RCP/COMPRESSIONS TORÀCIQUES MECÀNIQUES

1. Circ Arrhythm Electrophysiol. 2020 Feb;13(2):e007843. doi:10.1161/CIRCEP.119.007843. Epub 2020 Feb 18.

Impact of Change in 2010 American Heart Association Cardiopulmonary Resuscitation Guidelines on Survival After Out-of-Hospital Cardiac Arrest in the United States: An Analysis From 2006 to 2015.

Pasupula DK(1)(2), Bhat A(1), Siddappa Malleshappa SK(3), Munir MB(4)(5), Barakat A(3), Jain S(1), Wang NC(1), Saba S(1), Bhonsale A(1).

Abstract

BACKGROUND: In October 2010, the American Heart Association/Emergency Cardiovascular Care updated cardiopulmonary resuscitation guidelines. Its impact on the survival rate among out-of-hospital cardiac arrest patients (OHCA) is not well studied. We sought to assess the survival trends in OHCA patients before and after the introduction of the 2010 American Heart Association cardiopulmonary resuscitation guidelines in the United States. METHODS: A retrospective observational study from the National Emergency Department (ED) Sample was designed to identify patients presenting to the ED primarily after an OHCA in the United States between January 1, 2006, and December 31, 2015. The main outcome studied was the change in trends of ED survival and survival-to-discharge rates before and after guideline modification. RESULTS: Among 1 282 520 patients presenting to the ED after OHCA (mean [SD] age, 65.8 [17.2] years; 62% men), ED survival rate (23%) and survival-to-discharge rate (16%) trends showed significant improvement after implementation of the 2010 American Heart Association cardiopulmonary resuscitation guidelines, 1.25% ([95% CI, 0.72%-1.78%] *P*=0.001) and 0.89% ([95% CI, 0.35%-1.43%] *P*=0.006), respectively. Notably, among patients with nonshockable rhythm (change in ED survival rate trend, 1.3% [95% CI, 0.89%-1.74%]; *P*<0.001 and survival-to-discharge trend, 0.94% [95% CI, 0.42%-1.47%]; *P*=0.004). Among patients admitted to the presenting hospital (n=145 592), 46% were discharged alive, of which 49% were discharged home. Significant decrease in discharge to home was noted (-1.7% [95% CI, -3.18% to -0.22%]; *P*=0.03), while a significant increase in neurological complication (0.17% [95% CI, 0.06%-0.28%]; *P*=0.007) was noted with the guideline modification. CONCLUSIONS: The change in 2010 American Heart Association cardiopulmonary resuscitation guidelines was associated with only slight improvement in ED survival and survival-to-discharge trends among US OHCA patients and only 1 in 6 OHCA patients survival to discharge.

REGISTRES, REVISIONS I EDITORIALS

1. Anaesth Crit Care Pain Med. 2020 Feb 5. pii: S2352-5568(20)30013-8. doi: 10.1016/j.accpm.2019.10.016. [Epub ahead of print]

Haemodynamic monitoring during therapeutic hypothermia: Which tool?

Payot C(1), Vuadens-Lehmann A(2), Giraud R(3), Bendjelid K(3).

NO ABSTRACT AVAILABLE

SMA: Editorial about epidemiology and treatment of intraoperative cardiac arrest.

2. Anesth Analg. 2020 Mar;130(3):625-626. doi: 10.1213/ANE.0000000000004611.

Intraoperative Cardiac Arrest: Of Utmost Importance and a Stepchild at the Same Time.

Hinkelbein J(1), Böttiger BW.

NO ABSTRACT AVAILABLE

ACR INTRAHOSPITALÀRIA

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LESIONS PER RCP

1. Pak J Med Sci. 2020 Jan-Feb;36(2):296-298. doi: 10.12669/pjms.36.2.1363.

Gastric perforation following improper cardiopulmonary resuscitation in out-of-hospital cardiac arrest.

Zhou GJ(1), Jin P(2), Jiang SY(3).

Abstract

Gastric perforation is a rare complication of cardiopulmonary resuscitation (CPR), mostly resulting from incorrect airway management. If left unrecognized, it is associated with high mortality and morbidity. We present a case of gastric perforation after improper CPR. A 56-year-old drunken male was sent to the emergency department due to coma after fall onto the ground. He was thought to have cardiac arrest at scene and was saved with CPR maneuver by his friends who has never been trained before. He was taken to the hospital by emergency medical service personnel and presented with abdominal distention and extensive pneumoperitoneum. Emergency laparotomy was performed which revealed gastric perforation at the lesser curvature of the stomach. The laceration was repaired without any difficulty and the patient was discharged home without any neurological deficit. The aim of this report is to remind the public and emergency physicians that gastric perforation should be suspected in patients with distended abdomen and pneumoperitoneum after CPR. Because the most common risk factor for CPR-related gastric perforation is the bystander-provided resuscitation, it is encouraged for the public to take formal CPR training.

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FÀRMACS

1. J Am Heart Assoc. 2020 Mar 3;9(5):e015076. doi: 10.1161/JAHA.119.015076. Epub 2020 Feb 19.

Effects of Different Doses of Pralidoxime Administered During Cardiopulmonary Resuscitation and the Role of α-Adrenergic Receptors in Its Pressor Action.

Jung YH(1)(2), Mamadjonov N(3), Lee HY(1), Jeung KW(1)(2), Lee BK(1)(2), Youn CS(4), Heo T(1)(2), Min YI(1)(2).

Abstract

BACKGROUND: We previously reported that pralidoxime facilitated restoration of spontaneous circulation by potentiating the pressor effect of epinephrine. We determined the optimal dose of pralidoxime during cardiopulmonary resuscitation and evaluated the involvement of α-adrenoceptors in its pressor action. METHODS AND RESULTS: Forty-four pigs randomly received 1 of 3 doses of pralidoxime (40, 80, or 120 mg/kg) or saline placebo during cardiopulmonary resuscitation, including epinephrine administration. Pralidoxime at 40 mg/kg produced the highest coronary perfusion pressure, whereas 120 mg/kg of pralidoxime produced the lowest coronary perfusion pressure. Restoration of spontaneous circulation was attained in 4 (36.4%), 11 (100%), 9 (81.8%), and 3 (27.3%) animals in the saline, 40, 80, and 120 mg/kg groups, respectively (P<0.001). In 49 rats, arterial pressure response to 40 mg/kg of pralidoxime was determined after saline, guanethidine, phenoxybenzamine, or phentolamine pretreatment, and the response to 200 mg/kg pf pralidoxime was determined after saline, propranolol, or phentolamine pretreatment. Pralidoxime at 40 mg/kg elicited a pressor response. Phenoxybenzamine completely inhibited the pressor response, but guanethidine and phentolamine did not. The pressor response of pralidoxime was even greater after guanethidine or phentolamine pretreatment. Pralidoxime at 200 mg/kg produced an initial vasodepressor response followed by a delayed pressor response. Unlike propranolol, phentolamine eliminated the initial vasodepressor response. CONCLUSIONS: Pralidoxime at 40 mg/kg administered with epinephrine improved restoration of spontaneous circulation rate by increasing coronary perfusion pressure in a pig model of cardiac arrest, whereas 120 mg/kg did not improve coronary perfusion pressure or restoration of spontaneous circulation rate. The pressor effect of pralidoxime was unrelated to α-adrenoceptors and buffered by its vasodepressor action mediated by sympathoinhibition.

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2. J Intensive Care Med. 2020 Feb 18:885066620906802. doi: 10.1177/0885066620906802. [Epub ahead of print]

Pupillary Light Reflex Is Not Abolished by Epinephrine and Atropine Given During Advanced Cardiac Life Support in Patients Who Achieve Return of Spontaneous Circulation.

Achamallah N(1)(2), Fried J(1)(3), Love R(1), Matusov Y(1)(2), Sharma R(1).

Abstract

INTRODUCTION: Absence of pupillary light reflex (PLR) is a well-studied indicator of poor neurologic recovery after cardiac arrest. Interpretation of absent PLR is difficult in patients with hypothermia or hypotension, or who have electrolyte or acid-base disturbances. Additionally, many studies exclude patients who receive epinephrine or atropine from their analysis on the basis that these drugs are thought to abolish the PLR. This observational cohort study assessed for presence or absence of PLR in in-hospital cardiac arrest patients who received epinephrine with or without atropine during advanced cardiac life support and achieved return of spontaneous circulation (ROSC). METHODS: Pupil size and reactivity were assessed in adult patients who had an in-hospital cardiac arrest, received epinephrine with or without atropine, and achieved ROSC. Measurements were taken using a NeurOptics NPi-200 infrared pupillometer. RESULTS: Forty patients had pupillometry performed within 1 hour (median: 6 minutes) after ROSC. Of these only 1 (2.5%) patient had nonreactive pupils at first measurement after ROSC. The remaining 39 (97.5%) had reactive pupils. Of the 19 patients who had pupils checked within 3 minutes of ROSC, 100% had reactive pupils. Degree of pupil responsiveness was not correlated with cumulative dose of epinephrine. Ten patients received atropine in addition to epinephrine, including the sole patient with nonreactive pupils. The remaining 9 (90%) had reactive pupils. CONCLUSION: Epinephrine and atropine do not abolish the PLR in patients who achieve ROSC after in-hospital cardiac arrest. Lack of pupillary response in the post-arrest patient should not be attributed to these drugs.

TRAUMA

1. Chest. 2020 Feb 14. pii: S0012-3692(20)30271-3. doi: 10.1016/j.chest.2020.01.035.

[Epub ahead of print]

Drowning classification: a reappraisal of clinical presentation and prognosis for severe cases.

Markarian T(1), Loundou A(2), Heyer V(2), Marimoutou C(3), Borghese L(4), Coulange M(5), Michelet P(2).

Abstract

BACKGROUND: Drowning still a major cause of accidental death worldwide. In 1997, Szpilman proposed a classification of drowning that has become the reference. Over the last decades, considerable efforts have been made to improve prevention and care. It seemed appropriate to reassess the prognosis and clinical presentation of drowned patients more than 20 years after this first publication. The aim of our study was to provide a reappraisal of patients who needed advanced health care and a precise description of their respective neurological, respiratory, and hemodynamic profiles. METHODS: This retrospective study was conducted over four consecutive summer periods between 2014 and 2017 in Intensive Care Units (ICU) located in France, French Polynesia, and French Antilles. Patients were classified following the drowning classification system proposed by Szpilman. RESULTS: During the study period, 312 drowned patients were admitted with severe clinical presentation (Grade 2-6). All patients benefited from rapid extraction from the water (< 10 min for all) and specialized care (Emergency Medical Services), starting from the prehospital period. Although the global hospital mortality was similar to previously reported (18.5%), great differences existed among severity grades. Respective grades' mortalities were low for Grade 2-5 (Grade 2 - 0%; Grade 3 - 3%; Grade 4 - 0%; Grade 5 - 2%) as the mortality for Grade 6 remained similar to previously reported (54%). Our results confirmed that the occurrence of a cardiac arrest after drowning still pejorative. Conversely, for other grades, our study strengthens the importance of specialized intervention to interrupt the drowning process. CONCLUSION: Based on our results, drowning-related cardiac arrest is still the prognosis cornerstone. For other victims, prognosis was better than previously expected, which strengthens the importance of specialized intervention to interrupt the drowning process.

VENTILACIÓ

1. World J Emerg Med. 2020;11(2):97-101. doi: 10.5847/wjem.j.1920-8642.2020.02.006.

Changes in peak inspiratory flow rate and peak airway pressure with endotracheal tube size during chest compression.

Kim JW(1), Lee JW(1), Ryu S(1), Park JS(1)(2), Yoo I(1)(2), Cho YC(1), Ahn HJ(1).

Abstract

BACKGROUND: Adequate airway management plays an important role in high-quality cardiopulmonary resuscitation (CPR). Airway management is usually performed using an endotracheal tube (ETT) during CPR. However, no study has assessed the effect of ETT size on the flow rate and airway pressure during CPR. METHODS: We measured changes in peak inspiratory flow rate (PIFR), peak airway pressure (P_{peak}), and mean airway pressure (P_{mean}) according to changes in ETT size (internal diameter 6.0, 7.0, and 8.0 mm) and with or without CPR. A tidal volume of 500 mL was supplied at a rate of 10 times per minute using a mechanical ventilator. Chest compressions were maintained at a constant compression depth and speed using a mechanical chest compression device (LUCAS2, mode: active continuous, chest compression rate: 102±2/minute, chest compression depth 2-2.5 inches). RESULTS: The median of several respiratory physiological parameters during CPR was significantly different according to the diameter of each ETT (6.0 vs. 8.0 mm): PIFR (32.1 L/min [30.5-35.3] vs. 28.9 L/min [27.5-30.8], P<0.001), P_{peak} (48.84 cmH_2O [27.46-52.11] vs. 27.45 cmH_2O [22.53-52.57], P<0.001), and P_{mean} (18.34 cmH_2O [14.61-21.66] vs.13.66 cmH_2O [8.41-19.24], P<0.001). CONCLUSION: The changes in PIFR, P_{peak}, and P_{mean} were related to the internal diameter of ETT, and these values tended to decrease with an increase in ETT size. Higher airway pressures were measured in the CPR group than in the no CPR group.

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ECOGRAFIA EN SVA

1. Resuscitation. 2020 Feb 14. pii: S0300-9572(20)30066-6. doi:

10.1016/j.resuscitation.2020.02.004. [Epub ahead of print]

Association of ultrasound-related interruption during cardiopulmonary resuscitation with adult cardiac arrest outcomes: A video-reviewed retrospective study.

Chou EH(1), Wang CH(2), Monfort R(3), Likourezos A(3), Wolfshohl J(4), Lu TC(5), Hsieh YL(6), Haines L(3), Dickman E(3), Lin J(7).

