Bibliografia més rellevant publicada del 13 al 19 de Març de 2022 n = 38

CPR AND COVID-19

1. Resuscitation. 2022 Mar 14:S0300-9572(22)00071-5. doi: 10.1016/j.resuscitation.2022.02.027. Online ahead of print.
Safety of face-to-face 2021 annual congress of the Italian Resuscitation Council during the fourth COVID-19 wave in Italy.
Gamberini L(1), Scquizzato T(2), Semeraro F(3), Scapigliati A(4), Ristagno G(5), Cucino A(6); Italian Resuscitation Council Scientific Committee.
NO ABSTRACT AVAILABLE

CPR/MECHANICAL CHEST COMPRESSION

No articles identified.

REGISTRIES, REVIEWS AND EDITORIALS

No articles identified.

IN-HOSPITAL CARDIAC ARREST

1. West J Emerg Med. 2022 Feb 23;23(2):258-267. doi: 10.5811/westjem.2021.8.53063.
Development and Validation of a Novel Triage Tool for Predicting Cardiac Arrest in the Emergency Department.
Tsai CL(1)(2), Lu TC(1)(2), Fang CC(1)(2), Wang CH(1)(2), Lin JY(1), Chen WJ(1)(2), Huang CH(1)(2).
ABSTRACT
BACKGROUND: Early recognition and prevention of in-hospital cardiac arrest (IHCA) have played an increasingly important role in the chain of survival. However, clinical tools for predicting IHCA are scarce, particularly in the emergency department (ED). We sought to estimate the incidence of ED-based IHCA and to develop and validate a novel triage tool, the Emergency Department In-hospital Cardiac Arrest Score (EDICAS), for predicting ED-based IHCA. METHODS: In this retrospective cohort study we used electronic clinical warehouse data from a tertiary medical center with approximately 100,000 ED visits per year. We extracted data from 733,398 ED visits over a seven-year period. We selected one ED visit per person and excluded out-of-hospital cardiac arrest or children. Patient demographics and computerized triage information were included as potential predictors. RESULTS: A total of 325,502 adult ED patients were included. Of these patients, 623 (0.2%) developed ED-based IHCA. The EDICAS, which includes age and arrival mode and categorizes vital signs with simple cut-offs, showed excellent discrimination (area under the receiver operating characteristic [AUROC] curve, 0.87) and maintained its discriminatory ability (AUROC, 0.86) in cross-validation. Previously developed early warning scores showed lower AUROC (0.77 for the Modified Early Warning Score and 0.83 for the National Early Warning Score) when applied to our ED population. CONCLUSION: In-hospital cardiac arrest in the ED is relatively uncommon. We developed and internally validated a novel tool for predicting imminent IHCA in the ED. Future studies are warranted to determine whether this tool could gain lead time to identify high-risk patients and potentially reduce ED-based IHCA.

INJURIES AND CPR

Ischemic injury of the upper gastrointestinal tract after out-of-hospital cardiac arrest: a prospective, multicenter study.
Grimaldi D(1)(2), Legriel S(3)(4), Pichon N(3)(5), Colardelle P(6), Leblanc S(7), Canouï-Poitrine F(8)(9), Salem OBH(9)(10), Muller G(3)(10)(11), de Prost N(12)(13)(14), Herrmann S(15), Marque S(16), Baron A(17), Sauneuf B(3)(18), Messika J(19)(20), Dior M(21), Creteur J(22), Bedos JP(4), Boutin E(8)(9), Cariou A(3)(23)(24).
ABSTRACT
BACKGROUND: The consequences of cardiac arrest (CA) on the gastro-intestinal tract are poorly understood. We measured the incidence of ischemic injury in the upper gastro-intestinal tract after Out-of-hospital CA (OHCA) and determined the risk factors for and consequences of gastrointestinal ischemic injury according to its severity. METHODS: Prospective, non-controlled, multicenter study in nine ICUs in France and Belgium conducted from November 1, 2014 to November 30, 2018. Included patients underwent an esophago-gastro-duodenoscopy 2 to 4 d after OHCA if still intubated and the presence of ischemic lesions of the upper gastro-intestinal tract was determined by a gastroenterologist. Lesions were a priori defined as severe if there was ulceration or necrosis and moderate if there was mucosal edema or erythema. We compared clinical and cardiac arrest characteristics of three groups of patients (no, moderate, and severe lesions) and identified variables associated with gastrointestinal ischemic injury using multivariate regression analysis. We also compared the outcomes (organ failure during ICU stay and neurological status at hospital discharge) of the three groups of patients. RESULTS: Among the 214 patients included in the analysis, 121 (57%, 95% CI 50-63%) had an upper gastrointestinal ischemic lesion, most frequently on the fundus. Ischemic lesions were severe in 55/121 (45%) patients. In multivariate regression, higher adrenaline dose during cardiopulmonary resuscitation (OR 1.25 per mg (1.08-1.46)) was independently associated with increased odds of severe upper gastrointestinal ischemic lesions; previous proton pump inhibitor use (OR 0.40 (0.14-1.00)) and serum bicarbonate on day 1 (OR 0.89 (0.81-0.97)) were associated with lower odds of ischemic lesions. Patients with severe lesions had a higher SOFA score during the ICU stay and worse neurological outcome at hospital discharge. CONCLUSIONS: More than half of the patients successfully resuscitated from OHCA had upper gastrointestinal tract ischemic injury. Presence of ischemic lesions was independently associated with the amount of adrenaline used during resuscitation. Patients with severe lesions had higher organ failure scores during the ICU stay and a worse prognosis. Clinical Trial Registration NCT02349074.

CAUSE OF THE ARREST

Sudden cardiac death in congenital heart disease.
Khairy P(1), Silka MJ(2), Moore JP(3), DiNardo JA(4), Vehmeijer JT(5), Sheppard MN(6), van de Bruaene A(7), Chaix MA(1), Brida M(8), Moore BM(9), Shah MJ(10), Mondésert B(1), Balaji S(11), Gatzoulis MA(12), Ladouceur M(13).
ABSTRACT
Sudden cardiac death (SCD) accounts for up to 25% of deaths in patients with congenital heart disease (CHD). To date, research has largely been driven by observational studies and real-world experience. Drawbacks include varying definitions, incomplete taxonomy that considers SCD as a unitary diagnosis as opposed to a terminal event with diverse causes, inconsistent outcome ascertainment, and limited data granularity. Notwithstanding these constraints, identified higher-

risk substrates include tetralogy of Fallot, transposition of the great arteries, cyanotic heart disease, Ebstein anomaly, and Fontan circulation. Without autopsies, it is often impossible to distinguish SCD from non-cardiac sudden deaths. Asystole and pulseless electrical activity account for a high proportion of SCDs, particularly in patients with heart failure. High-quality cardiopulmonary resuscitation is essential to improve outcomes. Pulmonary hypertension and CHD complexity are associated with lower likelihood of successful resuscitation. Risk stratification for primary prevention implantable cardioverter-defibrillators (ICDs) should consider the probability of SCD due to a shockable rhythm, competing causes of mortality, complications of ICD therapy, and associated costs. Risk scores to better estimate probabilities of SCD and CHD-specific guidelines and consensus-based recommendations have been proposed. The subcutaneous ICD has emerged as an attractive alternative to transvenous systems in those with vascular access limitations, prior device infections, intra-cardiac shunts, or a Fontan circulation. Further improving SCD-related outcomes will require a multidimensional approach to research that addresses disease processes and triggers, taxonomy to better reflect underlying pathophysiology, high-risk features, early warning signs, access to high-quality cardiopulmonary resuscitation and specialized care, and preventive therapies tailored to underlying mechanisms.

Risk of out-of-hospital cardiac arrest in patients with epilepsy and users of antiepileptic drugs.

Eroglu TE(1)(2)(3), Folke F(1)(4)(5), Tan HL(2)(6), Torp-Pedersen C(7)(8), Gislason GH(1)(9).

ABSTRACT

AIM: A few studies suggested that epilepsy and antiepileptic drugs with sodium channel blocking properties were independently associated with out-of-hospital cardiac arrest (OHCA). However, these findings have not yet been replicated. METHODS: Using Danish registries, we conducted a nested case-control study in a cohort of individuals between 1 June 2001 and 31 December 2015. Cases were defined as OHCA from presumed cardiac causes, and were matched with non-OHCA-controls based on sex, and age on the date of OHCA. Exposure of interest was epilepsy or antiepileptic drug use. To study the association between individual antiepileptic drug use and the rate of OHCA, we compared each antiepileptic drug with valproic acid. Cox regression with time-dependent covariates was conducted to calculate hazard ratio (HR) and 95%-confident interval (CI). RESULTS: We identified 35,195 OHCA-cases and 351,950 matched non-OHCA controls. Epilepsy (cases:3.58%, controls:1.60%) was associated with increased rate of OHCA compared with the general population (HR:1.76, 95%-CI:1.64-1.88) when common OHCA risk factors were taken into account. When we studied antiepileptic drug use, we found that two antiepileptic drugs without sodium channel blockage, clonazepam (HR:1.88, 95%-CI:1.45-2.44) and pregabalin (HR:1.33, 95%-CI:1.05-1.69), were associated with OHCA, whereas none of the antiepileptic drugs with sodium channel blockage were associated with OHCA. CONCLUSION: Epilepsy is associated with increased rate of OHCA. Our findings do not support a possible association between antiepileptic drugs with sodium channels blocking properties and OHCA.

