RCP / COMPRESSIONS TORÀCIQUES MECÀNIQUES

1. Scand J Trauma Resusc Emerg Med. 2020 Mar 4;28(1):16. doi:10.1186/s13049-020-0709-0.

Rescue under ongoing CPR from an upper floor: evaluation of three different evacuation routes and mechanical and manual chest compressions: a manikin trial.

Drinhaus H(1)(2), Nüsgen S(3), Adams N(4)(3), Wetsch WA(4), Annecke T(4).

Abstract

BACKGROUND: If transport under ongoing cardiopulmonary resuscitation (CPR) from an upper floor is indicated, the ideal CPR-method and evacuation route is unknown hitherto. We aimed to elaborate a strategy for evacuation of patients under ongoing CPR from an upper floor, comparing three different evacuation routes and manual and mechanical chest compressions. METHODS: A CPR-training manikin recording CPR-quality was placed on the fifth floor and was evacuated to an ambulance via lift, turntable ladder, or staircase. Chest compressions were performed manually or with a mechanical CPR-device. Efficiency endpoints were compression depth and frequency, sufficiency of chest release, compared with European Resuscitation Council (ERC) Guidelines, and duration of the evacuation. Adverse outcomes were disconnection/dislocation of devices and hazards/accidents to the personnel. RESULTS: For all evacuation routes, compression depth and frequency were significantly more compliant with ERC-guidelines under mechanical CPR. Manual CPR was associated with considerable deviations from correct compression depth and frequency. Chest release only slightly differed between groups. Evacuation via lift under mechanical CPR was fastest and evacuation via turntable ladder under manual CPR was slowest. No device disconnections or accidents occurred, but hazard to personnel was perceived during evacuation via ladder under manual CPR. CONCLUSIONS: In this study, a mechanical CPR-device proved to deliver better CPR-quality during evacuation from an upper floor. If a lift accessible with a stretcher is available, this route should be preferred, regardless of manual or mechanical CPR. Turntable ladders can only be meaningfully used with mechanical CPR, otherwise CPR-quality is poor and hazard to the personnel is increased. Not all evacuation routes may be useable in a specific real-life scenario.

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REGISTRES, REVISIONS I EDITORIALS

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ACR INTRAHOSPITALÀRIA

SMA: Prospective observational study aimed to investigate the impact of "Between the flags", a two-tier rapid response system, across 35 hospitals' ICU, on the incidence of IHCA.

1. Intern Med J. 2020 Mar 4. doi: 10.1111/imj.14812. [Epub ahead of print]

Reduction of in hospital Cardiac arrest rates in Intensive care equipped NSW hospitals in association with Implementation of Between the Flags Rapid Response System.

Bhonagiri D(1), Lander H(2), Green M(3), Straney L(4), Jones D(5), Pilcher D(6).

Abstract

BACKGROUND: The NSW Clinical Excellence commission introduced the "Between the Flags" program in response to the death of a young patient as a system wide approach for early detection and management of the deteriorating patient in all 242 NSW hospitals. The impact of BTF implementation on the 35 larger hospitals with ICUs has not been reported previously. AIM: This study assessed the impact of "Between the Flags" (BTF), a two-tier rapid response system across 35 hospitals with an ICU in NSW on the incidence of in hospital cardiac arrests and the incidence and outcome of patients admitted to an Intensive Care Unit following cardiac arrest and rapid response team activation. METHODS: Prospective observational study of BTF registry (August 2010 to June 2016), and the Australian and New Zealand Intensive Care Society Adult Patient Database (January 2008 to December 2016) in 35 New South Wales public hospitals with ICU. Primary outcome studied was the proportion of in hospital cardiac arrests. Secondary outcomes included changes in the severity of illness and outcomes of cardiac arrest admissions to ICU and changes in the volume of rapid response calls. RESULTS: The cardiac arrest rate per 1000 hospital admissions declined from 0.91 in the implementation period to 0.70. Propensity score analysis showed significant declines in ICU and hospital mortality, and length of stay for cardiac arrest patients admitted to ICU (all $p < 0.001$). CONCLUSIONS: The BTF program was associated with a significant reduction in cardiac arrests in hospitals and ICU admissions secondary to cardiac arrests in 35 NSW hospitals with an ICU.

2.Resuscitation. 2020 Feb 27;149:109-116. doi: 10.1016/j.resuscitation.2020.02.022.

[Epub ahead of print]

In-hospital cardiac arrest in hospitals with mature rapid response systems – a multicentre, retrospective cohort study.

Tirkkonen J(1), Skrifvars MB(2), Parr MM(3), Tamminen T(4), Aneman A(5).

Abstract

AIM: To investigate in-hospital cardiac arrests (IHCAs) according to the Ustein template in hospitals with mature systems utilizing rapid response teams (RRTs), with a special reference to preceding RRT factors and factors associated with a favourable neurological outcome (cerebral performance category (CPC) 1-2) at hospital discharge. METHODS: Multicentre, retrospective cohort study between 2017-2018 including two Finnish and one Australian university affiliated tertiary hospitals. RESULTS: A total 309 IHCAs occurred with an incidence of 0.78 arrests per 1000 hospital admissions. The median age of the patients was 72 years, 63% were male and 73% had previously lived a fully independent life with a median Charlson comorbidity index of two. Before the IHCA, 16% of the patients had been reviewed by RRTs and 26% of the patients fulfilled RRT activation criteria in the preceding 8 h of the IHCA. Return of spontaneous circulation was achieved in 53% of the patients and 28% were discharged from hospital with CPC 1-2. In a multivariable model, younger age, no pre-arrest RRT criteria, arrest in normal work hours, witnessed arrest and shockable initial rhythm were independently associated with CPC 1-2 at hospital discharge. CONCLUSIONS: In hospitals with mature rapid response systems most IHCA patients live a fully independent life with low burden of comorbid diseases before their hospital admission, the IHCA incidence is low and outcome better than traditionally believed. Deterioration

before IHCA is present in a significant number of patients and improved monitoring and earlier interventions may further improve outcomes.

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FÀRMACS

1.Resuscitation. 2020 Mar 3. pii: S0300-9572(20)30091-5. doi:10.1016/j.resuscitation.2020.02.025. [Epub ahead of print]

Intravenous vs. Intraosseous Administration of Drugs During Cardiac Arrest: A Systematic Review.

Granfeldt A(1), Avis SR(2), Lind PC(3), Holmberg MJ(4), Kleinman M(5), Maconochie I(6), Hsu CH(7), Fernanda de Almeida M(8), Wang TL(9), Neumar RW(10), AndersenLW(11); International Liaison Committee on Resuscitation's (ILCOR) Neonatal Life Support; Paediatric Life Support; Advanced Life Support Task Forces.

Abstract

AIM: To perform a systematic review of the literature on intravenous (IV) vs. intraosseous (IO) administration of drugs during cardiac arrest in order to inform an update of international guidelines. METHODS: The review was performed according to PRISMA guidelines and registered on PROSPERO. Medline, Embase and Evidence-Based Medicine Reviews were searched on December 17, 2019 for studies comparing IV to IO administration of drugs. The population included neonatal, paediatric, and adult patients with cardiac arrest. Two investigators reviewed each search for study relevance, extracted data, and assessed the risk of bias of individual studies. Meta-analyses were performed for studies without a critical risk of bias. Certainty of evidence was evaluated using GRADE. RESULTS: We included six observational studies comparing IV to IO administration of drugs and two randomized trials assessing the effect of specific drugs in subgroups related to IV vs. IO administration. All studies included adult out-of-hospital cardiac arrest patients. No studies were identified in neonatal or paediatric patients. The risk of bias for the observational studies was overall assessed as critical or serious, with confounding and selection bias being the primary sources of bias. The meta-analyses excluding studies with a critical risk of bias favoured IV access for all outcomes. Using GRADE, the certainty of evidence was judged at very low. Subgroup analyses of the two randomized trials demonstrated no statistically significant interactions between the route of access and study drugs on outcomes. However, these trials were underpowered to assess such interactions. CONCLUSIONS: We identified a limited number of studies comparing IV vs. IO administration of drugs during cardiac arrest. Pooled results from four observational studies favoured IV access with very low certainty of evidence. From the subgroup analyses of two randomized clinical trials, there was no statistically significant interaction between the route of access and study drug on outcomes.

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MONITORATGE CEREBRAL

1. Resuscitation. 2020 Feb 27;149:134-140. doi: 10.1016/j.resuscitation.2020.02.017.

[Epub ahead of print]

The characteristics of patients with bilateral absent evoked potentials after post-anoxic brain damage: A multicentric cohort study.

Nobile L(1), Pognuz ER(2), Rossetti AO(3), Franchi F(1), Verginella F(2), Mavroudakis N(4), Creteur J(1), Berlot G(2), Oddo M(5), Taccone FS(6).

Abstract

OBJECTIVES: Patients with bilateral absence of cortical response (N20ABS) to somatosensory evoked potentials (SSEPs) have poor neurological outcome after cardiac arrest (CA). However, SSEPs are not available in all centers. The aim of this study was to identify predictors of N20ABS. METHODS: Retrospective analysis of institutional databases (2008-2015) in three ICUs including all adult admitted comatose patients undergoing SSEPs between 48 and 72 h after CA. We collected clinical (i.e. absence of pupillary reflexes, PLR, myoclonus and absent or posturing motor response and myoclonus on day 2-3), electroencephalographic (EEG; i.e. unreactive to painful stimuli; presence of a highly malignant patterns, such as burst-suppression or flat tracings) findings during the first 48 h, and the highest NSE levels on the first 3 days after CA. Unfavorable neurological outcome (UO) was assessed at 3 months using the Cerebral Performance Categories of 3-5. RESULTS: We studied 532 patients with SSEPs, including 143 (27%) without N20ABS; UO was observed in 334 (63%) patients. Median time to SSEPs was 72 [48-72] h after CA. No patient with absent PLR and myoclonus during the ICU stay had N20 present; similar results were observed with the combination of absent PLR, myoclonus and any EEG pattern (i.e. unreactive or highly malignant). Similar results were observed in the subgroup of patients where NSE was available (n = 303). In a multivariate logistic regression, non-cardiac etiology of arrest, unreactive EEG to painful stimuli, absence of pupillary reflexes and posturing motor response, were independent predictors of N20ABS. When available, the highest NSE was also an independent predictor of N20ABS. CONCLUSIONS: Clinical and EEG findings predicting patients with N20ABS, confirm that N20ABS reflects a severe and permanent cerebral damage after CA.

ORGANITZACIÓ I ENTRENAMENT

1.Am J Emerg Med. 2020 Feb 20. pii: S0735-6757(20)30091-7.

Does second EMS unit response time affect outcomes of OHCA in multi-tiered system? A nationwide observational study.

Park JH(1), Song KJ(2), Do Shin S(3), Hong KJ(3).

Abstract

OBJECTIVES: The time dependence of a multi-tier response for out-of-hospital cardiac arrest (OHCA) is unclear. The aim of this study was to evaluate the time-dependent effect of EMS response type in a multi-tiered system on the clinical outcomes of OHCA. METHODS: Adult EMS-treated OHCA of presumed cardiac etiology who were not witnessed by EMS between January 2015 and December 2017 were included. The main exposure was EMS response type: single-tier response, early multi-tier response (0-18 min from call to second EMS arrival), and late multi-tier response (19 min from call to second EMS arrival). The primary outcome was good neurologic recovery at the time of discharge from the hospital. Multivariate logistic regression analysis was performed, adjusting for patient-community and prehospital variables. RESULTS: Among 54,436 patients, 29,995 patients (55.1%), 21,552 patients (39.6%), and 2889 patients (5.3%) were treated by single-tiered EMS, early multi-tiered EMS, and late multi-tiered EMS,

respectively. Good neurological recovery and survival to discharge were more frequent in the early multi-tiered response group (6.4% and 9.7%) than in the single-tiered response group (4.8% and 7.5%) or late multi-tiered response group (3.1% and 5.8%). Compared to the single-tiered response group, the early multi-tiered response group was more likely to have good neurological recovery (adjusted OR, 95% CI: 1.15 [1.06-1.26]), but the late multi-tiered response group was less likely to have good neurological recovery (adjusted OR, 95% CI: 0.76 [0.61-0.96]). CONCLUSION: In our basic to intermediate-tiered EMS system, early multi-tier response was associated with improved survival and good neurological recovery.

2.Resuscitation. 2020 Feb 27. pii: S0300-9572(20)30084-8. doi: 10.1016/j.resuscitation.2020.02.018. [Epub ahead of print]

Association between health insurance status and transfer of patients with return of spontaneous circulation after out-of-hospital cardiac arrest.

Park CH(1), Ahn KO(2), Shin SD(3), Park JH(4), Lee SY(5).

Abstract

AIM: To explore the factors related to the probability of inter-hospital transfer to a heart attack centre in patients with return of spontaneous circulation after out-of-hospital cardiac arrest (OHCA) in the Republic of Korea. METHODS: This cross-sectional observational study used data from a Korean national emergency medical service OHCA database for cases between 2015 and 2017. Adult OHCA patients with a presumed cardiac origin who initially presented at a non-heart-attack centre were included in the analysis. The main exposure variable was health insurance type (national health insurance versus medical aid), which was used as a proxy measure of individual socioeconomic status. The primary outcome was emergency department disposition (transfer to a heart attack centre versus no transfer). A multivariate logistic analysis using propensity score matching was conducted. We also analysed the associations between patient transfer and neurologic recovery as well as survival to discharge. RESULTS: Of 7,804 eligible OHCA patients, 1,804 (23.0%) were transferred to a heart attack centre. Patients on medical aid were less likely to be transferred (adjusted odds ratio [OR], 0.75; 95% confidence interval [CI], 0.59-0.95 in a matched cohort) compared with patients with national health insurance. Transfer to a heart attack centre was significantly associated with a lower risk of death (adjusted OR, 0.38; 95% CI, 0.33-0.45) and better neurologic recovery (adjusted OR, 0.46; 95% CI, 0.38-0.56). CONCLUSION: Socioeconomic status appears likely to influence the probability of transfer to a heart attack centre after resuscitation.