Abstract

OBJECTIVES: To determine the association of focused transthoracic echocardiography (ECHO) related interruption during cardiopulmonary resuscitation (CPR) with patient outcomes in the Emergency Department (ED). METHODS: This was a retrospective, single center, cohort study,

conducted in an urban community teaching ED. Eligible study subjects were adult patients in the ED with sustained cardiac arrest. Exclusion criteria include traumatic cardiac arrest and age less than 18. All resuscitations were video recorded and were subsequently reviewed by 2 study investigators. The no-flow time from chest compression interruption was analyzed using video review and separated into ECHO-related and non-ECHOrelated. Our primary outcome was patient survival to hospital discharge and the secondary outcome was the rate of return of spontaneous circulation (ROSC). Multivariate logistic regression analyses were performed to examine the associations between independent variables and outcomes. RESULTS: From January 2016 to May 2017, a total of 210 patients were included for final analysis. The median total no-flow time observed on video was 99.5 seconds (IQR: 54.0-160.0 seconds). Among these, a median of 26.5 seconds (IQR: 0.0-59.0 seconds) was ECHO-related and a median of 60.5 seconds (IQR: 34.0-101.9) was non-ECHO-related. The ECHO-related noflow time between 77 and 122 seconds (OR: 7.31, 95% confidence interval [CI]: 1.59-33.59; p-value = 0.01) and ECHO-related interruption≦2 times (OR: 8.22, 95% CI: 1.51-44.64; p-value = 0.01) were positively associated with survival to hospital discharge. ECHO-related interruption≦2 times (OR: 5.55, 95% CI: 2.44-12.61; p-value <0.001) was also positively associated with ROSC. CONCLUSION: Short ECHO-related interruption during CPR was positively associated with ROSC and survival to hospital discharge. While ECHO can be a valuable diagnostic tool during CPR, the no-flow time associated with ECHO should be minimized.

MONITORATGE CEREBRAL

1. J Crit Care. 2020 Feb 4;57:49-54. doi: 10.1016/j.jcrc.2020.02.001. [Epub ahead of

print]

Cerebrospinal fluid lactate dehydrogenase as a potential predictor of neurologic

outcomes in cardiac arrest survivors who underwent target temperature management.

Park JS(1), You Y(2), Ahn HJ(3), Min JH(2), Jeong W(2), Yoo I(1), Cho Y(2), Ryu S(2), Lee J(2), Kim S(1), Cho SU(2), Oh SK(2), Kang CS(2), Lee BK(4).

Abstract

PURPOSE: Cerebrospinal fluid (CSF) lactate dehydrogenase (LDH) levels increase in patients with brain injury. We investigated neurologic outcomes associated with CSF LDH levels in out-of-hospital cardiac arrest (OHCA) survivors who underwent target temperature management (TTM). MATERIALS AND METHODS: This was a prospective single-centre observational study from April 2018 to May 2019 on a cohort of 41 patients. CSF and serum LDH samples were obtained immediately (LDH_0) and at 24 (LDH_{24}), 48 (LDH_{48}), and 72 h (LDH_{72}) after return of spontaneous circulation (ROSC). Neurologic outcomes were assessed at 3 months after ROSC using the Cerebral Performance Category scale. RESULTS: Twenty-one patients had a poor neurologic outcome. CSF LDH levels were significantly higher in the poor neurologic outcome group at each time point. The area under the curve (AUC) of CSF LDH_{48} was 0.941 (95% confidence interval [CI], 0.806-0.992). With a cut off value of 250 U/L, CSF LDH_{48} had a high sensitivity (94.1%; 95% CI, 71.3-99.9) at 100% specificity. CONCLUSIONS: CSF LDH level at 48 h was a highly specific and sensitive marker for 3-month poor neurologic outcome. This may constitute a useful predictive marker for neurologic outcome in OHCA survivors treated with TTM.

ORGANITZACIÓ I EDUCACIÓ

1. Circ J. 2020 Feb 20. doi: 10.1253/circj.CJ-19-0920. [Epub ahead of print]

Characteristics and Outcomes of Out-of-Hospital Cardiac Arrest in Educational Institutions in Japan - All-Japan Utstein Registry.

Nishiyama C(1), Kiyohara K(2), Matsuyama T(3), Kitamura T(4), Kiguchi T(5), Kobayashi D(5), Okabayashi S(5), Shimamoto T(5), Kawamura T(5), Iwami T(5).

Abstract

BACKGROUND: Although schools are key places that conduct cardiopulmonary resuscitation (CPR) and public-access defibrillation (PAD) programs, out-of-hospital cardiac arrest (OHCA) in educational institutions is poorly understood. This study describes the characteristics and outcomes of such OHCAs. METHODS AND RESULTS: Data for OHCAs of any cause occurring in educational institutions between 2013 and 2015 were extracted from the All-Japan Utstein Registry. Patient characteristics and outcomes were documented. Subjects were divided into 6 age groups (0-1, 2-5, 6-11, 12-14, 15-17, and ≥18 years). Among the 783 eligible OHCA patients, most received bystander CPR regardless of age, ranging from 73.9% in those aged ≥18 years to 90.0% in those aged 2-5 years. However, the proportion receiving PAD differed by age group, ranging from 2.9% in those aged 0-1 years to 66.7% in those aged 12-14 years. The proportion of patients with 1-month survival with favorable neurological outcome differed significantly by age group, being extremely low among patients aged 0-1 years (zero for OHCA of cardiac origin), but high among patients aged 6-11, 12-14, and 15-17 years (69.2%, 77.5%, and 70.0%, respectively) for OHCA of cardiac origin. CONCLUSIONS: The outcomes of OHCA occurring in educational institutions, where PAD is available, differed significantly by age.

2. Eur J Anaesthesiol. 2020 Feb 18. doi: 10.1097/EJA.0000000000001177. [Epub ahead of print]

Video-assisted cardiopulmonary resuscitation via smartphone improves quality of resuscitation: A randomised controlled simulation trial.

Ecker H(1), Lindacher F, Adams N, Hamacher S, Wingen S, Schier R, Böttiger BW, Wetsch WA.

Abstract

BACKGROUND: Despite intensive research, cardiac arrest remains a leading cause of death. It is of paramount importance to undertake every possible effort to increase the overall quality of cardiopulmonary resuscitation (CPR) and improve patient outcome. CPR initiated by a bystander is one of the key factors in survival of such an incident. Telephone-assisted CPR (T-CPR) has proved to be an effective measure in improving layperson resuscitation. OBJECTIVE: We hypothesised that adding video-telephony to the emergency call (video-CPR, V-CPR) enhances the quality of layperson resuscitation. DESIGN: This prospective randomised controlled simulation trial was performed from July to August 2018. Laypersons were randomly assigned to video-assisted (V-CPR), telephone-assisted (T-CPR) or control (unassisted CPR) groups. Participants were instructed to perform first aid on a mannequin during a simulated cardiac arrest. SETTING: This study was conducted in the Skills Lab of the University Hospital of Cologne. PARTICIPANTS: One hundred

and fifty healthy adult volunteers. INTERVENTION: The participants received a smartphone to call emergency services, with Emergency Eye video-call in V-CPR group, and normal telephone functionality in the other groups. T-CPR and V-CPR groups received standardised CPR assistance via phone. MAIN OUTCOME MEASURES: Our primary endpoint was resuscitation quality, quantified by compression frequency and depth, and correct hand position. RESULTS: Mean compression frequency of V-CPR group was 106.4±11.7 min, T-CPR group 98.9±12.3 min (NS), unassisted group 71.6±32.3 min ($P<0.001$). Mean compression depth was 55.4±12.3 mm in V-CPR, 52.1±13.3 mm in T-CPR ($P<0.001$) and 52.9±15.5 mm in unassisted ($P<0.001$). Total percentage of correct chest compressions was significantly higher ($P<0.001$) in V-CPR (82.6%), than T-CPR (75.4%) and unassisted (77.3%) groups. CONCLUSION: V-CPR was shown to be superior to unassisted CPR, and was comparable to T-CPR. However, V-CPR leads to a significantly better hand position compared with the other study groups. V-CPR assistance resulted in volunteers performing chest compressions with more accurate compression depth. Despite reaching statistical significance, this may be of little clinical relevance.

3. J Am Heart Assoc. 2020 Feb 18;9(4):e014178. doi: 10.1161/JAHA.119.014178. Epub 2020 Feb 12.

Association of Neighborhood Race and Income With Survival After Out-of-Hospital

Cardiac Arrest.

Chan PS(1)(2), McNally B(3)(4), Vellano K, Tang Y(1), Spertus JA(1)(2).

Abstract

Background For individuals with an out-of-hospital cardiac arrest (OHCA), survival may be influenced by the neighborhood in which the arrest occurs. Methods and Results Within the national CARES (Cardiac Arrest Registry to Enhance Survival) registry, we identified 169 502 patients with OHCA from 2013 to 2017. On the basis of census tract data, OHCAs were categorized as occurring in predominantly white (>80% white), majority black (>50% black), or integrated (neither of these 2) neighborhoods and in low-income (median household <$40 000), middle-income ($40 000 to $80 000), or high-income (>$80 000) neighborhoods. With hierarchical logistic regression, the association of neighborhood race and income on overall survival was assessed. Overall, 37.5%, 16.6%, and 45.9% of people had an OHCA in predominantly white, majority black, and integrated neighborhoods, and 30.1%, 53.4%, and 16.5% in low-, middle-, and high-income neighborhoods, respectively. Compared with OHCAs occurring in predominantly white neighborhoods, those in majority black neighborhoods were 12% less likely (6.9% versus 10.6%; adjusted odds ratio 0.88; 95% CI 0.82-0.95; $P<0.001$) to survive to discharge, whereas those in integrated neighborhoods had similar survival (10.3% versus 10.6%; adjusted odds ratio 1.00; 95% CI 0.96-1.04; $P=0.93$). Compared with high-income neighborhoods, those in middle-income neighborhoods were 11% (10.1% versus 11.3%; adjusted odds ratio 0.89; 95% CI 0.8-0.94; $P<0.001$) less likely to survive to discharge, whereas those in low-income neighborhoods were 12% (8.6% versus 11.3%; adjusted odds ratio 95% CI 0.83-0.94; $P<0.001$) less likely to survive. Differential rates of bystander cardiopulmonary resuscitation only modestly attenuated neighborhood differences in survival. Conclusions OHCAs in majority black and non-high-income neighborhoods have lower survival rates, and these differences were not explained by differential bystander cardiopulmonary resuscitation rates.

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4. J Am Heart Assoc. 2020 Feb 18;9(4):e014200. doi: 10.1161/JAHA.119.014200. Epub 2020 Feb 17.

Do Sex Differences Exist in the Establishment of "Do Not Attempt Resuscitation" Orders and Survival in Patients Successfully Resuscitated From In-Hospital Cardiac Arrest?

Perman SM(1), Beaty BL(2), Daugherty SL(2)(3), Havranek EP(4), Haukoos JS(1)(5)(6), Juarez-Colunga E(2), Bradley SM(7), Fendler TJ(8), Chan PS(8); American Heart Association Get With The Guidelines-Resuscitation Investigators

Abstract

BACKGROUND: Women have higher utilization of "do not attempt resuscitation" (DNAR) orders during treatment for critical illness. Occurrence of sex differences in the establishment of DNAR orders after resuscitation from in-hospital cardiac arrest is unknown. Whether differences in DNAR use by sex lead to disparities in survival remains unclear. METHODS AND RESULTS: We identified 71 820 patients with return of spontaneous circulation (ROSC) after in-hospital cardiac arrest from the Get With The Guidelines-Resuscitation registry. Multivariable models evaluated the association between de novo DNAR (anytime after ROSC, within 12 hours of ROSC, or within 72 hours of ROSC) by sex and the association between sex and survival to discharge accounting for DNAR. All models accounted for clustering of patients within hospital and adjusted for demographic and cardiac arrest characteristics. The cohort included 30 454 (42.4%) women, who were slightly more likely than male participants to establish DNAR orders anytime after ROSC (45.0% versus 43.5%; adjusted relative risk: 1.15 [95% CI, 1.10-1.20]; *P*<0.0001). Of those with DNAR orders, women were more likely to be DNAR status within the first 12 hours (51.8% versus 46.5%; adjusted relative risk: 1.40 [95% CI, 1.30-1.52]; *P*<0.0001) and within 72 hours after ROSC (75.9% versus 70.9%; adjusted relative risk: 1.35 [95% CI, 1.26-1.45]; *P*<0.0001). However, no difference in survival to hospital discharge between women and men (34.5% versus 36.7%; adjusted relative risk: 1.00 [95% CI, 0.99-1.02]; *P*=0.74) was appreciated. CONCLUSIONS: In patients successfully resuscitated from in-hospital cardiac arrest, there was no survival difference between men and women while accounting for DNAR. However, women had a higher rate of DNAR status early after resuscitation (<12 and <72 hours) in comparison to men.

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5. Resuscitation. 2020 Feb 14. pii: S0300-9572(20)30063-0. doi: 10.1016/j.resuscitation.2020.02.002. [Epub ahead of print]

High Risk Neighbourhoods: The Effect of Neighbourhood Level Factors on Cardiac Arrest Incidence.

Allan KS(1), Ray JG(2), Gozdyra P(3), Morrison LJ(4), Kiss A(5), Buick JE(6), Zhan CC(7), Dorian P(8); Rescu Investigators.

