CPR AND COVID-19

1. Catheter Cardiovasc Interv. 2022 Jan 1;99(1):1-8. doi: 10.1002/ccd.29525. Epub 2021 Feb 4.
Outcomes of in-hospital cardiac arrest in COVID-19 patients: A proportional prevalence meta-analysis.
Mir T(1), Sattar Y(2), Ahmad J(3), Ullah W(4), Shanah L(1), Alraies MC(5), Qureshi WT(6).
ABSTRACT
BACKGROUND: Limited epidemiological data are available on the outcomes of in-hospital cardiac arrest (CA) in COVID-19 patients. METHODS: We performed literature search of PubMed, EMBASE, Cochrane, and Ovid to identify research articles that studied outcomes of in-hospital cardiac arrest in COVID-19 patients. The primary outcome was survival at discharge. Secondary outcomes included return of spontaneous circulation (ROSC) and types of cardiac arrest. Pooled percentages with a 95% confidence interval (CI) were calculated for the prevalence of outcomes. RESULTS: A total of 7,891 COVID patients were included in the study. There were 621 (pooled prevalence 8%, 95% CI 4-13%) cardiac arrest patients. There were 52 (pooled prevalence 3.0%; 95% CI 0.0-10.0%) patients that survived at the time of discharge. ROSC was achieved in 202 (pooled prevalence 39%;95% CI 21.0-59.0%) patients. Mean time to ROSC was 7.74 (95% CI 7.51-7.98) min. The commonest rhythm at the time of cardiac arrest was pulseless electrical activity (pooled prevalence 46%; 95% 13-80%), followed by asystole (pooled prevalence 40%; 95% CI 6-80%). Unstable ventricular arrhythmia occurred in a minority of patients (pooled prevalence 8%; 95% CI 4-13%). CONCLUSION: This pooled analysis of studies showed that the survival post in-hospital cardiac arrest in COVID patients is dismal despite adequate ROSC obtained at the time of resuscitation. Nonshockable rhythm cardiac arrest is commoner suggesting a non-cardiac cause while cardiac related etiology is uncommon. Future studies are needed to improve the survival in these patients.

2. Cureus. 2021 Dec 9;13(12):e20304. doi: 10.7759/cureus.20304. eCollection 2021 Dec.
Development of a Mannequin for Simulation-Based Trials Involving Respiratory Viral Spread During Respiratory Arrest and Cardiopulmonary Arrest Scenarios.
Luu C(1), Chan M(2), Langga L(3), Bragg E(4), Rake A(4), Young C(2), Lau J(4), Guerrero E(3), Buan J(3), Chang T(1).
ABSTRACT
During the coronavirus disease 2019 (COVID-19) pandemic, mannequin models have been developed to mimic viral spread using fluorescent particles. These models use contraptions such as a spray gun or an exploding latex balloon to emanate a sudden acceleration of particles, simulating a "cough" reflex. No models have been developed to mimic passive aerosolization of viral particles during a cardiopulmonary arrest simulation. Our novel approach to aerosolization of simulated viral spread allows for a continuous flow of particles, which allows us to maintain components of high-fidelity team-based simulations. Our simulated model emanated GloGerm (Moab, UT) from the respiratory tract using a continuous nebulization chamber. Uniquely, the construction of our apparatus allowed for the ability to perform full, simulated cardiopulmonary resuscitation scenarios (such as chest compressions, bag-mask ventilation, and endotracheal intubation) on a high-fidelity mannequin while visualizing potential contamination spread at the conclusion of the simulation. Positive feedback from users included the ability to visualize particulate contamination after cardiopulmonary resuscitations in the context of personal protective equipment usage and roles in resuscitation (i.e. physician, respiratory therapist, nurse). Negative criticism towards the simulation included the lack of certain high-fidelity feedback markers of the mannequin

(auscultating breath sounds and checking pulses) due to the construction of the particle aerosolization mechanism.

3. Am J Emerg Med. 2022 Jan 4;53:122-126. doi: 10.1016/j.ajem.2021.12.069. Online ahead of print.
Comparison of Vie Scope® and Macintosh laryngoscopes for intubation during resuscitation by paramedics wearing personal protective equipment.
Szarpak L(1), Peacock FW(2), Rafique Z(2), Ladny JR(3), Nadolny K(4), Malysz M(5), Dabrowski M(6), Chirico F(7), Smereka J(8).
ABSTRACT
BACKGROUND: Endotracheal intubation (ETI) is still the gold standard of airway management, but in cases of sudden cardiac arrest in patients with suspected SARS-CoV-2 infection, ETI is associated with risks for both the patient and the medical personnel. We hypothesized that the Vie Scope® is more useful for endotracheal intubation of suspected or confirmed COVID-19 cardiac arrest patients than the conventional laryngoscope with Macintosh blade when operators are wearing personal protective equipment (PPE). METHODS: Study was designed as a prospective, multicenter, randomized clinical trial performed by Emergency Medical Services in Poland. Patients with suspected or confirmed COVID-19 diagnosis who needed cardiopulmonary resuscitation in prehospital setting were included. Patients under 18 years old or with criteria predictive of impossible intubation under direct laryngoscopy, were excluded. Patients were randomly allocated 1:1 to Vie Scope® versus direct laryngoscopy with a Macintosh blade. Study groups were compared on success of intubation attempts, time to intubation, glottis visualization and number of optimization maneuvers. RESULTS: We enrolled 90 out-of-hospital cardiac arrest (OHCA) patients, aged 43-92 years. Compared to the VieScope® laryngoscope, use of the Macintosh laryngoscope required longer times for tracheal intubation with an estimated mean difference of -48 s (95%CI confidence interval [CI], -60.23, -35.77; $p < 0.001$). Moreover VieScope® improved first attempt success rate, 93.3% vs. 51.1% respectively (odds ratio [OR] = 13.39; 95%CI: 3.62, 49.58; $p < 0.001$). CONCLUSIONS: The use of the Vie Scope® laryngoscope in OHCA patients improved the first attempt success rate, and reduced intubation time compared to Macintosh laryngoscope in paramedics wearing PPE for against aerosol generating procedures.

CPR/MECHANICAL CHEST COMPRESSION

No articles identified.

REGISTRIES, REVIEWS AND EDITORIALS

1. Emerg Med J. 2022 Jan 12:emermed-2021-211823. doi: 10.1136/emermed-2021-211823. Online ahead of print.
Evaluation of initial shockable rhythm as an indicator of short no-flow time in cardiac arrest: a national registry study.
Shibahashi K(1), Sugiyama K(2), Ishida T(2), Hamabe Y(2).
ABSTRACT
BACKGROUND: The duration from collapse to initiation of cardiopulmonary resuscitation (no-flow time) is one of the most important determinants of outcomes after out-of-hospital cardiac arrest (OHCA). Initial shockable cardiac rhythm (ventricular fibrillation or ventricular tachycardia) is reported to be a marker of short no-flow time; however, there is conflicting evidence regarding

the impact of initial shockable cardiac rhythm on treatment decisions. We investigated the association between initial shockable cardiac rhythm and the no-flow time and evaluated whether initial shockable cardiac rhythm can be a marker of short no-flow time in patients with OHCA. METHODS: Patients aged 18 years and older experiencing OHCA between 2010 and 2016 were selected from a nationwide population-based Japanese database. The association between the no-flow time duration and initial shockable cardiac rhythm was evaluated. Diagnostic accuracy was evaluated using the sensitivity, specificity and positive predictive value. RESULTS: A total of 177 634 patients were eligible for the analysis. The median age was 77 years (58.3%, men). Initial shockable cardiac rhythm was recorded in 11.8% of the patients. No-flow time duration was significantly associated with lower probability of initial shockable cardiac rhythm, with an adjusted OR of 0.97 (95% CI 0.96 to 0.97) per additional minute. The sensitivity, specificity and positive predictive value of initial shockable cardiac rhythm to identify a no-flow time of <5 min were 0.12 (95% CI 0.12 to 0.12), 0.88 (95% CI 0.88 to 0.89) and 0.35 (95% CI 0.34 to 0.35), respectively. The positive predictive values were 0.90, 0.95 and 0.99 with no-flow times of 15, 18 and 28 min, respectively. CONCLUSIONS: Although there was a significant association between initial shockable cardiac rhythm and no-flow time duration, initial shockable cardiac rhythm was not reliable when solely used as a surrogate of a short no-flow time duration after OHCA.

2. J Patient Saf. 2022 Jan 12. doi: 10.1097/PTS.0000000000000912. Online ahead of print.
A 6-Year Thematic Review of Reported Incidents Associated With Cardiopulmonary Resuscitation Calls in a United Kingdom Hospital.
Beed M(1), Hussain S, Woodier N, Fletcher C, Brindley PG.
ABSTRACT
BACKGROUND: Critical incident reporting can be applied to cardiopulmonary resuscitation (CPR) events as a means of reducing further occurrences. We hypothesized that local CPR-related events might follow patterns only seen after a long period of analysis. DESIGN: We reviewed 6 years of local incidents associated with cardiac arrest calls. The following search terms were used to identify actual or potential resuscitation events: "resuscitation," "cardio-pulmonary," "CPR," "arrest," "heart attack," "DNR," "DNAR," "DNACPR," "Crash," "2222." All identified incidents were independently reviewed and categorized, looking for identifiable patterns. SETTING: Nottingham University Hospitals is a large UK tertiary referral teaching hospital. RESULTS: A total of 1017 reports were identified, relating to 1069 categorizable incidents. During the same time, there were approximately 1350 cardiac arrest calls, although it should be noted that many arrest-related incidents were not associated with cardiac arrest call (e.g., failure to have the correct equipment available in the event of a cardiac arrest). Incidents could be broadly classified into 10 thematic areas: no identifiable incident (n = 189; 18%), failure to rescue (n = 133; 12%), staffing concerns (n = 134; 13%), equipment/drug concerns (n = 133; 12%), communication issues (n = 122; 10%), do-not-attempt-CPR decisions (n = 101; 9%), appropriateness of patient location or transfer (n = 96; 9%), concerns that the arrest may have been iatrogenic (n = 76; 7%), patient or staff injury (n = 43; 4%), and miscellaneous (n = 52; 5%). Specific patterns of events were seen within each category. CONCLUSIONS: By reviewing incidents, we were able to identify patterns only noticeable over a long time frame, which may be amenable to intervention. Our findings may be generalizable to other centers or encourage others to undertake this exercise themselves.

IN-HOSPITAL CARDIAC ARREST

1. Resuscitation. 2022 Jan 11:S0300-9572(21)00545-1. doi: 10.1016/j.resuscitation.2021.12.037. Online ahead of print.

Cardiorenal Function and Survival in In-Hospital Cardiac Arrest: A Nationwide Study of 22,819 Cases.

Berglund S(1), Andreasson A(2), Rawshani A(2), Hirlekar G(2), Lundgren P(3), Angerås O(2), Mandalenakis Z(3), Redfors B(2), Holm A(2), Hagberg E(2), Ricksten SE(4), Friberg H(5), Gustafsson L(3), Dworeck C(3), Herlitz J(6), Rawshani A(7).