CURES POST-RCE

1.Catheter Cardiovasc Interv. 2020 Mar 5. doi: 10.1002/ccd.28836. [Epub ahead of print]

The prognostic value of initial serum lactate for survival in postcardiac arrest patients undergoing cardiac catheterization.

Rosenberg RD(1), Guo CC(1), Chatterjee S(2), Schreyer KE(3), Bashir R(1), O'Murchu B(1), Aggarwal V(4), DeAngelis M(3), Edmundowicz D(1), O'Neill BP(1).

Abstract

OBJECTIVES: We sought to investigate the prognostic value of serum lactate on survival in patients postcardiac arrest. BACKGROUND: Patients who experience cardiac arrest, in- or out-of-hospital, may have a poor outcome. Initial electrocardiograms may suggest ischemia as an underlying cause and urgent referral for catheterization occurs. It remains unclear which of these patients may suffer a poor outcome. METHODS: We retrospectively reviewed all patients at our institution taken for urgent catheterization after cardiac arrest between January 2014 and September 2018. Three hundred and eighty four patients were referred urgently to the cath lab during this period, 50 with prior arrest. RESULTS: Sixty six percent underwent coronary intervention. The mean age of the entire cohort was 57 years. Thirty four percent were female, 40% had a history of coronary artery disease, and 94% were intubated at the time of cardiac catheterization. Overall survival to discharge was 40%. Survival in patients who underwent coronary intervention compared with those who did not was similar (45.5 vs. 29.4%, $p = .27$). Mean lactate level in survivors versus nonsurvivors was 4.7 ± 3.8 and 9.8 ± 4.7 mmol/L, respectively ($p < .05$). When divided into tertiles by serum lactate (< 4.5, 4.5-9, 9 mmol/L), survival to discharge was 75, 29.4, and 17.6%, respectively ($p < .05$). Initial serum lactate and age were independent predictors of in-hospital mortality. CONCLUSIONS: In patients undergoing cardiac catheterization following cardiac arrest, routine measurement of serum lactate is a useful and available laboratory test that may help identify patients at risk for a poor outcome.

TARGETED TEMPERATURE MANAGEMENT

1.Croat Med J. 2020 Feb 29;61(1):40-48.

The influence of therapeutic hypothermia on the outcomes of cardiac arrest survivors: a retrospective cohort study.

Pavlov M(1), Babić Z, Đuzel A, Crljenko K, Nedić M, Delić Brkljačić D.

Abstract

AIM: To determine whether therapeutic hypothermia (TH) improves survival and neurological outcomes in out-of-hospital cardiac arrest (OHCA) survivors. METHODS: This retrospective cohort study enrolled patients treated for OHCA with a return of spontaneous circulation admitted to the Cardiac Intensive Care Unit from October 2000 until March 2019. Data were collected from medical archives. Propensity score matching was used. The primary endpoint was death during hospital stay and secondary endpoint was cerebral performance category (CPC) score at discharge.

RESULTS: Out of 152 patients included in the study, 58 (38.7%) underwent TH treatment. After matching (which left 70 patients in the analysis), death during hospital stay occurred less often in TH group (28.6% vs 57.1%, P=0.029), while the difference in CPC score was not significant. Cox proportional hazards model showed the predictors of death during hospital stay to be TH (hazard ratio [HR] 0.29, 95% confidence interval [CI] 0.13-0.68, P=0.004), initial Glasgow Coma Scale score of 3 (HR 7.55, 95% CI 1.44-39.63, P=0.017), and heart failure (HR 2.35, 95% CI 1.02-5.34, P=0.045). TH was not an independent predictor of CPC score. Mann-Whitney U test and linear regression model showed that TH was associated with higher gain in GCS. CONCLUSION: TH

was associated with better survival and certain variables suggesting improved neurological outcomes, suggesting that TH is a vital treatment option for comatose OHCA survivors.

FREE FULL TEXT

ELECTROFISIOLOGIA I DESFIBRIL·LACIÓ

1.Am J Emerg Med. 2020 Feb 14. pii: S0735-6757(20)30093-0. doi: 10.1016/j.ajem.2020.02.020. [Epub ahead of print]

The safety and efficacy of hands-on defibrillation in the management of adult cardiac arrest: A systematic review.

Kwak J(1), Brady WJ(2).

Abstract

OBJECTIVE: Hands-on defibrillation (HOD) is a technique that has great potential to positively impact outcomes from cardiopulmonary resuscitation (CPR) with the removal of an interruption in chest compressions. The safety and efficacy of HOD, however, have yet to be proven. This review aims to examine the safety of HOD, and secondarily, its efficacy. METHODS: A systematic literature search was performed through PubMed, MEDLINE, Google Scholar, and the Cochrane Database. Additional articles were selected from the reference lists of this search result. RESULTS: From 52 results, 26 articles were reviewed and from the references of these articles, 9 more were included, leaving 35 articles for analysis. 14 of the analyzed articles were excluded. CONCLUSIONS: HOD generally appears safe, though significant uncertainty still remains for each protective barrier type. HOD appears to be efficacious in improving CPR with no strong evidence to suggest otherwise.

2.Heliyon. 2020 Feb 28;6(2):e03491. doi: 10.1016/j.heliyon.2020.e03491. eCollection 2020 Feb.

Bradycardia at the onset of pulseless electrical activity arrests in hospitalized patients is associated with improved survival to discharge.

Nguyen D(1), Kritek PA(2), Greco SA(3), Prutkin JM(4).

Abstract

BACKGROUND: Recent studies have suggested that the incidence of in-hospital pulseless electrical activity (PEA) arrests is increasing. Bradycardia in patients with in-hospital PEA is common but it is unknown if it is associated with respiratory arrest or patient outcomes. OBJECTIVE: To determine risk factors and outcomes associated with bradycardic-PEA arrests, and relationship between bradycardia and respiratory arrest. METHODS: This was a retrospective cohort study of all inpatient cardiac arrests at an academic medical center over a four-year period. Patient demographics, comorbidities, vital signs, arrest event data, and outcomes were abstracted from the medical record. PEA arrest was defined as a non-shockable rhythm with loss of pulse

requiring cardiopulmonary resuscitation and having organized electrocardiographic activity. Bradycardia was classified as a HR < 60 bpm at the time of pulse loss. The primary outcomes were survival of arrest and survival to hospital discharge. RESULTS: Between July 2013 and August 2017, there were 176 in-hospital patients with PEA arrests. While 105 (59.7%) survived the arrest, only 38 (21.6%) survived to discharge. A total of 66 (37.5%) were bradycardic-PEA arrests. Patients with bradycardic PEA arrests were no more likely to have their arrest precipitated by respiratory failure than non-bradycardic PEA patients (36.4% vs 27.3%, P = 0.24), but patients with non-bradycardic PEA arrests were more likely to have a CIED than non-bradycardic PEA patients (14.5% vs 3.0%, P = 0.02). On multivariate analysis, bradycardic PEA was associated with improved survival to hospital discharge (OR = 3.31, 95% CI: 1.41-7.79, p = 0.006), but not survival of arrest (OR 1.45, 95% CI: 0.68-3.09, p = 0.34). Respiratory arrest was an independent predictor of survival of code (OR 2.62, 95% CI: 1.36-5.47, P = 0.01) and to hospital discharge (OR 3.47, 95% CI: 1.35-8.91, P = 0.01). Other predictors of survival to discharge include history of coronary artery disease, and non-use of epinephrine, atropine, and sodium bicarbonate. CONCLUSION: In a retrospective study of hospitalized patients in the intensive care unit and non-intensive care, bradycardia at the time of PEA cardiac arrest was associated with improved survival to hospital discharge but not survival of arrest. Respiratory arrest was an independent predictor of survival, but there was no association between respiratory arrest and bradycardic PEA arrest.

FREE FULL TEXT

3.Resuscitation. 2020 Feb 29. pii: S0300-9572(20)30090-3. doi: 10.1016/j.resuscitation.2020.02.024. [Epub ahead of print]

Public Access Defibrillators: Gender-Based Inequities in Access and Application.

Grunau B(1), Humphries K(2), Stenstrom R(3), Pennington S(4), Scheuermeyer F(3), van Diepen S(5), Award E(6), Al Assil R(4), Kawano T(7), Brooks S(8), Gu B(5), Christenson J(3).

Abstract

AIM: While public access automated external defibrillator (AED) programs appear to improve outcomes in out-of-hospital cardiac arrest (OHCA) it is unclear if men and women benefit equally. We examined gender-based differences in OHCA location to determine what proportion were potentially eligible for public access AED application, and if patient gender was associated with AED utilization. METHODS: We analyzed data from the Resuscitation Outcomes Consortium registry (2011 to 2015). We compared differences in OHCA locations by gender. We fit multivariate logistic regression models, restricted to public location OHCAs and public-location cases with bystander intervention, to calculate the association between gender and public access AED application RESULTS: Among 61 473 cases, 34% were female and 50% had bystander resuscitation. The incidence of public OHCA was 8.8% for women and 18% for men (risk difference 9.2%, 95% CI 8.7 to 9.7%). Women had significantly fewer OHCAs on roadways, in public buildings, places of recreation, and farms, but more in homes, non-acute healthcare facilities, and residential institutions. Female gender was associated with a lower odds of AED application in public OHCA (adjusted OR 0.76, 95% CI 0.64-0.90) and public-location cases with bystander interventions (adjusted OR 0.83, 95% CI 0.71-0.99). CONCLUSION: Women had fewer OHCA in public locations that may have public access AEDs. Even among public location OHCA with bystander interventions, women were less likely to have public access AED applied.

Initiatives to optimize AED locations and to engage the public with gender-specific resuscitation training may improve outcomes in women with OHCA.

PEDIATRIA

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ECLS

1. Acute Crit Care. 2020 Feb;35(1):1-9.

Role of extracorporeal cardiopulmonary resuscitation in adults.

Kim H(1), Cho YH(1).

ABSTRACT NO DISPONIBLE

2. CJEM. 2020 Mar 2:1-4. doi: 10.1017/cem.2019.472. [Epub ahead of print]

Evaluating the potential impact of an emergency department extracorporeal resuscitation (ECPR) program: a health records review.

McDonald L(1), Mastoras G(2), Hickey M(2)(3), McDonald B(4), Kwok ESH(2).

Abstract

OBJECTIVES: Extracorporeal cardiopulmonary resuscitation in refractory cardiac arrest (ECPR) is an emerging resuscitative therapy that has shown promising results for selected patients who may not otherwise survive. We sought to identify the characteristics of cardiac arrest patients presenting to our institution to begin assessing the feasibility of an ECPR program. METHODS: This retrospective health records review included patients aged 18-75 years old presenting to our academic teaching hospital campuses with refractory nontraumatic out-of-hospital or in-emergency department (ED) cardiac arrest over a 2-year period. Based on a scoping review of the literature, both "liberal" and "restrictive" ECPR criteria were defined and applied to our cohort. RESULTS: A total of 179 patients met inclusion criteria. Median age was 60 years, and patients were predominantly male (72.6%). The initial rhythm was ventricular tachycardia/ventricular fibrillation in 49.2%. The majority of arrests were witnessed (69.3%), with immediate bystander CPR performed on 53.1% and an additional 12% receiving CPR within 10 minutes of collapse. Median prehospital time was 40 minutes (interquartile range, 31-53.3). Two-thirds of patients (65.9%) were identified as having a reversible cause of arrest and favorable premorbid status was identified in nearly three quarters (74.3%). Our two sets of ECPR inclusion criteria revealed that 33 and 5 patients (liberal and restrictive criteria, respectively), would have been candidates for ECPR. CONCLUSION: At our institution, we estimate between 6% and 40% of ED refractory cardiac arrest patients would be candidates for ECPR. These findings suggest that the implementation of an ECPR program should be explored.

3.JACC Basic Transl Sci. 2020 Feb 5;5(2):183-192. doi: 10.1016/j.jacbts.2019.11.010. eCollection 2020 Feb.

Sodium Nitroprusside-Enhanced Cardiopulmonary Resuscitation Improves Blood Flow by Pulmonary Vasodilation Leading to Higher Oxygen Requirements.

Ripeckyj A(1), Kosmopoulos M(1), Shekar K(1), Carlson C(1), Kalra R(1), Rees J(1), Aufderheide TP(2), Bartos JA(1)(3), Yannopoulos D(1)(3).

Abstract

Sodium nitroprusside-enhanced cardiopulmonary resuscitation has shown superior resuscitation rates and neurologic outcomes in large animal models supporting the need for a randomized human clinical trial. This study is the first to show nonselective pulmonary vasodilation as a potential mechanism for the hemodynamic benefits. The pulmonary shunting that is created requires increased oxygen treatment, but the overall improvement in blood flow increases minute oxygen delivery to tissues. In this context, hypoxemia is an important safety endpoint and a 100% oxygen ventilation strategy may be necessary for the first human clinical trial.

FREE FULL TEXT

RECERCA EXPERIMENTAL

1. Resuscitation. 2020 Feb 27. pii: S0300-9572(20)30089-7. doi:

10.1016/j.resuscitation.2020.02.023. [Epub ahead of print]

Controlled Progressive Elevation Rather Than an Optimal Angle Maximizes Cerebral Perfusion Pressure During Head Up CPR in a Swine Model of Cardiac Arrest.