Predictors of Hospital Admissions for Ventricular Arrhythmia or Cardiac Arrest in Patients With Cardiomyopathy.

Zacharia EM(1), Istvanic F(1), Mulukutla S(1), Thoma F(1), Aronis KN(1), Bhonsale A(1), Kancharla K(1), Voigt A(1), Shalaby A(1), Estes NAM 3rd(1), Jain SK(1), Saba S(2).

ABSTRACT

Although ventricular dysfunction is associated with the occurrence of ventricular arrhythmia (VA), most patients with cardiomyopathy do not experience VA. We therefore investigated other predictors of VA in a large contemporary cohort of patients with cardiomyopathy. All patients at a large academic medical system with left ventricular ejection fraction (LVEF) ≤50% were enrolled at the time of first documented low LVEF. Predictors of hospital admission for VA were examined using multivariable Cox models. The incidence of implantable defibrillator (ICD) placement was also examined. A total of 18,003 patients were enrolled. Over a median follow-up of 3.35 years, 389 patients (2.2%) were admitted for VA (304 of 12,037 [2.5%] among patients with LVEF ≤35% vs 85 of 5,966 [1.4%] among those with LVEF 36% to 50%). Predictors of VA hospitalization included lower LVEF (hazard ratio (HR) = 1.43 per 10% decrease, p <0.001), the presence of an ICD at baseline (HR = 1.63, p = 0.010), higher blood glucose (HR = 1.02 per 10 mg/100 ml increase, p = 0.050), the presence of end-stage renal disease (HR = 3.59, p <0.001), and the presence of liver cirrhosis (HR = 1.93, p = 0.013). During follow-up, 626 patients were implanted with a new ICD. In addition to being admitted with VA, a lower LVEF and a history of coronary artery disease or heart failure were the main predictors of ICD therapy in this population. In conclusion, in addition to more severe cardiomyopathy and the presence of an implanted ICD, metabolic derangements on initial contact are independent predictors of hospital admissions for VA in patients with cardiomyopathy. Noncardiac co-morbidities play an important role in stratifying patients with cardiomyopathy for their risk of VA or cardiac arrest.

Circulating linoleic acid at the time of myocardial infarction and risk of primary ventricular fibrillation.
Oliveras T(#)(1)(2)(3), Lázaro I(#)(4), Rueda F(5)(6)(7), Cediel G(5)(6)(7), Bhatt DL(8), Fitó M(4)(9), Madrid-Gambin F(4)(10), Pozo OJ(4), Harris WS(11)(12), García-García C(5)(6)(7), Sala-Vila A(13)(14), Bayés-Genís A(15)(16)(17).
ABSTRACT
Primary ventricular fibrillation (PVF) is a major driver of cardiac arrest in the acute phase of ST-segment elevation myocardial infarction (STEMI). Enrichment of cardiomyocyte plasma membranes with dietary polyunsaturated fatty acids (PUFA) reduces vulnerability to PVF experimentally, but clinical data are scarce. PUFA status in serum phospholipids is a valid surrogate biomarker of PUFA status in cardiomyocytes within a wide range of dietary PUFA. In this nested case-control study (n = 58 cases of STEMI-driven PVF, n = 116 control non-PVF STEMI patients matched for age, sex, smoking status, dyslipidemia, diabetes mellitus and hypertension) we determined fatty acids in serum phospholipids by gas-chromatography, and assessed differences between cases and controls, applying the Benjamini-Hochberg procedure on nominal P-values to control the false discovery rate (FDR). Significant differences between cases and controls were restricted to linoleic acid (LA), with PVF patients showing a lower level (nominal P = 0.002; FDR-corrected P = 0.027). In a conditional logistic regression model, each one standard deviation increase in the proportion of LA was related to a 42% lower prevalence of PVF (odds ratio = 0.58; 95% confidence interval, 0.37, 0.90; P = 0.02). The association lasted after the inclusion of confounders. Thus, regular consumption of LA-rich foods (nuts, oils from seeds) may protect against ischemia-driven malignant arrhythmias.

Higher chance of survival in patients with out-of-hospital cardiac arrest attributed to poisoning.
Hüser C(1), Baumgärtel M(2), Ristau P(3), Wnent J(4), Suárez V(1), Johannes Hackl M(1), Gräsner JT(4), Seewald S(5).

ABSTRACT

AIM OF THE STUDY: Description and comparison of cohort characteristics and outcome of adult patients with out-of-hospital cardiac arrest (OHCA) attributed to poisoning (P-OHCA) versus patients with OHCA attributed to other medical causes (NP-OHCA). METHODS: We included all patients who received cardiopulmonary resuscitation after OHCA between January 2011 and December 2020 from German emergency medical services with good data quality in the German Resuscitation Registry. EXCLUSION CRITERIA: patients < 18 years of age or OHCA attributed to trauma, drowning, intracranial bleeding or exsanguination. RESULTS: Patients with P-OHCA (n=574) were significantly younger compared to NP-OHCA (n=40,146) (median age of 43 (35-54) years vs. 73 (62-82) years; p <0.001). Cardiac arrest in P-OHCA patients was significantly less often witnessed by bystanders (41.8 % vs. 66.2 %, p<0.001). Asystole was the predominant initial rhythm in P-OHCA patients (73.5% vs. 53.7%, p< 0.001) while ventricular fibrillation (VF) and pulseless electrical activity (PEA) were less common (9.2% vs. 25.1% and 16.2 % vs. 20.5%, p<0.001). P-OHCA had a higher chance of survival with good neurological outcome at hospital discharge (15.2 vs. 8.8 % p<0.001) and poisoning was an independent protective prognostic factor in multivariate analysis (OR 2.47, 95%-CI [1.71-3.57]). P-OHCA patients with initial PEA survival with good neurological outcome was comparable to initial VF (34.3 % vs. 37.7%). CONCLUSION: Patients in the P-OHCA group had a significantly higher chance of survival with good neurological outcome and PEA as initial rhythm was as favourable as initial VF. Therefore, in P-OHCA patients resuscitation efforts should be extended.

Physiological Changes in Subjects Exposed to Accidental Hypothermia: An Update.
Bjertnæs LJ(1)(2), Næsheim TO(2)(3), Reierth E(4), Suborov EV(5), Kirov MY(6), Lebedinskii KM(7)(8), Tveita T(1)(2).

ABSTRACT

BACKGROUND: Accidental hypothermia (AH) is an unintended decrease in body core temperature (BCT) to below 35°C. We present an update on physiological/pathophysiological changes associated with AH and rewarming from hypothermic cardiac arrest (HCA). TEMPERATURE REGULATION AND METABOLISM: Triggered by falling skin temperature, Thyrotropin-Releasing Hormone (TRH) from hypothalamus induces release of Thyroid-Stimulating Hormone (TSH) and Prolactin from pituitary gland anterior lobe that stimulate thyroid generation of triiodothyronine and thyroxine (T4). The latter act together with noradrenaline to induce heat production by binding to adrenergic β3-receptors in fat cells. Exposed to cold, noradrenaline prompts degradation of triglycerides from brown adipose tissue (BAT) into free fatty acids that uncouple metabolism to heat production, rather than generating adenosine triphosphate. If BAT is lacking, AH occurs more readily. CARDIAC OUTPUT: Assuming a 7% drop in metabolism per °C, a BCT decrease of 10°C can reduce metabolism by 70% paralleled by a corresponding decline in CO. Consequently, it is possible to maintain adequate oxygen delivery provided correctly performed cardiopulmonary resuscitation (CPR), which might result in approximately 30% of CO generated at normal BCT. LIVER AND COAGULATION: AH promotes coagulation disturbances following trauma and acidosis by reducing coagulation and platelet functions. Mean prothrombin and partial thromboplastin times might increase by 40-60% in moderate hypothermia. Rewarming might release tissue factor from damaged tissues, that triggers disseminated intravascular coagulation. Hypothermia might inhibit platelet aggregation and coagulation. KIDNEYS: Renal blood flow decreases due to vasoconstriction of afferent arterioles, electrolyte and fluid disturbances and increasing blood viscosity. Severely deranged renal function occurs particularly in the presence of rhabdomyolysis induced by severe AH combined with trauma. CONCLUSION: Metabolism drops 7% per °C fall in BCT, reducing CO correspondingly. Therefore, it is possible to maintain adequate oxygen delivery after 10°C drop in BCT provided correctly performed

CPR. Hypothermia may facilitate rhabdomyolysis in traumatized patients. Victims suspected of HCA should be rewarmed before being pronounced dead. Rewarming avalanche victims of HCA with serum potassium > 12 mmol/L and a burial time >30 min with no air pocket, most probably be futile.

Sudden unexplained death versus nonautopsied possible sudden cardiac death: Findings in relatives.
Dalgaard CV(1), Hansen BL(1), Jacobsen EM(1), Kjerrumgaard A(1), Tfelt-Hansen J(1)(2), Weeke PE(1), Winkel BG(1), Christensen AH(1)(3), Bundgaard H(1).