ABSTRACT

BACKGROUND: We studied the association between cardiorenal function and survival, neurological outcome and trends in survival after in-hospital cardiac arrest (IHCA). METHODS: We included cases aged ≥18 years in the Swedish Cardiopulmonary Resuscitation Registry during 2008 to 2020. The CKD-EPI equation was used to calculate estimated glomerular filtration rate (eGFR). A history of heart failure was defined according to contemporary guideline criteria. Logistic regression was used to study survival. Neurological outcome was assessed using cerebral performance category (CPC). RESULTS: We studied 22,819 patients with IHCA. The 30-day survival was 19.3%, 16.6%, 22.5%, 28.8%, 39.3%, 44.8% and 38.4% in cases with eGFR <15, 15-29, 30-44, 45-59, 60-89, 90-130 and 130-150 ml/min/1.73 m2, respectively. All eGFR levels below and above 90 ml/min/1.73 m2 were associated with increased mortality. Probability of survival at 30 days was 62% lower in cases with eGFR <15 ml/min/1.73 m2, compared with normal kidney function. At every level of eGFR, presence of heart failure increased mortality markedly; patients without heart failure displayed higher mortality only at eGFR below 30 ml/min/1.73 m2. Among survivors with eGFR <15 ml/min/1.73 m2, good neurological outcome was noted in 87.2%. Survival increased in most groups over time, but most for those with eGFR <15 ml/min/1.73 m2, and least for those with normal eGFR. CONCLUSIONS: All eGFR levels below and above normal range are associated with increased mortality and this association is modified by the presence of heart failure. Neurological outcome is good in the majority of cases, across kidney function levels and survival is increasing.

2. PLoS One. 2022 Jan 13;17(1):e0262541. doi: 10.1371/journal.pone.0262541. eCollection 2022.

Trends of in-hospital cardiac arrests in a single tertiary hospital with a mature rapid response system.

Jung H(1), Ko RE(1), Ko MG(2), Jeon K(1)(3).

ABSTRACT

BACKGROUND: Most studies on rapid response system (RRS) have simply focused on its role and effectiveness in reducing in-hospital cardiac arrests (IHCAs) or hospital mortality, regardless of the predictability of IHCA. This study aimed to identify the characteristics of IHCAs including predictability of the IHCAs as our RRS matures for 10 years, to determine the best measure for RRS evaluation. METHODS: Data on all consecutive adult patients who experienced IHCA and received cardiopulmonary resuscitation in general wards between January 2010 and December 2019 were reviewed. IHCAs were classified into three groups: preventable IHCA (P-IHCA), non-preventable IHCA (NP-IHCA), and inevitable IHCA (I-IHCA). The annual changes of three groups of IHCAs were analyzed with Poisson regression models. RESULTS: Of a total of 800 IHCA patients, 149 (18.6%) had P-IHCA, 465 (58.1%) had NP-IHCA, and 186 (23.2%) had I-IHCA. The number of the RRS activations increased significantly from 1,164 in 2010 to 1,560 in 2019 (P = 0.009), and in-hospital mortality rate was significantly decreased from 9.20/1,000 patients in 2010 to 7.23/1000 patients in 2019 (P = 0.009). The trend for the overall IHCA rate was stable, from 0.77/1,000 patients in 2010 to 1.06/1,000 patients in 2019 (P = 0.929). However, while the incidence of NP-IHCA (P = 0.927) and I-IHCA (P = 0.421) was relatively unchanged over time, the incidence of P-IHCA decreased from 0.19/1,000 patients in 2010 to 0.12/1,000 patients in 2019 (P = 0.025). CONCLUSIONS: The incidence of P-IHCA could be a quality metric to measure the clinical outcomes of RRS implementation and maturation than overall IHCAs.

3. Resusc Plus. 2021 Dec 24;9:100191. doi: 10.1016/j.resplu.2021.100191. eCollection 2022 Mar.

The predictive power of the National Early Warning Score (NEWS) 2, as compared to NEWS, among patients assessed by a Rapid response team: A prospective multi-centre trial.

Thorén A(1)(2), Joelsson-Alm E(3)(4), Spångfors M(5)(6), Rawshani A(7), Kahan T(8), Engdahl J(8), Jonsson M(9), Djärv T(1)(10).

ABSTRACT

AIM: Early identification of patients at risk of serious adverse events (SAEs) is of vital importance, yet it remains a challenging task. We investigated the predictive power of National Early Warning Score (NEWS) 2, as compared to NEWS, among patients assessed by a Rapid response team (RRT). METHODS: Prospective, observational cohort study on 898 consecutive patients assessed by the RRTs in 26 Swedish hospitals. For each patient, NEWS and NEWS 2 scores were uniformly calculated by the study team. The associations of NEWS and NEWS 2 scores with unanticipated admissions to Intensive care unit (ICU), mortality and in-hospital cardiac arrests (IHCA) within 24 h, and the composite of these three events were investigated using logistic regression. The predictive power of NEWS and NEWS 2 was assessed using the area under the receiver operating characteristic (AUROC) curves. RESULTS: The prognostic accuracy of NEWS/NEWS 2 in predicting mortality was acceptable (AUROC 0.69/0.67). In discriminating the composite outcome and unanticipated ICU admission, both NEWS and NEWS 2 were relatively weak (AUROC 0.62/0.62 and AUROC 0.59/0.60 respectively); for IHCA the performance was poor. There were no differences between NEWS and NEWS 2 as to the predictive power. CONCLUSION: The prognostic accuracy of NEWS 2 to predict mortality within 24 h was acceptable. However, the prognostic accuracy of NEWS 2 to predict IHCA was poor. NEWS and NEWS 2 performed similar in predicting the risk of SAEs but their performances were not sufficient for use as a risk stratification tool in patients assessed by a RRT.

INJURIES AND CPR

1. Am J Forensic Med Pathol. 2022 Jan 10. doi: 10.1097/PAF.0000000000000743. Online ahead of print.

Cardiopulmonary Resuscitation Induced Posterior Rib Fractures in Nontraumatic Pediatric Deaths.

Love JC(1), Austin D, Giese KW, Roe SJ.

ABSTRACT

Posterior rib fractures are considered suspicious for nonaccidental injury when observed in infants without significant trauma history or underlying bone disease. The biomechanical mechanism postulated for causing posterior rib fractures is anterior/posterior compression of the chest with posterior levering of the rib head over the transverse process of the vertebra creating a focal area of stress. The recommended "2-thumb" cardiopulmonary resuscitation method involves the administrator placing both thumbs on the sternum of the patient, encircling the chest with the hands, and placing the finger tips lateral to the spine. From this position, the administrator compresses the chest in an anterior/posterior direction by pressing on the sternum. Theoretically, the 2-thumb method should focus all force on the sternum while the back is supported by the fingers limiting posterior levering of the ribs and reducing the risk of posterior rib fractures. However, posterior rib fractures have been found during the autopsy of infants who received 2-thumb cardiopulmonary resuscitation, had no traumatic history, had a nontraumatic cause of death, and had no indication of underlying bone disease. This case study series presents the demographics, birth histories, circumstances surrounding death, and autopsy findings of four such medical examiner cases.

CAUSE OF THE ARREST

1. Int J Environ Res Public Health. 2022 Jan 3;19(1):501. doi: 10.3390/ijerph19010501.

Accidental Hypothermia: 2021 Update.
Paal P(1)(2), Pasquier M(2)(3), Darocha T(4), Lechner R(5), Kosinski S(6), Wallner B(7), Zafren K(2)(8)(9), Brugger H(2)(10)(11).
ABSTRACT
Accidental hypothermia is an unintentional drop of core temperature below 35 °C. Annually, thousands die of primary hypothermia and an unknown number die of secondary hypothermia worldwide. Hypothermia can be expected in emergency patients in the prehospital phase. Injured and intoxicated patients cool quickly even in subtropical regions. Preventive measures are important to avoid hypothermia or cooling in ill or injured patients. Diagnosis and assessment of the risk of cardiac arrest are based on clinical signs and core temperature measurement when available. Hypothermic patients with risk factors for imminent cardiac arrest (temperature < 30 °C in young and healthy patients and <32 °C in elderly persons, or patients with multiple comorbidities), ventricular dysrhythmias, or systolic blood pressure < 90 mmHg) and hypothermic patients who are already in cardiac arrest, should be transferred directly to an extracorporeal life support (ECLS) centre. If a hypothermic patient arrests, continuous cardiopulmonary resuscitation (CPR) should be performed. In hypothermic patients, the chances of survival and good neurological outcome are higher than for normothermic patients for witnessed, unwitnessed and asystolic cardiac arrest. Mechanical CPR devices should be used for prolonged rescue, if available. In severely hypothermic patients in cardiac arrest, if continuous or mechanical CPR is not possible, intermittent CPR should be used. Rewarming can be accomplished by passive and active techniques. Most often, passive and active external techniques are used. Only in patients with refractory hypothermia or cardiac arrest are internal rewarming techniques required. ECLS rewarming should be performed with extracorporeal membrane oxygenation (ECMO). A post-resuscitation care bundle should complement treatment.

2. Ther Drug Monit. 2022 Jan 11. doi: 10.1097/FTD.0000000000000960. Online ahead of print.
Cardiac arrest following unsuspected self-poisoning with doxylamine.
Gomila I(1), Socias A, Socias L, Gutierrez L, Ripoll T, Alarcón FJ, García AB.
NO ABSTRACT AVAILABLE

3. J Anesth. 2022 Jan 10. doi: 10.1007/s00540-021-03034-3. Online ahead of print.
Risk factors of cardiac arrest and failure to achieve return of spontaneous circulation during anesthesia: a 20-year retrospective observational study from a tertiary care university hospital.
Maeda M(1), Hirata N(2), Chaki T(2), Yamakage M(2).
ABSTRACT
PURPOSE: There is still a lack of robust data on the epidemiology of cardiac arrest during anesthesia. We investigated the frequency and risk factors of cardiac arrest during anesthesia over the past two decades at a tertiary care university hospital in Japan. METHODS: We retrospectively analyzed 111,851 anesthesia records of patients who underwent surgery under anesthesia between 2000 and 2019. Cardiac arrest cases were classified according to the patient's background, surgical status, main cause and initial rhythm of cardiac arrest, and the presence of the return of spontaneous circulation (ROSC). Univariate and multivariate logistic regression analyses were used to identify the risk factors of cardiac arrest and failure to achieve ROSC. RESULTS: Ninety cardiac arrest cases during anesthesia were identified. The incidence of cardiac arrest was 8.05 per 10,000 anesthetics (95% CI, 6.54-9.90). There were 6 anesthesia-related cardiac arrests and 9 anesthesia-contributory cardiac arrests. The most common cause of cardiac arrest was blood loss. American Society of Anesthesiologists physical status 4-5, emergency surgery, and cardiovascular surgery were identified as independent risk factors of cardiac arrest. American Society of Anesthesiologists physical status 4-

5, blood loss-induced cardiac arrest, and non-shockable rhythm were independently associated with failure to achieve ROSC. CONCLUSION: Blood loss was the most common cause of cardiac arrest and blood loss-induced cardiac arrest was independently associated with failure to achieve ROSC. Further improvements in treatment strategies for bleeding may reduce the future incidence of cardiac arrest and death during anesthesia.

4. Int J Cardiol Heart Vasc. 2021 Dec 23;38:100934. doi: 10.1016/j.ijcha.2021.100934. eCollection 2022 Feb.

Incidence of acute aortic dissections in patients with out of hospital cardiac arrest: A systematic review and meta-analysis of observational studies.

Gouveia E Melo R(1)(2)(3), Machado C(2), Caldeira D(2)(3)(4)(5)(6), Alves M(2)(4)(5)(7), Lopes A(1)(3), Serrano M(2)(8), Fernandes E Fernandes R(1)(2)(3), Mendes Pedro L(1)(2)(3).

ABSTRACT

OBJECTIVES: Acute Aortic dissection (AAD) may present as out-of-hospital cardiac arrest (OHCA). However, the incidence of this presentation is not well known. Our aim was to perform a systematic review and meta-analysis of all observational studies reporting on the incidence of AAD in patients with OHCA. METHODS: We searched MEDLINE, CENTRAL, PsycInfo, Web of Science Core Collection and OpenGrey databases from inception to March-2021, for observational studies reporting on the incidence of AAD in patients with OHCA. Data was pooled using a random-effects model of proportions. The primary outcome was the incidence of AAD in OHCA patients. Secondary outcomes were the incidence of type A aortic dissections (TAAD) and type B aortic dissections (TBAD) in OHCA patients, overall mortality following AAD-OHCA and risk of death in AAD-OHCA patients compared to risk of death of non-AAD-OHCA patients. RESULTS: Fourteen studies were included. The pooled calculated incidence of OHCA due to AAD was 4.39% (95 %CI: 2.55; 6.8). Incidence of OHCA due to TAAD was 7.18% (95 %CI: 5.61; 8.93) and incidence of OHCA due to TBAD was 0.47% (95 %CI: 0.18; 0.85). Overall mortality following OHCA due to AAD was 100% (95 %CI: 97.62; 100). The risk of death in AAD-OHCA patients compared with non-AAD-OHCA patients was 1.10 (95 %CI: 0.94; 1.30). CONCLUSION: AAD as a cause of OHCA is more frequent than previously thought. Prognosis is dire, as it is invariably lethal. These findings should lead to a higher awareness of AAD when approaching a patient with OHCA and to future studies on this matter.