Moore JC(1), Salverda B(2), Lick M(2), Rojas-Salvador C(3), Segal N(4), Debaty G(5), Lurie KG(6).

Abstract

AIM OF THE STUDY: Elevation of the head and thorax (HUP) during cardiopulmonary resuscitation (CPR) has been shown to double brain blood flow with increased cerebral perfusion pressures (CerPP) after active compression-decompression (ACD) CPR with an impedance threshold device (ITD). However, the optimal angle for HUP CPR is unknown. METHODS: In Study A, different angles were assessed (20°, 30°, 40°), each randomized over 5-minute periods of ACD + ITD CPR, after 8 min of untreated ventricular fibrillation in an anesthetized swine model. Based upon Study A, Study B was performed, where animals were randomized to 1 of 2 sequences: 20°, 30°, 40° or 40°, 30°, 20° with a similar protocol. The primary endpoint was CerPP for both studies. RESULTS: In Study A, no optimal HUP angle was observed in 18 pigs. CerPPs for 30° and 40° (mmHg, mean ± SD) were equivalent (44 ± 22 and 47 ± 26, p = 0.18). However, CerPP appeared higher when 40° HUP was performed during the last 5-minutes of CPR,

suggestive of a sequence effect. For Study B, after 17 minutes of CPR, CerPP (mmHg) were higher with the 20°, 30°, 40° sequence: 60 ± 17 versus 33 ± 18 (p = 0.035). CONCLUSIONS: No optimal HUP CPR angle was observed. However, controlled progressive elevation of the head and thorax during CPR is more beneficial than an absolute angle or height to maximize CerPP. Further studies are needed to determine the optimal rate of rise during HUP ACD + ITD CPR.

CASE REPORTS

4. A A Pract. 2020 Apr;14(6):e01175.

Transesophageal Echocardiography-Guided Cardiopulmonary Resuscitation After Rocuronium Anaphylaxis.

Long CS(1), Miller MR, McMullin GM, Tivey SL.

Abstract

Anaphylaxis is a life-threatening hypersensitivity reaction that can quickly progress to circulatory collapse, even in the presence of timely epinephrine administration. This report describes a case of rocuronium anaphylaxis which progressed to circulatory arrest despite intravenous epinephrine and crystalloid resuscitation. Transesophageal echocardiography performed during cardiopulmonary resuscitation enabled rapid identification of the cause of shock and redirected management to prioritize further fluid administration, leading to return of spontaneous circulation with a good outcome. The etiology of shock in anaphylaxis can be variable, and transesophageal echocardiography can rapidly identify the likely mechanism and guide treatment without interrupting ongoing resuscitative efforts.

2.Case Rep Emerg Med. 2020 Feb 17;2020:6590101. doi: 10.1155/2020/6590101. eCollection 2020.

Two Cardiac Arrests that Occurred after the Administration of Sugammadex: A Case of Kounis Syndrome.

Yanai M(1), Ariyoshi K(1).

Abstract

Kounis syndrome is a form of acute coronary syndrome caused by allergic reactions. No cases of cardiac arrest caused by Kounis syndrome that arose after the administration of sugammadex have been reported. A 71-year-old female suffered two cardiac arrests. The first occurred after sugammadex was administered at the end of an operation for a right radial distal fracture. The patient was resuscitated and transferred to our intensive care unit. She was subsequently discharged home. Five months later, she suffered a second cardiac arrest after sugammadex was administered at the end of an operation for a right femoral neck fracture at our hospital. Urgent coronary angiography revealed multiple coronary spasms. Kounis syndrome was diagnosed based on the patient's elevated serum trypsin levels and a positive result in a skin allergy test of

sugammadex. In cases of cardiac arrest with unclear etiologies, Kounis syndrome should be considered.

FREE FULL TEXT

RCP / COMPRESSIONS TORÀCIQUES MECÀNIQUES

1. J Am Heart Assoc. 2020 Mar 17;9(6):e014420. doi: 10.1161/JAHA.119.014420. Epub 2020 Mar 10.

Mechanical, Team-Focused, Video-Reviewed Cardiopulmonary Resuscitation Improves Return of Spontaneous Circulation After Emergency Department Implementation.

Rolston DM(1)(2), Li T(1), Owens C(2), Haddad G(2), Palmieri TJ(1)(2), Blinder V(1), Wolff JL(1), Cassara M(1)(2), Zhou Q(1)(2), Becker LB(1)(2).

Abstract

Background Outcomes in cardiac arrest remain suboptimal. Mechanical cardiopulmonary resuscitation (CPR) has not demonstrated clear clinical benefit; however, video review provides the capability to monitor CPR quality and provide constructive feedback to individuals and teams to improve their performance. The aim of our study was to evaluate cardiac arrest outcomes before and after initiation of a mechanical, team-focused, video-reviewed CPR intervention. Methods and Results In 2018, our emergency department began using mechanical CPR; a new team-focused strategy with nurse-led Advanced Cardiovascular Life Support; and biweekly, multidisciplinary video review of cardiac arrests. A revised approach to resuscitation was generated from a performance improvement session, and in situ simulation was used to disseminate our approach. The primary outcome of this study was the return of spontaneous circulation rate before and after our mechanical, team-focused, video-reviewed CPR intervention. Secondary outcomes included survival to admission and discharge. Multivariable logistic regression modeling was used. The pre- and postintervention groups were similar at baseline. A total of 248 patients were included in our study (97 before and 151 after mechanical, team-focused, video-reviewed CPR). Return of spontaneous circulation was higher in the intervention group (41% versus 26%; *P*=0.014). There were nonsignificant increases in survival to admission (26% versus 20%; *P*=0.257) and survival to discharge (7% versus 3%; *P*=0.163). After controlling for covariates, the odds of return of spontaneous circulation remained higher after the intervention (odds ratio, 2.11; 95% CI, 1.14-3.89). Conclusions Implementation of our mechanical, team-focused, video-reviewed CPR intervention for cardiac arrest patients in our emergency department improved return of spontaneous circulation rates. Survival to hospital admission and discharge did not improve.

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REGISTRES REVISIONS I EDITORIALS

21. Ann Emerg Med. 2020 Mar 9. pii: S0196-0644(20)30039-1. doi: 10.1016/j.annemergmed.2020.01.015. [Epub ahead of print]

Intubation for Out-of-Hospital Cardiac Arrest: The Elephant Is in the Room.

Benoit JL(1), Wang HE(2).

NO ABSTRACT AVAILABLE

ACR INTRA HOSPITALÀRIA

1. Intensive Care Med. 2020 Mar 9. doi: 10.1007/s00134-020-05992-w. [Epub ahead of print]

Unexpected cardiac arrests occurring inside the ICU: outcomes of a French prospective multicenter study.

Leloup M(1), Briatte I(1), Langlois A(1), Cariou A(2)(3), Lesieur O(4)(5); ACIR study group.

Abstract

PURPOSE: Cardiac arrest may occur unexpectedly in intensive care units (ICU). We hypothesize that certain patient characteristics and treatments are associated with survival and long-term functional outcome following in-ICU cardiac arrest. METHODS: Over a 12-month period, cardiac arrests with resuscitation attempts were prospectively investigated in 45 French ICUs. Survivors were followed for 6 months. RESULTS: In total, 677 (2.16%) of 31,399 admitted patients had at least one in-ICU cardiac arrest with resuscitation attempt, 42% of which occurred on the day of admission. In 79% cases, one or more condition(s) likely to promote the occurrence of cardiac arrest was/were identified, including hypoxia (179 patients), metabolic disorders (122), hypovolemia (94), and adverse events linked to the life-sustaining devices in place (98). Return of spontaneous circulation was achieved in 478 patients, of whom 163 were discharged alive from ICU and 146 from hospital. Six-month survival with no or moderate functional sequel (118 of 125 patients alive) correlated with a number of organ failures ≤ 2 when cardiac arrest occurred (OR 4.17 [1.92-9.09]), resuscitation time ≤ 5 min (3.32 [2.01-5.47]), shockable rhythm cardiac arrests (2.13 [1.26-3.45]) or related to the life-sustaining devices in place (2.11 [1.22-3.65]), absence of preexisting disability (1.98 [1.09-3.60]) or disease deemed fatal within 5 years (1.70 [1.05-2.77]), and sedation (1.71 [1.06-2.75]). CONCLUSION: Only one in six patients with in-ICU cardiac arrest and resuscitation attempt was alive at 6 months with good functional status. Certain characteristics specific to cardiac arrests, resuscitation maneuvers, and the pathological context in which they happen may help clarify prognosis and inform relatives.

LESIONS SECUNDÀRIES A LA RCP

1. Anaesth Rep. 2020 Mar 2;8(1):10-13. doi: 10.1002/anr3.12025. eCollection 2020 Jan-Jun.

Compartment syndrome of the hand as a complication of prolonged mechanical cardiopulmonary resuscitation.

Lesser FD(1), Yakubi M(1), Rochester S(2), Evans J(3), Highgate J(3).

Abstract

A 45-year-old man suffered compartment syndrome of the hands as a complication of prolonged cardiopulmonary resuscitation. He was admitted following a hypothermic out-of-hospital cardiac arrest due to cold-water submersion. The patient was in cardiac arrest for 4 h with mechanical cardiopulmonary resuscitation delivered using the Lund University Cardiac Arrest System (Jolife AB, Lund, Sweden). Cardiopulmonary resuscitation along with aggressive rewarming achieved return of spontaneous circulation. He developed compartment syndrome in his left hand which was likely exacerbated by having his arm strapped to the Lund University Cardiac Arrest System device throughout the resuscitation. The compartment syndrome was managed conservatively. Despite preservation of neurological function the patient died of complications from the cardiac arrest after an extended intensive care unit stay. We recommend healthcare providers unstrap patient's hands during prolonged mechanical cardiopulmonary resuscitation.

ETILOGIA DE L'ACR

1. Anesth Analg. 2020 Mar 9. doi: 10.1213/ANE.0000000000004734. [Epub ahead of print]

Intraoperative Cardiac Arrest During Adult Liver Transplantation: Incidence and Risk Factor Analysis From 7 Academic Centers in the United States.

Smith NK(1), Zerillo J(1), Kim SJ(2), Efune GE(3), Wang C(4), Pai SL(5), Chadha R(5), Kor TM(6), Wetzel DR(6), Hall MA(7), Burton KK(8), Fukazawa K(9), Hill B(10), Spad MA(11), Wax DB(1), Lin HM(12), Liu X(12), Odeh J(3), Torsher L(6), Kindscher JD(13), Mandell MS(14)(15), Sakai T(16), DeMaria S Jr(1).

Abstract

BACKGROUND: Intraoperative cardiac arrest (ICA) has a reported frequency of 1 in 10,000 anesthetics but has a much higher estimated incidence in orthotopic liver transplantation (OLT). Single-center studies of ICA in OLT are limited by small sample size that prohibits multivariable regression analysis of risks. METHODS: Utilizing data from 7 academic medical centers, we performed a retrospective, observational study of 5296 adult liver transplant recipients (18-80 years old) between 2000 and 2017 to identify the rate of ICA, associated risk factors, and outcomes. RESULTS: ICA occurred in 196 cases (3.7% 95% confidence interval [CI], 3.2-4.2) and mortality occurred in 62 patients (1.2%). The intraoperative mortality rate was 31.6% in patients who experienced ICA. In a multivariable generalized linear mixed model, ICA was associated with body mass index (BMI) <20 (odds ratio [OR]: 2.04, 95% CI, 1.05-3.98; P = .0386), BMI ≥40 (2.16 [1.12-4.19]; P = .022), Model for End-Stage Liver Disease (MELD) score: (MELD 30-39: 1.75 [1.09-2.79], P = .02; MELD ≥40: 2.73 [1.53-4.85], P = .001), postreperfusion syndrome (PRS) (3.83 [2.75-5.34], P < .001), living donors (2.13 [1.16-3.89], P = .014), and reoperation (1.87 [1.13-3.11], P = .015). Overall 30-day and 1-year mortality were 4.18% and 11.0%, respectively. After ICA, 30-day and 1-year mortality were 43.9% and 52%, respectively,

compared to 2.6% and 9.3% without ICA. CONCLUSIONS: We established a 3.7% incidence of ICA and a 1.2% incidence of intraoperative mortality in liver transplantation and confirmed previously identified risk factors for ICA including BMI, MELD score, PRS, and reoperation and identified new risk factors including living donor and length of surgery in this multicenter retrospective cohort. ICA, while rare, is associated with high intraoperative mortality, and future research must focus on therapy to reduce the incidence of ICA.

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FEEDBACK

1. Simul Healthc. 2020 Mar 11. doi: 10.1097/SIH.0000000000000410. [Epub ahead of print]

Caregiver Characteristics Associated With Quality of Cardiac Compressions on an Adult Mannequin With Real-Time Visual Feedback: A Simulation-Based Multicenter Study.

Kessler DO(1), Lemke DS, Jani P, Dewan ML, Moore-Clingenpeel M, Chang TP, Pirie J, Lovett ME, Harwayne-Gidansky I, Wolfe HA; Quality Cardiopulmonary Resuscitation (QCPR) leaderboard investigators of the International Network for Simulation-based Pediatric Innovation, Research, and Education (INSPIRE).