ABSTRACT
BACKGROUND: International guidelines recommend work-up of relatives to autopsy negative sudden cardiac death victims, denoted as sudden unexplained death (SUD) and nonautopsied possible sudden cardiac death (pSCD) victims. This study assesses and compare baseline characteristics and clinical outcome at initial evaluation and during follow-up of relatives to SUD and pSCD victims. METHODS: We retrospectively included data from systematic screening and routine follow-up of first-degree relatives to SUD and pSCD victims referred to our Unit for Inherited Cardiac Diseases, Copenhagen, 2005-2018. Victims with an antemortem known inherited cardiac disease were excluded. RESULTS: We included 371 first-degree relatives from 187 families (120 SUD, 67 pSCD): 276 SUD relatives (age 33 ± 18 years, 54% men) and 95 pSCD relatives (age 40 ± 15 years, 51% men). The diagnostic yields of inherited cardiac diseases in SUD and pSCD families were 16% and 13%, respectively (p = .8). The diagnoses in SUD families were mainly channelopathies (68%), whereas pSCD families were equally diagnosed with cardiomyopathies, channelopathies, and premature ischemic heart disease. Ninety-three percent of diagnosed families were diagnosed at initial evaluation and 7% during follow-up (5.4 ± 3.3 years). During follow-up 34% of relatives with a diagnosed inherited cardiac disease had an arrhythmic event, compared to 5% of relatives without established diagnosis (p < .0001). CONCLUSIONS: Channelopathies dominated in SUD families whereas a broader spectrum of inherited diseases was diagnosed in pSCD families. Most affected relatives were diagnosed at initial evaluation. The event rate was low in relatives without an established diagnosis. Long-term clinical follow-up may not be warranted in all relatives with normal baseline-findings.

Filamin-C variant-associated cardiomyopathy: A pooled analysis of individual patient data to evaluate the clinical profile and risk of sudden cardiac death.
Celeghin R(1), Cipriani A(1), Bariani R(1), Bueno Marinas M(1), Cason M(1), Bevilacqua M(2), De Gaspari M(1), Rizzo S(1), Rigato I(1), Da Pozzo S(3), Zorzi A(1), Perazzolo Marra M(1), Thiene G(1), Iliceto S(1), Basso C(4), Corrado D(1), Pilichou K(1), Bauce B(1).

ABSTRACT
BACKGROUND: Mutations in filamin-C (FLNC) are involved in the pathogenesis of arrhythmogenic cardiomyopathy (ACM) and dilated cardiomyopathy (DCM), and have been associated with a left ventricular (LV) phenotype, characterized by nonischemic LV fibrosis, ventricular arrhythmias, and sudden cardiac death (SCD). OBJECTIVE: The purpose of this study was to investigate the prevalence of FLNC variants in a gene-negative ACM population and to evaluate the clinical phenotype and SCD risk factors in FLNC-associated cardiomyopathies. METHODS: ACM probands who tested negative for mutations in ACM-related genes underwent FLNC genetic screening. Clinical and genetic data were collected and pooled together with those of previously published FLNC-ACM and FLNC-DCM patients. RESULTS: In a cohort of 270 gene-elusive ACM probands, 12 (4.4%) had FLNC variants, and 13 additional family members carried the same mutation. Eighteen FLNC variant carriers (72%) had a

diagnosis of ACM (72% male; mean age 45 years). On pooled analysis, 145 patients with FLNC-associated cardiomyopathies were included. Electrocardiographic (ECG) low QRS voltages were detected in 37%, and T-wave inversion (TWI) in inferolateral/lateral leads in 24%. Among 67 patients who had cardiac magnetic resonance (CMR), LV nonischemic late gadolinium enhancement (LGE) was found in 75%. SCD occurred in 28 patients (19%), 15 of whom showed LV nonischemic LGE/fibrosis. Compared with patients with no SCD, those who experienced SCD more frequently had inferolateral/lateral TWI (P = .013) and LV LGE/fibrosis (P = .033). CONCLUSION: Clinical phenotype of FLNC cardiomyopathies is characterized by late-onset presentation and typical ECG and CMR features. SCD is associated with the presence of LV LGE/fibrosis but not with severe LV systolic dysfunction.

Predictive scores for identifying patients with type 2 diabetes mellitus at risk of acute myocardial infarction and sudden cardiac death.
Lee S(1), Zhou J(2), Guo CL(3), Wong WT(4), Liu T(5), Wong ICK(6)(7), Jeevaratnam K(8), Zhang Q(2), Tse G(5)(8).
ABSTRACT
INTRODUCTION: The present study evaluated the application of incorporating non-linear J/U-shaped relationships between mean HbA1c and cholesterol levels into risk scores for predicting acute myocardial infarction (AMI) and non-AMI-related sudden cardiac death (SCD) respectively, amongst patients with type 2 diabetes mellitus. METHODS: This was a territory-wide cohort study of patients with type 2 diabetes mellitus above the age 40 and free from prior AMI and SCD, with or without prescriptions of anti-diabetic agents between January 1st, 2009 to December 31st, 2009 at government-funded hospitals and clinics in Hong Kong. Patients recruited were followed up until 31 December 2019 or their date of death. Risk scores were developed for predicting incident AMI and non-AMI-related SCD. The performance of conditional inference survival forest (CISF) model compared to that of random survival forests (RSF) model and multivariate Cox model. RESULTS: This study included 261 308 patients (age = 66.0 ± 11.8 years old, male = 47.6%, follow-up duration = 3552 ± 1201 days, diabetes duration = 4.77 ± 2.29 years). Mean HbA1c and low high-density lipoprotein-cholesterol (HDL-C) were significant predictors of AMI on multivariate Cox regression. Mean HbA1c was linearly associated with AMI, whilst HDL-C was inversely associated with AMI. Mean HbA1c and total cholesterol were significant multivariate predictors with a J-shaped relationship with non-AMI-related SCD. The AMI and SCD risk scores had an area under the curve (AUC) of 0.666 (95% confidence interval (CI) = [0.662, 0.669]) and 0.677 (95% CI = [0.673, 0.682]), respectively. CISF significantly improves prediction performance of both outcomes compared to RSF and multivariate Cox models. CONCLUSION: A holistic combination of demographic, clinical and laboratory indices can be used for the risk stratification of patients with type 2 diabetes mellitus for AMI and SCD.

END-TIDAL CO$_2$

End-tidal CO(2) <10 mm Hg is not a reason to terminate cardiopulmonary resuscitation in hypothermic cardiac arrest.
Zafren K(1), Paal P(2).
NO ABSTRACT AVAILABLE

ORGAN DONATION

No articles identified.

FEEDBACK

No articles identified.

DRUGS

1. Eur J Emerg Med. 2022 Mar 16. doi: 10.1097/MEJ.0000000000000918. Online ahead of print.
Effect of sodium bicarbonate on functional outcome in patients with out-of-hospital cardiac arrest: a post-hoc analysis of a French and North-American dataset.
Touron M(1), Javaudin F, Lebastard Q, Baert V, Heidet M, Hubert H, Leclere B, Lascarrou JB; for the RéAC Network.

ABSTRACT

No large randomised controlled trial has assessed the potential benefits on neurologic outcomes of prehospital sodium bicarbonate administration in patients with nontraumatic out-of-hospital cardiac arrest (OHCA). The objective of this study was to obtain information of assistance in designing a randomised controlled trial of bicarbonate therapy after OHCA in specific patient subgroups. We conducted two, separate, simultaneous, retrospective studies of two distinct, unlinked datasets. One dataset was a French nationwide population-based registry (RéAC Registry, French dataset) and the other was a randomised controlled trial comparing continuous to interrupted chest compressions in North AmericaNorth-American dataset). We investigated whether prehospital bicarbonate administration was associated with better neurologic outcomes. The main outcome measure was the functional outcome at hospital discharge. To adjust for potential confounders, we conducted a nested propensity-score-matched analysis with inverse probability-of-treatment weighting. In the French dataset, of the 54 807 patients, 1234 (2.2%) received sodium bicarbonate and 450 were matched. After propensity-score matching, sodium bicarbonate was not associated with a higher likelihood of favourable functional outcomes on day 30 [adjusted odds ratio (aOR), 0.912; 95% confidence interval (95%CI), 0.501-1.655]. In the North-American dataset, of the 23 711 included patients, 4902 (20.6%) received sodium bicarbonate and 1238 were matched. After propensity-score matching, sodium bicarbonate was associated with a lower likelihood of favourable functional outcomes at hospital discharge (aOR, 0.45; 95% CI, 0.34-0.58). In patients with OHCA, prehospital sodium bicarbonate administration was not associated with neurologic outcomes in a French dataset and was associated with worse neurologic outcomes in a North-American dataset. Given the considerable variability in sodium bicarbonate use by different prehospital care systems and the potential resuscitation-time bias in the present study, a large randomised clinical trial targeting specific patient subgroups may be needed to determine whether sodium bicarbonate has a role in the prehospital management of prolonged OHCA.

2. J Intensive Care Med. 2022 Apr;37(4):518-527. doi: 10.1177/0885066621998936. Epub 2021 May 28.
Associations of Vasopressor Requirements With Echocardiographic Parameters After Out-of-Hospital Cardiac Arrest.
Tabi M(1), Burstein BJ(2), Anavekar NS(1), Kashani KB(2)(3), Jentzer JC(1)(2).