5. Br J Clin Pharmacol. 2022 Jan 9. doi: 10.1111/bcp.15224. Online ahead of print.

Risk of out-of-hospital cardiac arrest in antidepressant drug users.

Eroglu TE(1)(2)(3), Barcella CA(1), Gerds TA(4)(5), Kessing LV(6)(7), Zylyftari N(1)(8), Mohr GH(1)(9), Kragholm K(6), Polcwiartek C(6), Wissenberg M(1), Folke F(1)(10)(7), Tan HL(2)(11), Torp-Pedersen C(12)(8), Gislason GH(1)(3).

ABSTRACT

AIM: Conflicting results have been reported regarding the association between antidepressant use and out-of-hospital cardiac arrest (OHCA) risk. We investigated whether the use of antidepressants is associated with OHCA. METHODS: We conducted a nationwide nested case-control study to assess the association of individual antidepressant drugs within drug classes with the hazard of OHCA. Cases were defined as OHCA from presumed cardiac causes. Cox regression with time-dependent exposure and time-dependent covariates was conducted to calculate hazard ratios (HR) and 95% confidence intervals (95%-CIs) overall and in subgroups defined by established cardiac disease and cardiovascular risk factors. Also, we studied antidepressants with and without sodium channel blocking or potassium channel blocking properties separately. RESULTS: During the study period from 2001 to 2015 we observed 10,987 OHCA-cases, and found increased OHCA-rate for high-dose citalopram (>20 mg) and high-dose escitalopram (>10 mg) (HR:1.46[95%-CI:1.27-1.69], HR:1.43[95%-

CI:1.16-1.75], respectively) among selective serotonin reuptake inhibitors (reference drug sertraline), and for high-dose mirtazapine (>30) (HR:1.59[95%-CI:1.18-2.14]) among the serotonin-norepinephrine reuptake inhibitors or noradrenergic and specific serotonergic antidepressants (reference drug duloxetine). Among tricyclic antidepressants (reference drug amitriptyline), no drug was associated with significantly increased OHCA-rate. Increased OHCA-rate was found for antidepressants with known potassium channel blocking properties (HR:1.14[95%-CI:1.05-1.23]), but for not those with sodium channel blocking properties. Citalopram, although not statistically significant, and mirtazapine were associated with increased OHCA-rate in patients without cardiac disease and cardiovascular risk factors. CONCLUSION: Our findings indicate that careful titration of citalopram, escitalopram and mirtazapine dose may have to be considered due to drug safety issues.

6. Clin Exp Emerg Med. 2021 Dec;8(4):296-306. doi: 10.15441/ceem.20.114. Epub 2021 Dec 31.
Low serum cholesterol level as a risk factor for out-of-hospital cardiac arrest: a case-control study.
Yang JK(1), Kim YJ(2)(3), Jeong J(2)(3), Kim J(3), Park JH(1)(3), Ro YS(1)(3), Shin SD(3)(4).

ABSTRACT
OBJECTIVE: We aimed to identify the association between low serum total cholesterol levels and the risk of out-of-hospital cardiac arrest (OHCA). METHODS: This case-control study was performed using datasets from the Cardiac Arrest Pursuit Trial with Unique Registration and Epidemiologic Surveillance (CAPTURES) project and the Korea National Health and Nutrition Examination Survey (KNHANES). Cases were defined as emergency medical service-treated adult patients who experienced OHCA with a presumed cardiac etiology from the CAPTURES project dataset. Four controls from the KNHANES dataset were matched to each case based on age, sex, and county. Multivariable conditional logistic regression analysis was conducted to evaluate the effect of total cholesterol levels on OHCA. RESULTS: A total of 607 matched case-control pairs were analyzed. We classified total cholesterol levels into six categories (<148, 148-166.9, 167-189.9, 190-215.9, 216-237.9, and ≥238 mg/dL) according to the distribution of total cholesterol levels in the KNHANES dataset. Subjects with a total cholesterol level of 167-189.9 mg/dL (25th-49th percentile of the KNHANES dataset) were used as the reference group. In both the adjusted models and sensitivity analysis, a total cholesterol level of <148 mg/dL was significantly associated with OHCA (adjusted odds ratio [95% confidence interval], 6.53 [4.47-9.56]). CONCLUSION: We identified an association between very-low total cholesterol levels and an increased risk of OHCA in a large, community-based population. Future prospective studies are needed to better understand how a low lipid profile is associated with OHCA.

END-TIDAL CO_2

No articles identified.

ORGAN DONATION

No articles identified.

FEEDBACK

No articles identified.

DRUGS

1. J Clin Med. 2021 Dec 30;11(1):190. doi: 10.3390/jcm11010190.

Effect of Prehospital Epinephrine Use on Survival from Out-of-Hospital Cardiac Arrest and on Emergency Medical Services.

Park SY(1), Lim D(2), Kim SC(2), Ryu JH(3), Kim YH(4), Choi B(5), Kim SH(5).

ABSTRACT

This study was to identify the effect of epinephrine on the survival of out-of-hospital cardiac arrest (OHCA) patients and changes in prehospital emergency medical services (EMSs) after the introduction of prehospital epinephrine use by EMS providers. This was a retrospective observational study comparing two groups (epinephrine group and norepinephrine group). We used propensity score matching of the two groups and identified the association between outcome variables regarding survival and epinephrine use, controlling for confounding factors. The epinephrine group was 339 patients of a total 1943 study population. The survival-to-discharge rate and OR (95% CI) of the epinephrine group were 5.0% (p = 0.215) and 0.72 (0.43-1.21) in the total patient population and 4.7% (p = 0.699) and 1.15 (0.55-2.43) in the 1:1 propensity-matched population. The epinephrine group received more mechanical chest compression and had longer EMS response times and scene times than the norepinephrine group. Mechanical chest compression was a negative prognostic factor for survival to discharge and favorable neurological outcomes in the epinephrine group. The introduction of prehospital epinephrine use in OHCApatients yielded no evidence of improvement in survival to discharge and favorable neurological outcomes and adversely affected the practice of EMS providers, exacerbating the factors negatively associated with survival from OHCA.

TRAUMA

1. Indian J Crit Care Med. 2021 Dec;25(12):1408-1412. doi: 10.5005/jp-journals-10071-24057.

Outcomes of Trauma Victims with Cardiac Arrest Who Survived to Intensive Care Unit Admission in a Level 1 Apex Indian Trauma Centre: A Retrospective Cohort Study.

Soni KD(1), Rai N(2), Aggarwal R(1), Trikha A(3).

ABSTRACT

BACKGROUND AND AIMS: The prognosis of patients with cardiac arrest following trauma is poor. Our objectives were: (1) to determine outcomes of patients following in-hospital cardiac arrest posttrauma and admitted to the intensive care unit (ICU) and (2) to identify characteristics associated with in-hospital mortality. MATERIALS AND METHODS: This was a single-center retrospective analysis of patients admitted to ICU after resuscitation following in-hospital cardiac arrest between January 2017 and July 2018. Patients with isolated head injuries and multiple cardiac arrests were excluded. Bivariate analysis was done to determine a significant association between baseline characteristics and in-hospital mortality. RESULTS: A total of 37 patients were included. About 35.1% of trauma subjects survived hospital discharge. Bivariate analysis showed positive association between admission Acute Physiology and Chronic Health Evaluation II (APACHE II) and Sequential Organ Failure Assessment (SOFA) scores with in-hospital mortality. Other characteristics, such as age, duration of cardiopulmonary resuscitation (CPR), and serum lactate levels on admission, were not associated with in-hospital mortality. CONCLUSION: Despite being at lower survival following a cardiac arrest after trauma, approximately one-third of the patients survived hospital discharge. This implies that aggressive support of this population is not necessarily futile. Optimization of postresuscitation physiological factors and their impacts on outcomes for these patients need further studies. HOW TO CITE THIS ARTICLE: Soni KD, Rai N, Aggarwal R, Trikha A.

Outcomes of Trauma Victims with Cardiac Arrest Who Survived to Intensive Care Unit Admission in a Level 1 Apex Indian Trauma Centre: A Retrospective Cohort Study.

VENTILATION

1. Prehosp Disaster Med. 2022 Jan 11:1-8. doi: 10.1017/S1049023X21001382. Online ahead of print.
Iatrogenic Tracheal Rupture Related to Prehospital Emergency Intubation in Adults: A 15-Year Single Center Experience.
Struck MF(1), Ondruschka B(2), Beilicke A(3)(4), Krämer S(5).

ABSTRACT
OBJECTIVE: Iatrogenic tracheal rupture is an unusual and severe complication that can be caused by tracheal intubation. The frequency, management, and outcome of iatrogenic tracheal rupture due to prehospital emergency intubation in adults by emergency response physicians has not yet been sufficiently explored. METHODS: Adult patients with iatrogenic tracheal ruptures due to prehospital emergency intubation admitted to an academic referral center over a 15-year period (2004-2018) with consideration of individual risk factors were analyzed. RESULTS: Thirteen patients (eight female) with a mean age of 67 years met the inclusion criteria and were analyzed. Of these, eight tracheal ruptures (62%) were caused during the airway management of cardiopulmonary resuscitation (CPR). Stylet use and difficult laryngoscopy requiring multiple attempts were documented in eight cases (62%) and four cases (30%), respectively. Seven patients (54%) underwent surgery, while six patients (46%) were treated conservatively. The overall 30-day mortality was 46%; five patients died due to their underlying emergencies and one patient died of tracheal rupture. Three survivors (23%) recovered with severe neurological sequelae and four (30%) were discharged in good neurological condition. Survivors had significantly smaller mean rupture sizes (2.7cm versus 6.3cm; P <.001) and less cutaneous emphysema (n = 2 versus n = 6; P = .021) than nonsurvivors. CONCLUSIONS: Iatrogenic tracheal rupture due to prehospital emergency intubation is a rare complication. Published risk factors are not consistently present and may not be applicable to identify patients at high risk, especially not in rescue situations. Treatment options depend on individual patient condition, whereas outcome largely depends on the underlying disease and rupture extension.

2. J Clin Med. 2021 Dec 31;11(1):217. doi: 10.3390/jcm11010217.
Effect of Early Supraglottic Airway Device Insertion on Chest Compression Fraction during Simulated Out-of-Hospital Cardiac Arrest: Randomised Controlled Trial.
Stuby L(1), Jampen L(2), Sierro J(3), Bergeron M(4), Paus E(5), Spichiger T(6)(7), Suppan L(8), Thurre D(1).

ABSTRACT
Early insertion of a supraglottic airway (SGA) device could improve chest compression fraction by allowing providers to perform continuous chest compressions or by shortening the interruptions needed to deliver ventilations. SGA devices do not require the same expertise as endotracheal intubation. This study aimed to determine whether the immediate insertion of an i-gel® while providing continuous chest compressions with asynchronous ventilations could generate higher CCFs than the standard 30:2 approach using a face-mask in a simulation of out-of-hospital cardiac arrest. A multicentre, parallel, randomised, superiority, simulation study was carried out. The primary outcome was the difference in CCF during the first two minutes of resuscitation. Overall and per-cycle CCF quality of compressions and ventilations parameters were also compared. Among thirteen teams of two participants, the early insertion of an i-gel® resulted in higher CCFs during the first two minutes (89.0% vs. 83.6%, p = 0.001). Overall and per-cycle CCF were consistently higher in the i-gel® group, even after the 30:2 alternation had been resumed. In the i-gel® group, ventilation parameters were enhanced, but compressions were significantly shallower (4.6 cm vs. 5.2 cm, p = 0.007). This latter issue must be addressed before clinical trials can be considered.