Abstract

INTRODUCTION: Chest compression (CC) quality directly impacts cardiac arrest outcomes. Provider body type can influence the quality of cardiopulmonary resuscitation (CPR); however, the magnitude of this impact while using visual feedback is not well described. The aim of the study was to determine the association between provider anthropometric variables on fatigue and CC adherence to 2015 American Heart Association CPR while receiving visual feedback. METHODS: This was a planned secondary analysis of healthcare professionals from multiple hospitals performing continuous CC for 2 minutes on an adult CPR mannequin with dynamic visual feedback. Main outcome measures include compression data (depth, rate, and lean) evaluated in 30-second epochs to explore performance fatigue. Multivariable models examined the relationship of provider anthropometrics to CC quality. Binomial mixed effects models were used to characterize fatigue by examining performance for 4 epochs. RESULTS: Three hundred seventy-seven 2-minute CC episodes were analyzed. Extreme (low and high) BMI and weight are associated with poorer CC. Larger size (height, weight, and BMI) is associated with better depth but worse lean compliance. Performance fatigued for all providers for 2 minutes, but shorter, lighter weight, female participants had the greatest decline. On multivariable analysis, rate compliance did not deteriorate regardless of provider anthropometrics. CONCLUSIONS: Anthropometrics impact provider CC quality. Despite visual feedback, variable effects are seen

on compression depth, rate, recoil, and fatigue depending on the provider sex, weight, and BMI. The 2-minute interval for changing chest compressors should be reconsidered based on individual provider characteristics and risk of fatigue's impact on high-quality CPR.

FÀRMACS

1. Cardiovasc Drugs Ther. 2020 Mar 7. doi: 10.1007/s10557-020-06952-8. [Epub ahead of print]

Intraosseous Versus Peripheral Intravenous Access During Out-of-Hospital Cardiac Arrest: a Comparison of 30-Day Survival and Neurological Outcome in the French National Registry.

Baert V(1)(2)(3), Vilhelm C(4)(5), Escutnaire J(4)(5), Nave S(6), Hugenschmitt

D(7), Chouihed T(8)(9)(10)(11), Tazarourte K(7)(12), Javaudin F(13), Wiel

E(4)(6), El Khoury C(14)(15), Hubert H(4)(5); GR-RéAC.

Abstract

PURPOSE: To compare intraosseous access with peripheral venous access on adults out-of-hospital cardiac arrest (OHCA) patients' clinical outcomes. METHODS: A national retrospective multicentre study was conducted based on the French National Cardiac Arrest Registry. Comparison of patients (intraosseous vs. peripheral venous access) was conducted before and after a matching using a propensity score. The propensity score included confounding factors: age, time between the call (T0) to epinephrine (to take account of how quickly vascular access was achieved), the aetiology of OHCA, the shock and the patient initial rhythm at MMT arrival. RESULTS: A total of 1576 patients received intraosseous access, and 27,280 received peripheral intravenous access. Before matching, OHCA patients with intraosseous access were less likely to survive at all stages (return of spontaneous circulation (ROSC), 0-day survival and 30-day survival). No significant difference in neurological outcome was observed. After propensity score matching, no significant differences in 30-day survival rates (OR = 0.763 [0.473;1.231]) and neurological outcome (OR = 1.296 [0.973;1.726]) were observed. However, intraosseous patients still showed lower likelihood of short-term survival (ROSC and 0-day survival) even after propensity score matching was implemented. CONCLUSION: The populations we investigated were similar to those of other studies suggesting that intraosseous access is associated with reduced survival and poorer neurological outcome. Our findings suggest that intraosseous access is a comparably effective alternative to peripheral intravenous access for treating OHCA patients on matched populations.

2. Rev Esp Cardiol (Engl Ed). 2020 Mar 6. pii: S1885-5857(20)30034-7. doi: 10.1016/j.rec.2020.01.005. [Epub ahead of print]

Choice of access site and type of anticoagulant in acute coronary syndromes with advanced Killip class or out-of-hospital cardiac arrest.

Gargiulo G(1), Valgimigli M(2), Sunnåker M(3), Vranckx P(4), Frigoli E(5), Leonardi S(6), Spirito A(5), Gragnano F(7), Manavifar N(5), Galea R(5), De Caterina AR(8), Calabrò P(9), Esposito G(10), Windecker S(5), Hunziker L(5).

Abstract

INTRODUCTION AND OBJECTIVES: Patients who are vulnerable to hemodynamic or electrical disorders (VP) are often excluded from clinical trials and data on the optimal access-site or antithrombotic treatment are limited. We assessed outcomes of transradial vs transfemoral access and bivalirudin vs unfractionated heparin (UFH) in VP with acute coronary syndrome undergoing invasive management. METHODS: The MATRIX trial randomized 8404 patients to radial or femoral access and 7213 patients to bivalirudin or UFH. Among them, 934 (11.1%) were deemed VP due to advanced Killip class (n = 808), cardiac arrest (n = 168), or both (n = 42). The 30-day coprimary outcomes were major adverse cardiovascular and cerebrovascular events (MACE: death, myocardial infarction, or stroke) and net adverse clinical events (NACE: MACE or major bleeding). RESULTS: MACE and NACE were similarly reduced with radial vs femoral access in VP and non-VP. Transradial access was also associated with consistent relative benefits in all-cause and cardiovascular mortality or Bleeding Academic Research Consortium (BARC) 3 or 5 bleeding with greater absolute benefits in VP. The effects of bivalirudin vs UFH on MACE and NACE were consistent in VP and non-VP. Bivalirudin was associated with lower all-cause and cardiovascular mortality in VP but not in non-VP, with borderline interaction testing. Bivalirudin reduced bleeding in both VP and non-VP with a larger absolute benefit in VP. CONCLUSIONS: In acute coronary syndrome patients undergoing invasive management, the effects of randomized treatments were consistent in VP and non-VP, but absolute risk reduction with radial access and bivalirudin were greater in VP, with a 5- to 10-fold lower number needed to treat for benefits. Trial registry number: NCT01433627.

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1. Rev Esp Anestesiol Reanim. 2020 Mar 3. pii: S0034-9356(20)30018-9. doi: 10.1016/j.redar.2020.01.008. [Epub ahead of print]

Effectiveness of different supralottic airways during resuscitation manoeuvres. A systematic review.

Calheiros J(1), Charco-Mora P(2).

Abstract

INTRODUCTION: Supraglottic airways, which are easily inserted and minimize interruptions in cardiopulmonary resuscitation manoeuvres, are now widely used in pre- and in-hospital emergencies. However, most studies in these devices do not specify whether they ensure good ventilation during CPR. This systematic review aims to determine whether there is evidence that supraglotic airways enable effective ventilation during resuscitation. METHODS: The MEDLINE

and COCHRANE databases were searched for studies published in English up to 30 November 2018. Eligible studies were all those that objectively evaluated tidal volume during resuscitation maneuvers in patients over 18 years of age using various supraglottic airways. RESULTS: A total of 3734 articles were identified, of which 252 were duplicates. Only 1 objectively evaluated ventilation during resuscitation maneuvers and presented data relevant to this review. The study included 470 patients, 51 of which underwent spirometry. Only 4.48% of patients survived to hospital discharge; however, the correlation with ventilation effectiveness was not assessed. CONCLUSION: There is no scientific evidence that supraglottic airways provide effective ventilation during resuscitation maneuvers. Evaluation by spirometry, chest impedance and ultrasound may help to determine the ventilatory efficacy of supraglottic airways during CPR, and clarify whether this factor contributes to the difficulties experienced in reversing cardiorespiratory arrest.

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ORGANITZACIÓ I ENTRENAMENT

1. BMJ Open. 2020 Mar 10;10(3):e034908. doi: 10.1136/bmjopen-2019-034908.

Identifying and overcoming barriers to automated external defibrillator use by GoodSAM volunteer first responders in out-of-hospital cardiac arrest using the Theoretical Domains Framework and Behaviour Change Wheel: a qualitative study.

Smith CM(1), Griffiths F(2), Fothergill RT(3), Vlaev I(4), Perkins GD(5).

Abstract

OBJECTIVES: GoodSAM is a mobile phone app that integrates with UK ambulance services. During a 999 call, if a call handler diagnoses cardiac arrest, nearby volunteer first responders registered with the app are alerted. They can give cardiopulmonary resuscitation (CPR) and/or use a public access automated external defibrillator (AED). We aimed to identify means of increasing AED use by GoodSAM first responders. METHODS: We conducted semistructured telephone interviews, using the Theoretical Domains Framework to identify and classify barriers to AED use. We analysed findings using the Capability, Opportunity, Motivation, Behaviour (COM-B) model and subsequently used the Behaviour Change Wheel to develop potential interventions to improve AED use. SETTING:

London, UK. PARTICIPANTS: GoodSAM first responders alerted in the previous 7 days about a cardiac arrest. RESULTS: We conducted 30 telephone interviews in two batches in July and October 2018. A public access AED was taken to scene once, one had already been attached on

scene another time and three participants took their own AEDs when responding. Most first responders felt capable and motivated to use public access AEDs but were concerned about delaying CPR if they retrieved one and frustrated when arriving after the ambulance service. They perceived lack of opportunities due to unavailable and inaccessible AEDs, particularly out of hours. We subsequently developed 13 potential interventions to increase AED use for future testing. CONCLUSIONS: GoodSAM first responders used AEDs occasionally, despite a capability and motivation to do so. Those operating volunteer first responder systems should consider our proposed interventions to improve AED use. Of particular clinical importance are: highlighting AED location and providing route/time estimates to the patient via the nearest AED. This would help single responders make appropriate decisions about AED retrieval. As AED collection may extend time to reach the patient, where there is sufficient density of potential responders, systems could send one responder to initiate CPR and another to collect an AED.

FREE FULL TEXT

2. Emerg Med Australas. 2020 Mar 13. doi: 10.1111/1742-6723.13490. [Epub ahead of print]

Retrospective observational cohort study of out-of-hospital cardiac arrest outcomes in Tasmania 2010-2014.

Morgan DP(1), Muscatello D(1), Travaglia J(2), Hayen A(2).

Abstract

OBJECTIVE: This study aims to present overall survival rates to hospital discharge for out-of-hospital cardiac arrest (OHCA) in Tasmania and to identify predictors of survival. METHODS: A retrospective observational cohort study was undertaken from 1 January 2010 to 31 December 2014. A probabilistically linked data set was created from paramedic electronic medical records and hospital patient records. Logistic regression was used to assess factors associated with survival of OHCA. RESULTS: During the study, 2949 incidents of OHCA were reviewed and 1146 had emergency management provided, with an overall survival rate to hospital discharge of 135 (12%). A number of independent factors are associated with improved outcomes including if the initial presenting cardiac rhythm was either ventricular fibrillation or ventricular tachycardia (adjusted odds ratio [OR] 8.75, 95% confidence interval [CI] 5.15-14.89) ($P < 0.0001$) relative to those who were found in a non-shockable rhythm. Another factor was age group (overall $P < 0.001$). Those aged 85+ years had a reduced overall survival rate (2.9%), which was lower than those <16 years of age (OR 0.37, 95% CI 0.07-1.94; adjusted OR 0.38, CI 0.03-1.00) ($P < 0.001$). The odds of surviving OHCA decreased by 9% for every minute defibrillation of a shockable rhythm was delayed were witnessed by a bystander (OR 0.90, 95% CI 0.85-0.95). CONCLUSION: Time to defibrillation for witnessed arrests, other than paramedic witnessed arrest was associated with better overall survival rates than unwitnessed OHCA. Further factors such as the event being of cardiac aetiology, bystander cardio-pulmonary resuscitation performed, initial presenting cardiac rhythm of ventricular fibrillation or ventricular tachycardia and decreasing age were all associated with increased probability of survival.

3. Eur Heart J Acute Cardiovasc Care. 2020 Mar 13:2048872619891675. doi:

10.1177/2048872619891675. [Epub ahead of print]

Improving bystander defibrillation in out-of-hospital cardiac arrests at home.

Karlsson L(1)(2)(3), Hansen CM(2)(3), Vourakis C(4), Sun CL(5)(6), Rajan S(3), Søndergaard KB(3), Andelius L(2), Lippert F(2), Gislason GH(3)(7), Chan TC(8)(9), Torp-Pedersen C(10)(11), Folke F(2)(3).

Abstract

AIMS: Most out-of-hospital cardiac arrests occur at home with dismal bystander defibrillation rates. We investigated automated external defibrillator coverage of home arrests, and the proportion potentially reachable with an automated external defibrillator before emergency medical service arrival according to different bystander activation strategies. METHODS AND RESULTS: Cardiac arrests in homes (private/nursing/senior homes) in Copenhagen, Denmark (2008-2016) and registered automated external defibrillators (2007-2016), were identified. Automated external defibrillator coverage (distance from arrest to automated external defibrillator) and accessibility at the time of arrest were examined according to route distance to nearest automated external defibrillator and emergency medical service response time. The proportion of arrests reachable with an automated external defibrillator by bystander was calculated using two-way (from patient to automated external defibrillator and back) and one-way (from automated external defibrillator to patient) potential activation strategies. Of 1879 home arrests, automated external defibrillator coverage ≤100 m was low (6.3%) and a two-way bystander could potentially only retrieve an accessible automated external defibrillator before emergency medical service in 31.1% (*n*=37) of cases. If a bystander only needed to travel one-way to bring an automated external defibrillator (≤100 m, ≤250 m and ≤500 m), 45.4% (*n*=54/119), 37.1% (*n*=196/529) and 29.8% (*n*=350/1174) could potentially be reached before the emergency medical service based on current automated external defibrillator accessibility. CONCLUSIONS: Few home arrests were reachable with an automated external defibrillator before emergency medical service if bystanders needed to travel from patient to automated external defibrillator and back. However, nearly one-third of arrests ≤500 m of an automated external defibrillator could be reached before emergency medical service arrival if the bystander only needed to travel one-way from the automated external defibrillator to the patient.