ABSTRACT

BACKGROUND: Post-arrest hypotension is common after out of hospital cardiac arrest (OHCA) and many patients resuscitated after OHCA will require vasopressors. We sought to determine the associations between echocardiographic parameters and vasopressor requirements in OHCA patients. METHODS: We retrospectively analyzed adult patients with OHCA treated with targeted temperature management between December 2005 and September 2016 who underwent a transthoracic echocardiogram (TTE). Categorical variables were compared using 2-tailed Fisher's exact and Pearson's correlation coefficients and variance (r2) values were used to assess relationships between continuous variables. RESULTS: Among 217 included patients, the mean age was 62 ± 12 years, including 74% males. The arrest was witnessed in 90%, the initial rhythm was shockable in 88%, and 58% received bystander CPR. At the time of TTE, 41% of patients were receiving vasopressors; this group of patients was older, had greater severity of illness, higher inpatient mortality and left ventricular ejection fraction (LVEF) was modestly lower (36.8 ± 17.1% vs. 41.4 ± 16.4%, P = 0.04). Stroke volume, cardiac power output and left ventricular stroke work index correlated with number of vasopressors (Pearson r -0.24 to -0.34, all P < 0.002), but the correlation with LVEF was weak (Pearson r -0.13, P = 0.06). CONCLUSIONS: In patients after OHCA, left ventricular systolic dysfunction was associated with the need for vasopressors, and Doppler TTE hemodynamic parameters had higher correlation coefficients compared with vasopressor requirements than LVEF. This emphasizes the complex nature of shock after OHCA, including pathophysiologic processes not captured by TTE assessment alone.

TRAUMA

No articles identified.

VENTILATION

No articles identified.

CERERBRAL MONITORING

No articles identified.

ULTRASOUND AND CPR

1. Resusc Plus. 2022 Mar 11;10:100218. doi: 10.1016/j.resplu.2022.100218. eCollection 2022 Jun.
Point-of-Care Resuscitative Echocardiography Diagnosis of Intracardiac Thrombus during cardiac arrest (PREDICT Study): A retrospective, observational cohort study.
Lau V(1), Blaszak M(2), Lam J(2), German M(3), Myslik F(2).

ABSTRACT
BACKGROUND: Point-of-care ultrasound (POCUS) has been previously studied in cardiac arrest, without definitive markers for futile resuscitation efforts identified. Intracardiac thrombus during cardiac arrest has not been systematically studied. Our objective was to describe the incidence of intracardiac thrombus and spontaneous echo contrast found during cardiac arrest. METHODS: A two hospital, retrospective, observational cohort study of 56 cardiac arrest patients who were assessed with POCUS (between January 1st, 2017 to April 30th, 2020). Eligible studies were reviewed for echocardiographic findings (e.g. presence of intracardiac thrombus or spontaneous echo contrast),

baseline patient demographics, cardiac arrest-related data, and clinical outcomes. Primary outcome was in-hospital mortality. RESULTS: Fifty-six intra-arrest POCUS echocardiograms were identified (out of 738 out-of-hospital cardiac arrests). The median patient age was 63 years (interquartile range [IQR]: 51-72), with 25% female patients, and median Charlson Comorbidity Index score of 4 (IQR: 2-6). The incidence of intracardiac thrombus was 21 out of 56 patients (38%). Time-to-new thrombus formation during cardiac arrest was approximately 6 minutes (IQR: 2--8). All patients with intracardiac thrombus during cardiac arrest had termination of resuscitation. CONCLUSIONS: Intracardiac thrombus is potentially common during out-of-hospital cardiac arrests and was observed more frequently in those in whom termination of resuscitation was recommended. However, this is only hypothesis-generating at this time, and further study is required to determine if the presence of intracardiac thrombus may be used as a potential marker of resuscitation futility.

ORGANISATION AND TRAINING

1. Patient Educ Couns. 2022 Mar 5:S0738-3991(22)00097-0. doi: 10.1016/j.pec.2022.03.004. Online ahead of print.
A mixed methods analysis of caller-emergency medical dispatcher communication during 9-1-1 calls for out-of-hospital cardiac arrest.
Richards CT(1), McCarthy DM(2), Markul E(3), Rottman DR(4), Lindeman P(5), Prabhakaran S(6), Klabjan D(7), Holl JL(8), Cameron KA(9).
ABSTRACT
OBJECTIVE: Recognition of out-of-hospital cardiac arrest (OHCA) during 9-1-1 calls is critically important, but little is known about how laypersons and emergency medical dispatchers (EMDs) communicate. We sought to describe 9-1-1 calls for OHCA. METHODS: We performed a mixed-methods, retrospective analysis of 9-1-1 calls for OHCA victims in a large urban emergency medical services (EMS) system using a random sampling of cases containing the term "cardiopulmonary resuscitation" (CPR) in the EMS electronic report. A constant comparison qualitative approach with four independent reviewers continued until thematic saturation was achieved. Quantitative analysis employed computational linguistics. Callers' emotional states were rated using the emotional content and cooperation score (ECCS). RESULTS: Thematic saturation was achieved after 46 calls. Three "OHCA recognition" themes emerged [1) disparate OHCA terms used, 2) OHCA mimics create challenges, 3) EMD questions influence recognition]. Three "CPR facilitation" themes emerged [1) directive language may facilitate CPR, 2) specific instructions assist CPR, 3) caller's emotions affect CPR initiation]. Callers were generally "anxious but cooperative." Callers saying "pulse" was associated with OHCA recognition. CONCLUSION: Communication characteristics appear to influence OHCA recognition and CPR facilitation. PRACTICE IMPLICATIONS: Dispatch protocols that acknowledge characteristics of callers' communication may improve OHCA recognition and CPR facilitation.

2. PLoS One. 2022 Mar 17;17(3):e0265559. doi: 10.1371/journal.pone.0265559. eCollection 2022.
The use of early warning system scores in prehospital and emergency department settings to predict clinical deterioration: A systematic review and meta-analysis.
Guan G(1)(2), Lee CMY(3)(4), Begg S(5), Crombie A(6), Mnatzaganian G(1)(7).
ABSTRACT
BACKGROUND: It is unclear which Early Warning System (EWS) score best predicts in-hospital deterioration of patients when applied in the Emergency Department (ED) or prehospital setting. METHODS: This systematic review (SR) and meta-analysis assessed the predictive abilities of five commonly used EWS scores (National Early Warning Score (NEWS) and its updated version NEWS2,

Modified Early Warning Score (MEWS), Rapid Acute Physiological Score (RAPS), and Cardiac Arrest Risk Triage (CART)). Outcomes of interest included admission to intensive care unit (ICU), and 3-to-30-day mortality following hospital admission. Using DerSimonian and Laird random-effects models, pooled estimates were calculated according to the EWS score cut-off points, outcomes, and study setting. Risk of bias was evaluated using the Newcastle-Ottawa scale. Meta-regressions investigated between-study heterogeneity. Funnel plots tested for publication bias. The SR is registered in PROSPERO (CRD42020191254). RESULTS: Overall, 11,565 articles were identified, of which 20 were included. In the ED setting, MEWS, and NEWS at cut-off points of 3, 4, or 6 had similar pooled diagnostic odds ratios (DOR) to predict 30-day mortality, ranging from 4.05 (95% Confidence Interval (CI) 2.35-6.99) to 6.48 (95% CI 1.83-22.89), p = 0.757. MEWS at a cut-off point ≥3 had a similar DOR when predicting ICU admission (5.54 (95% CI 2.02-15.21)). MEWS ≥5 and NEWS ≥7 had DORs of 3.05 (95% CI 2.00-4.65) and 4.74 (95% CI 4.08-5.50), respectively, when predicting 30-day mortality in patients presenting with sepsis in the ED. In the prehospital setting, the EWS scores significantly predicted 3-day mortality but failed to predict 30-day mortality. CONCLUSION: EWS scores' predictability of clinical deterioration is improved when the score is applied to patients treated in the hospital setting. However, the high thresholds used and the failure of the scores to predict 30-day mortality make them less suited for use in the prehospital setting.

Implementation and Evaluation of Resuscitation Training for Childcare Workers.
Michel J(1), Ilg T(1), Neunhoeffer F(1), Hofbeck M(1), Heimberg E(1).