Abstract

BACKGROUND: Numerous studies have shown significant neighbourhood level variation in out-of-hospital cardiac arrest (OHCA) incidence rates, however, few have provided an explanation for these disparities beyond traditional socioeconomic measures. METHODS: This was a retrospective study using data from a large population-based OHCA database (Rescu Epistry). We included adults ≥20 years who experienced a non-traumatic OHCA and were treated by emergency medical services within Toronto, Canada between 2006-2012. The residential address of each OHCA patient was spatially mapped to 1 of 517 Toronto census tracts (CTs). Patient and CT level characteristics were included in multivariate regression models to assess their association with OHCA incidence per 100,000 persons. RESULTS: Of the 7775 OHCAs occurring in the study area, 7692 (98.9%) were

eligible for inclusion. OHCA incidence rates varied widely across CT quintiles, with rates differing almost 4-fold (109.1 per 100,000 yearly Q5 most deprived vs. 30.0 per 100,000 yearly Q1 least deprived $p < 0.0001$). Numerous areas of high incidence adjacent to areas of low incidence were observed. After adjustment, all variables except the activity friendly index showed highly significant linear trends, with increasing age, sex ratio, diabetes prevalence, material deprivation and ethnic concentration being independently associated with increasing OHCA incidence. In contrast, we did not observe a linear relationship between high OHCA incidence and median household income. CONCLUSIONS: This study showed almost 4-fold OHCA incidence variability across a large metropolitan area. This variability was partially correlated with population and health data, but not typical socioeconomic predictors, such as median household income.

CURES POST-RCE

1. Circ J. 2020 Feb 18. doi: 10.1253/circj.CJ-19-0836. [Epub ahead of print]

Heart Rate After Resuscitation From Out-of-Hospital Cardiac Arrest due to Acute Coronary Syndrome Is an Independent Predictor of Clinical Outcome.

Matsumoto S(1), Nakanishi R(1), Watanabe I(2), Aikawa H(2), Noike R(2), Yabe T(2), Okubo R(2), Fujino T(1), Amano H(1), Toda M(2), Ikeda T(1).

Abstract

BACKGROUND: Heart rate (HR) is a useful predictor of cardiovascular disease, especially in acute coronary syndrome (ACS). However, it is unclear whether there is an association between HR and clinical outcomes after resuscitation from out-of-hospital cardiac arrest (OHCA) due to ACS. The aim of this study was to investigate the impact of HR on clinical outcome in individuals resuscitated from OHCA due to ACS.Methods and Results:Data from 3,687 OHCA patients between October 2002 and October 2014 were retrospectively analyzed. We divided 154 patients diagnosed with ACS into 2 groups: those with tachycardia (HR >100 beats/min, n=71) and those without tachycardia (HR ≤100 beats/min, n=83) after resuscitation. The primary endpoint was 1-year mortality and the secondary endpoint was neurological injury at discharge according to cerebral performance category score. Overall, mean HR was 95.6 beats/min. There were several significant differences in patient characteristics, indicating poor general condition of patients with tachycardia. Mortality at 1-year was 41.6%, and neurological injury at discharge was observed in 44.1% of individuals. In the multivariate analysis, tachycardia after resuscitation was an independent predictor of both 1-year mortality (hazard ratio, 2.66; 95% CI: 1.20-5.85; P=0.03) and neurological injury at discharge (odds ratio, 2.65; 95% CI: 1.27-5.55; P=0.04). CONCLUSIONS: In patients who recovered from OHCA due to ACS, tachycardia after resuscitation predicted poor clinical outcome.

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1. Resuscitation. 2020 Feb 15. pii: S0300-9572(20)30065-4. doi: 10.1016/j.resuscitation.2020.01.037. [Epub ahead of print]

Paediatric traumatic out-of-hospital cardiac arrest: A systematic review and meta-analysis.

Alqudah Z(1), Nehme Z(2), Alrawashdeh A(3), Williams B(4), Oteir A(3), Smith K(5).

Abstract

AIM: In this study, we sought to quantitatively describe the survival outcomes, incidence rates, and predictors of survival after paediatric traumatic out-of-hospital cardiac arrest (OHCA). METHODS: We systematically searched MEDLINE, EMBASE, EMCARE, and CINAHL to identify observational or interventional studies reporting relevant data for paediatric traumatic OHCA. The Joanna Briggs Institute critical appraisal tool for prognostic studies was used to assess study quality. We analysed the survival outcomes and pooled incidence rates per 100,000 person-years using random-effect models. RESULTS: Nineteen articles met the eligibility criteria involving 705 Emergency Medical Service (EMS)-attended and 973 EMS-treated traumatic paediatric OHCAs across an estimated serviceable population of 15.2 million. Four studies were conducted in the Asia-pacific region, seven in Europe, and eight in North America. Nine studies were assessed as low quality. Overall pooled survival to hospital discharge or 30-day survival for the EMS-treated cases was 1.2% (n = 6 studies; 95% confidence interval (CI): 0.1%, 3.1%; $I^2 = 26.1\%$). The pooled rate of return of spontaneous circulation in four studies was 22.1% (95% CI: 18.4%, 26.1%; $I^2 = 0.0\%$), and the pooled rate of event survival was 18.8% (n = 3 studies; 95% CI: 15.2%, 22.7%; $I^2 = 0.0\%$). The pooled incidence of EMS-treated paediatric traumatic OHCA was 1.6 cases per 100,000 person-years (n = 10 studies; 95% CI: 1.1, 2.2; $I^2 = 98.1\%$). No study reported on the impact of epidemiological or clinical factors on survival. CONCLUSION: Survival outcomes of paediatric traumatic OHCA are poor and existing studies report varying incidence rates. The absence of large prospective and international registry data hinders the development of novel strategies to improve survival rates.

2. Resuscitation. 2020 Feb 15. pii: S0300-9572(20)30067-8. doi: 10.1016/j.resuscitation.2020.02.005. [Epub ahead of print]

Type of advanced airway and survival after pediatric out-of-hospital cardiac arrest.

Fukuda T(1), Sekiguchi H(2), Taira T(3), Hashizume N(4), Kitamura Y(5), Terada T(6), Ohashi-Fukuda N(7), Kukita I(8).

Abstract

BACKGROUND: There is a knowledge gap about advanced airway management (AAM) after pediatric out-of-hospital cardiac arrest (OHCA) in the prehospital setting. We assessed which AAM strategy would be associated with an increased chance of survival after pediatric OHCA. METHODS: A nationwide population-based observational study was conducted using the Japanese government-led registry data of OHCA. Pediatric OHCA patients (aged 1-17 years) who received prehospital AAM via endotracheal intubation (ETI) or supraglottic airway (SGA) insertion by

emergency medical service (EMS) personnel from 2011 to 2017 were included. Patients who received ETI were compared with those who received SGA insertion. The primary outcome was one-month survival after OHCA. RESULTS: A total of 967 patients (mean [SD] age, 12.2 [5.1] years; 66.6% male) were included; 113 received ETI, and 854 received SGA insertion. Among the total cohort, 118 (12.2%) survived one month after OHCA. In the propensity score-matched cohort, no difference was observed in one-month survival between the ETI and SGA insertion groups: 13 of 113 patients (11.5%) vs 12 of 113 patients (10.6%); RR, 1.08; 95%CI, 0.52-2.27. This lack of association between AAM strategy and survival was observed across a variety of subgroup and sensitivity analyses, and also for neurologically favorable survival (P = 0.5611) in the propensity score-matched analysis.

CONCLUSIONS: In Japan, among pediatric OHCA patients, there was no significant difference in one-month survival between prehospital ETI and SGA insertion by EMS personnel. Although an adequately powered randomized controlled trial is needed, EMS personnel may choose their familiar strategy when prehospital AAM was performed during pediatric OHCA.

ECMO

Sense articles aquesta setmana

RECERCA EXPERIMENTAL

1. Prehosp Disaster Med. 2020 Feb 19:1-8. doi: 10.1017/S1049023X2000014X. [Epub ahead of print]

Serum Copeptin Levels Predict the Return of Spontaneous Circulation and the Short-Term Prognosis of Patients with Out-of-Hospital Cardiac Arrest: A Randomized Control Study.

Cakmak S(1), Sogut O(1), Albayrak L(2), Yildiz A(3).

Abstract

INTRODUCTION: Early and accurate prediction of survival to hospital discharge following resuscitation after cardiac arrest (CA) is a major challenge. Biomarkers can be used for early and accurate prediction of survival and prognosis following resuscitation after CA, but none of those identified so far are sufficient by themselves. HYPOTHESIS/PROBLEM: The goal of this study was to investigate the predictive power of the serum copeptin level for determining the return of spontaneous circulation (ROSC) and prognosis of patients with non-traumatic out-of-hospital cardiac arrest (OHCA) who underwent cardiopulmonary resuscitation (CPR). METHODS: A total of 76 consecutive consenting adult patients who were diagnosed as non-traumatic OHCA and 63 age- and sex-matched healthy controls were enrolled. The patients were divided into two groups based on whether or not they had ROSC. The ROSC group was divided into two sub-groups according to whether death occurred within 24 hours or after 24 hours following ROSC. Serum copeptin, high-sensitivity cardiac troponin (hs-cTnI), creatine kinase-muscle/brain (CK-MB), glucose, and blood gas values were compared between the groups. RESULTS: Serum copeptin levels were significantly higher in the patient group than control group (P <.001). Receiving operator characteristic analysis revealed a cut-off copeptin level of 27.29pmol/L, with 98.7% sensitivity and 100.0% specificity, for distinguishing patients from controls. Serum copeptin levels were significantly lower in the ROSC group than non-ROSC group (P = .018). Additionally, the mean serum hs-cTnI level was significantly higher in the ROSC group than non-ROSC group (P = .032). However, there were no significant differences in the mean serum glucose level and CK-MB levels or arterial blood gas levels between the ROSC and non-ROSC groups (all P >.05).Ten (38.5%) of

the patients died within the first 24 hours after ROSC, whereas 16 (61.5%) survived longer than 24 hours. Serum copeptin levels were significantly lower in patients who survived longer than 24 hours compared with those who died within the first 24 hours. Moreover, the mean CPR duration was significantly lower in patients surviving more than 24 hours compared with less than 24 hours. CONCLUSION: The serum copeptin level may serve as a guide in diagnostic decision making to predict ROSC in patients undergoing CPR and determining the short-term prognosis of patients with ROSC.

2. J Transl Med. 2020 Feb 14;18(1):83. doi: 10.1186/s12967-020-02264-5.

An impedance threshold device did not improve carotid blood flow in a porcine model of prolonged cardiac arrest.

Kjaergaard B(1)(2)(3), Holdgaard HO(4)(5), Magnusdottir SO(4)(6), Lundbye-Christensen S(4)(7), Christensen EF(4)(5)(8).

Abstract

BACKGROUND: An impedance threshold device (ITD) was developed to increase venous return to the heart and therefore increase cardiac output and organ blood flow during cardiopulmonary rescue (CPR). Basic CPR aims to maintain coronary and cerebral blood flow at the minimum level necessary for survival. The present study compared the effects of an ITD on cerebral blood flow assessed as blood flow in both carotid arteries to the blood flow of a control group during prolonged CPR. METHODS: Fourteen anaesthetized pigs were monitored during 60 min of CPR after induced ventricular fibrillation. The primary outcome was blood flow in both carotid arteries, and the secondary outcomes were blood pressure, acid-base parameters, plasma potassium, and plasma lactate. The pigs were randomized to mechanical compressions and ventilation with an ITD added to the ventilation or to a control group treated only with mechanical compressions and ventilation. The time course for the parameters was tested using analysis of variance. RESULTS: The cumulative carotid blood flow in the ITD group decreased from 64 to 42 ml/min, and it decreased from 69 to 51 ml/min in the control group during 60 min of CPR. The difference was not significant. The secondary outcome measures were also not significantly different. CONCLUSIONS: This study did not show any beneficial effect of an ITD on carotid blood flow.

FREE FULL TEXT

CASE REPORTS

1. Am J Forensic Med Pathol. 2020 Mar;41(1):42-47. doi:10.1097/PAF.0000000000000531.

Severe Myocardial Steatosis: Incidental Finding or a Significant Anatomic Substrate for Sudden Cardiac Arrest?

Tuzzolo A(1), Febres-Aldana CA(2), Poppiti R(1)(2).

Abstract

Myocardial steatosis, also known as lipomatosis cordis, is characterized by adipose tissue within the myocardium without significant fibrosis. Evidence suggests that accumulation of fat can disturb the normal electromechanical physiology of the myocardium. Herein, we discuss the case of a 60-year-

old woman with a history of chronic obstructive pulmonary disease who died because of anoxic encephalopathy after a sudden cardiac arrest (SCA). An electrocardiogram showed QRS fragmentation noted as notched R in inferior leads. The autopsy revealed a very small thromboembolus in a distal subsegmental branch of the pulmonary artery, which could not explain the SCA. There was an extensive intramyocardial accumulation of adipose tissue involving the right ventricle and interventricular septum, which split the myocardium into discrete bundles. Arrhythmogenic right ventricular cardiomyopathy was ruled out based on the absence of typical fibrofatty changes. The mechanism of fat replacement was likely secondary to redistribution of visceral fat in the setting of Cushing syndrome. We propose that severe myocardial steatosis can create an anatomic substrate to facilitate the development of SCA. Myocardial steatosis should be reported to identify patients who are at risk for developing cardiovascular events secondary to extreme cardiac adiposity.

RCP/COMPRESSIONS TORÀCIQUES MECÀNIQUES

1. PLoS One. 2020 Feb 13;15(2):e0228702. doi: 10.1371/journal.pone.0228702. eCollection 2020.

Providing the best chest compression quality: Standard CPR versus chest compressions only in a bystander resuscitation model.

Rössler B(1)(2), Goschin J(1), Maleczek M(1)(3), Piringer F(3), Thell R(3), Mittlböck M(4), Schebesta K(1)(2).