4. Eur Heart J Qual Care Clin Outcomes. 2020 Mar 10. pii: qcaa019. doi: 10.1093/ehjqcco/qcaa019. [Epub ahead of print]

Risk Prediction Models for Out-of-Hospital Cardiac Arrest Outcomes in England.

Ji C(1), Brown TP(1), Booth SJ(1), Hawkes C(1), Nolan JP(1)(2), Mapstone J(3), Fothergill RT(1)(4), Spaight R(5), Black S(6), Perkins GD(1)(7); OHCAO Collaborators.

Abstract

INTRODUCTION: The Out-of-Hospital Cardiac Arrest (OHCA) Outcomes project is a national research registry. One of its aims is to explore sources of variation in OHCA survival outcomes. This study reports the development and validation of risk prediction models for return of spontaneous circulation (ROSC) at hospital handover and survival to hospital discharge. METHODS AND RESULTS: The study included OHCA patients who were treated during 2014 and 2015 by emergency medical services (EMS) from 7 English National Health Service ambulance services. The 2014 data were used to identify important variables and to develop the risk prediction models, which were validated using the 2015 data. Model prediction was measured

by area under the curve (AUC), Hosmer-Lemeshow test, Cox calibration regression and Brier score. All analyses were conducted using mixed effects logistic regression models. Important factors included age, gender, witness/bystander cardiopulmonary resuscitation (CPR) combined, aetiology and initial rhythm. Interaction effects between witness/bystander CPR with gender, aetiology and initial rhythm and between aetiology and initial rhythm were significant in both models. The survival model achieved better discrimination and overall accuracy compared with the ROSC model (AUC=0.86 vs 0.67, Brier score=0.072 vs 0.194, respectively). Calibration tests showed over- and under-estimation for the ROSC and survival models, respectively. A sensitivity analysis individually assessing Index of Multiple Deprivation scores and location in the final models substantially improved overall accuracy with inconsistent impact on discrimination. CONCLUSION: Our risk prediction models identified and quantified important pre-EMS intervention factors determining survival outcomes in England. The survival model had excellent discrimination.

5. J Am Heart Assoc. 2020 Mar 17;9(6):e015599. doi: 10.1161/JAHA.119.015599. Epub 2020 Mar 10.

Causes of Chest Compression Interruptions During Out-of-Hospital Cardiac Arrest Resuscitation.

Hanisch JR(1), Counts CR(2), Latimer AJ(2), Rea TD(3)(4), Yin L(4), Sayre MR(2)(5).

Abstract

BACKGROUND Interruptions in chest compressions contribute to poor outcomes in out-of-hospital cardiac arrest. The objective of this retrospective observational cohort study was to characterize the frequency, reasons, and duration of interruptions in chest compressions and to determine if interruptions changed over time. METHODS AND RESULTS All out-of-hospital cardiac arrests treated by the Seattle Fire Department (Seattle, WA, United States) from 2007 to 2016 with capture of recordings from automated external defibrillators and manual defibrillators were included. Compression interruptions >1 second were classified into categories using audio recordings. Among the 3601 eligible out-of-hospital cardiac arrests, we analyzed 74 584 minutes, identifying 30 043 pauses that accounted for 6621 minutes (8.9% of total resuscitation duration). The median total interruption duration per case decreased from 115 seconds in 2007 to 72 seconds in 2016 (P<0.0001). Median individual interruption duration decreased from 14 seconds in 2007 to 7 seconds in 2016 (P<0.0001). Among interruptions >10 seconds, median interruption duration decreased from 20 seconds in 2007 to 16 seconds in 2016 (P<0.0001). Cardiac rhythm analysis accounted for most compression interruptions. Manual ECG rhythm analysis and pulse checks accounted for 41.6% of all interruption time (median individual interruption, 8 seconds), automated external defibrillator rhythm analysis for 13.7% (median, 17 seconds), and manual rhythm analysis and shock delivery for 8.0% (median, 9 seconds). CONCLUSIONS Median duration of chest compression interruptions decreased by half from 2007 to 2016, indicating that care teams can significantly improve performance. Reducing compression interruptions is an evidence-based benchmark that provides a modifiable process quality improvement goal.

FREE FULL TEXT

6. J Med Internet Res. 2020 Mar 9;22(3):e16987. doi: 10.2196/16987.

Precourse Preparation Using a Serious Smartphone Game on Advanced Life Support Knowledge and Skills: Randomized Controlled Trial.

Phungoen P(1), Promto S(1), Chanthawatthanarak S(1), Maneepong S(2), Apiratwarakul K(1), Kotruchin P(1), Mitsungnern T(1).

Abstract

BACKGROUND: In the past several years, gamified learning has been growing in popularity in various medical educational contexts including cardiopulmonary resuscitation (CPR) training. Furthermore, prior work in Basic Life Support (BLS) training has demonstrated the benefits of serious games as a method for pretraining among medical students. However, there is little evidence to support these benefits with regard to Advanced Life Support (ALS) training. OBJECTIVE: We compare the effects of a brief precourse ALS preparation using a serious smartphone game on student knowledge, skills, and perceptions in this area with those of conventional ALS training alone. METHODS: A serious game (Resus Days) was developed by a Thai physician based on global ALS clinical practice guidelines. Fifth-year medical students were enrolled and randomized to either the game group or the control group. Participants in both groups attended a traditional ALS lecture, but the game group was assigned to play Resus Days for 1 hour before attending the lecture and were allowed to play as much as they wished during the training course. All students underwent conventional ALS training, and their abilities were evaluated using multiple-choice questions and with hands-on practice on a mannequin. Subject attitudes and perceptions about the game were evaluated using a questionnaire. RESULTS: A total of 105 students participated in the study and were randomly assigned to either the game group (n=52) or the control group (n=53). Students in the game group performed better on the ALS algorithm knowledge posttest than those in the control group (17.22 [SD 1.93] vs 16.60 [SD 1.97], P=.01; adjusted mean difference [AMD] 0.93; 95% CI 0.21-1.66). The game group's pass rate on the skill test was also higher but not to a statistically significant extent (79% vs 66%, P=.09; adjusted odds ratio [AOR] 2.22; 95% CI 0.89-5.51). Students indicated high satisfaction with the game (9.02 [SD 1.11] out of 10). CONCLUSIONS: Engaging in game-based preparation prior to an ALS training course resulted in better algorithm knowledge scores for medical students than attending the course alone.

FREE FULL TEXT

7. J Med Internet Res. 2020 Mar 12;22(3):e17425. doi: 10.2196/17425.

Utilization of a Voice-Based Virtual Reality Advanced Cardiac Life Support Team Leader Refresher: Prospective Observational Study.

Katz D(1), Shah R(1), Kim E(2), Park C(1), Shah A(1), Levine A(1), Burnett G(1).

Abstract

BACKGROUND: The incidence of cardiac arrests per year in the United States continues to increase, yet in-hospital cardiac arrest survival rates significantly vary between hospitals. Current methods of training are expensive, time consuming, and difficult to scale, which necessitates improvements in advanced cardiac life support (ACLS) training. Virtual reality (VR) has been proposed as an alternative or adjunct to high-fidelity simulation (HFS) in several environments. No evaluations to date have explored the ability of a VR program to examine both technical and

behavioral skills and demonstrate a cost comparison. OBJECTIVE: This study aimed to explore the utility of a voice-based VR ACLS team leader refresher as compared with HFS. METHODS: This prospective observational study performed at an academic institution consisted of 25 postgraduate year 2 residents. Participants were randomized to HFS or VR training and then crossed groups after a 2-week washout. Participants were graded on technical and nontechnical skills. Participants also completed self-assessments about the modules. Proctors were assessed for fatigue and task saturation, and cost analysis based on local economic data was performed. RESULTS: A total of 23 of 25 participants were included in the scoring analysis. Fewer participants were familiar with VR compared with HFS (9/25, 36% vs 25/25, 100%; P<.001). Self-reported satisfaction and utilization scores were similar; however, significantly more participants felt HFS provided better feedback: 99 (IQR 89-100) vs 79 (IQR 71-88); P<.001. Technical scores were higher in the HFS group; however, nontechnical scores for decision making and communication were not significantly different between modalities. VR sessions were 21 (IQR 19-24) min shorter than HFS sessions, the National Aeronautics and Space Administration task load index scores for proctors were lower in each category, and VR sessions were estimated to be US $103.68 less expensive in a single-learner, single-session model. CONCLUSIONS: Utilization of a VR-based team leader refresher for ACLS skills is comparable with HFS in several areas, including learner satisfaction. The VR module was more cost-effective and was easier to proctor; however, HFS was better at delivering feedback to participants. Optimal education strategies likely contain elements of both modalities. Further studies are needed to examine the utility of VR-based environments at scale.

FREE FUL TEXT

CURES POST RCE

1. Int J Cardiol Heart Vasc. 2020 Mar 2;27:100483. doi: 10.1016/j.ijcha.2020.100483.

eCollection 2020 Apr.

Post-resuscitation myocardial dysfunction in out-of-hospital cardiac arrest patients randomized to immediate coronary angiography versus standard of care.

Elfwén L(1), Lagedal R(2), Rubertsson S(2), James S(3), Oldgren J(3), Olsson J(1), Hollenberg J(4), Jensen U(1), Ringh M(4), Svensson L(4), Nordberg P(4).

Abstract

BACKGROUND: Immediate coronary angiography with subsequent percutaneous coronary intervention (PCI) has the potential to reduce post-resuscitation myocardial dysfunction in out-of-hospital cardiac arrest (OHCA) patients. The aim of this study was to see if immediate coronary angiography, with potential PCI, in patients without ST-elevation on the ECG, influenced post-resuscitation myocardial function and cardiac biomarkers. METHODS: A secondary analysis of the Direct or Subacute Coronary Angiography in Out-of-Hospital Cardiac Arrest (DISCO) trial (ClinicalTrials.gov ID: NCT02309151). Patients with bystander-witnessed OHCA, without ST-elevations on the ECG were randomly assigned to immediate coronary angiography within two hours of cardiac arrest (n = 38) versus standard-of-care with deferred angiography (n = 40). Outcome measures included left ventricle ejection fraction (LVEF) at 24 h, peak Troponin T levels, lactate clearance and NT-proBNP at 72 h. RESULTS: In the immediate-angiography group, median LVEF at 24 h was 47% (Q1-Q3; 30-55) vs. 46% (Q1-Q3; 35-55) in the standard-of-care group. Peak Troponin-T levels during the first 24 h were 362 ng/L (Q1-Q3; 174-2020) in the immediate angiography group and 377 ng/L (Q1-Q3; 205-1078) in the standard-of-care group.

NT-proBNP levels at 72 h were 931 ng/L (Q1-Q3; 396-2845) in the immediate-angiography group and 1913 ng/L (Q1-Q3; 489-3140) in the standard-of-care group. CONCLUSION: In this analysis of OHCA patients without ST-elevation on the ECG randomized to immediate coronary angiography or standard-of-care, no differences in post-resuscitation myocardial dysfunction parameters between the two groups were found. This finding was consistent also in patients randomized to immediate coronary angiography where PCI was performed compared to those where PCI was not performed.

FREE FULL TEXT

2. J Clin Med. 2020 Mar 10;9(3). pii: E744. doi: 10.3390/jcm9030744.

Does Combining Biomarkers and Brain Images Provide Improved Prognostic Predictive Performance for Out-Of-Hospital Cardiac Arrest Survivors before Target Temperature Management?

Son SH(1), Lee IH(2), Park JS(1)(3), Yoo IS(1)(2), Kim SW(1)(3), Lee JW(1), Ryu S(1), You Y(1), Min JH(1)(3), Cho YC(1), Jeong WJ(1), Oh SK(1), Cho SU(1), Ahn HJ(1), Kang C(1), Lee DH(4), Lee BK(4), Youn CS(5).

Abstract

We examined whether combining biomarkers measurements and brain images early after the return of spontaneous circulation improves prognostic performance compared with the use of either biomarkers or brain images for patients with cardiac arrest following target temperature management (TTM). This retrospective observational study involved comatose out-of-hospital cardiac arrest survivors. We analyzed neuron-specific enolase levels in serum (NSE) or cerebrospinal fluid (CSF), grey-to-white matter ratio by brain computed tomography, presence of high signal intensity (HSI) in diffusion-weighted imaging (DWI), and voxel-based apparent diffusion coefficient (ADC). Of the 58 patients, 33 (56.9%) had poor neurologic outcomes. CSF NSE levels showed better prognostic performance (area under the curve (AUC) 0.873, 95% confidence interval (CI) 0.749-0.950) than serum NSE levels (AUC 0.792, 95% CI 0.644-0.888). HSI in DWI showed the best prognostic performance (AUC 0.833, 95% CI 0.711-0.919). Combining CSF NSE levels and HSI in DWI had better prognostic performance (AUC 0.925, 95% CI 0.813-0.981) than each individual method, followed by the combination of serum NSE levels and HSI on DWI and that of CSF NSE levels and the percentage of voxels of ADC (AUC 0.901, 95% CI 0.792-0.965; AUC 0.849, 95% CI 0.717-0.935, respectively). Combining CSF/serum NSE levels and HSI in DWI before TTM improved the prognostic performance compared to either each individual method or other combinations.

FREE FULL TEXT

3. Sci Rep. 2020 Mar 12;10(1):4604. doi: 10.1038/s41598-020-61426-z.

Associations between Central Obesity and Outcomes of Adult In-hospital Cardiac Arrest: A Retrospective Cohort Study.

Wang CH(1)(2), Chang WT(1)(2), Huang CH(1)(2), Tsai MS(1)(2), Lu TC(1)(2), Chou E(3), Wu YW(4)(5)(6), Chen WJ(7)(8)(9).