ABSTRACT
BACKGROUND AND OBJECTIVE: Children spend a large amount of time in daycare centers or schools. Therefore, it makes sense to train caregivers well in first-aid measures in children. The aim of this study is to evaluate whether a multimodal resuscitation training for childcare workers can teach adherence to resuscitation guidelines in a sustainable way. MATERIALS AND METHODS: Caregivers at a daycare center who had previously completed a first-aid course received a newly developed multimodal resuscitation training in small groups of 7-8 participants by 3 AHA certified PALS instructors and providers. The 4-h focused retraining consisted of a theoretical component, expert modeling, resuscitation exercises on pediatric manikins (Laerdal Resusci Baby QCPR), and simulated emergency scenarios. Adherence to resuscitation guidelines was compared before retraining, immediately after training, and after 6 months. This included evaluation of chest compressions per round, chest compression rate, compression depth, full chest recoil, no-flow time, and success of rescue breaths. For better comparability and interpretation of the results, the parameters were evaluated both separately and summarized in a resuscitation score reflecting the overall adherence to the guidelines. RESULTS: A total of 101 simulated cardiopulmonary resuscitations were evaluated in 39 participants. In comparison to pre-retraining, chest compressions per round (15.0 [10.0-29.0] vs. 30.0 [30.0-30.0], p < 0.001), chest compression rate (100.0 [75.0-120.0] vs. 112.5 [105-120.0], p < 0.001), correct compression depth (6.7% [0.0-100.0] vs. 100.0% [100.0-100.0], p < 0.001), no-flow time (7.0 s. [5.0-9.0] vs. 4.0 s. [3.0-5.0], p < 0.001), success of rescue breaths (0.0% [0.0-0.0] vs. 100.0% [100.0-100.0], p < 0.001), and resuscitation score were significantly improved immediately after training (3.9 [3.2-4.9] vs. 6.3 [5.6-6.7], p < 0.001). At follow-up, there was no significant change in chest compression rate and success of rescue breaths. Chest compressions per round (30.0 [15.0-30.0], p < 0.001), no-flow time (5.0 s. [4.0-8.0], p < 0.001), compression depths (100.0% [96.7-100.0], p < 0.001), and resuscitation score worsened again after 6 months (5.7 [4.7-6.4], p = 0.03). However, the results were still significantly better compared to pre-retraining. CONCLUSION: Our multimodal cardiopulmonary resuscitation training program for caregivers is effective to increase the

resuscitation performance immediately after training. Although the effect diminishes after 6 months, adherence to resuscitation guidelines was significantly better than before retraining.

Association of Physical Activity With Primary Cardiac Arrest Risk in the General Population: A Nationwide Cohort Study of the Dose-Response Relationship.
Jin MN(1), Yang PS(2), Yu HT(3), Kim TH(3), Lee HY(4), Sung JH(2), Byun YS(4), Joung B(5).
ABSTRACT
OBJECTIVE: To quantify the dose-response relationship between moderate to vigorous physical activity and primary cardiac arrest (PCA). PATIENTS AND METHODS: There were 504,840 participants older than 18 years who underwent the Korean National Health Screening Program, including a self-administered questionnaire for physical activity from January 1, 2009, through December 31, 2014. Physical activity levels were converted into metabolic equivalent tasks (METs) per week and categorized to correspond with multiples of public health recommendations. We evaluated the quantitative and categorical dose-response relationship between physical activity and PCA. RESULTS: A curvilinear dose-response relationship between physical activity and PCA was observed; the benefits started at two-thirds (5 MET-hour/week) of the United States and World Health Organization guidelines-recommended minimum (7.5 MET-hour/week) and continued to 5 times (40 MET-hour/week) the recommended minimum (P nonlinearity $<.001$). The largest benefit was noted at a level of 2 to 3 times the recommended minimum (hazard ratio, 0.6; 95% CI, 0.4 to 0.8). In addition, there was no evidence of an increased PCA risk at a level more than 5 times the recommended minimum (hazard ratio, 0.7; 95% CI, 0.5 to 1.1). These associations were consistent regardless of age, sex, body mass index, comorbid conditions, and estimated 10-year risk for cardiovascular disease. CONCLUSION: The beneficial effect of physical activity on PCA started at two-thirds of the recommended minimum and continued to 5 times the recommended minimum. No excess risk for PCA was present among individuals with activity levels more than 5 times the recommended minimum regardless of cardiovascular disease or lifestyle risk factor presence.

Implantable device measured objective daily physical activity as a predictor of long-term all-cause mortality and cardiac death in patients with age > 75 years and high risk of sudden cardiac death: a cohort study : Physical activity and patients over 75 years old.
Li X(1), Chen K(1), Hua W(1), Su Y(2), Yang J(3), Liang Z(4), Xu W(5), Zhao S(1), Li Z(1), Zhang S(6).
ABSTRACT
BACKGROUND: To study the relationship between objective daily physical activity (PA), as measured by implantable cardioverter defibrillators (ICDs)/cardiac resynchronization therapy defibrillators (CRTDs), and long-term prognoses in patients with age > 75 years at high risk of sudden cardiac death (SCD).METHODS: In total, 133 patients with age > 75 years old (age 79.52 ± 3.68 years) in the SUMMIT study were retrospectively analysed. The major endpoint was all-cause mortality, and the minor endpoint was cardiac death. RESULTS: The mean follow-up time was 57.1 ± 24.2 months (range: from 4 to 96 months). In total, 46 all-cause mortality and 23 cardiac death events occurred. The receiver operating characteristic curve indicated a baseline PA cut-off value of 6.47% (93 min/day) can predict all-cause mortality in patients with age > 75 years, with an area under the curve of 0.670 (95% confidence interval (CI): 0.573-0.767, P = 0.001). The sensitivity was 67.4%, and the specificity was 66.7%. Patients with baseline PA ≤ 6.47% had higher rates of all-cause mortality (51.7% vs 20.5%, P < 0.001) and cardiac death (25.0% vs 11.0%, P = 0.040). The estimated Kaplan-Meier survival curves showed that patients with PA ≤ 6.47% had an increased cumulative incidence

of all-cause mortality (Log-rank P < 0.0001) and cardiac death (Log-rank P = 0.0067). Multivariate Cox regression analysis showed that PA ≤ 6.47% was an independent predictor of all-cause mortality (hazard ratio (HR) 3.137, 95% CI: 1.667-5.904, P < 0.001) and cardiac death (HR value 3.345, 95% CI: 1.394-8.028, P = 0.007). CONCLUSIONS: Daily PA of about 1.5 h was associated with lower all-cause mortality and cardiac death risk in patients with age > 75 years and high risk of SCD with ICDs/CRTDs. PA monitoring may aid in long-term management of older patients at high risk of SCD.

Dispatcher Self-assessment and Attitude Toward Video Assistance as a New Tool in Simulated Cardiopulmonary Resuscitation.
Ecker H(1), Wingen S(1)(2), Hagemeier A(3), Plata C(1)(4), Böttiger BW(1), Wetsch WA(1).
ABSTRACT
INTRODUCTION: Video-assisted cardiopulmonary resuscitation (V-CPR) describes an advanced telephone-assisted CPR (T-CPR), in which emergency medical service (EMS) dispatchers view a live video steam of the resuscitation. Dispatchers ' general attitudes toward and self-assessment in V-CPR have not been previously investigated. MATERIAL AND METHODS: We conducted this quantitative analysis along with a pilot study on V-CPR. After conducting V-CPR with laypersons in a simulation, EMS dispatchers were given questionnaires with 21 items concerning their personal attitude toward V-CPR and their self-assessment in providing instructions. The actual CPR performance achieved was recorded and compared to the dispatchers' self-assessments. RESULTS: Dispatchers completed 49 questionnaires, and the data is presented descriptively. Over 80% strongly agreed that V-CPR was helpful in guiding and that their feedback improved CPR quality. Fifty-one percent agreed that video images supported them in making a diagnosis, while 44.9% disagreed. A vast majority (80-90% each) strongly agreed that V-CPR helped them recognize CPR issues such as compression point, compression rate, and deterioration. In contrast, data for improved compression depth and release were weaker. Thirty percent found V-CPR to be more stressful or exhausting than T-CPR. A majority stated they would prefer V-CPR as an addition to T-CPR in the future. There was a huge gap between dispatchers' own view of CPR effort and measured CPR quality. CONCLUSION: Dispatchers generally embrace V-CPR and praise the abilities it provides. Our results indicate that the use of V-CPR did not automatically result in an overall improvement in guideline-compliant CPR quality.

Corrigendum to "Mathematical model of modified hybrid pump mechanism for cardiopulmonary resuscitation" [Computer methods and programs in biomedicine 206 (2021) 106106].
Shin DA(1), Lee JC(2).
NO ABSTRACT AVAILABLE

Dispatching citizens as first responders to out-of-hospital cardiac arrests: a systematic review and meta-analysis.
Scquizzato T(1), Belloni O, Semeraro F, Greif R, Metelmann C, Landoni G, Zangrillo A.
ABSTRACT
Mobile phone technologies to alert citizen first responders to out-of-hospital cardiac arrests (OCHAs) were implemented in numerous countries. This systematic review and meta-analysis aim to investigate whether activating citizen first responders increases bystanders' interventions and improves outcomes. We searched PubMed, EMBASE, and the Cochrane Central Register of

Controlled Trials from inception to 24 November 2021, for studies comparing citizen first responders' activation versus standard emergency response in the case of OCHA. The primary outcome was survival at hospital discharge or 30 days. Secondary outcomes were discharge with favourable neurological outcome, bystander-initiated cardiopulmonary resuscitation (CPR), and the use of automated external defibrillators (AEDs) before ambulance arrival. Evidence certainty was evaluated with GRADE. Our search strategy yielded 1215 articles. After screening, we included 10 studies for a total of 23 351 patients. OCHAs for which citizen first responders were activated had higher rates of survival at hospital discharge or 30 days compared with standard emergency response [nine studies; 903/9978 (9.1%) vs. 1104/13 247 (8.3%); odds ratio (OR), 1.45; 95% confidence interval (CI), 1.21-1.74; P < 0.001], return of spontaneous circulation [nine studies; 2575/9169 (28%) vs. 3445/12 607 (27%); OR, 1.40; 95% CI, 1.07-1.81; P = 0.01], bystander-initiated CPR [eight studies; 5876/9074 (65%) vs. 6384/11 970 (53%); OR, 1.75; 95% CI, 1.43-2.15; P < 0.001], and AED use [eight studies; 654/9132 (7.2%) vs. 624/14 848 (4.2%); OR, 1.82; 95% CI, 1.31-2.53; P < 0.001], but similar rates of neurological intact discharge [three studies; 316/2685 (12%) vs. 276/2972 (9.3%); OR, 1.37; 95% CI, 0.81-2.33; P = 0.24]. Alerting citizen first responders to OCHA patients is associated with higher rates of bystander-initiated CPR, use of AED before ambulance arrival, and survival at hospital discharge or 30 days.