Abstract

AIM OF THE STUDY: Bystander-initiated basic life support (BLS) for the treatment of prehospital cardiac arrest increases survival but is frequently not performed due to fear and a lack of knowledge. A simple flowchart can improve motivation and the quality of performance. Furthermore, guidelines

do recommend a chest compression (CC)-only algorithm for dispatcher-assisted bystander resuscitation, which may lead to increased fatigue and a loss of compression depth. Consequently,

we wanted to test the hypothesis that CCs are more correctly delivered in a flowchart-assisted standard resuscitation algorithm than in a CC-only algorithm. METHODS: With the use of a manikin

model, 84 laypersons were randomized to perform either flowchart-assisted standard resuscitation or CC-only resuscitation for 5min. The primary outcome was the total number of CCs. RESULTS: The

total number of correct CCs did not significantly differ between the CC-only group and the standard group (63 [±81] vs. 79 [±86]; p = 0.394; 95% CI of difference: 21-53). The total hand-off time was

significantly lower in the CC-only group than in the standard BLS group. The relative number of correct CCs (the fraction of the total number of CCs achieving 5-6cm) and the level of exhaustion

after BLS did not significantly differ between the groups. CONCLUSION: Standard BLS did not lead to an increase in correctly delivered CCs compared to CC-only resuscitation and exhibited significantly

more hand-off time. The low rate of CCs in both groups indicates the need for an increased focus on performance during BLS training.

FREE FULL TEXT

REGISTRES, REVISIONS I EDITORIALS

1. Air Med J. 2020 Jan - Feb;39(1):64-67. doi: 10.1016/j.amj.2019.09.012. Epub 2019 Oct 31.

Cardiac Arrest Secondary to Accidental Hypothermia: Rewarming Strategies in the Field.

Willmore R(1).

Abstract

Hypothermic cardiac arrest is rare and poses a challenge to prehospital responders. Standard cardiac arrest protocols advise treating reversible causes of arrest; however, rewarming the cold casualty is not easily achieved in the field. This article aimed to review the literature on hypothermia in order to

produce evidence-based recommendations on rewarming that could realistically be applied to hypothermic cardiac arrest patients.

1. Eur Heart J Cardiovasc Pharmacother. 2020 Feb 12. pii: pvaa009. doi:10.1093/ehjcvp/pvaa009. [Epub ahead of print]

Antithrombotic therapy in patients with acute coronary syndrome complicated by cardiogenic shock or out-of-hospital cardiac arrest: a Joint Position Paper from the European Society of Cardiology (ESC) Working Group on Thrombosis, in association with the Acute Cardiovascular Care Association (ACCA) and European Association of Percutaneous Cardiovascular Interventions (EAPCI).

Gorog DA(1), Price S(2), Sibbing D(3), Baumbach A(4), Capodanno D(5), Gigante B(6), Halvorsen S(7), Huber K(8), Lettino M(9), Leonardi S(10), Morais J(11), Rubboli A(12), Siller-Matula JM(13), Storey RF(14), Vranckx P(15), Rocca B(16).

NO ABSTRACT AVAILABLE

ACR INTRAHOSPITALÀRIA

RES AQUESTA SETMANA

LESIONS PER RCP

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DONACIÓ D'ÒRGANS

RES AQUESTA SETMANA

FEEDBACK

RES AQUESTA SETMANA

FÀRMACS

1. Resuscitation. 2020 Feb 6;149:10-16. doi: 10.1016/j.resuscitation.2020.01.028. [Epub ahead of print]

Safe prognostication following cardiac arrest: The role of the pharmacokinetics of fentanyl in patients treated with targeted temperature management.

Baldwin F(1), Gray R(2), Boyd O(2), Waxman D(3), Patel B(4), Allen M(4), Scutt G(4).

Abstract

BACKGROUND: Neurological prognostication following cardiac arrest (CA) is complex and sedative agents may significantly impair responses to clinical examination. This study investigates the elimination of fentanyl in patients treated with targeted temperature management (TTM). METHODS: We measured the blood concentration of fentanyl in 23 post-cardiac arrest patients treated with TTM following discontinuation of continuous infusion. Fentanyl was discontinued when the patients were rewarmed to a temperature of 36-36.5 °C and a blood sample taken 12 h later. Measured concentrations were compared with predicted concentrations using population pharmacokinetic parameters. Variables likely to prolong half-life were analysed using a multivariate regression model. RESULTS: We found a statistically significant difference between median measured and predicted concentrations (measured 0.93 μg/L [range 0.11-8.29 μg/L] vs. predicted 0.30 μg/L [range 0.16-0.59 μg/L]; $p < 0.05$). Univariate analysis identified a significant relationship between estimated fentanyl half-life and serum lactate concentrations ($r = 0.45$, $p < 0.05$). Multivariate linear regression identified two variables (SAPS score and genotype), which together were able to explain approximately 30 % of the variation in the population (adjusted $R^2 = 0.3177$, $p = 0.0194$). No significant relationships were found between fentanyl half-life and patients' clinical or biochemical variables or co-administration of drugs metabolized by cytochrome p450. CONCLUSIONS: There is marked variation in the clearance of fentanyl following continuous infusion during TTM after CA which correlates with illness severity, lactate concentration and genetic polymorphisms of the cytochrome p450 liver enzymes. Sustained presence of fentanyl may influence response to neurological examination at 12 h post discontinuation in patients receiving the drug as an infusion as part of TTM.

TRAUMA

1. J Surg Res. 2020 Jan;245:593-599. doi: 10.1016/j.jss.2019.07.014. Epub 2019 Sep 6.

Are We Out of the Woods Yet? The Aftermath of Resuscitative Thoracotomy.

Fitch JL(1), Dieffenbaugher S(2), McNutt M(2), Miller CC(3), Wainwright DJ(2), Villarreal JA(3), Wilson CT(3), Todd SR(3).

Abstract

BACKGROUND: After traumatic arrest, resuscitative thoracotomy is lifesaving in appropriately selected patients, yet data are limited regarding hospital course after intensive care unit (ICU) admission. The objective of this study was to describe the natural history of resuscitative thoracotomy survivors admitted to the ICU. MATERIALS AND METHODS: We conducted a retrospective review (January 1, 2012-June 30, 2017) of all adult trauma patients who underwent resuscitative thoracotomy after traumatic arrest at two adult level 1 trauma centers. Data evaluated include demographics, injury characteristics, hospital course, and outcome. RESULTS: Over 66 mo, there were 52,624 trauma activations. Two hundred ninety-eight patients underwent resuscitative thoracotomy and 96 (32%) survived to ICU admission. At ICU admission, mean age was 35.8 ± 14.5 y, 79 (82%) were male, 36 (38%) sustained blunt trauma, and the mean injury severity score was 32.3 ± 13.7. Eight blunt and 20 penetrating patients (22% and 34% of ICU admissions, respectively) survived to discharge. 67% of deaths in the ICU occurred within the first 24 h, whereas 90% of those alive at day 21 survived to discharge. For the 28 survivors, mean ICU length of stay was 24.1 ± 17.9 d and mean hospital length of stay was 43.9 ± 32.1 d. Survivors averaged 1.9 ± 1.5 complications. Twenty-four patients (86% of hospital survivors) went home or to a rehabilitation center. CONCLUSIONS: After resuscitative thoracotomy and subsequent ICU admission, 29% of patients survived to hospital discharge. Complications and a long hospital stay should be expected, but the functional outcome for survivors is not as bleak as previously reported.

VENTILACIÓ

RES AQUESTA SETMANA

ECOGRAFIA EN LA RESSUSCITACIÓ

RES AQUESTA SETMANA

MONITORATGE CEREBRAL

1. Resuscitation. 2020 Feb 7;149:17-23. doi: 10.1016/j.resuscitation.2020.01.025. [Epub ahead of print]

Added value of somato-sensory evoked potentials amplitude for prognostication after cardiac arrest.

Barbella G(1), Novy J(2), Marques-Vidal P(3), Oddo M(4), Rossetti AO(5).

Abstract

AIMS: Bilateral absence of cortical somato-sensory evoked potentials (SSEPs) robustly predicts poor outcome after cardiac arrest (CA), but it is uncertain if SSEP amplitudes provide additional

information. Here, we examined the prognostic value of cortical SSEP amplitude in comparison with other known outcome predictors. METHODS: We retrospectively determined SSEP amplitudes in a prospective CA registry, identified an amplitude cut-off for worst Cerebral Performance Category (CPC) within three months, and examined correlations of SSEP amplitude with pupillary light reflex (PLR), myoclonus, peak serum neuron specific enolase (NSE), and 24-36 h and 36-72 h EEG (reactivity, epileptiform features). RESULTS: Among 158 patients, 54% awoke. Amplitudes correlated with EEG findings, present PLR, myoclonus, NSE. A cut-off for cortical SSEP ≤ 0.41 μV was 100% specific for poor outcome (95% CI: 96-100%); sensitivity increased marginally vs. SSEPs absence [47% (35-59%) vs 46% (34-58%)] for CPC 4-5. Adding SSEPs ≤0.41 μV to a multimodal prognostic model including EEG, clinical features, and NSE improved prediction for mortality, but not for CPC 3-5 at three months. No statistical correlation between amplitudes and good outcome was observed. SSEP amplitudes correlated inversely with CPC at three months in the overall cohort ($r = -0.332$; $p < 0.0001$) but not in the subgroup with present SSEPs ($r = -0.102$; $p = 0.256$).CONCLUSION: Decreased SSEPs amplitudes are associated with poor outcome after cardiac arrest; however, adding this to a multimodal prognostic approach including EEG, clinical and blood biomarkers, improves slightly prediction of mortality, but not of poor or good outcome.

ORGANITZACIÓ I FORMACIÓ

1. Int Emerg Nurs. 2020 Feb 8:100827. doi: 10.1016/j.ienj.2019.100827. [Epub ahead of print]

When resuscitation doesn't work: A qualitative study examining ambulance personnel preparation and support for termination of resuscitation and patient death.

Anderson NE(1), Slark J(2), Gott M(2).

Abstract

BACKGROUND: Many ambulance personnel can withhold or terminate resuscitation on-scene, but these decisions are emotionally, ethically and cognitively challenging. Although there is a wealth of research examining training and performance of life-saving resuscitation efforts, there is little published research examining how ambulance personnel are prepared and supported for situations where resuscitation is unsuccessful, unwanted or unwarranted. AIM: To identify and describe existing preparation and support mechanisms for ambulance personnel enacting decisions to terminate resuscitation and manage patient death in the field. METHOD: Focus groups were held with senior ambulance personnel working in clinical education and peer support roles. RESULTS: Participants believed professional and personal exposure to death and dying and positive social modelling by mentors were essential preparation for ambulance personnel terminating resuscitation and managing patient death. Ambulance personnel responded to patient death idiosyncratically. Key supports included on-scene or phone back-up during the event and informal peer and managerial support after the event. CONCLUSION: Clinical and life experience is highly-valued by ambulance personnel who provide training and support. However, novice ambulance personnel may benefit from greater awareness and rehearsal of skills associated with terminating resuscitation and managing the scene of a patient death. Organisations need to acknowledge idiosyncratic staff needs and offer a variety of support mechanisms both during and after the event.

2. J Surg Res. 2020 Feb;246:544-549. doi: 10.1016/j.jss.2019.09.033. Epub 2019 Oct 18.

Team Assessment and Decision Making Is Associated With Outcomes: A Trauma Video Review Analysis.

Dumas RP(1), Vella MA(2), Chreiman KC(2), Smith BP(2), Subramanian M(2), Maher Z(3), Seamon MJ(2), Holena DN(4).

Abstract

BACKGROUND: Teamwork is a critical element of trauma resuscitation. Assessment tools such as T-NOTECHS (Trauma NOn-TECHnical Skills) exist, but correlation with patient outcomes is unclear. Using emergency department thoracotomy (EDT), we sought to describe T-NOTECHS scores during resuscitations. We hypothesized that patients undergoing EDT whose resuscitations had better scores would be more likely to have return of spontaneous circulation (ROSC). METHODS: Continuously recording video was used to review all captured EDTs over a 24-mo period. We used a modification of the validated T-NOTECHS instrument to measure five domains on a 3-point scale (1 = best, 2 = average, 3 = worst). A total T-NOTECHS score was calculated by one of three reviewers. The primary outcome was ROSC. ROSC was defined as an organized rhythm no longer requiring internal cardiac compressions. Associations between variables and ROSC were examined using univariate regression. RESULTS: Sixty-one EDTs were captured. Nineteen patients had ROSC (31%) and 42 (69%) did not. The median T-NOTECHS score for all resuscitations was 8 [IQR 6-10]. As demographic and injury data (age, gender, mechanism, signs of life) were not associated with ROSC in univariate analysis, they were not considered for inclusion in a multivariable regression model. The association between overall T-NOTECHS score and ROSC did not reach statistical significance, but examination of the individual components of the T-NOTECHS score demonstrated that, compared to resuscitations that had "average" (2) or "worst" (3) scores on "Assessment and Decision Making," resuscitations with a "best" score were 5 times more likely to lead to ROSC. CONCLUSIONS: Although the association between overall T-NOTECHS scores and ROSC did not reach statistical significance, better scores in the domain of assessment and decision making are associated with improved rates of ROSC in patients arriving in cardiac arrest who undergo EDT. LEVEL OF EVIDENCE: Level IV Therapeutic/Care Management.

3. Resuscitation. 2020 Feb 8. pii: S0300-9572(20)30059-9. doi:10.1016/j.resuscitation.2020.01.033. [Epub ahead of print]

Transfer of Essential AED information to Treating hospital (TREAT).

Homma PCM(1), de Graaf C(2), Tan HL(1), Hulleman M(1), Koster RW(1), Beesems SG(1), Blom MT(1).