Abstract

To investigate the association between central obesity and outcomes following in-hospital cardiac arrest (IHCA). A single-centred retrospective study was conducted. Adult patients that experienced IHCA during 2006-2015 were screened. Body mass index (BMI) was calculated at hospital admission. Central obesity-related anthropometric parameters were measured by analysing computed tomography images. A total of 648 patients were included, with mean BMI of 23.0 kg/m^2. The proportions of BMI-defined obesity in this cohort were underweight (13.1%), normal weight (41.4%), overweight (31.5%) and obesity (14.0%). The mean waist circumference was 85.9 cm with mean waist-to-height ratio (WHtR) of 0.53. The mean sagittal abdominal diameter was 21.2 cm with mean anterior and posterior abdominal subcutaneous adipose tissue (SAT) depths of 1.6 and 2.0 cm, respectively. Multivariate logistic regression analyses indicated BMI of 11.7-23.3 kg/m^2 (odds ratio [OR]: 2.53, 95% confidence interval [CI]: 1.10-5.85; p-value = 0.03), WHtR of 0.49-0.59 (OR: 3.45, 95% CI: 1.56-7.65; p-value = 0.002) and anterior abdominal SAT depth <1.9 cm (OR: 2.84, 95% CI: 1.05-7.74; p-value = 0.04) were positively associated with the favourable neurological outcome. Central obesity was associated with poor IHCA outcomes, after adjusting for the effects of BMI.

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ECMO

1. BMC Res Notes. 2020 Mar 6;13(1):137. doi: 10.1186/s13104-020-04982-x.

Exploratory analysis of myocardial function after extracorporeal cardiopulmonary resuscitation vs conventional cardiopulmonary resuscitation.

Tonna JE(1)(2), McKellar SH(3), Selzman CH(3), Drakos S(4), Koliopoulou AG(3), Taleb I(4), Stoddard GJ(5), Stehlik J(4), Welt FGP(4), Fair JF 3rd(6), Stoddard K(7), Youngquist ST(6).

Abstract

OBJECTIVE: Ventricular unloading is associated with myocardial recovery. We sought to evaluate the association of extracorporeal cardiopulmonary resuscitation (ECPR) on myocardial

function after cardiac arrest. We conducted a retrospective exploratory analysis, comparing ejection fraction (EF) after adult cardiac arrest, between ECPR and conventional CPR. RESULTS: Among 1119 cases of cardiac arrest, 116 had an echocardiogram post-return of spontaneous circulation (ROSC) and were included. Thirty-eight patients had ≥ 2 echocardiograms. ECPR patients had differences in age, hypertension and chronic heart failure. ECPR patients had a lower EF post-ROSC (24% vs 45%; $p < 0.01$) and were more likely to undergo percutaneous coronary intervention (25% vs 3%; $p < 0.01$). In multivariate analysis, only ECPR use (β-coeff: 10.4 [95% CI 3.68-17.13]; $p < 0.01$) independently predicted improved myocardial function. In this exploratory study, EF after cardiac arrest may be more likely to improve among ECPR patients than CCPR patients. Our methodology should be replicated to confirm or refute the validity of our findings.

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RECERCA EXPERIMENTAL

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CASE REPORTS

1. Acta Anaesthesiol Scand. 2020 Mar 9. doi: 10.1111/aas.13574. [Epub ahead of print]

A long prehospital resuscitation and evacuation of a skier with cardiac arrest - a case report.

Mannerkorpi P(1), Raatiniemi L(2), Kaikkonen K(3), Kaakinen T(1).

Abstract

The prognosis for patients with refractory cardiac arrest transferred to hospital during ongoing resuscitation is poor. Additionally, in remote areas, the response time of the emergency medical services (EMS) may be long, which further decreases the likelihood of a good outcome. The most common reason for sudden death during cross-country skiing is acute coronary artery syndrome and subsequent ventricular fibrillation (VF).

RCP y COVID19

1. Br J Anaesth. 2020 Feb 27. pii: S0007-0912(20)30098-2. doi: 10.1016/j.bja.2020.02.008. [Epub ahead of print]

Outbreak of a new coronavirus: what anaesthetists should know.

Peng PWH, Ho PL, Hota SS.

NO ABSTRACT AVAILABLE

2. Anaesth Crit Care Pain Med. 2020 Feb 20. pii: S2352-5568(20)30029-1. doi: 10.1016/j.accpm.2020.02.002. [Epub ahead of print]

COVID-19: A critical care perspective informed by lessons learnt from other viral epidemics.

Ling L, Joynt GM, Lipman J, Constantin JM, Joannes-Boyau O.

NO ABSTRACT AVAILABLE

CPR / MECHANICAL CHEST COMPRESSION

Sin artículos esta semana

REGISTRES, REVISIONS I EDITORIALS

1. Air Med J. 2020 Mar - Apr;39(2):133-136. doi: 10.1016/j.amj.2019.09.013. Epub 2019 Oct 31.

Cardiac Arrest Secondary to Accidental Hypothermia: The Physiology Leading to Hypothermic Arrest.

Willmore R(1).

Abstract

Cardiac arrest secondary to accidental hypothermia is rare in the United Kingdom. However, some evidence suggests that it is under-reported; furthermore, recognizing hypothermia as the cause of death is difficult in the postmortem setting. Urban and rural residents are exposed to cold winter conditions both at home and while undertaking recreational activities. Understanding the physiology underpinning hypothermic cardiac arrest is crucial in order to make informed clinical decisions in regard to triage and management by air ambulance services and in prevention of this rare presentation. This article discusses the epidemiology and pathophysiology of accidental hypothermic to explain how personnel can survive after 8 hours 40 minutes of cardiac arrest.

PCR INTRAHOSPITALARIA

1. Crit Care Med. 2020 Apr;48(4):e285-e289. doi: 10.1097/CCM.0000000000004236.

Detecting Patient Deterioration Using Artificial Intelligence in a Rapid Response System.

Cho KJ(1), Kwon O(1), Kwon JM(2), Lee Y(1), Park H(1), Jeon KH(3), Kim KH(3), Park J(3), Oh BH(3).

Abstract

OBJECTIVES: As the performance of a conventional track and trigger system in a rapid response system has been unsatisfactory, we developed and implemented an artificial intelligence for predicting in-hospital cardiac arrest, denoted the deep learning-based early warning system. The purpose of this study was to compare the performance of an artificial intelligence-based early warning system with that of conventional methods in a real hospital situation. DESIGN: Retrospective cohort study. SETTING: This study was conducted at a hospital in which deep learning-based early warning system was implemented. PATIENTS: We reviewed the records of adult patients who were admitted to the general ward of our hospital from April 2018 to March 2019. INTERVENTIONS: The study population included 8,039 adult patients. A total 83 events of deterioration occurred during the study period. The outcome was events of deterioration, defined as cardiac arrest and unexpected ICU admission. We defined a true alarm as an alarm occurring within 0.5-24 hours before a deteriorating event. MEASUREMENTS AND MAIN RESULTS: We used the area under the receiver operating characteristic curve, area under the precision-recall curve, number needed to examine, and mean alarm count per day as comparative measures. The deep learning-based early warning system (area under the receiver operating characteristic curve, 0.865; area under the precision-recall curve, 0.066) outperformed the modified early warning score (area under the receiver operating characteristic curve, 0.682; area under the precision-recall curve, 0.010) and reduced the number needed to examine and mean alarm count per day by 69.2% and 59.6%, respectively. At the same specificity, deep learning-based early warning system had up to 257% higher sensitivity than conventional methods. CONCLUSIONS: The developed artificial intelligence based on deep-learning, deep learning-based early warning system, accurately predicted deterioration of patients in a general ward and outperformed conventional methods. This study showed the potential and effectiveness of artificial intelligence in an rapid response system, which can be applied together with electronic health records. This will be a useful method to identify patients with deterioration and help with precise decision-making in daily practice.

2. J Am Heart Assoc. 2020 Apr 7;9(7):e014837. doi: 10.1161/JAHA.119.014837. Epub 2020 Mar 21.

Risk-Standardizing Rates of Return of Spontaneous Circulation for In-Hospital Cardiac Arrest to Facilitate Hospital Comparisons.

Chan PS(1)(2), Tang Y(2); American Heart Association's Get With the Guidelines®-Resuscitation Investigators.

Abstract

Background Sustained return of spontaneous circulation (ROSC) is the most proximal and direct assessment of acute resuscitation quality in hospitals. However, validated tools to benchmark hospital rates for ROSC after in-hospital cardiac arrest currently do not exist. Methods and Results Within the national Get With The Guidelines-Resuscitation registry, we identified 83 206 patients admitted from 335 hospitals from 2014 to 2017 with in-hospital cardiac arrest. Using hierarchical logistic regression, we derived and validated a model for ROSC, defined as spontaneous and

sustained ROSC for ≥20 consecutive minutes, from 24 pre-arrest variables and calculated rates of risk-standardized ROSC for in-hospital cardiac arrest for each hospital. Overall, rates of ROSC were 72.0% and 72.7% for the derivation and validation cohorts, respectively. The model in the derivation cohort had moderate discrimination (C-statistic 0.643) and excellent calibration (R^2 of 0.996). Seventeen variables were associated with ROSC, and a parsimonious model retained 10 variables. Before risk-adjustment, the median hospital ROSC rate was 70.5% (interquartile range: 64.7-76.9%; range: 33.3-89.6%). After adjustment, the distribution of risk-standardized ROSC rates was narrower: median of 71.9% (interquartile range: 68.2-76.4%; range: 42.2-84.6%). Overall, 56 (16.7%) of 335 hospitals had at least a 10% absolute change in percentile rank after risk standardization: 27 (8.0%) with a ≥10% negative percentile change and 29 (8.7%) with a ≥10% positive percentile change. Conclusions We have derived and validated a model to risk-standardize hospital rates of ROSC for in-hospital cardiac arrest. Use of this model can support efforts to compare acute resuscitation survival across hospitals to facilitate quality improvement.

FREE FULL TEXT

3. Resuscitation. 2020 Mar 21. pii: S0300-9572(20)30108-8. doi: 10.1016/j.resuscitation.2020.03.002. [Epub ahead of print]

ECG-monitoring of in-hospital cardiac arrest and factors associated with survival.

Thorén A(1), Rawshani A(2), Herlitz J(3), Engdahl J(4), Kahan T(4), Gustafsson L(5), Djärv T(6).

Abstract

BACKGROUND: ECG-monitoring is a strong predictor for 30-days survival after in-hospital cardiac arrest (IHCA). The aim of the study is to investigate factors influencing the effect of ECG-monitoring on 30-days survival after IHCA and elements of importance in everyday clinical practice regarding whether patients are ECG-monitored prior to IHCA. METHODS: In all, 19.225 adult IHCAs registered in the Swedish Registry for Cardiopulmonary Resuscitation (SRCR) were included. Cox-adjusted survival curves were computed to study survival post IHCA. Logistic regression was used to study the association between 15 predictors and 30-days survival. By means of gradient boosting propensity scores (PS) for ECG-monitoring was computed; the PS was used as a covariate in a logistical regression estimating the association between ECG-monitoring and 30-days survival. Gradient boosting was used to study the relative importance of all predictors on ECG-monitoring. RESULTS: Overall 30-days survival was 30 %. The ECG-monitored group (n = 10.133, 52%) had a 38 % lower adjusted mortality (HR 0.62 95% CI 0.60-0.64). We observed tangible variations in ECG-monitoring ratio at different centres. The predictors of most relative influence on ECG-monitoring in IHCA were location in hospital and geographical localization. CONCLUSION: ECG-monitoring in IHCA was associated to a 38% lower adjusted mortality, despite this finding only every other IHCA patient was monitored. The significant variability in the frequency of ECG-monitoring in IHCA at different centres needs to be evaluated in future research. Guidelines for in-hospital ECG-monitoring could contribute to an improved identification and treatment of patients at risk, and possibly to an improved survival.

LESIONES POR RCP

Sin artículos esta semana

CAUSA DE LA PCR

1. Resuscitation. 2020 Mar 18. pii: S0300-9572(20)30107-6. doi: 10.1016/j.resuscitation.2020.02.040. [Epub ahead of print]

Out-of-hospital cardiac arrest: causes according to autopsy and electrocardiography-analysis of 781 patients with neither hospital care nor prescribed medication during the preceding two years.

Christina H(1), Johan AN(2), Lennart B(3), Nils E(4), Johan H(5), Thomas K(6), Britta N(3), Bengt Å(7).

Abstract

BACKGROUND: There is a knowledge gap regarding aetiology of and potential for predicting out-of-hospital cardiac arrest (OHCA) among individuals who are healthy before the event. AIM: To describe causes of OHCA and the potential for predicting OHCA in apparently healthy patients. METHODS: Patients were recruited from the Swedish Register of Cardiopulmonary Resuscitation from November 2007 to January 2011. Inclusion criteria were: OHCA with attempted CPR but neither dispensed prescription medication nor hospital care two years before the event The register includes the majority of patients suffering OHCA in Sweden where cardiopulmonary resuscitation (CPR) was attempted. Medication status was defined by linkage to the Swedish Prescribed Drug Register. Cause of death was assessed based on autopsy and the Swedish Cause of Death Register. Prediction of OHCA was attempted based on available electrocardiograms (ECG) before the OHCA event. RESULTS: Altogether 781 individuals (16% women) fulfilled the inclusion criteria. Survival to 30 days was 16%. Autopsy rate was 72%. Based on autopsy, 70% had a cardiovascular aetiology and 59% a cardiac aetiology. An ECG recording before the event was found in 23% of cases. The ECG was abnormal in 22% of them. CONCLUSION: Among OHCA victims who appeared to be healthy prior to the event, the cause was cardiovascular in the great majority according to autopsy findings. A minority had a preceding abnormal ECG that could have been helpful in avoiding the event. Key-words: Out-of-hospital cardiac arrest, etiology, medication, healthy.