3. Prehosp Emerg Care. 2022;26(sup1):54-63. doi: 10.1080/10903127.2021.1971349.
Prehospital Cardiac Arrest Airway Management: An NAEMSP Position Statement and Resource Document.
Carlson JN, Colella MR, Daya MR, J De Maio V, Nawrocki P, Nikolla DA, Bosson N.
ABSTRACT
Airway management is a critical component of out-of-hospital cardiac arrest (OHCA) resuscitation. Multiple cardiac arrest airway management techniques are available to EMS clinicians including bag-valve-mask (BVM) ventilation, supraglottic airways (SGAs), and endotracheal intubation (ETI). Important goals include achieving optimal oxygenation and ventilation while minimizing negative effects on physiology and interference with other resuscitation interventions. NAEMSP recommends: Based on the skill of the clinician and available resources, BVM, SGA, or ETI may be considered as airway management strategies in OHCA.Airway management should not interfere with other key resuscitation interventions such as high-quality chest compressions, rapid defibrillation, and treatment of reversible causes of the cardiac arrest.EMS clinicians should take measures to avoid hyperventilation during cardiac arrest resuscitation. Where available for clinician use, capnography should be used to guide ventilation and chest compressions, confirm and monitor advanced airway placement, identify return of spontaneous circulation (ROSC), and assist in the decision to terminate resuscitation.

4. Prehosp Emerg Care. 2022;26(sup1):42-53. doi: 10.1080/10903127.2021.1990447.
Prehospital Drug Assisted Airway Management: An NAEMSP Position Statement and Resource Document.
Jarvis JL, Lyng JW, Miller BL, Perlmutter MC, Abraham H, Sahni R.
ABSTRACT
Airway management is a critical intervention for patients with airway compromise, respiratory failure, and cardiac arrest. Many EMS agencies use drug-assisted airway management (DAAM) - the administration of sedatives alone or in combination with neuromuscular blockers - to facilitate advanced airway placement in patients with airway compromise or impending respiratory failure who also have altered mental status, agitation, or intact protective airway reflexes. While DAAM provides several benefits including improving laryngoscopy and making insertion of endotracheal tubes and supraglottic airways easier, DAAM also carries important risks. NAEMSP recommends: DAAM is an appropriate tool for EMS clinicians in systems with clear guidelines, sufficient training, and close EMS physician oversight. DAAM should not be used in settings without adequate resources. EMS physicians should develop clinical guidelines informed by evidence and oversee the training and credentialing for safe and effective DAAM. DAAM programs should include best practices of airway management including patient selection, assessment and positioning, preoxygenation strategies including apneic oxygenation, monitoring and management of physiologic abnormalities, selection of medications, post-intubation analgesia and sedation, equipment selection, airway confirmation and monitoring, and rescue airway techniques. Post-DAAM airway placement must be confirmed and continually monitored with waveform capnography. EMS clinicians must have the necessary equipment and training to manage patients with failed DAAM, including bag mask ventilation, supraglottic airway devices and surgical airway approaches. Continuous quality improvement for DAAM must include assessment of individual and aggregate performance metrics. Where available for review, continuous physiologic recordings (vital signs, pulse oximetry, and capnography), audio and video recordings, and assessment of patient outcomes should be part of DAAM continuous quality improvement.

CERERBRAL MONITORING

1. Resuscitation. 2022 Jan 10:S0300-9572(22)00004-1. doi: 10.1016/j.resuscitation.2022.01.003. Online ahead of print.

Delayed head CT in out-of-hospital cardiac arrest survivors: Does this improve predictive performance of neurological outcome?

Nam In Y(1), Ho Lee I(2), Soo Park J(3), Mi Kim Data Acquisition D(2), You Data Acquisition Y(4), Hong Min J(1), Jeong W(4), Jun Ahn H(5), Kang C(4), Kook Lee B(6).

ABSTRACT

BACKGROUND: We compared the ability of head computed tomography (HCT) and MRI, respectively, obtained before or after target temperature management to predict neurologic outcomes in out-of-hospital cardiac arrest (OHCA) survivors. METHODS: This retrospective study included adult comatose OHCA survivors who underwent neuroimaging scans within 6 h (first HCT) or 72-96 h (second HCT and MRI) after the return of spontaneous circulation (ROSC). We calculated the gray-white matter ratio (GWR), hypoxic-ischemic brain injury presence (loss of boundary at the basal ganglia level [LOB at BG], sulcal effacement at the centrum semiovale [SE at CS], and pseudo-SAH sign), and the overall score based on MRI findings (a total score of 21 brain regions individually scored according to the degree of signal abnormality). RESULTS: Overall, 78 patients were included in this analysis, of whom 45 (58%) showed poor outcomes. The second HCT scan showed greater prognostic performance than the first HCT scan for GWR (area under curve 0.92 vs. 0.70), LOB at BG (0.93 vs. 0.65), SE at CS (0.89 vs. 0.64), and pseudo-SAH sign (0.75 vs. 0.51). The overall score on MRI (0.99) showed the highest prognostic performance. However, on the second HCT scan, the combination of GWR and LOB at BG showed prognostic performance (0.96) comparable to the overall score on MRI (P=0.12); the corresponding sensitivity and specificity values were 85.7% and 100%. CONCLUSIONS: Overall score on MRI and the combination of GWR and LOB at BG findings on second HCT scans may help predict poor outcomes in OHCA survivors.

2. Neurology. 2022 Jan 11:10.1212/WNL.0000000000013301. doi: 10.1212/ WNL. 0000000000013301. Online ahead of print.

Regional Distribution of Brain Injury After Cardiac Arrest: Clinical and Electrographic Correlates.

Snider SB(1), Fischer D(2), McKeown ME(2), Cohen AL(3)(4)(5), Schaper FLWVJ(4), Amorim E(6)(7), Fox MD(4)(8)(9), Scirica B(10), Bevers MB(2), Lee JW(11).

ABSTRACT

BACKGROUND AND OBJECTIVES: Disorders of consciousness, EEG background suppression and epileptic seizures are associated with poor outcome after cardiac arrest. Our objective was to identify the distribution of diffusion MRI-measured anoxic brain injury after cardiac arrest and to define the regional correlates of disorders of consciousness, EEG background suppression, and seizures. METHODS: We analyzed patients from a single-center database of unresponsive patients who underwent diffusion MRI following cardiac arrest (n=204). We classified each patient based on recovery of consciousness (command-following) before discharge, the most continuous EEG background (burst suppression versus continuous), and the presence or absence of seizures. Anoxic brain injury was measured using the apparent diffusion coefficient (ADC) signal. We identified ADC abnormalities relative to control subjects without cardiac arrest (n=48) and used voxel lesion symptom mapping to identify regional associations with disorders of consciousness, EEG background suppression, and seizures. We then used a bootstrapped lasso regression procedure to identify robust, multivariate regional associations with each outcome variable. Finally, using area under receiver operating characteristic curves, we then compared the classification ability of the strongest regional associations to that of brain-wide summary measures. RESULTS: Compared to controls, cardiac arrest patients demonstrated ADC signal reduction most significant in the occipital lobes. Disorders of consciousness were associated with reduced ADC most prominently in the occipital lobes, but also in deep structures. Regional injury more accurately classified patients with disorders of consciousness than whole-brain injury. Background suppression mapped to a similar set of brain

regions, but regional injury could no better classify patients than whole-brain measures. Seizures were less common in patients with more severe anoxic injury, particularly in those with injury to the lateral temporal white matter. DISCUSSION: Anoxic brain injury was most prevalent in posterior cerebral regions, and this regional pattern of injury was a better predictor of disorders of consciousness than whole-brain injury measures. EEG background suppression lacked a specific regional association, but patients with injury to the temporal lobe were less likely to have seizures. Regional patterns of anoxic brain injury are relevant to the clinical and electrographic sequelae of cardiac arrest and may hold importance for prognosis. CLASSIFICATION OF EVIDENCE: This study provides Class IV evidence that disorders of consciousness after cardiac arrest are associated with widely lower ADC values on diffusion MRI and are most strongly associated with reductions in occipital ADC.

3. Resuscitation. 2022 Jan 8:S0300-9572(22)00001-6. doi: 10.1016/j.resuscitation.2022.01.001. Online ahead of print.
Physicians' cognitive approach to prognostication after cardiac arrest.
Steinberg A(1), Grayek E(2), Arnold RM(3), Callaway C(4), Fischhoff B(5), Krishnamurti T(6), Mohan D(7), White DB(8), Elmer J(9).
ABSTRACT
OBJECTIVE: Elucidate how physicians formulate a neurological prognosis after cardiac arrest and compare differences between experts and general providers. METHODS: We performed semi-structured interviews with experts in post-arrest care and general physicians. We created an initial model and interview guide based on professional society guidelines. Two authors independently coded interviews based on this initial model, then identified new topics not included in it. To describe individual physicians' cognitive approach to prognostication, we created a graphical representation. We summarized these individual "mental models" into a single overall model, as well as two models stratified by expertise. RESULTS: We performed 36 interviews (17 experts and 19 generalists), most of whom practice in Europe (23) or North America (12). Participants described their approach to prognosis formulation as complex and iterative, with sequential and repeated data acquisition, interpretation, and prognosis formulation. Eventually, this cycle results in a final prognosis and treatment recommendation. Commonly mentioned factors were diagnostic test performance, time from arrest, patient characteristics. Participants also discussed factors rarely discussed in prognostication research including physician and hospital characteristics. We found no substantial differences between experts and general physicians. CONCLUSION: Physicians' cognitive approach to neurologic prognostication is complex and influenced by many factors, including some rarely considered in current research. Understanding these processes better could inform interventions designed to aid physicians in prognostication.

ULTRASOUND AND CPR

No articles identified.

ORGANISATION AND TRAINING

1. Med Biol Eng Comput. 2022 Jan 13. doi: 10.1007/s11517-021-02455-2. Online ahead of print.
Handling of derived imbalanced dataset using XGBoost for identification of pulmonary embolism-a non-cardiac cause of cardiac arrest.
Firdous N(1), Bhardwaj S(2).

ABSTRACT

Relationship between pulmonary embolism and heart failure is presented in this paper. The proposed research is divided into two phases. The first phase includes the establishment of a novel database with the help of a Cleveland's database for cardiology in order to establish a link between pulmonary embolism and heart failure. The connectivity is based on the relationship between the stroke volume and the pulse pressure (Pp < 25% (ap_hi)). The second phase includes the applicability of machine learning on the novel database. Novel database formed in this work is imbalanced, resulting in the overfitting problem. XGBoost has been used to get rid of overfitting problem. Efficiency has been increased by formulating an ensemble technique by combining extreme learning machines, IB3 tree, logistic regression, and averaged neural network (avNNet) models.

2. Eur Heart J Acute Cardiovasc Care. 2022 Jan 12;11(1):20-31. doi: 10.1093/ehjacc/zuab103.

The effect of the GoodSAM volunteer first-responder app on survival to hospital discharge following out-of-hospital cardiac arrest.

Smith CM(1), Lall R(1), Fothergill RT(1)(2), Spaight R(3), Perkins GD(1).