Abstract

BACKGROUND: Defibrillation in out-of-hospital cardiac arrest (OHCA) is increasingly performed by using an Automated External Defibrillator (AED). Therefore presence of a shockable rhythm is recurrently only documented by the AED. However, AED-information is rarely available to the treating physician. PURPOSE: To determine 1) how often a shockable rhythm was recorded only in the AED; 2) if so, how often information that a shockable rhythm had been present reached the physician. METHODS: Data on OHCA patients with (presumed) cardiac cause with an AED connected in the years 2012-2014 (Study period 1) and 2016 (Study period 2) in the Amsterdam

Resuscitation Study (ARREST) database were collected. We determined how often only the AED had defibrillated. In these patients, we retrospectively analyzed EMS run sheets and hospital discharge letters to determine if a shockable rhythm and/or AED use was correctly noted. In Study period 2, we prospectively contacted the physicians to study whether AED defibrillation was known. RESULTS: In Study period 1, of 2840 OHCA CPR attempts with (presumed) cardiac cause, 1521 (54%) patients had a shockable rhythm, with 356 patients (13%) receiving AED defibrillation only. Of these patients, 11 hospital discharge letters (4%) contained no information about a shockable rhythm. In Study period 2, 125/1128 patients (11%) received AED defibrillation only; of these, in two cases the shockable rhythm was unknown by the physician. CONCLUSION: In 11-13% of OHCAs, a shockable rhythm is only seen on the AED-ECG. Adequate transfer to the physician of vital AED-information is essential but not always accomplished.

4. Resuscitation. 2020 Feb 8. pii: S0300-9572(20)30057-5. doi:10.1016/j.resuscitation.2020.01.031. [Epub ahead of print]

AED and Text Message Responders Density in Residential Areas for Rapid Response in Out-of-Hospital Cardiac Arrest.

Stieglis R(1), Zijlstra JA(2), Riedijk F(3), Smeekes M(3), van der Worp WE(4), Koster RW(2).

Abstract

BACKGROUND: For out-of-hospital cardiac arrest (OHCA) in residential areas, a dispatcher driven alert-system using text messages (TM-system) directing local rescuers (TM-responders) to OHCA patients was implemented and the desired density of automated external defibrillators (AEDs) or TM-responders investigated. METHODS: We included OHCA cases with the TM-system activated in residential areas between 2010-2017. For each case, densities/km^2 of activated AEDs and TM-responders within a 1000 m circle were calculated. Time intervals between 112-call and first defibrillation were calculated. RESULTS: In total, 813 patients (45%) had a shockable initial rhythm. In 17% a TM-system AED delivered the first shock. With increasing AED density, the median time to shock decreased from 10:59 to 08:17 min. ($p < 0.001$) and shocks <6 min increased from 6% to 12% ($p = 0.024$). Increasing density of TM-responders was associated with a decrease in median time to shock from 10:59 to 08:20 min. ($P < 0.001$) and increase of shocks <6 min from 6% to 13% ($p = 0.005$). Increasing density of AEDs and TM-responders resulted in a decline of ambulance first defibrillation by 19% ($p = 0.016$) and 22% ($p = 0.001$), respectively. First responder AED defibrillation did not change significantly. Densities of >2 AEDs/km^2 did not result in further decrease of time to first shock but >10 TM-responders/km^2 resulted in more defibrillations <6 minutes. CONCLUSION: With increasing AED and TM-responder density within a TM-system, time to defibrillation in residential areas decreased. AED and TM-responders only competed with ambulances, not with first responders. The recommended density of AEDs and TM-responders for earliest defibrillation is 2 AEDs/km^2 and >10 TM-responders/km^2.

5. Resuscitation. 2020 Feb 8;149:1-9. doi: 10.1016/j.resuscitation.2020.01.034. [Epub ahead of print]

The experiences of EMS providers taking part in a large randomized trial of airway management during out of hospital cardiac arrest, and the impact on their views and practice. Results of a survey and telephone interviews.

Kirby K(1), Brandling J(2), Robinson M(3), Thomas M(4), Voss S(2), Benger J(5).

Abstract

AIMS: To explore EMS experiences of participating in a large trial of airway management during out-of-hospital cardiac arrest (AIRWAYS-2), specifically to explore: 1. Any changes in views and practice as a result of trial participation. 2. Experiences of trial training. 3. Experiences of enrolling critically unwell patients without consent. 4. Barriers and facilitators for out-of-hospital trial participation. METHODS: An online questionnaire was distributed to 1523 EMS providers who participated in the trial. In-depth telephone interviews explored the responses to the online questionnaire. Quantitative data were collated and presented using simple descriptive statistics. Qualitative data collected during the online survey were analysed using content analysis. Interpretive Phenomenological Analysis was used for qualitative interview data. RESULTS: Responses to the online questionnaire were received from 33% of the EMS providers who participated in AIRWAYS-2, and 19 providers were interviewed. EMS providers described barriers and facilitators to trial participation and changes in their views and practice. The results are presented in five distinct themes: research process; changes in airway management views and practice; engagement with research; professional identity; professional competence. CONCLUSIONS: Participation in the AIRWAYS-2 trial was enjoyable and EMS providers valued the study training and support. There was enhanced confidence in airway management as a result of taking part in the trial. EMS providers indicated existing variability in training, experience and confidence in tracheal intubation, and expressed a preference for the method of airway management to which they had been randomised. There was support for the stepwise approach to airway management, but also concern regarding the potential loss of tracheal intubation from 'standard' EMS practice. The views and practices of the EMS providers expressed in this research will usefully inform the design of future similar trials.

6. Wilderness Environ Med. 2020 Feb 7. pii: S1080-6032(19)30179-6. doi:

10.1016/j.wem.2019.10.008. [Epub ahead of print]

Reduction of Arterial Oxygen Saturation Among Rescuers During Cardiopulmonary Resuscitation in a Hypobaric Hypoxic Environment.

Suto T(1), Saito S(2), Tobe M(1), Kanamoto M(1), Matsui Y(1).

Abstract

We experienced a case involving prolonged cardiopulmonary resuscitation (CPR) during cardiac arrest on Mt. Fuji (3776 m), demanding lengthy exertion by the rescuers performing CPR. Considering the effects of exertion on the rescuers, we examined their percutaneous arterial oxygen saturation during simulated CPR and compared the effects of compression-only and conventional CPR at 3700 m above sea level. The effects of CPR on the physical condition of rescuers were examined at the summit of Mt. Fuji: Three rescue staff equipped with pulse-oximeters performed CPR with or without breaths using a CPR mannequin. At 3700 m, the rescuers' heart rate increased during CPR regardless of the presence or absence of rescue breathing. Percutaneous arterial oxygen saturation measured in such an environment was reduced only when CPR without rescue breathing was performed. Scores on the Borg scale, a subjective score of fatigue, after CPR in a 3700 m environment were 13 to 15 of 20 (somewhat hard to hard). Performing CPR at high altitude exerts a significant physical effect upon the condition of rescuers. Compression-only CPR at high altitude

may cause a deterioration in rescuer oxygenation, whereas CPR with rescue breathing might ameliorate such deterioration.

CURES POS-RCE

1. Ann Behav Med. 2020 Feb 11. pii: kaz058. doi: 10.1093/abm/kaz058. [Epub ahead of print]

Hyperarousal Symptoms in Survivors of Cardiac Arrest Are Associated With 13 Month Risk of Major Adverse Cardiovascular Events and All-Cause Mortality.

Presciutti A(1), Shaffer J(1), Sumner JA(2), Elkind MSV(3)(4), Roh DJ(4), Park S(4), Claassen J(4), Edmondson D(2), Agarwal S(4).

Abstract

BACKGROUND: Key dimensions of cardiac arrest-induced posttraumatic stress disorder (PTSD) symptoms include reexperiencing, avoidance, numbing, and hyperarousal. It remains unknown which dimensions are most predictive of outcome. PURPOSE: To determine which dimensions of cardiac arrest-induced PTSD are predictive of clinical outcome within 13 months posthospital discharge. METHODS: PTSD symptoms were assessed in survivors of cardiac arrest who were able to complete psychological screening measures at hospital discharge via the PTSD Checklist-Specific scale, which queries for 17 symptoms using five levels of severity. Responses on items for each symptom dimension of the four-factor numbing model (reexperiencing, avoidance, numbing, and hyperarousal) were converted to Z-scores and treated as continuous predictors. The combined primary endpoint was all-cause mortality (ACM) or major adverse cardiovascular events (MACE; hospitalization for myocardial infarction, unstable angina, heart failure, emergency coronary revascularization, or urgent defibrillator/pacemaker placements) within 13 months postdischarge. Four bivariate Cox proportional hazards survival models evaluated associations between individual symptom dimensions and ACM/MACE. A multivariable model then evaluated whether significant bivariate predictors remained independent predictors of the primary outcome after adjusting for age, sex, comorbidities, premorbid psychiatric diagnoses, and initial cardiac rhythm. RESULTS: A total of 114 patients (59.6% men, 52.6% white, mean age: 54.6 ± 13 years) were included. In bivariate analyses, only hyperarousal was significantly associated with ACM/MACE. In a fully adjusted model, 1 standard deviation increase in hyperarousal symptoms corresponded to a two-times increased risk of experiencing ACM/MACE. CONCLUSIONS: Greater level of hyperarousal symptoms was associated with a higher risk of ACM/MACE within 13 months postcardiac arrest. This initial evidence should be further investigated in a larger sample.

2. Intern Emerg Med. 2020 Feb 12. doi: 10.1007/s11739-020-02286-3. [Epub ahead of print]

Infections in out-of-hospital and in-hospital post-cardiac arrest patients.

Mortensen SJ(1), Hurley M(2), Blewett L(2), Uber A(2), Yassa D(3), MacDonald M(2), Patel P(2), Chase M(2)(4), Holmberg MJ(2)(5), Grossestreuer AV(2), Donnino MW(2)(6), Cocchi MN(2)(4)(7).

Abstract

This study aims to describe infectious complications in both out-of-hospital cardiac arrest (OHCA) and in-hospital cardiac arrest (IHCA) patients with sustained return of spontaneous circulation

(ROSC) and to compare differences in antimicrobial treatment and outcomes between the two groups. This was a retrospective, single-center, observational study. Adult patients (≥ 18 years) with OHCA or IHCA who had sustained ROSC between December 2007 to March 2015 were included. Blood, urine, sputum, and other fluid cultures, as well as radiologic imaging, were obtained at the discretion of the treating clinical teams. 275 IHCA and 318 OHCA patients were included in the analysis. We found evidence of infection in 181 IHCA and 168 OHCA patients. Significant differences were found between the IHCA and OHCA group in terms of initial rhythm, duration of arrest (10 min vs. 20, p = < 0.001), targeted temperature management (30% vs. 73%, p = < 0.001), and post-arrest infection rates (66% vs 53%, p = 0.001). 95% of IHCA and 82% of OHCA patients received antimicrobial treatment in the post-cardiac arrest period. The source of infection in both groups was largely respiratory, followed by urinary. Gram-positive cocci and gram-negative rods were the most common organisms identified among subjects with culture-proven bacteremia. Infections in the post-arrest period were common in both OHCA and IHCA. We found significantly more infections in IHCA compared to OHCA patients. The most common infection category was respiratory and the most common organism isolated from sputum cultures was Staphylococcus aureus coagulase-positive. The incidence of culture-positive bacteremia was similar in both OHCA and IHCA cohorts but overall lower than previously reported.

3. Ir J Med Sci. 2020 Feb 12. doi: 10.1007/s11845-020-02189-4. [Epub ahead of print]

Out-of-hospital cardiac arrest quality of life follow-up study of survivors in Munster, Ireland.

Henry K(1), Mulcaire J(2), Kirby A(3), Cotter A(3), Masterson S(3), O'Donnell C(4), Deasy C(4)(3).

Abstract

Quality of life of out-of-hospital cardiac arrest (OHCA) survivors is believed to be as important as a factor in resuscitation outcome as the survival rate. The aim of this investigation is to assess the quality of life outcomes of survivors of out-of- hospital cardiac arrest in the Munster region. OHCAR was used to identify survivors who were contacted in writing to invite their participation. Internationally standardized phone based questionnaires were utilized to assess quality of life. The mean age of participants was 63.5 years with 85% male and 15% female. Eighty percent (n = 16) had no issues with mobility, 90% (n = 18) had no issues with personal care, 90% could undertake all usual activities, and 90% (n = 18) experienced no anxiety or depression. In conclusion, survivors of OHCA in the Munster area, who participated in this study, survive at a very high functional level.

4. Resuscitation. 2020 Feb 5. pii: S0300-9572(20)30054-X. doi: 10.1016/j.resuscitation.2020.01.029. [Epub ahead of print]

Validation of the ROSC After Cardiac Arrest (RACA) Score in Pan-Asian Out-of-Hospital Cardiac Arrest Patients.

Liu N(1), Ong MEH(2), Ho AFW(3), Pek PP(4), Lu TC(5), Khruekarnchana P(6), Song KJ(7), Tanaka H(8), Naroo GY(9), Gan HN(10), Koh ZX(11), Ma MH(5); PAROS Clinical Research Network.

Abstract

AIM: Survival is the most consistently captured outcome across countries for out-of-hospital cardiac arrests (OHCA), with return of spontaneous circulation (ROSC) representing the earliest endpoint for 'unbiased' initial resuscitation success. The ROSC after cardiac arrest (RACA) score was developed to predict ROSC and has been validated in several European countries. In this study, we aimed to evaluate the performance of RACA in a Pan-Asian population. METHODS: We conducted a retrospective analysis of data collected in the Pan-Asian Resuscitation Outcomes Study (PAROS) registry. We included OHCA cases from seven communities (Japan, South Korea, Malaysia, Singapore, Taiwan, Thailand, and United Arab Emirates) between January 2009 and December 2012. Paediatric cases, cases that were conveyed by non-emergency medical services (EMS), and cases with incomplete records were excluded from the study. RESULTS: The RACA score showed similar discrimination performance as the original German study and various European validation studies. However, it had poor calibration with the original constant regression coefficient, which was primarily due to the low ROSC rate (8.2%) in the PAROS cohort. The calibration performance of RACA significantly improved after the constant coefficient was modified to adjust for the disparity in ROSC rates between Asia and Europe. CONCLUSION: This is the largest validation study of the RACA score. RACA consistently performs well in both Pan-Asian and European communities and can thus be a valuable tool for evaluating EMS systems. However, to implement it, the constant coefficient has to be modified in the RACA formula with local historical data.

