID-19 to be on ECMO support for more than 1 year until recovery or lung transplant. With that being said, complications of bleeding, thrombosis, clot formation in the circuit, and intravascular hemolysis still remain and continue to be major challenges. Here, several clinical ECMO experts, including the "Father of ECMO"-Dr. Robert Bartlett, describe the history and advances of ECMO.

EXPERIMENTAL RESEARCH

1. Cells. 2023 Jan 26;12(3):414. doi: 10.3390/cells12030414.
Therapeutic Hypothermia after Cardiac Arrest Attenuates Hindlimb Paralysis and Damage of Spinal Motor Neurons and Astrocytes through Modulating Nrf2/HO-1 Signaling Pathway in Rats.
Ahn JH(1), Lee TK(2), Kim DW(3), Shin MC(4), Cho JH(4), Lee JC(5), Tae HJ(6), Park JH(7), Hong S(8), Lee CH(9), Won MH(5), Kim YH(8).
ABSTRACT
Cardiac arrest (CA) and return of spontaneous circulation (ROSC), a global ischemia and reperfusion event, lead to neuronal damage and/or death in the spinal cord as well as the brain. Hypothermic therapy is reported to protect neurons from damage and improve hindlimb paralysis after resuscitation in a rat model of CA induced by asphyxia. In this study, we investigated roles of nuclear factor erythroid 2-related factor 2 (Nrf2) and heme oxygenase-1 (HO-1) in the lumbar spinal cord protected by therapeutic hypothermia in a rat model of asphyxial CA. Male Sprague-Dawley rats were subjected to seven minutes of asphyxial CA (induced by injection of 2 mg/kg vecuronium bromide) and hypothermia (four hours of cooling, 33 ± 0.5 °C). Survival rate, hindlimb motor function, histopathology, western blotting, and immunohistochemistry were examined at 12, 24, and 48 h after CA/ROSC. The rats of the CA/ROSC and hypothermia-treated groups had an increased survival rate and showed an attenuated hindlimb paralysis and a mild damage/death of motor neurons located in the anterior horn of the lumbar spinal cord compared with those of the CA/ROSC and normothermia-treated groups. In the CA/ROSC and hypothermia-treated groups, expressions of cytoplasmic and nuclear Nrf2 and HO-1 were significantly higher in the anterior horn compared with

those of the CA/ROSC and normothermia-treated groups, showing that cytoplasmic and nuclear Nrf2 was expressed in both motor neurons and astrocytes. Moreover, in the CA/ROSC and hypothermia-treated group, interleukin-1β (IL-1β, a pro-inflammatory cytokine) expressed in the motor neurons was significantly reduced, and astrocyte damage was apparently attenuated compared with those found in the CA/ROSC and normothermia group. Taken together, our results indicate that hypothermic therapy after CA/ROSC attenuates CA-induced hindlimb paralysis by protecting motor neurons in the lumbar spinal cord via activating the Nrf2/HO-1 signaling pathway and attenuating pro-inflammation and astrocyte damage (reactive astrogliosis).

2. ACS Nano. 2023 Feb 9. doi: 10.1021/acsnano.2c09931. Online ahead of print.
A Nanotherapy of Octanoic Acid Ameliorates Cardiac Arrest/Cardiopulmonary Resuscitation-Induced Brain Injury via RVG29- and Neutrophil Membrane-Mediated Injury Relay Targeting.
Yang J(1), Wang P(2), Jiang X(1), Xu J(1), Zhang M(3), Liu F(1), Lin Y(1), Tao J(1), He J(1), Zhou X(2), Zhang M(1).
ABSTRACT
Treatment of cardiac arrest/cardiopulmonary resuscitation (CA/CPR)-induced brain injury remains a challenging issue without viable therapeutic options. Octanoic acid (OA), a lipid oil that is mainly metabolized in the astrocytes of the brain, is a promising treatment for this type of injury owing to its potential functions against oxidative stress, apoptosis, inflammation, and ability to stabilize mitochondria. However, the application of OA is strictly limited by its short half-life and low available concentration in the target organ. Herein, based on our previous research, an OA-based nanotherapy coated with a neutrophil membrane highly expressing RVG29, RVG29-H-NPOA, was successfully constructed by computer simulation-guided supramolecular assembly of polyethylenimine and OA. The in vitro and in vivo experiments showed that RVG29-H-NPOA could target and be distributed in the injured brain focus via the relay-targeted delivery mediated by RVG29-induced blood-brain barrier (BBB) penetration and neutrophil membrane protein-induced BBB binding and injury targeting. This results in enhancements of the antioxidant, antiapoptotic, mitochondrial stability-promoting and anti-inflammatory effects of OA and exhibited systematic alleviation of astrocyte injury, neuronal damage, and inflammatory response in the brain. Due to their systematic intervention in multiple pathological processes, RVG29-H-NPOA significantly increased the 24 h survival rate of CA/CPR model rats from 40% to 100% and significantly improved their neurological functions. Thus, RVG29-H-NPOA are expected to be a promising therapeutic forthe treatment of CA/CPR-induced brain injury.