ABSTRACT

AIMS: Bystander cardiopulmonary resuscitation and defibrillation can double survival to hospital discharge in out-of-hospital cardiac arrest. Mobile phone applications, such as GoodSAM, alerting nearby volunteer first-responders about out-of-hospital cardiac arrest could potentially improve bystander cardiopulmonary resuscitation and defibrillation, leading to better patient outcomes. The aim of this study was to determine GoodSAM's effect on survival to hospital discharge following out-of-hospital cardiac arrest. METHODS AND RESULTS: We collected data from the Out-of-Hospital Cardiac Arrest Outcomes Registry (University of Warwick, UK) submitted by the London Ambulance Service (1 April 2016 to 31 March 2017) and East Midlands Ambulance Service (1 January 2018 to 17 June 2018) and matched out-of-hospital cardiac arrests to GoodSAM alerts. We constructed logistic regression models to determine if there was an association between a GoodSAM first-responder accepting an alert and survival to hospital discharge, adjusting for location type, presenting rhythm, age, gender, ambulance service response time, cardiac arrest witnessed status, and bystander actions. Survival to hospital discharge was 9.6% (393/4196) in London and 7.2% (72/1001) in East Midlands. A GoodSAM first-responder accepted an alert for out-of-hospital cardiac arrest in 1.3% (53/4196) cases in London and 5.4% (51/1001) cases in East Midlands. When a responder accepted an alert, the adjusted odds ratio for survival to hospital discharge was 3.15 (95% CI: 1.19-8.36, P = 0.021) in London and 3.19 (95% CI: 1.17-8.73, P = 0.024) in East Midlands. CONCLUSION: Alert acceptance was associated with improved survival in both ambulance services. Alert acceptance rates were low, and challenges remain tomaximize the potential benefit of GoodSAM.

3. J Clin Med. 2021 Dec 23;11(1):49. doi: 10.3390/jcm11010049.

The Relationship between Selected Body Composition Components and Cardiopulmonary Resuscitation Parameters in Nurses: An Observational Simulation Study.

Więch P(1)(2), Muster M(1), Godek Ł(3), Sałacińska I(1), Guty E(2), Kucaba G(4), Bazaliński D(1).

ABSTRACT

The provision of cardiopulmonary resuscitation (CPR) may be related to the physical parameters of the medical personnel, including fat mass (FM) and fat-free mass (FFM) components. In this study, we aimed to assess the relationship between selected body composition components and chest compression and ventilation parameters provided by medical staff. An observational simulation study was undertaken between December 2017 and January 2019 at the Center for Innovative Research in Medical and Natural Sciences of Rzeszów. In all participants (505 nurses, 37.71 y ± 12.16), the body weight and height were measured and the body mass index (BMI) was calculated.

The body composition indicators were obtained using a bioelectrical impedance device, AKERN BIA 101. Afterwards, all participants performed CPR sequences (30 chest compressions and rescue for 2 breaths) for 2 min on a Laerdal Resusci Anne simulator placed on an examination couch with a self-inflating bag and a face mask. Our observations proved that high values of the anthropometric, nutritional and body composition parameters of the medical staff demonstrated a positive significant correlation with the depth and rate chest parameters and were inversely related to the chest adequate recoil. No statistically significant differences were found between the FM or FFM components and ventilation parameters. This study showed that nutritional status and body composition components may be important factors affecting the quality of CPR.

4. Clin Exp Emerg Med. 2021 Dec;8(4):255-267. doi: 10.15441/ceem.21.066. Epub 2021 Dec 31.
Global prevalence of cardiopulmonary resuscitation training among the general public: a scoping review.
Birkun A(1), Gautam A(2), Trunkwala F(3).
ABSTRACT
A scoping review was conducted to identify, map, and analyze international evidence from studies investigating the prevalence of community cardiopulmonary resuscitation (CPR) training. We searched major bibliographic databases and grey literature for original studies evaluating the prevalence of CPR training in the general population. Studies published from January 2000 to October 2020 were included without language or publication type restrictions. Seventy-three eligible papers reported a total of 61 population-based surveys conducted in 29 countries. More than three-fourths of the surveys were conducted in countries with high-income economies, and none in low-income countries. Over half of the surveys were at a subnational level. Globally, the proportion of laypeople trained in CPR varied greatly (median, 40%). For high-income countries, the median percentage was twice as high as that of upper middle-income countries (50% vs. 23%). The studies used heterogeneous survey methods and reporting patterns. Key methodological aspects were frequently not described. In summary, few studies have assessed CPR training prevalence among the general public. The rates of resuscitation training for the vast majority of countries remain unknown. High heterogeneity of studies precludes a reliable interpretation of the research. International Utstein-style consensus guidelines are needed to inform future research and reporting of public resuscitation training worldwide.

5. J Law Med Ethics. 2021;49(4):633-640. doi: 10.1017/jme.2021.87.
The Ethics of Unilateral Do-Not-Resuscitate Orders for COVID-19 Patients.
Ciaffa J.
ABSTRACT
This paper examines several decision-making models that have been proposed to limit the use of CPR for COVID-19 patients. My main concern will be to assess proposals for the implementation of unilateral DNRs - i.e., orders to withhold CPR without the agreement of patients or their surrogates.

6. World J Emerg Med. 2022;13(1):18-22. doi: 10.5847/wjem.j.1920-8642.2022.005.
A cadaveric model for transesophageal echocardiography transducer placement training: A pilot study.
Horton RW(1)(2), Niknam KR(1)(3), Lobo V(1), Pade KH(1)(4), Jones D(1)(5), Anderson KL(1).
ABSTRACT
BACKGROUND: Transesophageal echocardiography (TEE) is used in the emergency department to guide resuscitation during cardiac arrest. Insertion of a TEE transducer requires manual skill and experience, yet in some residency programs cardiac arrest is uncommon, so some physicians may

lack the means to acquire the manual skills to perform TEE in clinical practice. For other infrequently performed procedural skills, simulation models are used. However, there is currently no model that adequately simulates TEE transducer insertion. The aim of this study is to evaluate the feasibility and efficacy of using a cadaveric model to teach TEE transducer placement among novice users. METHODS: A convenience sample of emergency medicine residents was enrolled during a procedure education session using cadavers as tissue models. A pre-session assessment was used to determine prior knowledge and confidence regarding TEE manipulation. Participants subsequently attended a didactic and hands-on education session on TEE placement. All participants practised placing the TEE transducer until they were able to pass a standardized assessment of technical skill (SATS). After the educational session, participants completed a post-session assessment. RESULTS: Twenty-five residents participated in the training session. Mean assessment of knowledge improved from 6.2/10 to 8.7/10 (95% confidence interval [CI] of knowledge difference 1.6-3.2, P<0.001) and confidence improved from 1.6/5 to 3.1/5 (95% CI of confidence difference 1.1-2.0, P<0.001). There was no relationship between training level and the delta in knowledge or confidence. CONCLUSIONS: In this pilot study, the use of a cadaveric model to teach TEE transducer placement methods among novice users is feasible and improves both TEE manipulation knowledge and confidence levels.

7. Pediatr Crit Care Med. 2022 Jan 12. doi: 10.1097/PCC.0000000000002892. Online ahead of print.
Critical Care Unit Organizational and Personnel Factors Impact Cardiac Arrest Prevention and Rescue in the Pediatric Cardiac Population.
Lasa JJ(1), Banerjee M, Zhang W, Bailly DK, Sasaki J, Bertrandt R, Raymond TT, Olive MK, Smith A, Alten J, Gaies M.

ABSTRACT
OBJECTIVES: Patient-level factors related to cardiac arrest in the pediatric cardiac population are well understood but may be unmodifiable. The impact of cardiac ICU organizational and personnel factors on cardiac arrest rates and outcomes remains unknown. We sought to better understand the association between these potentially modifiable organizational and personnel factors on cardiac arrest prevention and rescue. DESIGN: Retrospective analysis of the Pediatric Cardiac Critical Care Consortium registry. SETTING: Pediatric cardiac ICUs. PATIENTS: All cardiac ICU admissions were evaluated for cardiac arrest and survival outcomes. INTERVENTIONS: None. MEASUREMENTS AND MAIN RESULTS: Successful prevention was defined as the proportion of admissions with no cardiac arrest (inverse of cardiac arrest incidence). Rescue was the proportion of patients surviving to cardiac ICU discharge after cardiac arrest. Cardiac ICU organizational and personnel factors were captured via site questionnaires. The associations between organizational and personnel factors and prevention/rescue were analyzed using Fine-Gray and multinomial regression, respectively, accounting for clustering within hospitals. We analyzed 54,521 cardiac ICU admissions (29 hospitals) with 1,398 cardiac arrest events (2.5%) between August 1, 2014, and March 5, 2019. For both surgical and medical admissions, lower average daily cardiac ICU occupancy was associated with better cardiac arrest prevention. Better rescue for medical admissions was observed for higher registered nursing hours per patient day and lower proportions of "part time" cardiac ICU physician staff (< 6 service weeks/yr). Increased registered nurse experience was associated with better rescue for surgical admissions. Increased proportion of critical care certified nurses, full-time intensivists with critical care fellowship training, dedicated respiratory therapists, quality/safety resources, and annual cardiac ICU admission volume were not associated with improved prevention or rescue. CONCLUSIONS: Our multi-institutional analysis identified cardiac ICU bed occupancy, registered nurse experience, and physician staffing as potentially important factors associated with cardiac arrest prevention and rescue. Recognizing the limitations of measuring these variables cross-sectionally, additional studies are needed to further investigate these organizational and personnel

factors, their interrelationships, and how hospitals can modify structure to improve cardiac arrest outcomes.

8. Eur Heart J. 2022 Jan 7:ehab892. doi: 10.1093/eurheartj/ehab892. Online ahead of print.
European Society of Cardiology: cardiovascular disease statistics 2021.
Timmis A(1), Vardas P(2)(3), Townsend N(4), Torbica A(5), Katus H(6), De Smedt D(7), Gale CP(8), Maggioni AP(9), Petersen SE(1), Huculeci R(3), Kazakiewicz D(3), de Benito Rubio V(3), Ignatiuk B(10), Raisi-Estabragh Z(1), Pawlak A(11), Karagiannidis E(12), Treskes R(13), Gaita D(14), Beltrame JF(15), McConnachie A(16), Bardinet I(17), Graham I(18), Flather M(19), Elliott P(20), Mossialos EA(21), Weidinger F(22), Achenbach S(23); Atlas Writing Group.
ABSTRACT
AIMS: This report from the European Society of Cardiology (ESC) Atlas Project updates and expands upon the widely cited 2019 report in presenting cardiovascular disease (CVD) statistics for the 57 ESC member countries. METHODS AND RESULTS: Statistics pertaining to 2019, or the latest available year, are presented. Data sources include the World Health Organization, the Institute for Health Metrics and Evaluation, the World Bank, and novel ESC sponsored data on human and capital infrastructure and cardiovascular healthcare delivery. New material in this report includes sociodemographic and environmental determinants of CVD, rheumatic heart disease, out-of-hospital cardiac arrest, left-sided valvular heart disease, the advocacy potential of these CVD statistics, and progress towards World Health Organization (WHO) 2025 targets for non-communicable diseases. Salient observations in this report: (i) Females born in ESC member countries in 2018 are expected to live 80.8 years and males 74.8 years. Life expectancy is longer in high income (81.6 years) compared with middle-income (74.2 years) countries. (ii) In 2018, high-income countries spent, on average, four times more on healthcare than middle-income countries. (iii) The median PM2.5 concentrations in 2019 were over twice as high in middle-income ESC member countries compared with high-income countries and exceeded the EU air quality standard in 14 countries, all middle-income. (iv) In 2016, more than one in five adults across the ESC member countries were obese with similar prevalence in high and low-income countries. The prevalence of obesity has more than doubled over the past 35 years. (v) The burden of CVD falls hardest on middle-income ESC member countries where estimated incidence rates are ∼30% higher compared with high-income countries. This is reflected in disability-adjusted life years due to CVD which are nearly four times as high in middle-income compared with high-income countries. (vi) The incidence of calcific aortic valve disease has increased seven-fold during the last 30 years, with age-standardized rates four times as high in high-income compared with middle-income countries. (vii) Although the total number of CVD deaths across all countries far exceeds the number of cancer deaths for both sexes, there are 15 ESC member countries in which cancer accounts for more deaths than CVD in males and five-member countries in which cancer accounts for more deaths than CVD in females. (viii) The under-resourced status of middle-income countries is associated with a severe procedural deficit compared with high-income countries in terms of coronary intervention, ablation procedures, device implantation, and cardiac surgical procedures. CONCLUSION: Risk factors and unhealthy behaviours are potentially reversible, and this provides a huge opportunity to address the health inequalities across ESC member countries that are highlighted in this report. It seems clear, however, that efforts to seize this opportunity are falling short and present evidence suggests that most of the WHO NCD targets for 2025 are unlikely to be met across ESC member countries.