5. Resuscitation. 2020 Feb 11. pii: S0300-9572(20)30062-9. doi: 10.1016/j.resuscitation.2020.01.036. [Epub ahead of print]

Association between mild hypercapnia and hospital mortality in patients admitted to the intensive care unit after cardiac arrest: a retrospective study.

Zhou D(1), Li Z(2), Zhang S(3), Wu L(4), Li Y(5), Shi G(6).

Abstract

BACKGROUND: Mild hypercapnia may increase cerebral oxygenation and attenuate cerebral injury in post-cardiac arrest patients. However, its association with hospital mortality has not been evaluated. METHODS: We conducted a retrospective multi-center study of prospectively collected data of all cardiac arrest patients admitted to the ICU between 2014 and 2015. Different kinds of arterial carbon dioxide tension ($PaCO_2$), including time-weighted mean $PaCO_2$, mean $PaCO_2$, admission $PaCO_2$ and proportion of time spent in four $PaCO_2$ categories (hypocapnia, normocapnia, mild hypercapnia, and severe hypercapnia) were used to explore the association with outcomes. Restricted cubic splines models were built to evaluate the association between $PaCO_2$ and odds ratio for hospital mortality in overall population and subgroups of different pH levels (acidosis, normal pH and alkalosis). RESULTS: 2,783 post-cardiac arrest patients in 150 ICUs were included. 933 (33.5%) were classified into the hypocapnia ($PaCO_2 < 35$ mmHg), 1088 (39.1%) into the normocapnia (35-45 mmHg), 472 (17%) into the mild hypercapnia (45 - 55 mmHg) and 390 (10.4%) into the severe hypercapnia (> 55 mmHg) group. Compared with normocapnia, mild hypercapnia was not associated with higher hospital survival probability (OR 1.08 [95% CI 0.84 - 1.38, $p = 0.558$]). Time spent in the normocapnia was associated with good outcome (OR 0.98 [95% CI 0.97 - 0.99, $p < 0.001$], for every 5 percentage point increase in time), but mild hypercapnia was not (OR 1 [95% CI 0.98 - 1.01, $p = 0.542$]). Cox-proportional hazards models supported these findings. Associations between $PaCO_2$ and hospital mortality were not statistically significant in normal pH and alkalosis subgroups. CONCLUSIONS: $PaCO_2$ has a U-shaped association with odds ratio for hospital mortality, with mild hypercapnia not having a higher hospital survival probability than normocapnia in post-cardiac arrest patients.

TARGETED TEMPERATURE MANAGEMENT

RES AQUESTA SETMANA

ELECTROFISIOLOGIA I DESFIBRIL·LACIÓ

RES AQUESTA SETMANA

PEDIATRIA

1. Heart Rhythm. 2020 Feb 6. pii: S1547-5271(20)30085-0. doi:10.1016/j.hrthm.2020.01.030. [Epub ahead of print]

Initially Unexplained Cardiac Arrest in Children and Adolescents: A National Experience from the Canadian Pediatric Heart Rhythm Network.

Cunningham T(1), Roston TM(2), Franciosi S(1), Liu MC(1), Atallah J(3), Escudero CA(3), Udupa S(4), Roberts JD(5), Dhillon S(6), Dallaire F(7), Fournier A(8), Fatah M(9), Hamilton R(9), Sanatani S(10).

Abstract

BACKGROUND: Unexplained cardiac arrest (UCA) is rare in children. Despite investigations, the etiology in up to half remains unknown. OBJECTIVES: We assessed the management and outcomes of pediatric UCA survivors through the Canadian Pediatric Heart Rhythm Network METHODS: A retrospective case series of children (aged 1-19 years) presenting with UCA between January 1, 2004 and November 1, 2017 was conducted. Patients with known heart disease pre-UCA were excluded. UCA details, investigations, genetic test results, treatment, implantable cardioverter defibrillator (ICD) data, subsequent diagnoses, and family screening data were collected RESULTS: 46 patients (61% male) were survivors of sudden unexpected death and met inclusion criteria at 8 participating sites. Median age at UCA was 13.8 years (IQR 9-16 years). Baseline retrievable investigations included electrocardiogram (96%), echocardiogram (85%), exercise stress test (73%) and cardiac MRI (57%). The presumed etiology for the UCA was identified in 24 (52%), mainly long QT syndrome or catecholaminergic polymorphic ventricular tachycardia. Genetic testing was performed in 33/46 (72%), with pathogenic/likely pathogenic variants identified in 13/33 (39%) and variants of uncertain significance in 8/33 (24%). ICDs were implanted in 35/46 (76%). Over a median follow-up of 36 months (IQR 17-57 months), 8/35 had arrhythmia events captured on device interrogation. Families of 26/46 (57%) patients underwent screening, leading to a cardiac diagnosis in 6/26 families CONCLUSION: A cause for UCA was not identified in nearly 50% of patients despite extensive investigations, including cascade screening. A large proportion (75%) of ICD shocks occurred in patients without a diagnosis.

2. Resuscitation. 2020 Feb 11. pii: S0300-9572(20)30061-7. doi:

10.1016/j.resuscitation.2020.01.035. [Epub ahead of print]

Deviations from AHA Guidelines During Pediatric Cardiopulmonary Resuscitation are Associated with Decreased Event Survival.

Wolfe HA(1), Morgan RW(2), Zhang B(2), Topjian AA(2), Fink EL(3), Berg RA(2), Nadkarni VM(2), Nishisaki A(2), Mensinger J(4), Sutton RM(2); American Heart Association's Get With the Guidelines-Resuscitation Investigators.

Abstract

BACKGROUND: Deviations (DEVs) from resuscitation guidelines are associated with worse outcomes after adult in-hospital cardiac arrest (IHCA), but impact during pediatric IHCA is unknown. METHODS: Retrospective cohort study of prospectively collected data from the American Heart Association's Get With The Guidelines-Resuscitation registry. Children who had an index IHCA of ≥1 minute from 2000-2014 were included. DEVs are defined by the registry by category (airway, medications, etc.) A composite measure termed circulation DEV(C-DEV), defined as at least one process deviation in the following categories: medications, defibrillation, vascular access, or chest compressions, was the primary exposure variable. Primary outcome was survival to hospital discharge. Mixed-effect models with random intercept for each hospital assessed the relationship of DEVs with survival to hospital discharge. Robustness of findings was assessed via planned secondary analysis using propensity score matching. RESULTS: Among 7078 eligible index IHCA events, 1200 (17.0%) had DEVs reported. Airway DEVs (466; 38.8%) and medication DEVs (321; 26.8%) were most common. C-DEVs were present in 629 (52.4%). Before matching, C-DEVs were associated with decreased rate of ROSC (aOR = 0.53, CI95: 0.43-0.64, p < .001) and survival to hospital discharge (aOR = 0.71, CI95: 0.60-0.86, p < .001). In the matched cohort (C-DEV n = 573, no C-DEV n = 1146), C-DEVs were associated with decreased rate of ROSC (aOR 0.76, CI95 0.60-0.96, p = .02), but no association with survival to hospital discharge (aOR 1.01, CI95 0.81-1.25, p = .96). CONCLUSIONS: DEVs were common in this cohort of pediatric IHCA. In a propensity matched cohort, while survival to hospital discharge was similar between groups, events with C-DEVs were less likely to achieve ROSC.

ECMO

1. Intensive Care Med. 2020 Feb 12. doi: 10.1007/s00134-020-05926-6. [Epub ahead of print]

Extracorporeal membrane oxygenation for refractory cardiac arrest: a retrospective multicenter study.

Lunz D(1), Calabrò L(2)(3), Belliato M(4), Contri E(4), Broman LM(5), Scandroglio AM(2), Patricio D(3), Malfertheiner M(6), Creteur J(3), Philipp A(7), Taccone FS(8), Pappalardo F(2).

Abstract

PURPOSE: The aim of this study was to assess the neurologic outcome following extracorporeal cardiopulmonary resuscitation (ECPR) in five European centers. METHODS: Retrospective database analysis of prospective observational cohorts of patients undergoing ECPR (January 2012-December 2016) was performed. The primary outcome was 3-month favorable neurologic outcome (FO), defined as the cerebral performance categories of 1-2. Survival to ICU discharge and the number of patients undergoing organ donation were secondary outcomes. A subgroup of patients with stringent selection criteria (i.e., age ≤ 65 years, witnessed bystander CPR, no major co-morbidity and ECMO implemented within 1 h from arrest) was also analyzed. RESULTS: A total of 423 patients treated with ECPR were included (median age 57 [48-65] years; male gender 78%); ECPR was initiated for OHCA in 258 (61%) patients. Time from arrest to ECMO implementation was 65 [48-84] min. Eighty patients (19%) had favorable neurological outcome. ICU survival was

24% (n = 102); 23 (5%) non-survivors underwent organ donation procedures. Favorable neurological outcome rate was lower (9% vs. 34%, $p < 0.01$) in out-of-hospital than in-hospital cardiac arrest and was significantly associated with shorter time from collapse to ECMO. The application of stringent ECPR criteria (n = 105) resulted in 38% of patients with favorable neurologic outcome. CONCLUSIONS: ECPR was associated with intact neurological recovery in 19% of unselected cardiac arrest victims, with 38% favorable outcome if stringent selection criteria would have been applied.

RECERCA EXPERIMENTAL

1. J Surg Res. 2020 Feb;246:6-18. doi: 10.1016/j.jss.2019.07.091. Epub 2019 Sep 18.

α7 Nicotinic Acetylcholine Receptor Mediates the Neuroprotection of Remote Ischemic Postconditioning in a Rat Model of Asphyxial Cardiac Arrest.

Han R(1), Zhang G(2), Qiao X(3), Guo Y(1), Sun L(1), Li J(1), Gao C(4), Sun X(5).

Abstract

BACKGROUND: Remote ischemic postconditioning (RIPost) has been shown to reduce the ischemia-reperfusion injury of the heart and brain. However, the protection mechanisms have not yet been fully elucidated. We have observed that RIPost could alleviate the brain injury after cardiac arrest (CA). The aim of this study was to explore whether α7 nicotinic acetylcholine receptor (α7nAChR) mediates the neuroprotection of RIPost in a rat model of asphyxial CA. MATERIALS AND METHODS: Asphyxial CA model was induced by occlusion of the tracheal tube for 8 min and resuscitated later. RIPost produced by three cycles of 15-min occlusion and 15-min release of the right hind limb by a tourniquet was performed respectively at the moment and the third hour after restoration of spontaneous circulation. The α7nAChR agonist PHA-543613 and the antagonist methyllycaconitine (MLA) were used to investigate the role of α7nAChR in mediating neuroprotective effects. RESULTS: Results showed that α7nAChR was decreased in hippocampus and cortex after resuscitation, whereas RIPost could attenuate the reduction. The use of PHA-543613 provided neuroprotective effects against cerebral injury after CA. Furthermore, RIPost decreased the levels of neuron-specific enolase, inflammatory mediators, the number of apoptotic cells, and phosphorylation of nuclear factor-κB while increased the phosphorylation of signal transducer and activator of transcription-3. However, the above effects of RIPost were attenuated by α7nAChR antagonist methyllycaconitine. CONCLUSIONS: Neuroprotection of RIPost was related with the activation of α7nAChR, which could suppress nuclear factor-κB and activate signal transducer and activator of transcription-3 in a rat asphyxial CA model.

CASE REPORTS

RES AQUESTA SETMANA

RCP COMPRESSIONS TORÀCIQUES MECÀNIQUES

1. PLoS One. 2020 Jan 28;15(1):e0228111. doi: 10.1371/journal.pone.0228111. eCollection 2020.

Duty cycle of 33% increases cardiac output during cardiopulmonary resuscitation.

Kim T(1), Kim KS(1), Suh GJ(1)(2), Kwon WY(1)(2), Jung YS(3), Ko JI(4)(5), Shin SM(1).

Abstract

BACKGROUND: The aim of this study was to investigate whether 33% duty cycle increases end-tidal carbon dioxide (ETCO2) level, a surrogate measurement for cardiac output during cardiopulmonary resuscitation (CPR), compared with 50% duty cycle. METHODS: Six pigs were randomly assigned to the DC33 or DC50 group. After 3 min of induced ventricular fibrillation (VF), CPR was performed for 5 min with 33% duty cycle (DC33 group) or with 50% duty cycle (DC50 group) (phase I). Defibrillation was delivered until return of spontaneous circulation (ROSC) thereafter. After 30 min of stabilization, the animals were re-assigned to the opposite groups. VF was induced again, and CPR was performed (phase II). The primary outcome was ETCO2 during CPR, and the secondary outcomes were coronary perfusion pressure (CPP), systolic arterial pressure (SAP), diastolic arterial pressure (DAP), and right atrial pressure (RAP). RESULTS: Mean ETCO2 was higher in the DC33 group compared with the DC50 group (22.5 mmHg vs 21.5 mmHg, P = 0.018). In a linear mixed model, 33% duty cycle increased ETCO2 by 1.0 mmHg compared with 50% duty cycle (P < 0.001). ETCO2 increased over time in the DC33 group [0.6 mmHg/min] while ETCO2 decreased in the DC50 group [-0.6 mmHg/min] (P < 0.001). Duty cycle of 33% increased SAP (6.0 mmHg, P < 0.001), DAP (8.9 mmHg, P < 0.001) RAP (2.6 mmHg, P < 0.001) and CPP (4.7 mmHg, P < 0.001) compared with the duty cycle of 50%. CONCLUSION: Duty cycle of 33% increased ETCO2, a surrogate measurement for cardiac output during CPR, compared with duty cycle of 50%. Moreover, ETCO2 increased over time during CPR with 33% duty cycle while ETCO2 decreased with 50% duty cycle.