END-TIDAL CO_2

Sin artículos esta semana

DONACIÓN DE ÓRGANOS

1. Pediatr Transplant. 2020 Mar 21:e13676. doi: 10.1111/petr.13676. [Epub ahead of print]

Effects of donor cause of death, ischemia time, inotrope exposure, troponin values, cardiopulmonary resuscitation, electrocardiographic and echocardiographic data on recipient outcomes: A review of the literature.

McCulloch MA(1), Zuckerman WA(2), Möller T(3), Knecht K(4), Lin KY(5), Beasley GS(6), Peng DM(7), Albert DC(8), Miera O(9), Dipchand AI(10), Kirk R(11), Davies RR(12).

Abstract

BACKGROUND: Heart transplantation has become standard of care for pediatric patients with either end-stage heart failure or inoperable congenital heart defects. Despite increasing surgical complexity and overall volume, however, annual transplant rates remain largely unchanged. Data demonstrating pediatric donor heart refusal rates of 50% suggest optimizing donor utilization is critical. This review evaluated the impact of donor characteristics surrounding the time of death on pediatric heart transplant recipient outcomes. METHODS: An extensive literature review was performed to identify articles focused on donor characteristics surrounding the time of death and their impact on pediatric heart transplant recipient outcomes. RESULTS: Potential pediatric heart transplant recipient institutions commonly receive data from seven different donor death-related categories with which to determine organ acceptance: cause of death, need for CPR, serum troponin, inotrope exposure, projected donor ischemia time, electrocardiographic, and echocardiographic results. Although DITs up to 8 hours have been reported with comparable recipient outcomes, most data support minimizing this period to <4 hours. CVA as a cause of death may be associated with decreased recipient survival but is rare in the pediatric population. Otherwise, however, in the setting of an acceptable donor heart with a normal echocardiogram, none of the other data categories surrounding donor death negatively impact pediatric heart transplant recipient survival. CONCLUSIONS: Echocardiographic evaluation is the most important donor clinical information following declaration of brain death provided to potential recipient institutions. Considering its relative importance, every effort should be made to allow direct image visualization.

FEEDBACK

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FÁRMACOS

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TRAUMA

Sin artículos esta semana

VENTILACIÓN

Sin artículos esta semana

ECOGRAFIA

Sin artículos esta semana

MONITORIZACIÓN CEREBRAL

1. Neurology. 2020 Mar 25. pii: 10.1212/WNL.0000000000009283. doi: 10.1212/WNL.0000000000009283. [Epub ahead of print]

Prediction of regaining consciousness despite an early epileptiform EEG after cardiac arrest.

Barbella G(1), Lee JW(1), Alvarez V(1), Novy J(1), Oddo M(1), Beers L(1), Rossetti AO(2).

Abstract

OBJECTIVE: After cardiac arrest (CA), epileptiform EEG, occurring in about 1/3 of patients, often but not invariably heralds poor prognosis. We tested the hypothesis that a combination of specific EEG features identifies patients who may regain consciousness despite early epileptiform patterns. METHODS: We retrospectively analyzed a registry of comatose patients post-CA (2 Swiss centers), including those with epileptiform EEG. Background and epileptiform features in EEGs 12-36 hours or 36-72 hours from CA were scored according to the American Clinical Neurophysiology Society nomenclature. Best Cerebral Performance Category (CPC) score within 3 months (CPC 1-3 vs 4-5) was the primary outcome. Significant EEG variables were combined in a score assessed with receiver operating characteristic curves, and independently validated in a US cohort; its correlation with serum neuron-specific enolase (NSE) was also tested. RESULTS: Of 488 patients, 107 (21.9%) had epileptiform EEG <72 hours; 18 (17%) reached CPC 1-3. EEG 12-36 hours background continuity ≥50%, absence of epileptiform abnormalities ($p < 0.00001$ each), 12-36 and 36-72 hours reactivity ($p < 0.0001$ each), 36-72 hours normal background amplitude ($p = 0.0004$), and stimulus-induced discharges ($p = 0.0001$) correlated with favorable outcome. The combined 6-point score cutoff ≥2 was 100% sensitive (95% confidence interval [CI], 78%-100%) and 70% specific (95% CI, 59%-80%) for CPC 1-3 (area under the curve [AUC], 0.98; 95% CI, 0.94-1.00). Increasing score correlated with NSE ($\rho = -0.46$, $p = 0.0001$). In the validation cohort (41 patients), the score was 100% sensitive (95% CI, 60%-100%) and 88% specific (95% CI, 73%-97%) for CPC 1-3 (AUC, 0.96; 95% CI, 0.91-1.00). CONCLUSION:

Prognostic value of early epileptiform EEG after CA can be estimated combining timing, continuity, reactivity, and amplitude features in a score that correlates with neuronal damage.

ORGANIZACIÓN Y ENTRENAMIENTO

1. Emerg Med J. 2020 Mar 22. pii: emermed-2018-207939. doi:10.1136/emermed-2018-207939. [Epub ahead of print]

Assessing the quality of CPR performed by a single lifeguard, two lifeguards and a lifeguard with a bystander after water rescue: a quasi-experimental trial.

Li S(1), Kan T(2), Guo Z(3), Chen C(1), Gui L(4).

Abstract

BACKGROUND: High-quality cardiopulmonary resuscitation (CPR) could improve survival of drowning victims. The purpose of the study is to assess the impact of fatigue caused by water rescue on subsequent CPR quality and the influence of a bystander's participation on CPR quality in a lifeguard rescue. METHODS: This was a simulated quasi-experimental study with a sample of 14 lifeguards and 13 laypersons. Each lifeguard performed 2 min single-rescuer CPR as baseline measurement. In three separate trials, a single lifeguard swam 50 m to perform a water rescue in a pool and returned with the manikin another 50 m. After each rescue, 10 min of CPR was performed by a single lifeguard, two lifeguards or a lifeguard with a layperson with no CPR training. Paired t-test and repeated analysis of variance were used to analyse CPR quality variables. RESULTS: Baseline CPR quality was adequate for most measures except compression depth and re-expansion. After water rescue, the single lifeguard trial showed no significant differences compared with baseline. CPR score and ventilation score of the single-lifeguard trial was higher than that of the lifeguard-bystander trial ($p=0.027$, $p<0.001$). Both the two-lifeguard trial ($p=0.025$), and lifeguard-bystander trial ($p=0.010$) had a lower percentage of breaths with correct ventilation volume and higher percentage of breaths with excessive ventilation volume ($p=0.007$, $p=0.011$, respectively) than the single-lifeguard trial. No-flow time of the lifeguard-bystander trial was longer than other trials ($p<0.001$). CONCLUSIONS: Although CPR given by the lifeguard was not optimal, fatigue generated by a water rescue has no impact on the quality of subsequent CPR performed by a trained lifeguard for 10 min. Untrained bystanders assisting in CPR in a drowning event is unlikely to be helpful.

2. J Eval Clin Pract. 2020 Mar 24. doi: 10.1111/jep.13390. [Epub ahead of print]

Identification of a morning out-of-hospital cardiac arrest cluster of high-incidence: towards a chrono-preventive care strategy.

Baert V(1)(2), Vilhelm C(1)(2), Escutnaire J(1)(2), Marc JB(3), Wiel E(1)(2)(3), Tazarourte K(4)(5), Goldstein P(3), Khoury CE(5)(6), Hubert H(1)(2), Génin M(1); on behalf GR-RéAC(2).

Abstract

RATIONALE, AIMS, AND OBJECTIVES: The human body is regulated by intrinsic factors which follow a 24-hour biological clock. Implications of a circadian rhythm in the out-of-hospital cardiac arrest (OHCA) are studied but the literature is not consistent. The main objective of our study was to identify temporal cluster of high or low incidence of OHCA occurrence during a day. METHODS: Multicentre comparative study based on the French national OHCA registry data between 2013 and 2017. After describing the population, the detection of significant temporal clusters of OHCA incidence was achieved using temporal scan statistics based on a Poisson model adjusted for age and gender. Then, comparisons between identified patients clusters and the rest of the population were performed. RESULTS: During the study, 37 163 medical OHCA victims were included. The temporal scan revealed a significant 3-hour high incidence temporal cluster between 8:00 am and 10:59 am (Relative R = 1.76, P < .001). In the identified cluster, OHCA occurred more out of the home with fewer witnesses, and advanced life support was less attempted in the cluster. No difference was observed on the return of spontaneous circulation, survival at hospital admission, and survival 30 days after the OHCA or at hospital discharge. CONCLUSIONS: We observed a three-hour morning high incidence peak of OHCA. This high incidence could be explained by different physiological changes in the morning. These changes are well known and the evidence of a morning peak of cardiovascular disease should enable medical teams to adapt care strategy and hospital organization.

3. Resuscitation. 2020 Mar 21. pii: S0300-9572(20)30109-X. doi: 10.1016/j.resuscitation.2020.03.003. [Epub ahead of print]

Short- and Long-term Outcomes of Out-Of-Hospital Cardiac Arrest Following ST-elevation Myocardial Infarction Managed with Percutaneous Coronary Intervention.

Dawson LP(1), Dinh BAppSci D(2), Duffy S(3), Brennan A(2), Clark D(4), Reid CM(2), Blusztein D(1), Stub D(3), Andrianopoulos N(2), Freeman M(5), Oqueli E(6), Ajani AE(7); Melbourne Interventional Group (MIG) Investigators.

Abstract

AIM: We compared the outcomes between patients who experienced out-of-hospital cardiac arrest at private residences and public locations to investigate whether patient and bystander characteristics can explain the poorer outcomes of out-of-hospital cardiac arrests at private residences. METHODS: Adult patients with intrinsic out-of-hospital cardiac arrest (n = 6,191, age ≥18 years) were selected from a prospectively collected Japanese database (January 2012 and March 2013). Patients were grouped according to arrest location into private-residence or control (e.g., public station or road, workplace, school, and other public locations) groups. The primary outcome was a favourable neurological outcome 1 month after out-of-hospital cardiac arrest. RESULTS: The arrest location and initial cardiac rhythm had interaction effects on the outcome. After adjusting for patient and bystander characteristics and relative to the control group, a significantly poorer 1-month neurological outcome was observed in the private-residence group if the initial cardiac rhythm was non-shockable (odds ratio: 0.36, 95% confidence interval: 0.24 to 0.54), while it was not significant if the initial cardiac rhythm was shockable (odds ratio: 1.16, 95% confidence interval: 0.74 to 1.84). CONCLUSIONS: Patients with out-of-hospital cardiac arrest at private residences had poorer outcomes than those with out-of-hospital cardiac arrest at public locations, even after adjusting for patient and bystander characteristics, if the initial cardiac rhythm was non-shockable. Our results suggest that poorer patient and bystander characteristics do not completely explain the poorer outcomes of out-of-hospital cardiac arrests; there may be unknown mechanisms through which the location of cardiac arrest affect the outcomes.

CUIDADOS POST-RCE

1. Crit Care. 2020 Mar 23;24(1):115. doi: 10.1186/s13054-020-2822-x.

Renal replacement therapy is independently associated with a lower risk of death in patients with severe acute kidney injury treated with targeted temperature management after out-of-hospital cardiac arrest.

Choi YH(1), Lee DH(2), Oh JH(3), Wee JH(4), Jang TC(5), Choi SP(6), Park KN(7); Korean Hypothermia Network Investigators.

Abstract

BACKGROUND: The effect of renal replacement therapy (RRT) on the outcomes of severe acute kidney injury (AKI) after out-of-hospital cardiac arrest (OHCA) is uncertain. This study aimed to evaluate the association of RRT with 6-month mortality in patients with severe AKI treated with targeted temperature management (TTM) after OHCA. METHODS: This was a retrospective analysis of a prospectively collected multicentre observational cohort study that included adult OHCA patients treated with TTM across 22 hospitals in South Korea between October 2015 and December 2018. AKI was diagnosed using the Kidney Disease: Improving Global Outcomes criteria. The primary outcome was 6-month mortality and the secondary outcome was cerebral performance category (CPC) at 6 months. Multivariate Cox regression analysis was performed to define the role of RRT in stage 3 AKI. RESULTS: Among 10,426 patients with OHCA, 1373 were treated with TTM. After excluding those who died within 48 h of return of spontaneous circulation (ROSC) and those with pre-arrest chronic kidney disease, our study cohort comprised 1063 patients. AKI developed in 590 (55.5%) patients and 223 (21.0%) had stage 3 AKI. Among them, 115 (51.6%) were treated with RRT. The most common treatment modality among RRT patients was continuous renal replacement therapy (111 [96.5%]), followed by intermittent haemodialysis (4 [3.5%]). The distributions of CPC (1-5) at 6 months for the non-RRT vs. the RRT group were 3/108 (2.8%) vs. 12/115 (10.4%) for CPC 1, 0/108 (0.0%) vs. 1/115 (0.9%) for CPC 2, 1/108 (0.9%) vs. 3/115 (2.6%) for CPC 3, 6/108 (5.6%) vs. 6/115 (5.2%) for CPC 4, and 98/108 (90.7%) vs. 93/115 (80.9%) for CPC 5, respectively (P = 0.01). The RRT group had significantly lower 6-month mortality than the non-RRT group (93/115 [81%] vs. 98/108 [91%], P = 0.04). Multivariate Cox regression analyses showed that RRT was independently associated with a lower risk of death in patients with stage 3 AKI (hazard ratio, 0.569 [95% confidence interval, 0.377-0.857, P = 0.01]). CONCLUSION: Dialysis interventions were independently associated with a lower risk of death in patients with stage 3 AKI treated with TTM after OHCA.