9. J Clin Med. 2021 Dec 29;11(1):174. doi: 10.3390/jcm11010174.
The ED-PLANN Score: A Simple Risk Stratification Tool for Out-of-Hospital Cardiac Arrests Derived from Emergency Departments in Korea.

Lim HJ(1)(2), Ro YS(1)(2), Kim KH(1)(2), Park JH(1)(2), Hong KJ(1)(2), Song KJ(2)(3), Shin SD(1)(2).

ABSTRACT

Early risk stratification of out-of-hospital cardiac arrest (OHCA) patients with insufficient information in emergency departments (ED) is difficult but critical in improving intensive care resource allocation. This study aimed to develop a simple risk stratification score using initial information in the ED. Adult patients who had OHCA with medical etiology from 2016 to 2020 were enrolled from the Korean Cardiac Arrest Research Consortium (KoCARC) database. To develop a scoring system, a backward logistic regression analysis was conducted. The developed scoring system was validated in both external dataset and internal bootstrap resampling. A total of 8240 patients were analyzed, including 4712 in the development cohort and 3528 in the external validation cohort. An ED-PLANN score (range 0-5) was developed incorporating 1 point for each: P for serum pH ≤ 7.1, L for serum lactate ≥ 10 mmol/L, A for age ≥ 70 years old, N for non-shockable rhythm, and N for no-prehospital return of spontaneous circulation. The area under the receiver operating characteristics curve (AUROC) for favorable neurological outcome was 0.93 (95% CI, 0.92-0.94) in the development cohort, 0.94 (95% CI, 0.92-0.95) in the validation cohort. Hosmer-Lemeshow goodness-of-fit tests also indicated good agreement. The ED-PLANN score is a practical and easily applicable clinical scoring system for predicting favorable neurological outcomes of OHCA patients.

10. World J Emerg Med. 2022;13(1):67-68. doi: 10.5847/wjem.j.1920-8642.2022.009.

Understanding the epidemiology and outcomes of out-of-hospital cardiac arrest in the former Union of Soviet Socialist Republics: Observations from the Crimean peninsula.

Birkun A(1).

NO ABSTRACT AVAILABLE

POST-CARDIAC ARREST TREATMENTS

1. J Card Surg. 2022 Jan 12. doi: 10.1111/jocs.16222. Online ahead of print.

Acoustic pulse thrombolysis complemented by ECMO improved survival in patients with high-risk pulmonary embolism.

Dumantepe M(1), Ozturk C(2).

ABSTRACT

BACKGROUND: The optimal treatment of high-risk pulmonary embolism (PE) with cardiac arrest is still controversial although various treatment approaches have been developed and improved. Here, we present a serie of patients with high-risk PE showing hemodynamic collapse, who were successfully treated with extracorporeal membrane oxygenation (ECMO) as an adjunct to EKOS™ acoustic pulse thrombolysis (APT). METHODS: From April 2016 to June 2020, 29 patients with high-risk PE with cardiac arrest were retrospectively included. The mean age was 55.3 ± 9.2 years. A total of 12 (41.3%) patients were female. All patients had cardiac arrest, either as an initial presentation or in-hospital after presentation. All patients exhibited acute symptoms, computed tomography evidence of large thrombus burden, and severe right ventricular dysfunction. Primary outcome was all-cause 30-day mortality. RESULTS: Twenty-two patients survived to hospital discharge, with a mean intensive care unit stay of 9.9 ± 1.6 days (range: 7-22 days) and mean length of hospital stay of 23.7 ± 8.5 days (range: 11-44 days). Six patients died from refractory shock. Ninety-day mortality was 24.1% (7/29). The Mean ECMO duration was 3.5 ± 1.1 days and the mean RV/LV ratio decreased from 1.31 ± 0.17 to 0.92 ± 0.11 in patients who survived to discharge. The mean tissue plasminogen activator dose for survivor patients was 20.5 ± 1.6 mg. CONCLUSION: Patients with high-risk pulmonary embolism who suffer a cardiac arrest have high morbidity and mortality. APT complemented by ECMO could be a successful treatment option for the patients who have high-risk PE with circulatory collapse.

2. N Engl J Med. 2021 Dec 30;385(27):2544-2553. doi: 10.1056/NEJMoa2101909. Epub 2021 Aug 29.
Angiography after Out-of-Hospital Cardiac Arrest without ST-Segment Elevation.
Desch S(1), Freund A(1), Akin I(1), Behnes M(1), Preusch MR(1), Zelniker TA(1), Skurk C(1), Landmesser U(1), Graf T(1), Eitel I(1), Fuernau G(1), Haake H(1), Nordbeck P(1), Hammer F(1), Felix SB(1), Hassager C(1), Engstrøm T(1), Fichtlscherer S(1), Ledwoch J(1), Lenk K(1), Joner M(1), Steiner S(1), Liebetrau C(1), Voigt I(1), Zeymer U(1), Brand M(1), Schmitz R(1), Horstkotte J(1), Jacobshagen C(1), Pöss J(1), Abdel-Wahab M(1), Lurz P(1), Jobs A(1), de Waha-Thiele S(1), Olbrich D(1), Sandig F(1), König IR(1), Brett S(1), Vens M(1), Klinge K(1), Thiele H(1); TOMAHAWK Investigators.
ABSTRACT
BACKGROUND: Myocardial infarction is a frequent cause of out-of-hospital cardiac arrest. However, the benefits of early coronary angiography and revascularization in resuscitated patients without electrocardiographic evidence of ST-segment elevation are unclear. METHODS: In this multicenter trial, we randomly assigned 554 patients with successfully resuscitated out-of-hospital cardiac arrest of possible coronary origin to undergo either immediate coronary angiography (immediate-angiography group) or initial intensive care assessment with delayed or selective angiography (delayed-angiography group). All the patients had no evidence of ST-segment elevation on postresuscitation electrocardiography. The primary end point was death from any cause at 30 days. Secondary end points included a composite of death from any cause or severe neurologic deficit at 30 days. RESULTS: A total of 530 of 554 patients (95.7%) were included in the primary analysis. At 30 days, 143 of 265 patients (54.0%) in the immediate-angiography group and 122 of 265 patients (46.0%) in the delayed-angiography group had died (hazard ratio, 1.28; 95% confidence interval [CI], 1.00 to 1.63; P = 0.06). The composite of death or severe neurologic deficit occurred more frequently in the immediate-angiography group (in 164 of 255 patients [64.3%]) than in the delayed-angiography group (in 138 of 248 patients [55.6%]), for a relative risk of 1.16 (95% CI, 1.00 to 1.34). Values for peak troponin release and for the incidence of moderate or severe bleeding, stroke, and renal-replacement therapy were similar in the two groups. CONCLUSIONS: Among patients with resuscitated out-of-hospital cardiac arrest without ST-segment elevation, a strategy of performing immediate angiography provided no benefit over a delayed or selective strategy with respect to the 30-day risk of death from any cause. (Funded by the German Center for Cardiovascular Research; TOMAHAWK ClinicalTrials.gov number, NCT02750462.).

3. Am J Health Syst Pharm. 2022 Jan 10:zxac011. doi: 10.1093/ajhp/zxac011. Online ahead of print.
Current and investigational therapies for the treatment of refractory ventricular fibrillation.
Scaturo N(1), Shomo E(1), Frank M(2).
ABSTRACT
PURPOSE: Esmolol, dual sequential defibrillation, vector change defibrillation, and left stellate ganglion block are presented and reviewed for the treatment of refractory ventricular fibrillation. SUMMARY: Although no formal definition has been established for refractory ventricular fibrillation, the literature describes it as a pulseless ventricular arrhythmia that persists despite 3 standard defibrillation attempts, administration of amiodarone 300 mg intravenously, and provision of three 1-mg intravenous doses of epinephrine. Evolving literature surrounding resuscitation in this particular subset of cardiac arrest challenges the efficacy of traditional therapies, such as epinephrine, and suggests that other treatment modalities may improve outcomes. Case reports, case series, and small retrospective studies have pointed to benefit when utilizing a variety of therapies, namely, esmolol, dual sequential defibrillation, vector change defibrillation, or left stellate ganglion block, in patients with refractory ventricular fibrillation arrest. CONCLUSION: A mounting, although limited, body of evidence suggests that esmolol, dual sequential defibrillation, vector change defibrillation, or left stellate ganglion block may be effective at terminating refractory ventricular fibrillation and improving patient outcomes. Further evidence is required before these therapies can be adopted as standard practice; however, as key members of the code response

team, it is imperative for pharmacists to be familiar with the supporting evidence, safety considerations, and logistical challenges of utilizing these treatments during arrest.

TARGETED TEMPERATURE MANAGEMENT

1. Neurology. 2022 Jan 11:10.1212/WNL.0000000000013297. doi: 10.1212/ WNL. 0000000000013297. Online ahead of print.

Magnetic Resonance Spectroscopy of Hypoxic-Ischemic Encephalopathy After Cardiac Arrest.

Lee JW(1), Sreepada L(2), Bevers M(1), Li K(3), Scirica B(4), Santana da Silva D(4), Henderson GV(1), Bay C(2), Lin AP(5).

ABSTRACT

OBJECTIVE: To correlate brain metabolites to clinical outcome using magnetic resonance spectroscopy (MRS) in patients undergoing targeted temperature management (TTM) after cardiac arrest, and assess their relationships to MRI and EEG variables. METHODS: A prospective cohort of 50 patients was studied. The primary outcome was coma recovery to follow commands. Comparison of MRS measures in the posterior cingulate gyrus, parietal white matter, basal ganglia, and brainstem were also made to 25 normative control subjects. RESULTS: Fourteen of 50 achieved coma recovery before hospital discharge. There was a significant decrease in total N-acetyl-aspartate (NAA/Cr) and an increase in lactate (Lac/Cr) in patients who did not recover, with changes most prominent in the posterior cingulate gyrus. Patients who recovered had decrease in NAA/Cr as compared to control subjects. NAA/Cr had a strong monotonic relationship with MRI cortical apparent diffusion coefficient (ADC); lactate level exponentially increased with decreasing ADC. EEG suppression/burst suppression was universally associated with lactate elevation. CONCLUSIONS: NAA and lactate changes are associated with clinical/MRI/EEG changes consistent with hypoxic-ischemic encephalopathy (HIE) and are most prominent in the posterior cingulate gyrus. NAA/Cr decrease observed in patients with good outcomes suggests mild HIE in patients asymptomatic at hospital discharge. The appearance of cortical lactate represents a deterioration of aerobic energy metabolism and is associated with EEG background suppression, synaptic transmission failure, and severe, potentially irreversible HIE. CLASSIFICATION OF EVIDENCE: This study provides Class IV evidence that in patients undergoing TTM after cardiac arrest, brain MRS-determined decrease in total NAA/Cr and an increase in Lac/Cr are associated with an increased risk of not recovering.

ELECTROPHYSIOLOGY AND DEFIBRILLATION

1. Resuscitation. 2022 Jan 11:S0300-9572(21)00542-6. doi: 10.1016/j.resuscitation.2021.12.035. Online ahead of print.

Utilization and cost-effectiveness of school and community center AED deployment models in Canadian cities.