9. Acute Crit Care. 2022 Feb 24. doi: 10.4266/acc.2021.01095. Online ahead of print.
Changes in the incidence of cardiopulmonary resuscitation before and after implementation of the Life-Sustaining Treatment Decisions Act.
Im H(1), Choe HW(2), Oh SY(1), Ryu HG(2), Lee H(2).
ABSTRACT
BACKGROUND: The Life-Sustaining Treatment (LST) Decisions Act allows withholding and withdrawal of LST, including cardiopulmonary resuscitation (CPR). In the present study, the incidence of CPR before and after implementation of the Act was compared. METHODS: This was a retrospective review involving hospitalized patients who underwent CPR at a single center between February 2016 and January 2020 (pre-implementation period, February 2016 to January 2018; post-implementation period, February 2018 to January 2020). The primary outcome was monthly incidence of CPR per 1,000 admissions. The secondary outcomes were duration of CPR, return of spontaneous circulation (ROSC) rate, 24-hour survival rate, and survival-to-discharge rate. The study outcomes were compared before and after implementation of the Act. RESULTS: A total of 867 patients who underwent CPR was included in the analysis. The incidence of CPR per 1,000 admissions showed no significant difference before and after implementation of the Act (3.02±0.68 vs. 2.81±0.75, P=0.255). The ROSC rate (67.20±0.11 vs. 70.99±0.12, P=0.008) and survival to discharge rate (20.24±0.09 vs. 22.40±0.12, P=0.029) were higher after implementation of the Act than before implementation. CONCLUSION: The incidence of CPR did not significantly change for 2 years after implementation of the Act. Further studies are needed to assess the changes in trends in the decisions of CPR and other LSTs in real-world practice.

POST-CARDIAC ARREST TREATMENTS

1. Am J Cardiol. 2022 Mar 13:S0002-9149(22)00117-5. doi: 10.1016/j.amjcard.2022.01.053. Online ahead of print.
Determinants of Undertaking Coronary Angiography and Adverse Prognostic Predictors Among Patients Presenting With Out-of-Hospital Cardiac Arrest and a Shockable Rhythm.
Zheng WC(1), Noaman S(2), Batchelor RJ(1), Hanson L(1), Bloom J(1), Kaye D(3), Duffy SJ(3), Walton A(4), Pellegrino V(4), Shaw J(4), Yang Y(5), French C(6), Stub D(7), Cox N(8), Chan W(9).

ABSTRACT

Characteristics of patients presenting with out-of-hospital cardiac arrest (OHCA) selected for coronary angiography (CA) and factors predicting in-hospital mortality remain unclear. We assessed clinical characteristics associated with undertaking CA in patients presenting with OHCA and shockable rhythm (CA group). Predictors of in-hospital mortality were evaluated with multivariable analysis. Of 1,552 patients presenting with cardiac arrest between 2014 and 2018 to 2 health services in Victoria, Australia, 213 patients with OHCA and shockable rhythm were stratified according to CA status. The CA group had shorter cardiopulmonary resuscitation duration (17 vs 25 minutes) and time to return of spontaneous circulation (17 vs 26 minutes) but higher proportion of ST-elevation on electrocardiogram (48% vs 24%) (all p <0.01). In-hospital mortality was 38% (n = 81) for the overall cohort, 32% (n = 54) in the CA group, and 61% (n = 27) in the no-CA group. Predictors of in-hospital mortality included non-selection for CA (odds ratio 4.5, 95% confidence interval 1.5 to 14), adrenaline support (3.9, 1.3 to 12), arrest at home (2.7, 1.1 to 6.6), longer time to defibrillation (2.5, 1.5 to 4.2 per 5-minute increase), lower blood pH (2.1, 1.4 to 3.2 per 0.1 decrease), lower albumin (2.0, 1.2 to 3.3 per 5 g/L decrease), higher Acute Physiology and Chronic Health Evaluation II score (1.7, 1.0 to 3.0 per 5-point increase), and advanced age (1.4, 1.0 to 2.0 per 10-year increase) (all p ≤0.05). In conclusion, non-selection for CA, concomitant cardiogenic shock requiring inotropic support, poor initial resuscitation (arrest at home, longer time to defibrillation and lower pH), greater burden of co-morbidities (higher Acute Physiology and Chronic Health Evaluation II score and lower albumin), and advanced age were key adverse prognostic indicators among patients with OHCA and shockable rhythm.

2. Sci Rep. 2022 Mar 14;12(1):4354. doi: 10.1038/s41598-022-08383-x.
Immediate complete revascularization showed better outcome in out-of-hospital cardiac arrest survivors with left main or triple-vessel coronary diseases.
Kim YJ(1), Park DW(2), Kim YH(3), Choi M(4), Kim SJ(5), Lee GT(6), Lee DH(7), Lee BK(7), Oh JS(8), Oh SH(9), Lee DH(10), Kim WY(11).

ABSTRACT

This study aimed to evaluate the prevalence of left main or triple vessel coronary artery disease (CAD) in comatose out-of-hospital cardiac arrest (OHCA) survivors and assessed their outcome based on the revascularization strategy. This multicenter, retrospective, observational registry-based study was conducted at 9 Korean tertiary care hospitals. Adult comatose OHCA survivors with left main or triple vessel CAD documented by immediate (≤ 2 h) coronary angiography after return of spontaneous circulation between 2011 and 2019 were included. The primary outcome was neurologically intact survival at 1-month. Among 727 OHCA patients, 150 (25%) had left main or triple vessel CAD and underwent complete (N = 32), incomplete (N = 78), and no immediate (N = 40) revascularization, respectively. The rate of neurologically intact survival at 1 month was significantly different among the groups (53%, 32%, and 23% for complete, incomplete, and no immediate revascularization groups, respectively; P = 0.02). After adjustment using the inverse probability of treatment weighting, complete revascularization was associated with neurologically intact survival at 1 month (odds ratio, 2.635; P = 0.01). Left main or triple vessel CAD is not uncommon in OHCA patients. The complete revascularization was associated with better outcome. Further clinical trials to confirm the best revascularization strategy are needed.

TARGETED TEMPERATURE MANAGEMENT

1. Ther Hypothermia Temp Manag. 2022 Mar 15. doi: 10.1089/ther.2021.0030. Online ahead of print.
The Early Prognostic Value and Optimal Time of Measuring Serum and Cerebrospinal Fluid Tau Protein for Neurologic Outcomes in Postcardiac Arrest Patients Treated with Targeted Temperature Management.

You Y(1), Kang C(1), Jeong W(1)(2), Park JS(1)(2), Cho Y(1), Ahn HJ(1)(2), Min JH(2)(3), In YN(2)(3).
ABSTRACT

Neuroprognostication of cardiac arrest patients remains a challenge. We evaluated the early prognostic value and optimal time of measuring serum and cerebrospinal fluid (CSF) tau protein levels to predict neurologic outcome in postcardiac arrest patients treated with targeted temperature management (TTM). We also evaluated the cutoff values in predicting poor outcomes. Patients treated with TTM following cardiac arrest, from May 2018 to June 2019, were included in the study. Serum and CSF tau levels were obtained and compared immediately, at 24, 48, and 72 hours after return of spontaneous circulation (ROSC). The area under the receiver-operating characteristic curve (AUROC) and the Delong method were used to identify the cutoff values of serum and CSF tau protein levels in predicting poor outcomes at each interval. Of 38 patients enrolled, 16 experienced poor outcomes. Both serum and CSF tau levels were consistently higher in the poor outcome group than in the good outcome group. The AUROCs of serum and CSF tau protein were not significantly different at each time point. Immediately after ROSC, sensitivities of both serum and CSF tau protein levels were 31.25% at 100% specificity and increased to 86.6% and 73.3%, respectively, at 72 hours. This study demonstrates that serum and CSF tau protein levels could be used as valuable predictors of neurologic outcomes in postcardiac arrest patients treated with TTM. The early optimal time for measuring the serum and CSF tau protein levels was determined to be 72 hours after ROSC.