CASE REPORTS

1. BMJ Case Rep. 2023 Feb 10;16(2):e253500. doi: 10.1136/bcr-2022-253500.
Cardiac arrest in myocardial infarction with non-obstructive coronary artery (MINOCA) secondary to thyroid dysfunction.
Omar AMA(1), Knott K(2), Saba MM(3), Lim PO(2).
ABSTRACT
A man in his 40s who was previously well had an out-of-hospital cardiac arrest. Postresuscitation ECG showed ST-elevation myocardial infarction (MI). Emergency coronary angiogram revealed MI with non-obstructive coronary arteries (MINOCA) with evidence of spasm in the right coronary artery. Both his echocardiogram and cardiac MRI revealed a normal heart. Further workup showed markedly elevated free T4 (99.5 pmol/L) and free T3 (26.7 pmol/L) with low thyroid stimulating hormone (<0.02 pmol/L) in keeping with thyroid storm. He also had an elevated adjusted calcium level (2.84 mmol/L), which could have contributed to his coronary artery spasm. His peak troponin T

was elevated at 798 ng/L (<14) suggesting myocardial damage. He was treated with propylthiouracil, steroids, beta-blocker, calcium channel blocker and intravenous fluids. The patient achieved a full recovery and was discharged home. This is an unusual case of thyroid dysfunction resulting in coronary artery spasm, cardiac arrest and MINOCA.

2. Ulus Travma Acil Cerrahi Derg. 2023 Feb;29(2):255-258. doi: 10.14744/tjtes.2021.56055.
Out-of-hospital cardiac arrest due to cervical spine injury by uncertain trauma: A study of two cases.
Chung H(1), Lee DH(1), Kim K(2), Choi YH(1), Bae SJ(3).
ABSTRACT
Cervical spinal cord injury is a well-known cause of cardiac arrest in trauma victims. Unless trauma is definitively suspected, emergency medical services teams perform resuscitation in the pre-hospital stage without cervical spine immobilization. During advanced cardiovascular life support (ACLS), intubation with cervical spinal immobilization causes difficulty in accessing the airway, thus, immobilization tends to not be performed, unless the patient is a clear case of trauma. We report two patients with out-of-hospital cardiac arrests (OHCA) due to cervical fractures that have occurred without clear trauma. In these cases, pre-existing cervical spine lesions was additional informed and identification of the cervical spine fractures was delayed. Emergency medical physicians tend to neglect cervical spine injury when the likelihood of trauma is unclear in a patient presenting with OHCA. These cases urge physicians to consider the possibility of cervical spinal injuries, even in cases of minor trauma. If there is a possibility of cervical spinal injury, imaging should not be delayed and should be followed by appropriate treatment.

3. Aesthetic Plast Surg. 2023 Feb 6. doi: 10.1007/s00266-023-03265-7. Online ahead of print.
Death from Pulmonary Embolism Caused by Vaginal Injection of Hyaluronic Acid: a Case Report and a Literature Review.
Kong J(1), Yang T(1), Yang X(1), Zhang F(2), Liao X(2), Li D(3).
ABSTRACT
A 40-year-old woman underwent vaginoplasty with intramural injection of fillers from an illegal medical practitioner. Approximately 2 h after the injection, she developed lower abdominal pain. The patient was taken to the hospital approximately 5 h later due to worsening pain. When the patient was admitted for physical examination, she suddenly experienced cardiac and respiratory arrest. She was resuscitated but remained in a coma. Unfortunately, the patient died approximately 12 h after being admitted to the hospital. The forensic autopsy revealed extensive amorphous basophilic emboli in the small interstitial vascular lumen of both lungs, and a large amount of the same type of substances were also found in the vaginal wall. Hyaluronidase digestion and Alcian blue staining confirmed that most components of the injection were hyaluronic acid (HA). HA is widely used as a cosmetic filler in the field of plastic surgery and is generally considered to have few adverse effects. This paper reports the first anatomical case of fatal pulmonary embolism caused by vaginal injection of HA.

4. Vascular. 2023 Feb 6:17085381231155944. doi: 10.1177/17085381231155944. Online ahead of print.
Ultrasound-guided proximal external aortic compression in a vascular trauma patient.
Wu Z(1), Ma Y(1).
ABSTRACT
OBJECTIVES: Emergency treatment of patients with severe subphrenic vascular trauma often adopts resuscitative thoracotomy or endovascular balloon. This case report proposes a non-invasive

method to treat patients with vascular trauma, mainly through ultrasound-guided positioning of the proximal aorta and applying pressure to occlude the aorta and limit the distal blood flow, using bedside ultrasound to achieve accurate compression, continuous monitoring of its efficacy, and early detection of the recovery of autonomic circulation in patients with cardiac arrest. METHODS: We introduced a case of left iliac artery injury caused by a knife wound and subsequent cardiac arrest. Results We tried to externally compress the proximal aorta under bedside US guidance to achieve and maintain the recovery of the autonomic circulation. This allowed the patient to be transferred from the emergency department to the operating room. CONCLUSION: This case demonstrated that ultrasound-guided proximal external aortic compression can be used as a bridge for further treatment of patients with vascular trauma, such as resuscitative thoracotomy or endoaortic balloon or covered stent occlusion.