Danny Liang L(1), C Y Chan T(2), Benjamin Leung KH(2), Scheuermeyer F(3), Chakrabarti S(4), Andelius L(5), Deakin J(6), Heidet M(7), Fordyce CB(8), Helmer J(9), Christenson J(8), Al Assil R(10), Grunau B(11).

ABSTRACT

BACKGROUND: The optimal locations and cost-effectiveness of placing automated external defibrillators(AEDs) for out-of-hospital cardiac arrest(OHCAs) in urban residential neighbourhoods are unclear. METHODS: We used prospectively collected data from 2016 to 2018 from the British Columbia OHCA Registry to examine the utilization and cost-effectiveness of hypothetical AED deployment in municipalities with a population of over 100 000. We geo-plotted OHCA events using

seven hypothetical deployment models where AEDs were placed at the exteriors of public schools and community centers and fetched by bystanders. We calculated the "radius of effectiveness" around each AED within which it could be retrieved and applied to an individual prior to EMS arrival, comparing automobile and pedestrian-based retrieval modes. For each deployment model, we estimated the number of OHCAs within the "radius of effectiveness". RESULTS: We included 4017 OHCAs from ten urban municipalities. The estimated radius of effectiveness around each AED was 625 m for automobile and 240m for pedestrian retrieval. With AEDs placed outside each school and community center, 2567(64%) and 605(15%) of OHCAs fell within the radii of effectiveness for automobile and pedestrian retrieval, respectively. For each AED, there was an average of 1.20-2.66 and 0.25-0.61 in-range OHCAs per year for automobile retrieval and pedestrian retrieval, respectively, depending on the deployment model. All of our proposed surpassed the cost-effectiveness threshold of 0.125 OHCA/AED/year provided >5.3-11.6% in-range AEDs were brought-to-scene. CONCLUSIONS: The systematic deployment of AEDs at schools and community centers in urban neighbourhoods may result in increased application and be a cost-effective public health intervention.

PEDIATRICS AND CHILDREN

1. Eur J Pediatr. 2022 Jan 13. doi: 10.1007/s00431-021-04360-0. Online ahead of print.
Correction to: Can parental simulation improve neonatal CPR performance? A pilot study.
Rephaeli R(1), Gafanovich D(2), Shchors I(3), Weiser G(4)(5).
NO ABSTRACT AVAILABLE

2. Crit Care Explor. 2022 Jan 5;4(1):e0600. doi: 10.1097/CCE.0000000000000600. eCollection 2022 Jan.
Low Inadequate Oxygen Delivery Index is Associated with Decreased Cardiac Arrest Risk in High-Risk Pediatric ICU Patients.
Dewan M(1)(2)(3)(4), Cooper DS(1)(5), Tegtmeyer K(1)(2).
ABSTRACT
OBJECTIVES: To evaluate the Inadequate Oxygen Delivery Index (IDO2) in the PICU to identify patients labeled as high risk by clinician concern who will not experience a cardiac arrest. DESIGN SETTING AND PARTICIPANTS: Prospective observational cohort study in a single PICU from February 1, 2017, to May 20, 2020. All mean calculated IDO2 was collected for patients in 12-hour increments. MEASUREMENTS AND MAIN RESULTS: We monitored 3,087 patients over 24,505 12-hour periods. Four thousand seventeen were watcher periods-12-hour period following watcher determination to watch for clinical deterioration. Overall, there were 224 clinical deterioration events of which 21% (n = 48) were cardiopulmonary resuscitation (CPR) events. Twenty-three CPR events (48%) and 93 clinical deteriorationevents (42%) occurred during 4,017 watcher periods. Following addition of a mean IDO2 threshold less than 5 during the prewatcher period, 23 CPR events (48%) and 77 clinical deterioration events (34%) occurred during 2,958 watcher periods. Using clinical concern alone, the number needed to evaluate for CPR events was 167 watcher periods for each single CPR event and 43 watcher periods for each clinical deterioration event. With the addition of a mean IDO2 less than 5, the number needed to evaluate decreased to 125 and 38, respectively, with no change in the prediction of CPR events. CONCLUSIONS: The use of physiologic monitor data can be applied to clinician-activated situation awareness systems to decrease the number needed to alert and improve system efficiency.

3. J Palliat Care. 2022 Jan 11:8258597211073228. doi: 10.1177/08258597211073228. Online ahead of print.

The State of the Do-Not-Resuscitate Order in a Pediatric Intensive Care Unit in the Middle East: A Retrospective Study.

Sabouneh R(1), Lakissian Z(2), Hilal N(1), Sharara-Chami R(1).

ABSTRACT

OBJECTIVES: The Do-Not-Resuscitate (DNR) order is part of most hospitals' policies on the process of making and communicating decisions about a patient's resuscitation status. Yet it has not become a part of our society's ritual of dying in the Middle East especially among children. Given the diversity of pediatric patients, the DNR order continues to represent a challenge to all parties involved in the care of children including the medical team and the family. METHODS: This was a retrospective review of the medical charts of patients who had died in the pediatric intensive care unit (PICU) of a tertiary academic institution in Beirut, Lebanon within the period of January 2012 and December 2017. RESULTS: Eighty-two charts were extracted, 79 were included in the analysis. Three were excluded as one patient had died in the Emergency Department (ED) and 2 charts were incomplete. Most patients were male, Lebanese, and from Muslim families. These patients clinically presented with primary cardiac and oncological diseases or were admitted from the ED with respiratory distress or from the operating room for post-operative management. The primary cause of death was multiorgan failure and cardiac arrest. Only 34% of families had agreed to a DNR order prior to death and 10% suggested "soft" resuscitation. Most discussions were held in the presence of the parents, the PICU team and the patient's primary physician. CONCLUSIONS: The DNR order presents one of the most difficult challenges for all care providers involved, especially within a culturally conservative setting such as Lebanon. As the numbers suggest, it is difficult for parents to reach the decision to completely withhold resuscitative measures for pediatric patients, instead opting for "soft" resuscitations like administering epinephrine without chest compressions.

EXTRACORPOREAL LIFE SUPPORT

No articles identified.

EXPERIMENTAL RESEARCH

1. Mol Neurobiol. 2022 Jan 14. doi: 10.1007/s12035-021-02645-x. Online ahead of print.

Rapid Treatment with Intramuscular Magnesium Sulfate During Cardiopulmonary Resuscitation Does Not Provide Neuroprotection Following Cardiac Arrest.

Zhang R(1)(2)(3), Bryson TD(1)(4), Fogo GM(1)(5), Liao J(1), Raghunayakula S(1), Mathieu J(1), Wider JM(1)(6), Ren X(1), Maheras KJ(1), Emaus KJ(1)(5), Gruley E(1), Chen Y(2), Neumar RW(7)(8), Sanderson TH(9)(10)(11)(12)(13).

ABSTRACT

Brain injury is the most common cause of death for patients resuscitated from cardiac arrest. Magnesium is an attractive neuroprotective compound which protects neurons from ischemic injury by reducing neuronal calcium overload via NMDA receptor modulation and preventing calcium-induced mitochondrial permeability transition. Intramuscular (IM) delivery of MgSO4 during CPR has the potential to target these mechanisms within an early therapeutic window. We hypothesize that IM MgSO4 administrated during CPR could achieve therapeutic serum magnesium levels within 15 min after ROSC and improve neurologic outcomes in a rat model of asphyxial cardiac arrest. Male Long Evans rats were subjected to 8-min asphyxial cardiac arrest and block randomized to receive

placebo, 107 mg/kg, 215 mg/kg, or 430 mg/kg MgSO4 IM at the onset of CPR. Serum magnesium concentrations increased rapidly with IM delivery during CPR, achieving twofold to fourfold increase by 15 min after ROSC in all magnesium dose groups. Rats subjected to cardiac arrest or sham surgery were block randomized to treatment groups for assessment of neurological outcomes. We found that IM MgSO4 during CPR had no effect on ROSC rate ($p > 0.05$). IM MgSO4 treatment had no statistically significant effect on 10-day survival with good neurologic function or hippocampal CA1 pyramidal neuron survival compared to placebo treatment. In conclusion, a single dose IM MgSO4 during CPR achieves up to fourfold baseline serum magnesium levels within 15 min after ROSC; however, this treatment strategy did not improve survival, recovery of neurologic function, or neuron survival. Future studies with repeated dosing or in combination with hypothermic targeted temperature management may be indicated.

2. J Clin Med. 2021 Dec 27;11(1):131. doi: 10.3390/jcm11010131.

Real-Time Brain Monitoring by Near-Infrared Spectroscopy Predicts Neurological Outcome after Cardiac Arrest and Resuscitation in Rats: A Proof of Concept Study of a Novel Prognostic Measure after Cardiac Arrest.

Takegawa R(1)(2)(3), Hayashida K(1)(2), Yin T(1)(2), Choudhary RC(1)(2), Miyara SJ(1)(2), Khalili H(1), Shoaib M(1)(4), Endo Y(1)(2), Molmenti EP(4)(5), Becker LB(1)(2)(4).

ABSTRACT

Clinical studies have demonstrated that dynamic changes in regional cerebral oxygen saturation (rSO2) after cardiac arrest (CA) and cardiopulmonary resuscitation (CPR) have a role in predicting neurological outcomes after the return of spontaneous circulation (ROSC). Our study evaluated whether the timing of rSO2 decline shortly after CPR reflects the severity of brain injury in a rat model of CA. Rats were subjected to different durations of asphyxia to produce variable severities of brain injury, due to CA. Time from ROSC to achieving the initial minimum rSO2 was defined as Tnadir. A Tnadir cut-off of 24 min had optimal sensitivity and specificity for predicting good neurological outcomes at 72 h after ROSC (AUC, 0.88; sensitivity, 89%; specificity, 86%; $p < 0.01$). Immunohistochemistry at 72 h post-CA revealed that the number of Fluoro-Jade B positive degenerating neurons in the hippocampus CA1 sector were markedly higher in animals with Tnadir > 24 min than that in animals with Tnadir ≤ 24 min. There was no difference in the gene expressions of cytokines and mitochondrial fission proteins in the brain at 2 h after ROSC between rats with Tnadir > 24 min and with Tnadir ≤ 24 min. In conclusion, Tnadir can be a novel predictor of good neurological outcomes after CA/CPR.

3. World J Emerg Med. 2022;13(1):46-53. doi: 10.5847/wjem.j.1920-8642.2022.015.

Protective effect of mesenchymal stem cell-derived exosomal treatment of hippocampal neurons against oxygen-glucose deprivation/reperfusion-induced injury.

Guo XF(1), Gu SS(1), Wang J(2), Sun H(1), Zhang YJ(3), Yu PF(4), Zhang JS(1), Jiang L(1).

ABSTRACT

BACKGROUND: Individuals who survive a cardiac arrest often sustain cognitive impairments due to ischemia-reperfusion injury. Mesenchymal stem cell (MSC) transplantation is used to reduce tissue damage, but exosomes are more stable and highly conserved than MSCs. This study was conducted to investigate the therapeutic effects of MSC-derived exosomes (MSC-Exo) on cerebral ischemia-reperfusion injury in an in vitro model of oxygen-glucose deprivation/reperfusion (OGD/R), and to explore the underlying mechanisms. METHODS: Primary hippocampal neurons obtained from 18-day Sprague-Dawley rat embryos were subjected to OGD/R treatment, with or without MSC-Exo treatment. Exosomal integration, cell viability, mitochondrial membrane potential, and generation of reactive oxygen species (ROS) were examined. Terminal deoxynucleotidyl transferase-mediated 2'-

deoxyuridine 5'-triphosphate nick-end labeling (TUNEL) staining was performed to detect neuronal apoptosis. Moreover, mitochondrial function-associated gene expression, Nrf2 translocation, and expression of downstream antioxidant proteins were determined. RESULTS: MSC-Exo attenuated OGD/R-induced neuronal apoptosis and decreased ROS generation ($P<0.05$). The exosomes reduced OGD/R-induced Nrf2 translocation into the nucleus (2.14±0.65 vs. 5.48±1.09, $P<0.01$) and increased the intracellular expression of antioxidative proteins, including superoxide dismutase and glutathione peroxidase (17.18±0.97 vs. 14.40±0.62, and 20.65±2.23 vs. 16.44±2.05, respectively; $P<0.05$ for both). OGD/R significantly impaired the mitochondrial membrane potential and modulated the expression of mitochondrial function-associated genes, such as PINK, DJ1, LRRK2, Mfn-1, Mfn-2, and OPA1. The abovementioned changes were partially reversed by exosomal treatment of the hippocampal neurons. CONCLUSIONS: MSC-Exo treatment can alleviate OGD/R-induced oxidative stress and dysregulation of mitochondrial function-associated genes in hippocampal neurons. Therefore, MSC-Exo might be a potential therapeutic strategy to prevent OGD/R-induced neuronal injury.