Target temperature management following cardiac arrest: a systematic review and Bayesian meta-analysis.
Aneman A(1)(2)(3), Frost S(4)(5), Parr M(4)(6)(7), Skrifvars MB(8)(9)
ABSTRACT

BACKGROUND: Temperature control with target temperature management (TTM) after cardiac arrest has been endorsed by expert societies and adopted in international clinical practice guidelines but recent evidence challenges the use of hypothermic TTM. METHODS: Systematic review and Bayesian meta-analysis of clinical trials on adult survivors from cardiac arrest undergoing TTM for at least 12 h comparing TTM versus no TTM or with a separation > 2 °C between intervention and control groups using the PubMed/MEDLINE, EMBASE, CENTRAL databases from inception to 1 September 2021 (PROSPERO CRD42021248140). All randomised and quasi-randomised controlled trials were considered. The risk ratio and 95% confidence interval for death (primary outcome) and unfavourable neurological recovery (secondary outcome) were captured using the original study definitions censored up to 180 days after cardiac arrest. Bias was assessed using the updated Cochrane risk-of-bias for randomised trials tool and certainty of evidence assessed using the Grading of Recommendation Assessment, Development and Evaluation methodology. A hierarchical robust Bayesian model-averaged meta-analysis was performed using both minimally informative and data-driven priors and reported by mean risk ratio (RR) and its 95% credible interval (95% CrI). RESULTS: In seven studies (three low bias, three intermediate bias, one high bias, very low to low certainty) recruiting 3792 patients the RR by TTM 32-34 °C was 0.95 [95% CrI 0.78-1.09] for death and RR 0.93 [95% CrI 0.84-1.02] for unfavourable neurological outcome. The posterior probability for no benefit (RR ≥ 1) by TTM 32-34 °C was 24% for death and 12% for unfavourable neurological outcome. The posterior probabilities for favourable treatment effects of TTM 32-34 °C were the highest for an absolute risk reduction of 2-4% for death (28-53% chance) and unfavourable neurological outcome (63-78% chance). Excluding four studies without active avoidance of fever in the control arm reduced the probability to achieve an absolute risk reduction > 2% for death or unfavourable

neurological outcome to ≤ 50%. CONCLUSIONS: The posterior probability distributions did not support the use of TTM at 32-34 °C compared to 36 °C also including active control of fever to reduce the risk of death and unfavourable neurological outcome at 90-180 days. Any likely benefit of hypothermic TTM is smaller than targeted in RCTs to date.

ELECTROPHYSIOLOGY AND DEFIBRILLATION

SSEP N20 and P25 amplitudes predict poor and good neurologic outcomes after cardiac arrest.
Benghanem S(1)(2)(3)(4), Nguyen LS(5), Gavaret M(6)(7)(8), Mira JP(9)(6), Pène F(9)(6), Charpentier J(9), Marchi A(6)(7)(8), Cariou A(9)(6)(10)(11).
ABSTRACT
BACKGROUND: To assess in comatose patients after cardiac arrest (CA) if amplitudes of two somatosensory evoked potentials (SSEP) responses, namely, N20-baseline (N20-b) and N20-P25, are predictive of neurological outcome. METHODS: Monocentric prospective study in a tertiary cardiac center between Nov 2019 and July-2021. All patients comatose at 72 h after CA with at least one SSEP recorded were included. The N20-b and N20-P25 amplitudes were automatically measured in microvolts (µV), along with other recommended prognostic markers (status myoclonus, neuron-specific enolase levels at 2 and 3 days, and EEG pattern). We assessed the predictive value of SSEP for neurologic outcome using the best Cerebral Performance Categories (CPC1 or 2 as good outcome) at 3 months (main endpoint) and 6 months (secondary endpoint). Specificity and sensitivity of different thresholds of SSEP amplitudes, alone or in combination with other prognostic markers, were calculated. RESULTS: Among 82 patients, a poor outcome (CPC 3-5) was observed in 78% of patients at 3 months. The median time to SSEP recording was 3(2-4) days after CA, with a pattern "bilaterally absent" in 19 patients, "unilaterally present" in 4, and "bilaterally present" in 59 patients. The median N20-b amplitudes were different between patients with poor and good outcomes, i.e., 0.93 [0-2.05]µV vs. 1.56 [1.24-2.75]µV, respectively (p < 0.0001), as the median N20-P25 amplitudes (0.57 [0-1.43]µV in poor outcome vs. 2.64 [1.39-3.80]µV in good outcome patients p < 0.0001). An N20-b > 2 µV predicted good outcome with a specificity of 73% and a moderate sensitivity of 39%, although an N20-P25 > 3.2 µV was 93% specific and only 30% sensitive. A low voltage N20-b < 0.88 µV and N20-P25 < 1 µV predicted poor outcome with a high specificity (sp = 94% and 93%, respectively) and a moderate sensitivity (se = 50% and 66%). Association of "bilaterally absent or low voltage SSEP" patterns increased the sensitivity significantly as compared to "bilaterally absent" SSEP alone (se = 58 vs. 30%, p = 0.002) for prediction of poor outcome. CONCLUSION: In comatose patient after CA, both N20-b and N20-P25 amplitudes could predict both good and poor outcomes with high specificity but low to moderate sensitivity. Our results suggest that caution is needed regarding SSEP amplitudes in clinical routine, and that these indicators should be used in a multimodal approach for prognostication after cardiac arrest.

A governing equation for rotor and wavelet number in human clinical ventricular fibrillation: Implications for sudden cardiac death.
Dharmaprani D(1), Jenkins EV(2), Quah JX(3), Lahiri A(4), Tiver K(4), Mitchell L(5), Bradley CP(6), Hayward M(7), Paterson DJ(8), Taggart P(9), Clayton RH(10), Nash MP(6), Ganesan AN(11).
ABSTRACT
BACKGROUND: Ventricular fibrillation (VF) is characterized by multiple wavelets and rotors. No equation to predict the number of rotors and wavelets observed during fibrillation has been validated in human VF. OBJECTIVE: The purpose of this study was to test the hypothesis that a single

equation derived from a Markov M/M/∞ birth-death process could predict the number of rotors and wavelets occurring in human clinical VF. METHODS: Epicardial induced VF (256-electrode) recordings obtained from patients undergoing cardiac surgery were studied (12 patients; 62 epochs). Rate constants for phase singularity (PS) (which occur at the pivot points of rotors) and wavefront (WF) formation and destruction were derived by fitting distributions to PS and WF interformation and lifetimes. These rate constants were combined in an M/M/∞ governing equation to predict the number of PS and WF in VF episodes. Observed distributions were compared to those predicted by the M/M/∞ equation. RESULTS: The M/M/∞ equation accurately predicted average PS and WF number and population distribution, demonstrated in all epochs. Self-terminating episodes of VF were distinguished from VF episodes requiring termination by a trend toward slower PS destruction, slower rates of PS formation, and a slower mixing rate of the VF process, indicated by larger values of the second largest eigenvalue modulus of the M/M/∞ birth-death matrix. The longest-lasting PS (associated with rotors) had shorter interactivation time intervals compared to shorter-lasting PS lasting <150 ms (~1 PS rotation in human VF). CONCLUSION: The M/M/∞ equation explains the number of wavelets and rotors observed, supporting a paradigm of VF based on statistical fibrillatory dynamics.

3. Front Cardiovasc Med. 2022 Feb 24;9:771679. doi: 10.3389/fcvm.2022.771679. eCollection 2022.
Estimation of Health and Economic Benefits of a Small Automatic External Defibrillator for Rapid Treatment of Sudden Cardiac Arrest (SMART): A Cost-Effectiveness Analysis.
Shaker MS(1)(2), Abrams EM(3), Oppenheimer J(4), Singer AG(5), Shaker M(6), Fleck D(6)(7), Greenhawt M(8), Grove E(1)(9).
ABSTRACT
BACKGROUND: Sudden cardiac arrest (SCA) occurs in 0.4% of the general population and up to 6% or more of at-risk groups each year. Early CPR and defibrillation improves SCA outcomes but access to automatic external defibrillators (AEDs) remains limited. METHODS: Markov models were used to evaluate the cost-effectiveness of a portable SMART (SMall AED for Rapid Treatment of SCA) approach to early SCA management over a life-time horizon in at-risk and not at-risk populations. Simulated patients (n = 600,000) who had not received an implantable cardioverter defibrillator (ICD) were randomized to a SMART device with CPR prompts or non-SMART approaches. Annual SCA risk was varied from 0.2 to 3.5%. Analysis was performed in a US economy from both societal (SP) and healthcare (HP) perspectives to evaluate the number of SCA fatalities prevented by SMART, and SMART cost-effectiveness at a threshold of $100,000/Quality Adjusted Life Year (QALY). RESULTS: A SMART approach was cost-effective when annual SCA risk exceeded 1.51% (SP) and 1.62% (HP). The incremental cost-effectiveness ratios (ICER) were $95,251/QALY (SP) and $100,797/QALY (HP) at a 1.60% SCA annual risk. At a 3.5% annual SCA risk, SMART was highly cost-effective from both SP and HP [ICER: $53,925/QALY (SP), $59,672/QALY (HP)]. In microsimulation, SMART prevented 1,762 fatalities across risk strata (1.59% fatality relative risk reduction across groups). From a population perspective, SMART could prevent at least 109,839 SCA deaths in persons 45 years and older in the United States. CONCLUSIONS AND RELEVANCE: A SMART approach to SCA prophylaxis prevents fatalities and is cost-effective in patients at elevated SCA risk. The availability of a smart-phone enabled pocket-sized AED with CPR prompts has the potential to greatly improve population health and economic outcomes.