FREE FULL TEXT

REGISTRES, REVISIONS I EDITORIALS

1. Resuscitation. 2020 Jan 25. pii: S0300-9572(20)30040-X. doi: 10.1016/j.resuscitation.2020.01.018. [Epub ahead of print]

Out of Hospital Cardiac Arrest, There's an app for that.

Miller S(1), Falk J(2).

NO ABSTRACT AVAILABLE

2. Resuscitation. 2020 Jan 22. pii: S0300-9572(20)30029-0. doi:10.1016/j.resuscitation.2020.01.008. [Epub ahead of print]

Extracorporeal cardiopulmonary resuscitation in out of hospital cardiac arrest: Does exist the right patient?

Chiumello D(1), Coppola S(2).

ACR INTRAHOSPITALÀRIA

1. Eur J Cardiovasc Nurs. 2020 Jan 30:1474515119900075. doi: 10.1177/1474515119900075. [Epub ahead of print]

Healthcare professionals' knowledge on cardiopulmonary resuscitation correlated with return of spontaneous circulation rates after in-hospital cardiac arrests: A multicentric study between university hospitals in 12 European countries.

Kourek C(1), Greif R(2), Georgiopoulos G(3), Castrén M(4), Böttiger B(5), Mongardon N(6), Hinkelbein J(5), Carmona-Jiménez F(7), Scapigliati A(8), Marchel M(9), Bárczy G(10), Van de Velde M(11), Koutun J(12), Corrada E(13), Scheffer GJ(14), Dougenis D(15), Xanthos T(16).

Abstract

BACKGROUND: In-hospital cardiac arrest is a major cause of death in European countries, and survival of patients remains low ranging from 20% to 25%. AIMS: The purpose of this study was to assess healthcare professionals' knowledge on cardiopulmonary resuscitation among university hospitals in 12 European countries and correlate it with the return of spontaneous circulation rates of their patients after in-hospital cardiac arrest. METHODS AND RESULTS: A total of 570 healthcare professionals from cardiology, anaesthesiology and intensive care medicine departments of European university hospitals in Italy, Poland, Hungary, Belgium, Spain, Slovakia, Germany, Finland, The Netherlands, Switzerland, France and Greece completed a questionnaire. The questionnaire consisted of 12 questions based on epidemiology data and cardiopulmonary resuscitation training and 26 multiple choice questions on cardiopulmonary resuscitation knowledge. Hospitals in Switzerland scored highest on basic life support (P=0.005) while Belgium hospitals scored highest on advanced life support (P<0.001) and total score in cardiopulmonary resuscitation knowledge (P=0.01). The Swiss hospitals scored highest in cardiopulmonary resuscitation training (P<0.001). Correlation between cardiopulmonary resuscitation knowledge and return of spontaneous circulation rates of patients with in-hospital cardiac arrest demonstrated that each additional correct answer on the advanced life support score results in a further increase in return of spontaneous circulation rates (odds ratio 3.94; 95% confidence interval 2.78 to 5.57; P<0.001). CONCLUSION: Differences in knowledge about resuscitation and course attendance were found between university hospitals in 12 European countries. Education in cardiopulmonary resuscitation is considered to be vital for patients' return of spontaneous circulation rates after in-hospital cardiac arrest. A higher level of knowledge in advanced life support results in higher return of spontaneous circulation rates.

CAUSA DE L'ACR

1. Lancet Planet Health. 2020 Jan;4(1):e15-e23. doi: 10.1016/S2542-5196(19)30262-1.

Short-term exposure to ambient fine particulate matter and out-of-hospital cardiac arrest: a nationwide case-crossover study in Japan.

Zhao B(1), Johnston FH(1), Salimi F(2), Kurabayashi M(3), Negishi K(4).

Abstract

BACKGROUND: PM2·5 is an important but modifiable environmental risk factor, not only for pulmonary diseases and cancers, but for cardiovascular health. However, the evidence regarding the association between air pollution and acute cardiac events, such as out-of-hospital cardiac arrest (OHCA), is inconsistent, especially at concentrations lower than the WHO daily guideline (25 μg/m3). This study aimed to determine the associations between exposure to ambient air pollution and the incidence of OHCA. METHODS: In this nationwide case-crossover study, we linked prospectively collected population-based registry data for OHCA in Japan from Jan 1, 2014, to Dec 31, 2015, with daily PM2·5, carbon monoxide (CO), nitrogen dioxide (NO2), photochemical oxidants (Ox), and sulphur dioxide (SO2) exposure on the day of the arrest (lag 0) or 1-3 days before the arrest (lags 1-3), as well as the moving average across days 0-1 and days 0-3. Daily exposure was calculated by averaging the measurements from all PM2·5 monitoring stations in the same prefecture. The effect of PM2·5 on risk of all-cause or cardiac OHCA was estimated using a time-stratified case-crossover design coupled with conditional logistic regression analysis, adjusted for daily temperature and relative humidity. Single-pollutant models were also investigated for the individual gaseous pollutants (CO, NO2, Ox, and SO2), as well as two-pollutant models for PM2·5 with these gaseous pollutants. Subgroup analyses were done by sex and age. FINDINGS: Over the 2 years, 249 372 OHCAs were identified, with 149 838 (60·1%) presumed of cardiac origin. The median daily PM2·5 was 11·98 μg/m3 (IQR 8·13-17·44). Each 10 μg/m3 increase in PM2·5 was associated with increased risk of all-cause OHCA on the same day (odds ratio [OR] 1·016, 95% CI 1·009-1·023) and at lags of up to 3 days, ranging from OR 1·015 (1·008-1·022) at lag 1 to 1·033 (1·023-1·043) at lag 0-3. Results for cardiac OHCA were similar (ORs ranging from 1·016 [1·007-1·025] at lags 1 and 2 to 1·034 [1·021-1·047] at lag 0-3). Patients older than 65 years were more susceptible to PM2·5 exposure than younger age groups but no sex differences were identified. CO, Ox, and SO2 were also positively associated with OHCA while NO2 was not. However, in two-pollutant models of PM2·5 and gaseous pollutants, only PM2·5 (positive association) and NO2 (negative association) were independently associated with increased risk of OHCA. INTERPRETATION: Short-term exposure to PM2·5 was associated with an increased risk of OHCA even at relatively low concentrations. Regulatory standards and targets need to incorporate the potential health gains from continual air quality improvement even in locations already meeting WHO standards. FUNDING: None.

DONACIÓ D'ÒRGANS

1. Transplantation. 2020 Jan 29. doi: 10.1097/TP.0000000000003139. [Epub ahead of print]

Uncontrolled donation after circulatory death: a unique opportunity.

Coll E(1), Miñambres E(2), Sánchez-Fructuoso A(3), Fondevila C(4), Campo-Cañaveral de la Cruz JL(5), Domínguez-Gil B(1).

Abstract

Uncontrolled Donation after Circulatory Death (uDCD) refers to donation from persons who

die following an unexpected and unsuccessfully-resuscitated cardiac arrest. Despite the large potential for uDCD, programs of this kind only exist in a reduced number of countries with a limited activity. Barriers to uDCD are of a logistical and ethical-legal nature, as well as arising from the lack of confidence in the results of transplants from uDCD donors.The procedure needs to be designed to reduce and limit the impact of the prolonged warm ischemia inherent to the uDCD process, and to deal with the ethical issues that this practice poses: termination of advanced cardio-pulmonary resuscitation (aCPR), extension of aCPR beyond futility for organ preservation, family approach to discuss donation opportunities, criteria for the determination of death, or the use of normothermic regional perfusion (NRP) for the in situ preservation of organs. Although the incidence of primary non function and delayed graft function is higher with organs obtained from uDCD donors, overall patient and graft survival is acceptable in kidney, liver and lung transplantation, with a proper selection and management of both donors and recipients. NRP has shown to be critical to achieve optimal outcomes in uDCD kidney and liver transplantation. However, the role of ex situ preservation with machine perfusion is still to be elucidated.uDCD is a unique opportunity to improve patient access to transplantation therapies and to offer more patients the chance to donate organs after death, if this is consistent with their wishes and values.

FÀRMACS

Assessment of the Role of Adrenaline: Measuring the Effectiveness of Drug Administration in Cardiac Arrest (PARAMEDIC2) randomized, controlled trial.

1. Intensive Care Med. 2020 Jan 30. doi: 10.1007/s00134-019-05920-7. [Epub ahead of print]

Intraosseous versus intravenous administration of adrenaline in patients with out-of-hospital cardiac arrest: a secondary analysis of the PARAMEDIC2 placebo-controlled trial.

Nolan JP(1)(2), Deakin CD(3)(4), Ji C(5), Gates S(6), Rosser A(7), Lall R(5), Perkins GD(5)(8).

Abstract

PURPOSE: To compare the effectiveness of the intravenous (IV) and intraosseous (IO) routes for drug administration in adults with a cardiac arrest enrolled in the Pre-Hospital Assessment of the Role of Adrenaline: Measuring the Effectiveness of Drug Administration in Cardiac Arrest (PARAMEDIC2) randomised, controlled trial. METHODS: Patients were recruited from five National Health Service Ambulance Services in England and Wales from December 2014 through October 2017. Patients with an out-of-hospital cardiac arrest who were unresponsive to initial resuscitation attempts were randomly assigned to 1 mg adrenaline or matching placebo. Intravascular access was established as soon as possible, and IO access was considered if IV access was not possible after two attempts. RESULTS: Among patients with out-of-hospital cardiac arrest, 3631 received adrenaline and 3686 received placebo. Amongst these, 1116 (30.1%) and 1121 (30.4%) received the study drug via the IO route. The odds ratios were similar in the IV and IO groups for return of spontaneous circulation (ROSC) at hospital handover [adjusted odds ratio (aOR) 4.07 (95% CI 3.42-4.85) and (aOR 3.98 (95% CI 2.86-5.53), P value for interaction 0.90]; survival to 30 days [aOR 1.67 (1.18-2.35) versus 0.9 (0.4-2.05), P = 0.18]; and favourable neurological outcome [aOR 1.39 (0.93-2.06) versus 0.62 (0.23-1.67), P = 0.14]. CONCLUSION: There was no significant difference in treatment effect (adrenaline versus placebo) on ROSC at hospital handover between drugs administered by the intraosseous route or by the intravenous route. We could not detect any difference in the treatment effect between the IV and IO

routes on the longer term outcomes of 30-day survival or favourable neurological outcome at discharge (ISRCTN73485024).

2. Resuscitation. 2020 Jan 23. pii: S0300-9572(20)30030-7. doi: 10.1016/j.resuscitation.2020.01.009. [Epub ahead of print]
Intravenous versus intraosseous adrenaline administration in out-of-hospital cardiac arrest: A retrospective cohort study.
Zhang Y(1), Zhu J(2), Liu Z(1), Gu L(1), Zhang W(1), Zhan H(1), Hu C(1), Liao J(3), Xiong Y(4), Idris AH(5).
Abstract
BACKGROUND: Adrenaline is an important component in the resuscitation of individuals experiencing out-of-hospital cardiac arrest (OHCA). The 2018 Advanced Cardiac Life Support (ACLS) algorithm gives the option of either intravenous (IV) or intraosseous (IO) routes for adrenaline administration during cardiac arrest. However, the optimal route during prehospital resuscitation remains controversial. This study aims to investigate whether IV and IO routes lead to different outcomes in OHCA patients who received prehospital adrenaline. METHODS: This retrospective analysis included adult patients with OHCA of presumed cardiac origin who had Emergency Medical Services (EMS) CPR, received adrenaline, and were enrolled in the Resuscitation Outcomes Consortium (ROC) Cardiac Epistry version 3 database between 2011 and 2015. We divided the study population into IV and IO groups based on the administration route. Logistic regression analysis was performed to evaluate the association between adrenaline delivery routes and prehospital return of spontaneous circulation (ROSC), survival to hospital discharge, and favorable neurological outcome. RESULTS: Of the 35,733 patients included, 27,758 (77.7%) had adrenaline administered via IV access and 7975 (22.3%) via IO access. With the IO group as a reference in the logistic regression model, the adjusted odds ratios of the IV group for prehospital ROSC, survival and favorable neurological outcome were 1.367 (95%CI, 1.276-1.464), 1.468 (95%CI, 1.264-1.705) and 1.849 (95%CI, 1.526-2.240), respectively. Similar results were found in the propensity score matched population and subgroup analysis. CONCLUSION: Compared with the IO approach, the IV approach appears to be the optimal route for adrenaline administration in advanced life support for OHCA during prehospital resuscitation.

VENTILACIÓ

1. Ann Emerg Med. 2020 Jan 23. pii: S0196-0644(19)31434-9. doi: 10.1016/j.annemergmed.2019.12.003. [Epub ahead of print]
Comparing Effectiveness of Initial Airway Interventions for Out-of-Hospital Cardiac Arrest: A Systematic Review and Network Meta-analysis of Clinical Controlled Trials.
Wang CH(1), Lee AF(2), Chang WT(1), Huang CH(1), Tsai MS(1), Chou E(3), Lee CC(4), Chen SC(1), Chen WJ(5).
Abstract
STUDY OBJECTIVE: We compare effectiveness of different airway interventions during cardiopulmonary resuscitation for patients with out-of-hospital cardiac arrest. METHODS: We systematically searched the PubMed and EMBASE databases from their inception through August 2018 and selected randomized controlled trials or quasi randomized controlled trials comparing intubation, supraglottic airways, or bag-valve-mask ventilation for treating adult out-of-hospital cardiac arrest patients. We performed a network meta-

analysis along with sensitivity analyses to investigate the influence of high intubation success rate on meta-analytic results. RESULTS: A total of 8 randomized controlled trials and 3 quasi randomized controlled trials were included in the network meta-analysis: 7,361 patients received intubation, 7,475 received supraglottic airway, and 1,201 received bag-valve-mask ventilation. The network meta-analysis indicated no differences among these interventions for survival or neurologic outcomes at hospital discharge. Rather, network meta-analysis suggested that supraglottic airway improved the rate of return of spontaneous circulation compared with intubation (odds ratio 1.11; 95% confidence interval 1.03 to 1.20) or bag-valve-mask ventilation (odds ratio 1.35; 95% confidence interval 1.11 to 1.63). Furthermore, intubation improved the rate of return of spontaneous circulation compared with bag-valve-mask ventilation (odds ratio 1.21; 95% confidence interval 1.01 to 1.44). The sensitivity analyses revealed that the meta-analytic results were sensitive to the intubation success rates across different out-of-hospital care systems. CONCLUSION: Although there were no differences in long-term survival or neurologic outcome among these airway interventions, these system-based comparisons demonstrated that supraglottic airway was better than intubation or bag-valve-mask ventilation and intubation was better than bag-valve-mask ventilation in improving return of spontaneous circulation. The intubation success rate greatly influenced the meta-analytic results, and therefore these comparison results should be interpreted with these system differences in mind.