CASE REPORTS

1. Trauma Case Rep. 2021 Dec 23;37:100587. doi: 10.1016/j.tcr.2021.100587. eCollection 2022 Feb.
Critical anterior mediastinal hematoma without internal mammary artery injury caused by cardiopulmonary resuscitation: A case report.
Nishimura H(1), Mochida Y(1), Ogino S(1), Fukushi K(2), Yamazaki H(2), Miyakuni Y(1), Kaita Y(1), Minamishima T(2), Soejima K(2), Yamaguchi Y(1).

ABSTRACT
BACKGROUND: Massive anterior mediastinal hematoma due to chest compression during cardiopulmonary resuscitation is often caused by internal mammary artery injury. However, critical massive anterior mediastinal hematoma without damage to major blood vessels is extremely rare. We report a case of life-threatening anterior mediastinal hematoma without internal mammary artery injury during extracorporeal cardiopulmonary resuscitation. CASE PRESENTATION: A 70-year-old man was transferred to our emergency department because of ventricular fibrillation arrest. Manual chest compressions and venoarterial extracorporeal membrane oxygenation were applied in the angiography room. Acute myocardial infarction was diagnosed, and percutaneous coronary intervention with stent placement was performed. Despite the establishment of venoarterial extracorporeal membrane oxygenation flow, the hemodynamics were unstable. Computed tomography revealed a massive anterior mediastinal hematoma compressing the right heart system and causing obstructive shock. Although local incision and anterior mediastinal hematoma drainage were tried for resolving obstructive shock, the patient's anemia did not improve, and there was still continuous hemorrhaging from the drainage tube. A median thoracotomy was then performed. There was no injury of the main trunk of the internal mammary artery but only hemorrhaging from the sternal fracture site. The patient's hemodynamics and anemia improved after hemostasis and gauze packing. Re-thoracotomy for gauze removal and sternal closure was performed three days post-hospitalization. CONCLUSIONS: It is important to consider hemorrhaging and unstable hemodynamics in patients who receive extracorporeal cardiopulmonary resuscitation. Therefore, a thoracotomy may take precedence over intravascular treatment for restoring hemostasis when there is no information regarding the bleeding site, such as the presence of extravasation.

2. J Extra Corpor Technol. 2021 Dec;53(4):299-301. doi: 10.1182/ject-2100024.
Deep Hypothermic Circulatory Arrest for Emergency Repair of Type A Aortic Dissection in a Patient with Cold Agglutinins.

Sarrafpour S(1), Bose R(1).

ABSTRACT

Cold agglutinins (CA) are auto-antibodies that adhere to erythrocytes in cold temperatures, and can result in agglutination of red blood cells. This process can cause complement-mediated intravascular hemolysis, which can be catastrophic. We describe a patient who developed CA during initiation of deep hypothermic circulatory arrest for emergent repair of Type A aortic dissection. The patient was found to have anti-I and anti-C antibodies and a positive direct Coombs test. CA resolved with re-warming, and resulted in no adverse events.

3. Front Cardiovasc Med. 2021 Dec 22;8:795249. doi: 10.3389/fcvm.2021.795249. eCollection 2021.

Case Report: Fulminant Myocarditis Successfully Treated With Extracorporeal Membrane Oxygenation in Ikeda Strain Orientia tsutsugamushi Infection.

Park H(1), Lim Y(2), Kim MC(2), Kim SE(3), Jeong IS(4), Choi YD(5), Kim DM(6).

ABSTRACT

Scrub typhus is an acute zoonotic febrile illness caused by Orientia tsutsugamushi having a specific geographic endemic area. This infection could be complicated with multi-organ involvement including myocarditis with variable severity. Here, we report a rare case of scrub typhus with biopsy-proven acute fulminant myocarditis which progressed very rapidly to cardiac arrest and was treated successfully with extracorporeal cardiopulmonary resuscitation. Clinicians should be alert to possible rapid progression of scrub typhus myocarditis to fulminant form and be prepared for close monitoring and temporary mechanical support if indicated.

4. J Med Case Rep. 2022 Jan 11;16(1):9. doi: 10.1186/s13256-021-03204-7.

Vomiting, electrolyte disturbance, and medications; the perfect storm for acquired long QT syndrome and cardiac arrest: a case report.

Tiver KD(1)(2), Dharmaprani D(2), Quah JX(1)(2), Lahiri A(1), Waddell-Smith KE(1), Ganesan AN(3)(4).

ABSTRACT

BACKGROUND: Acquired long QT syndrome is an important and preventable cause of cardiac arrest. Certain medications and electrolyte disturbance are common contributors, and often coexist. In this case, we report five contributors to cardiac arrest. CASE PRESENTATION: This case is of a 51-year-old Caucasian female patient who presented with vomiting associated with hypokalemia and hypomagnesemia. She subsequently received ondansetron and metoclopramide, on the background of chronic treatment with fluoxetine. She then suffered an in-hospital monitored cardiac arrest, with features of long QT and torsades de pointes retrospectively noted on her prearrest electrocardiogram. She was diagnosed with acquired long QT syndrome, and her QT interval later normalized after removal of offending causes. CONCLUSIONS: This case highlights the importance of proper consideration prior to prescribing QT prolonging medications, especially in patients who have other risk factors for prolonged QT, such as electrolyte disturbances and pretreatment with QT prolonging medications.

5. Indian Pacing Electrophysiol J. 2022 Jan 10:S0972-6292(22)00002-X. doi: 10.1016/j.ipej.2022.01.002. Online ahead of print.

Unusual presentation of supraventricular tachycardia degenerating into ventricular fibrillation during pregnancy: Aortocaval compression the probable culprit.

Prashar A(1), Tan SML(2), Hopkins A(3), Ilsar R(4).

ABSTRACT

Cardiac arrhythmias are common and often benign in pregnancy. However, haemodynamic instability can occur when tachyarrhythmias are accompanied by aortocaval compression, which can

lead to loss of cardiac output. We present an atypical case of a pregnant woman with a supraventricular tachyarrhythmia, which degenerated into ventricular fibrillation arrest while supine due to aortocaval compression. Inducible atypical atrioventricular nodal re-entry tachycardia was subsequently detected on electrophysiological study and presumed to be the most likely initial supraventricular tachyarrhythmia.

6. J Anal Toxicol. 2022 Jan 11:bkac003. doi: 10.1093/jat/bkac003. Online ahead of print.
Case Report: Fatal Intoxication by the Novel Cathinone 4-fluoro-3-methyl-α-PVP.
Hobbs JM(1), DeRienz RT(1), Baker DD(1), Shuttleworth MR(1), Pandey M(1).
ABSTRACT
A 30-year-old non-hispanic white male was found unresponsive at his workplace and admitted to the hospital in cardiac arrest. He was pronounced deceased shortly after arrival. At autopsy the pathologist noted a 176-pound, well-nourished, atraumatic, adult male with significant bilateral frothy pulmonary edema (right lung 930g and left lung 1130g), cardiomegaly (430g), dilated ventricles, and slight cerebral edema. Upon completion of the systematic toxicological analysis scope for the Franklin County Coroner's Office Toxicology Laboratory, no known drugs were found. Further review of the gas chromatography/mass spectrometry (GC/MS) full scan library summary reports showed an unknown peak in both the blood and urine solid phase extracts. An analogue of α-pyrrolidinovalerophenone (α-PVP) was identified, and a GC/MS selected ion monitoring (SIM) method was developed to identify and quantitate the presence of 4-fluoro-3-methyl-α-PVP. This method quantified the drug at 26ng/mL in gray top femoral blood, 30ng/mL in purple top heart blood, and 20ng/mL in red top vitreous humor. Qualitative presence was also observed in the urine but was not detected in liver. The decedent's cause of death was determined to be due to Fluoro-methyl-PVP toxicity and the manner was ruled to be accidental. Investigational follow-up interviews corroborated drug use by the deceased with a preference of research chemicals and synthetic cannabinoids via the internet. No published literature is available currently and to the author's knowledge this is the first incident of a fatal death solely attributed to this substituted cathinone.

7. Front Cardiovasc Med. 2021 Dec 23;8:810291. doi: 10.3389/fcvm.2021.810291. eCollection 2021.
Genetic Clues on Implantable Cardioverter-Defibrillator Placement in Young-Age Hypertrophic Cardiomyopathy: A Case Report of Novel MYH7 Mutation and Literature Review.
Li X(1), Tang J(1), Li J(1), Lin S(1), Wang T(1), Zhou K(1), Li Y(1), Hua Y(1).
ABSTRACT
Background: Hypertrophic cardiomyopathy (HCM) is the second most common cardiomyopathy in childhood with a life-threatening risk. Implantable cardioverter-defibrillator (ICD) placement is recommended for early prevention if there are two or more clinical risk factors. Pediatric patients with HCM are at a higher risk of sudden cardiac death (SCD), but there are limited reports on indications for ICD implantation in children. Herein we describe the case of Myh7 mutation-induced HCM and cardiac arrest in a patient and evaluated information originating from genetic background to guide ICD administration. Case Presentation: The patient was a girl aged 7 years and 8 months who had been diagnosed with cardiomyopathy in utero 8 years prior. She had had recurrent cardiac arrests within the last 4 years. Electrocardiography indicated abnormalities in conduction, and ST segment changes. Echocardiography indicated significant left ventricular hypertrophy and hypertrophic systolic interventricular septum. Cardiac magnetic resonance imaging depicted general heart enlargement with hypertrophy, and delayed enhancement in myocardium with perfusion defect was also evident. Whole exon sequencing identified a de novo c.2723T>C (p.L908P) heterozygous mutation in the MYH7 gene. MYH7 p.L908P predicted unstable protein structure and

impaired function. The patient was scheduled for ICD implantation. There were no complications after ICD implantation, and she was discharged from hospital on the 10th day. Regular oral beta-blockers, amiodarone, spironolactone, and enalapril were administered, and she was required to attend hospital regularly for follow-up. During follow-up there were no cardiac arrests. Literature review of clinical prognoses associated with genetic mutations of MYH7, MYBPC3, TNNI3, TNNT2, and TPM1 in pediatric HCM patients with and without ICD implantation indicated that they were totally differently. Previous reports also indicated that gene mutations predicted earlier onset of cardiac hypertrophy, and increase likelihood of SCD. Conclusion: Variant burden and variant type contribute to the risk of adverse events in pediatric HCM. Early recognition and intervention are vital in children. Gene mutation could be considered an indication for early ICD placement during standard risk stratification of HCM patients. Whether this extends to the majority of pediatric patients requires further investigation.

8. Pediatr Int. 2021 Dec;63(12):1524-1526. doi: 10.1111/ped.14641. Epub 2021 Aug 16.
Successful resuscitation with shallow chest compression depth: A pediatric case.
Miyashita N(1), Kurosawa H(1), Aoki K(1).
NO ABSTRACT AVAILABLE