PEDIATRICS AND CHILDREN

1. Circulation. 2022 Mar 14. doi: 10.1161/CIRCULATIONAHA.121.057508. Online ahead of print.
Age and Racial/Ethnic Disparities in Pediatric Out-of-Hospital Cardiac Arrest.

Shekhar AC(1), Campbell T(2), Mann NC(3), Blumen IJ(4), Madhok M(5).

ABSTRACT

Out-of-hospital cardiac arrest (OHCA) in the pediatric population is a significant public health concern. Estimates of mortality suggest ≈7000 pediatric cardiac arrests occur annually in the United States.1 The existence of racial disparities in adult OHCA has been well established2; however, there is limited research examining whether similar disparities might also be present in the pediatric population. Age-related disparities in pediatric OHCA have also been previously identified.3 For cardiac arrests in both adult and pediatric patients, early cardiopulmonary resuscitation (CPR) is crucial to prevent permanent injury and promote a desirable outcome; in the out-of-hospital setting, this often involves CPR being initiated by nonmedical bystanders.1,3 Emergency medical services (EMS) are often the first professional responders to OHCA, and data from the EMS perspective might be the only means of determining whether disparities-defined as significant differences in care and/or outcomes-are present in pediatric OHCA.

2. PLoS One. 2022 Mar 14;17(3):e0265072. doi: 10.1371/journal.pone.0265072. eCollection 2022.
Effect of rotating providers on chest compression performance during simulated neonatal cardiopulmonary resuscitation.
Sandhu T(1), Szyld EG(1), Anderson MP(2), Shah BA(1).

ABSTRACT

OBJECTIVE: Simulation studies in adults and pediatrics demonstrate improvement in chest compression (CCs) quality as providers rotate every two minutes. There is paucity of studies in neonates on this matter. This study hypothesized that frequent rotation while performing CCs improves provider performance and decreases fatigue. STUDY DESIGN: Prospective randomized, observational crossover study where 51 providers performed 3:1 compression-ventilation CPR as a pair on a term manikin. Participants performed CCs as part of 3 simulation models, rotating every 3, 5 and 10 minutes. Data on various CC metrics were collected. Participant vitals were recorded at multiple points during the simulation and participants reported their level of fatigue at completion of simulation. RESULTS: No statistically significant difference was seen in any of the compression metrics. However, differences in the providers' fatigue scores were statistically significant. CONCLUSION: CC performance metrics did not differ significantly, however, providers' vital signs and self-reported fatigue scores significantly increased with longer CC durations.

EXTRACORPOREAL LIFE SUPPORT

1. Emerg Med Australas. 2022 Mar 16. doi: 10.1111/1742-6723.13963. Online ahead of print.
Survival with extracorporeal membrane oxygenation during cardiopulmonary resuscitation following cardiac arrest due to nortriptyline overdose.
Humphreys M(1)(2)(3), Pincus J(3)(4), Harburg G(1)(3), Isoardi KZ(1)(2)(3).
NO ABSTRACT AVAILABLE

EXPERIMENTAL RESEARCH

Vitamin C Improves the Outcomes of Cardiopulmonary Resuscitation and Alters Shedding of Syndecan-1 and p38/MAPK Phosphorylation in a Rat Model.
Xiao Y(1)(2), Su C(2)(3), Zhang G(2), Liang L(2), Jin T(2), Bradley J(2), Ornato JP(2)(4), Tang W(2)(4**).**
ABSTRACT
Background Post-resuscitation syndrome, involves a severe inflammatory response following successful cardiopulmonary resuscitation. The potential mechanism of Vitamin C (VitC) after cardiopulmonary resuscitation on myocardial and cerebral function, duration of survival is undefined. Methods and Results A first set of experiments were done in 18 male Sprague-Dawley rats for the investigation of short-term follow-up, randomized into 3 groups: (1) sham; (2) controls; (3) VitC. Ventricular fibrillation was electrically induced and untreated for 6 minutes. Cardio-pulmonary resuscitation including chest compression and mechanical ventilation were then initiated and continued for 8 minutes followed by defibrillation. At 5 minutes after return of spontaneous circulation, either VitC (200 mg/kg) or placebo was administered by intravenous infusion with a syringe pump for half an hour. There were significant improvements in myocardial function and buccal microcirculation in rats treated with VitC after return of spontaneous circulation 4 hours compared with controls. VitC inhibited proinflammatory cytokines (interleukin-6 and tumor necrosis factor-α), SDC-1 (Syndecan-1), and hyaluronic acid in plasma compared with controls (P<0.01). VitC decreased reactive oxygen species production and inhibited p38/MAPK (mitogen-activated protein kinase) pathway phosphorylation. A second set with 20 animals was used for assessing the neurological deficit score after return of spontaneous circulation 72 hours, randomized into 2 groups: 1) controls; 2) VitC. The survival rate and neurological deficit score after return of spontaneous circulation 72 hours were improved in VitC-treated animals compared with those of the control group. Conclusions VitC reduces the severity of post-resuscitation myocardial and cerebral dysfunction and improves the survival. The mechanisms may involve inhibiting transcription of inflammatory cytokines and oxidative stress, thus protecting the integrity of the vascular endothelium. Meanwhile VitC reduces shedding of SDC-1 and alters p38/MAPK phosphorylation and microcirculation.

CASE REPORTS

Successful recovery of severe hypothermia with minimally invasive central catheter: A case report.
Pahs L(1), Khan J(2).
ABSTRACT
BACKGROUND: Severe hypothermia can result in malignant arrhythmias or cardiac arrest and require invasive central rewarming modalities due to a core body temperature < 28 °C. Difficult rescue missions can make continuous CPR challenging, but the decrease in oxygen consumption at these low temperatures allows for successful recovery despite the delay. Although other active warming techniques, such as peritoneal lavage, intravascular warming catheter, and renal replacement therapy can be beneficial, the consensus statements recommend extracorporeal life support as the preferred rewarming method. CASE PRESENTATION: A 42-year-old female was found in a pond after presumed exposure for 30-40 min with an outside temperature of 17 °F (- 8 °C) and was found to be in ventricular fibrillation. ACLS protocol was then initiated. At the hospital, she was intubated and sedated with continuous CPR during multimodal rewarming, including active internal

via the ZOLL Icy catheter. One hour after rewarming, with core temperature above 29 °C, she was defibrillated and achieved ROSC. As she continued to warm, she made purposeful movement and was warmed and maintained at euthermia. She was initiated on antibiotics due to aspiration concerns and titrated off vasopressors with extubation on day 2 of hospitalization. She had mild complaints of extremity numbness and chest pain from compressions prior to discharge on hospitalization day 4. CONCLUSIONS: This case has a successful resuscitation of severe hypothermia associated with cardiac arrest. The patient was warmed at greater than 4 °C/h with a less invasive, quicker and potentially more available approach to warming. With equipment improvements, the ability to provide prolonged CPR while rewarming may suggest that transferring to an extracorporeal life support center is not necessary.

Pulmonary Embolism: The Battle to Save Life in a Resource Poor Setting.
Mbata GC(1), Eke COU(1), Okoli LE(1).
ABSTRACT
INRODUCTION: Pulmonary embolism (PE) is a cardiovascular emergency caused by occlusion of one or more pulmonary arteries by thrombi that originate from a deep venous thrombosis (subsequently called an embolus), typically in the large veins of the lower limb or pelvis. It is a common cause of preventable hospital death and a cause of mortality in obstetrics setting because it largely remains under diagnosed especially in a resource poor setting. CASE REPORT: Mrs OG, a 30-year-old primigravida, had a spontaneous delivery of a baby boy. A few hours after delivery, she had two episodes of syncope and was resuscitated with intra-venous fluids and blood transfusion. Further evaluation, with an abdominopelvic ultrasound scan, showed that she had supra-levator haematoma necessitating emergency exploratory laparotomy. During the induction of anaesthesia for the surgery, she had a cardiac arrest and was again resuscitated with cardiac compression and intravenous adrenaline. She was transferred to ICU on account of cardio-respiratory instability. On the 2nd day post operation, the chest physician reviewed and noted history of cough, haemoptysis and breathlessness of two days duration. She had an associated unilateral (right) leg swelling, with presence of cyanosis, tachypnoea and tachycardia with SPO2 fluctuating between 82-92% (while on oxygen with nasal prongs). The clinical probability of PE using Well's scoring system was high (11.5). In the absence of computerized tomography (CT) pulmonary angiography and ventilation perfusion (V/Q) scan, a Doppler ultrasound of both legs was done which showed dilation of the proximal one-third of the right femoral vein with meshwork of thrombi. She was subsequently commenced on Enoxaparin and intra-venous fluids and antibiotics. She also received supplementary oxygen. The Prothrombin time and International Normalized Ratio (INR) were monitored over the period. She slowly but progressively improved and was discharged home on oral warfarin. The index patient had cardiopulmonary arrest and expectedly, needed urgent intervention with embolectomy or thrombolytic therapy. In the absence of these, anticoagulation with vasopressor agents, supplementary oxygen and close monitoring was able to sustain the patient. SUMMARY: Pulmonary embolism is a killer condition with 10% of the patients dying within one hour of onset. Most times, mortality occurs in patients who were never diagnosed. The best prospect for reducing mortality in patients with PE lies in improving diagnosis.