FREE FULL TEXT

2. Kardiol Pol. 2020 Mar 23. doi: 10.33963/KP.15244. [Epub ahead of print]

Out-of-hospital cardiac arrest - long term survival analysis in patients with acute coronary syndromes within Polish small region based on the National Registry of Invasive Procedures (ORPKI).

Sielski J, Kaziród-Wolski K, Siudak Z.

Abstract

BACKGROUND: Out-of-hospital cardiac arrest (OHCA) is one of the leading causes of death in high-income countries. AIMS: Analyze long-term survival of patients with OHCA identified within the ORPKI (National Registry of Invasive Procedures)for the Świętokrzyskie Province - estimating the probability of survival and evaluating risk factors. METHODS: Based on the ORPKI registry we identified subjects with OHCA prior to hospitalization. Data was collected from 01 January 2014 to 31 December 2016. RESULTS: OHCA occurred in 90 among 9855 patients with the diagnosis of MI (myocardial infarction). We identified two statistically significant risk factors: renal failure (HR=6.53 [1.17-36.40]; P = 0.03) and time from symptoms onset to first medical contact expressed in hours (HR=1.04 [1.01-1.08]; P = 0.02). The probability of survival in patients under the age of 66 was almost twice as high (HR=1.99[1.10 - 3.59]; P = 0.02) as in those over the age of 66. The probability of survival in subjects without diabetes mellitus was more than twice as high (HR=2.36 [1.12 - 4.98]; P = 0.03) as in diabetic patients. The probability of survival in patients with one-vessel coronary artery disease was almost thrice as high (HR=2.76[1.51 - 5.06]; P = 0.001) as in patients with multivessel coronary artery disease. CONCLUSIONS: The well-documented risk factors are age, history of diabetes mellitus and renal failure, multivessel coronary artery disease on angiography and time from pain onset to first medical contact. The less conventional risk predictors are total amount of contrast agent administered during invasive procedures and patient radiation exposure during the procedures.

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TARGETED TEMPERATURE MANAGEMENT

Sin artículos esta semana

ELECTROFISIOLOGÍA I DESFIBRILACIÓN

Sin artículos esta semana

PEDIATRIA

1. PLoS One. 2020 Mar 24;15(3):e0230687. doi: 10.1371/journal.pone.0230687. eCollection 2020.

Differences in the performance of resuscitation according to the resuscitation guideline terminology during infant cardiopulmonary resuscitation: "Approximately 4 cm" versus "at least one-third the anterior-posterior diameter of the chest".

Lee W(1), Yang D(1), Oh JH(1).

Abstract

AIM: This study was conducted to investigate the effect of resuscitation guideline terminology on the performance of infant cardiopulmonary resuscitation (CPR). METHODS: A total of 40 intern or resident physicians conducted 2-min CPR with the two-finger technique (TFT) and two-thumb technique (TT) on a simulated infant cardiac arrest model with a 1-day interval. They were randomly assigned to Group A or B. The participants of Group A conducted CPR with the chest compression depth (CCD) target of "approximately 4 cm" and those of Group B conducted CPR with the CCD target of "at least one-third the anterior-posterior diameter of the chest". Single rescuer CPR was performed with a 15:2 compression to ventilation ratio on the floor. RESULTS: In both chest compression techniques, the average CCD of Group B was significantly deeper than that of Group A (TFT: 41.0 [range, 39.3-42.0] mm vs. 36.5 [34.0-37.9] mm, P = 0.002; TT: 42.0 [42.0-43.0] mm vs. 37.0 [35.3-38.0] mm, P < 0.001). Adequacy of CCD also showed similar results (Group B vs. A; TFT: 99% [82-100%] vs. 29% [12-58%], P = 0.001; TT: 100% [100-100%] vs. 28% [8-53%], P < 0.001). CONCLUSIONS: Using the CCD target of "at least one-third the anterior-posterior diameter of the chest" resulted in deep and adequate chest compressions during simulated infant CPR in contrast to the CCD target of "approximately 4 cm". Therefore, changes in the terminology used in the guidelines should be considered to improve the quality of CPR.

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ECMO

1. J Am Heart Assoc. 2020 Apr 7;9(7):e015291. doi: 10.1161/JAHA.119.015291. Epub 2020 Mar 24.

Extracorporeal Cardiopulmonary Resuscitation for Out-of-Hospital Cardiac Arrest in Adult Patients.

Inoue A(1)(2), Hifumi T(3), Sakamoto T(4), Kuroda Y(1).

Abstract

Extracorporeal cardiopulmonary resuscitation (ECPR) followed by targeted temperature management has been demonstrated to significantly improve the outcomes of out-of-hospital cardiac arrest (OHCA) in adult patients. Although recent narrative and systematic reviews on

extracorporeal life support in the emergency department are available in the literature, they are focused on the efficacy of ECPR, and no comprehensively summarized review on ECPR for OHCA in adult patients is available. In this review, we aimed to clarify the prevalence, pathophysiology, predictors, management, and details of the complications of ECPR for OHCA, all of which have not been reviewed in previous literature, with the aim of facilitating understanding among acute care physicians. The leading countries in the field of ECPR are those in East Asia followed by those in Europe and the United States. ECPR may reduce the risks of reperfusion injury and deterioration to secondary brain injury. Unlike conventional cardiopulmonary resuscitation, however, no clear prognostic markers have been identified for ECPR for OHCA. Bleeding was identified as the most common complication of ECPR in patients with OHCA. Future studies should combine ECPR with intra-aortic balloon pump, extracorporeal membrane oxygenation flow, target blood pressure, and seizure management in ECPR.

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INVESTIGACIÓN EXPERIMENTAL

1. ASAIO J. 2020 Mar 24. doi: 10.1097/MAT.0000000000001146. [Epub ahead of print]

Balanced Biventricular Assist Versus Extracorporeal Membrane Oxygenation in Cardiac Arrest.

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Abstract

Mechanical assist devices in refractory cardiac arrest are increasingly employed. We compared the hemodynamics and organ perfusion during cardiac arrest with either veno-arterial extracorporeal membrane oxygenation (ECMO) or biventricular assisted circulation combining left- and right-sided impeller devices (BiPella) in an acute experimental setting. Twenty pigs were randomized in two equal groups receiving circulatory support either by ECMO or by BiPella during 40 minutes of ventricular fibrillation (VF) followed by three attempts of cardioversion, and if successful, 60 minute observation with spontaneous, unsupported circulation. Hemodynamic variables were continuously recorded. Tissue perfusion was evaluated by fluorescent microsphere injections. Cardiac function was visualized by intracardiac echocardiography. During VF device output, carotid flow, kidney perfusion, mean aortic pressure (AOPmean), and mean left ventricular pressure (LVPmean) were all significantly higher in the ECMO group, and serum-lactate values were lower compared with the BiPella group. No difference in myocardial or cerebral perfusion was observed between groups. In 15 animals with sustained cardiac function for 60 minutes after return of spontaneous circulation, left ventricular subendocardial blood flow rate averaged 0.59 ± 0.05 ml/min/gm during VF compared with 0.31 ± 0.07 ml/min/gm in five animals with circulatory collapse ($p = 0.005$). Corresponding values for the midmyocardium was 0.91 ± 0.06 vs. 0.65 ± 0.15 ml/min/gm ($p = 0.085$). Both BiPella and ECMO could sustain vital organ function. ECMO provided a more optimal systemic circulatory support related to near physiologic output.

Myocardial tissue perfusion and sustained cardiac function were related to coronary perfusion pressure during VF, irrespective of mode of circulatory support.

2. Crit Care Med. 2020 Apr;48(4):e299-e307. doi: 10.1097/CCM.0000000000004242.

Carbon Monoxide Exerts Functional Neuroprotection After Cardiac Arrest Using Extracorporeal Resuscitation in Pigs.

Wollborn J(1)(2), Steiger C(3)(4), Doostkam S(2)(5), Schallner N(1)(2), Schroeter N(2)(6), Kari FA(2)(7), Meinel L(4), Buerkle H(1)(2), Schick MA(1)(2), Goebel U(1)(2).

Abstract

OBJECTIVES: Neurologic damage following cardiac arrest remains a major burden for modern resuscitation medicine. Cardiopulmonary resuscitation with extracorporeal circulatory support holds the potential to reduce morbidity and mortality. Furthermore, the endogenous gasotransmitter carbon monoxide attracts attention in reducing cerebral injury. We hypothesize that extracorporeal resuscitation with additional carbon monoxide application reduces neurologic damage. DESIGN: Randomized, controlled animal study. SETTING: University research laboratory. SUBJECTS: Landrace-hybrid pigs. INTERVENTIONS: In a porcine model, carbon monoxide was added using a novel extracorporeal releasing system after resuscitation from cardiac arrest. MEASUREMENTS AND MAIN RESULTS: As markers of cerebral function, neuromonitoring modalities (somatosensory-evoked potentials, cerebral oximetry, and transcranial Doppler ultrasound) were used. Histopathologic damage and molecular markers (caspase-3 activity and heme oxygenase-1 expression) were analyzed. Cerebral oximetry showed fast rise in regional oxygen saturation after carbon monoxide treatment at 0.5 hours compared with extracorporeal resuscitation alone (regional cerebral oxygen saturation, 73% ± 3% vs 52% ± 8%; $p < 0.05$). Median nerve somatosensory-evoked potentials showed improved activity upon carbon monoxide treatment, whereas post-cardiac arrest cerebral perfusion differences were diminished. Histopathologic damage scores were reduced compared with customary resuscitation strategies (hippocampus: sham, 0.4 ± 0.2; cardiopulmonary resuscitation, 1.7 ± 0.4; extracorporeal cardiopulmonary resuscitation, 2.3 ± 0.2; extracorporeal cardiopulmonary resuscitation with carbon monoxide application [CO-E-CPR], 0.9 ± 0.3; $p < 0.05$). Furthermore, ionized calcium-binding adaptor molecule 1 staining revealed reduced damage patterns upon carbon monoxide treatment. Caspase-3 activity (cardiopulmonary resuscitation, 426 ± 169 pg/mL; extracorporeal cardiopulmonary resuscitation, 240 ± 61 pg/mL; CO-E-CPR, 89 ± 26 pg/mL; $p < 0.05$) and heme oxygenase-1 (sham, 1 ± 0.1; cardiopulmonary resuscitation, 2.5 ± 0.4; extracorporeal cardiopulmonary resuscitation, 2.4 ± 0.2; CO-E-CPR, 1.4 ± 0.2; $p < 0.05$) expression were reduced after carbon monoxide exposure. CONCLUSIONS: Carbon monoxide application during extracorporeal resuscitation reduces injury patterns in neuromonitoring and decreases histopathologic cerebral damage by reducing apoptosis. This may lay the basis for further clinical translation of this highly salutary substance.

CASE REPORTS

1. CJEM. 2020 Mar;22(2):155-158. doi: 10.1017/cem.2019.456.

Just the facts: Organ donation in the emergency department: When you can't save one, save eight.

Hancock J(1), Huang S(2), Zavalkoff S(3)(4).

Abstract

A 16-year-old female presents to a community emergency room following a suicide attempt by hanging. Prehospital, on arrival of paramedics, the patient was in a pulseless electrical activity rhythm. Paramedics provided advanced cardiac life support for 20 minutes before they obtained return of spontaneous circulation. In the emergency department, she had another 25-minute cardiac arrest with ultimate return of spontaneous circulation. She is now hemodynamically stable on Levophed 0.2 µg/kg/min. Her neurological exam shows pupils to be 3 mm and fixed bilaterally, absent cough and gag, and no response to central or peripheral pain. She occasionally triggers 2-3 spontaneous breaths per minute above the set rate on the ventilator. Her CT head scan shows severe anoxic changes and cerebral edema.

2. J Emerg Med. 2020 Mar 20. pii: S0736-4679(20)30010-X. doi:10.1016/j.jemermed.2020.01.008. [Epub ahead of print]

Catecholaminergic Polymorphic Ventricular Tachycardia: Challenges During Resuscitation and Post-Cardiac Arrest Care.

Carinci V(1), Gamberini L(2), Coniglio C(2), Casella G(1), Gordini G(2), Di Pasquale G(1).

Abstract

BACKGROUND: Catecholaminergic polymorphic ventricular tachycardia (CPVT) is a rare channelopathy involving cardiac calcium metabolism that often shows up at an early age with misleading clinical symptoms, such as emotion- or exercise-related syncope with a normal resting electrocardiogram. In addition, it might be the underlying cause of sudden cardiac arrest in children or young adults. The particular pathophysiology of CPVT makes it particularly challenging for both resuscitation and the subsequent intensive care management after return of spontaneous circulation (ROSC). CASE REPORT: We describe a case of sudden cardiac arrest in an 11-year-old girl affected by CPVT, with a particular focus on the most challenging aspects of resuscitation and intensive care management in light of other experiences found in the literature. A warning about the prodysrythmicity of mild hypothermia induced in the context of post-ROSC targeted temperature management in this particular population of patients and its possible physiopathological basis are discussed. WHY SHOULD AN EMERGENCY PHYSICIAN BE AWARE OF THIS?: CPVT is a rare but potentially lethal cause of stress-related syncope and sudden cardiac arrest in children and young adults. The diagnosis of CPVT requires a high level of suspicion and an interdisciplinary approach, including some adjustments during resuscitation and post-cardiac arrest care.