ECOGRAFIA A LA RESSUSCITACIÓ

1. Am J Emerg Med. 2020 Jan 16. pii: S0735-6757(20)30026-7. doi: 10.1016/j.ajem.2020.01.026. [Epub ahead of print]

Diagnosis of aortic dissection by transesophageal echocardiography during cardiopulmonary resuscitation.

Kim YW(1), Jung WJ(2), Cha KC(2), Roh YI(2), Kim YS(2), Kim OH(2), Cha YS(2), Kim H(2), Lee KH(2), Hwang SO(3).

Abstract

OBJECTIVES: Early identification of the causes of cardiac arrest is helpful in determining the resuscitation measures during cardiopulmonary resuscitation (CPR). We aimed to evaluate the feasibility of transesophageal echocardiography (TEE) during CPR in diagnosing aortic dissection and the influence of aortic dissection on resuscitation outcome in adult patients with prolonged non-traumatic cardiac arrest. METHODS: Adult patients aged >20 years with non-traumatic cardiac arrest who underwent prolonged CPR (>10 min) and TEE examination during CPR were enrolled. The enrolled patients were grouped according to the presence of aortic dissection on TEE: the aortic dissection (AD) group and the non-AD group. Variables related to cardiac arrest event, CPR, and resuscitation outcome were compared between the two groups. RESULTS: Forty-five patients (median age, 71 years; 26 men) were enrolled. Ten (22.2%) and 35 (77.8%) patients were included in the AD and non-AD groups, respectively. No patients in the AD group survived. Aortic dissection on TEE was inversely related to the rate of return of spontaneous circulation on multivariate analysis (odds ratio, 0.019; 95% confidence interval, 0.001-0.750; p = .035). CONCLUSION: TEE is a useful tool for diagnosing aortic dissection as a cause of cardiac arrest during CPR. Aortic dissection is associated with poor resuscitation outcomes.

MONITORATGE CEREBRAL

1. Resuscitation. 2020 Jan 28. pii: S0300-9572(20)30044-7. doi: 10.1016/j.resuscitation.2020.01.022. [Epub ahead of print]

Serum Tau as a predictor for neurological outcome after cardiopulmonary resuscitation.

Hasslacher J(1), Rass V(2), Beer R(2), Ulmer H(3), Humpel C(4), Schiefecker A(2), Lehner G(1), Bellmann R(1), Joannidis M(5), Helbok R(2).

Abstract

AIM: We evaluated serum tau protein as biomarker for poor neurological outcome over an extended observation period in patients after successful cardiopulmonary resuscitation (CPR) treated with mild therapeutic hypothermia (MTH) or normothermia (NT). METHODS: This is a retrospective analysis of a prospective observational study including 132 patients after successful CPR. Serum tau was determined in 24 h intervals for up to 168 h after CPR. Patients were treated with MTH targeting a temperature of 33 °C for 24 h or NT according to current guidelines. Neurological outcome was assessed with the Cerebral Performance Categories Scale (CPC) at hospital discharge. RESULTS: Forty-three percent of the patients were treated with MTH. Serial serum tau levels (pg/ml) showed a peak between 72-96 h after CPR (159 (IQR 27-625). Patients with poor neurological outcome (CPC 3-5) at hospital discharge (n = 68,52%) had significantly higher serum tau levels compared to patients with good neurological outcome at 0-24 h (164 (48-946) vs. 69 (12-224); p = 0.009), at 24-48 h (414 (124-1049) vs. 74 (0-215); p < 0.001), at 48-72 h (456 (94-1225) vs. 69 (0-215); p < 0.001) and at 72-96 h (691 (197-1173) vs. 73 (0-170); p < 0.001). At 72-96 h the AUC to predict poor neurological outcome was 0.848 (95% CI: 0.737-0.959). Serum tau levels were not significantly different between patients with MTH and NT in multivariate analysis after adjusting for clinical relevant covariates. CONCLUSION: Serum tau showed highest values and the best prognostic discrimination of poor neurological outcome at 72-96 h after CPR. Prolonged elevation may indicate ongoing axonal damage in patients with hypoxic encephalopathy.

2. Resuscitation. 2020 Jan 28. pii: S0300-9572(20)30039-3. doi: 10.1016/j.resuscitation.2020.01.017. [Epub ahead of print]

Prognostic role of EEG identical bursts in patients after cardiac arrest: Multimodal correlation.

Barbella G(1), Novy J(2), Marques-Vidal P(3), Oddo M(4), Rossetti AO(5).

Abstract

AIMS: EEG burst-suppression (BS) heralds poor outcome after cardiac arrest (CA). Within this pattern, identical bursts (IB) have been suggested to be absolutely specific, in isolation. We assessed IB prevalence and their added predictive value for poor outcome in a multimodal prognostic approach. METHODS: We retrospectively analyzed a registry of comatose adults with CA (April 2011-February 2019), undergoing EEG at 5-36 h and 36-72 h. SB and IB were visually assessed. Cerebral Performance Categories (CPC) at 3 months were dichotomized as "good" (CPC 1-2), or "poor" (CPC 3-5). Sensitivity, specificity, positive, negative predictive values of BS and IB for poor outcome were calculated. A multimodal prognostic score was created assigning one point each to unreactive and epileptiform EEG, pupillary light reflex and SSEPs absence, NSE > 75 μg/l. In a second score, IB were added; predictive performances were compared using Receiver Operating Characteristic (ROC) curves. RESULTS: Of 522 patients, 147 (28%) had BS in any EEG (10 [7%] had good outcome and 129 [88%] died). Of them, 53/147 (36%, 10% of total) showed IB, 47/53 (89%) of which within 36 h. IB were 100% specific for poor outcome, and associated with higher serum NSE than BS. However, there was no significant difference between the scores with and without

IB for CPC 3-5 (p = 0.116) CONCLUSION: IB occur in 10% of patients after CA. In our multimodal context, IB, albeit being very specific for poor outcome, seem redundant with other predictors.

3. Resuscitation. 2020 Jan 23. pii: S0300-9572(20)30036-8. doi: 10.1016/j.resuscitation.2020.01.014. [Epub ahead of print]
Topography of MR lesions correlates with standardized EEG pattern in early comatose survivors after cardiac arrest.
Barth R(1), Zubler F(2), Weck A(3), Haenggi M(4), Schindler K(1), Wiest R(5), Wagner F(5).
Abstract
AIM: Multimodal prognostication in comatose patients after cardiac arrest (CA) is complicated by the fact that different modalities are usually not independent. Here we set out to systematically correlate early EEG and MRI findings. METHODS: 89 adult patients from a prospective register who underwent at least one EEG and one MRI in the acute phase after CA were included. The EEGs were characterized using pre-existent standardized categories (highly malignant, malignant, benign). For MRIs, the apparent diffusion coefficient (ADC) was computed in pre-defined regions. We then introduced a novel classification based on the topography of ADC reduction (MR-lesion pattern (MLP) 1: no lesion; MLP 2: purely cortical lesions; MLP 3: involvement of the basal ganglia; MLP 4 involvement of other deep grey matter regions). RESULTS: EEG background reactivity and EEG background continuity were strongly associated with a lower MLP value ($p < 0.001$ and $p = 0.003$ respectively). The EEG categories highly malignant, malignant and benign were strongly correlated with the MLP values (rho = 0.46, $p < 0.001$). CONCLUSION: The MRI lesions are highly correlated with the EEG pattern. Our results suggest that performing MRI in comatose patients after CA with either highly malignant or with a benign EEG pattern is unlikely to yield additional useful information for prognostication, and should therefore be performed in priority in patients with intermediate EEG patterns ("malignant pattern").
FREE FULL TEXT

ORGANITZACIONS I ENTRENAMENT

1. Resuscitation. 2020 Jan 28. pii: S0300-9572(20)30041-1. doi: 10.1016/j.resuscitation.2020.01.019. [Epub ahead of print]
Regional variation in out-of-hospital cardiac arrest: incidence and survival - a nationwide study of regions in Denmark.
Møller SG(1), Wissenberg M(2), Møller-Hansen S(3), Folke F(2), Malta Hansen C(4), Kragholm K(5), Bundgaard Ringgren K(5), Karlsson L(2), Lohse N(6), Lippert F(7), Køber L(8), Gislason G(9), Torp-Pedersen C(10).
Abstract AIM: Regional variation in incidence and survival after out-of-hospital cardiac arrest (OHCA) may be caused by many factors including differences in definitions and reporting. We examined regional differences in Denmark. METHODS: From the Danish Cardiac Arrest Registry we identified adult OHCA patients between 2009-2014 of presumed cardiac cause. Patients were grouped according to the five administrative/geographical regions of Denmark and survival was examined based on all arrest-cases (30-day survival percentage) and number of survivors per 100,000 inhabitants. RESULTS: We included 12,902 OHCAs of which 1,550 (12.0%) were alive 30 days after OHCA. No regional differences were observed in age, sex or comorbidities. Incidence of OHCA ranged from 32.9 to 42.4 per 100,000 inhabitants; 30-day survival percentages ranged from 8.5% to 13.8% and number of survivors per 100,000 inhabitants ranged from 3.5 to 5.9, across the regions. In one of the

regions car-manned pre-hospital physicians were discontinued from 2011. Here, the incidence of OHCA per 100,000 inhabitants increased markedly from 37.1 in 2011 to 52.2 in 2014 and 30-day survival percentage decreased from 10.9% in 2011 to 7.5% in 2014; while the number of survivors per 100,000 inhabitants stagnated from 4.0 in 2011 to 3.9 in 2014. In comparison, survival increased in the other four regions. CONCLUSION: Differences in incidence and 30-day survival after OHCA were observed between the five regions of Denmark. Comparisons of survival should not only be based on survival percentages, but also on number of survivors of the background population as inclusion bias can influence survival outcomes.

2. Resuscitation. 2020 Jan 28. pii: S0300-9572(20)30042-3. doi: 10.1016/j.resuscitation.2020.01.020. [Epub ahead of print]

Comparison of parametric and nonparametric methods for outcome prediction using longitudinal data after cardiac arrest.

Elmer J(1), Jones BL(2), Nagin DS(3).

Abstract

INTRODUCTION: Predicting outcome after cardiac arrest is challenging. We previously tested group-based trajectory modeling (GBTM) for prognostication based on baseline characteristics and quantitative electroencephalographic (EEG) trajectories. Here, we describe implementation of this method in a freely available software package and test its performance against alternative options. METHODS: We included comatose patients admitted to a single center after resuscitation from cardiac arrest from April 2010 to April 2019 who underwent ≥6 hours of EEG monitoring. We abstracted clinical information from our prospective registry and summarized suppression ratio in 48 hourly epochs. We tested three classes of longitudinal models: frequentist, statistically based GBTMs; non-parametric (i.e. machine learning) k-means models; and Bayesian regression. Our primary outcome of interest was discharge CPC 1 to 3 (vs unconsciousness or death). We compared sensitivity for detecting poor outcome at a false positive rate (FPR) <1%. RESULTS: Of 1,010 included subjects, 250 (25%) were awake and alive at hospital discharge. GBTM and k-means derived trajectories, group sizes and group-specific outcomes were comparable. Conditional on an FPR < 1%, GBTMs yielded optimal sensitivity (38%) over 48 hours. More sensitive methods had 2-3% FPRs. CONCLUSION: We explored fundamentally different tools for patient-levelpredictions based on longitudinal and time-invariant patient data. Of the evaluated methods, GBTM resulted in optimal sensitivity while maintaining a false positive rate <1%. The provided code and software of this method provides an easy-to-use implementation for outcome prediction based on GBTMs.

3. Resuscitation. 2020 Jan 24;148:128-134. doi: 10.1016/j.resuscitation.2020.01.016. [Epub ahead of print]

Sex differences in out-of-hospital cardiac arrest interventions within the province of British Columbia, Canada.

Awad E(1), Christenson J(2), Grunau B(3), Tallon J(4), Humphries K(5).

Abstract

INTRODUCTION: Out-of-hospital cardiac arrest (OHCA) is common among females and males alike; however, previous studies reported differences in outcomes between sexes in different regions. To investigate possible explanations for this disparity, we examined sex differences in resuscitation interventions in the province of British Columbia (BC). METHODS: We performed an observational analysis of the BC Cardiac Arrest Registry (2011-16). We included adults with non-traumatic and EMS-treated OHCA. We examined sex

differences in bystander CPR, chest compression rate, and intra-arrest transport using chi-square tests, student's t-test, multivariable linear and logistic regressions. RESULTS: In total, 7398 patients were eligible for the bystander CPR analysis; 31% were female. More males received bystander CPR (54% vs. 50%); however, male sex was not associated with bystander CPR after adjustment for confounders (adjusted OR male vs. female: 1.07, 95% CI 0.96, 1.18). There was no difference in the chest compression rate for males and females in unadjusted or adjusted analyses. Among subjects who did not achieve prehospital ROSC (n = 5225, 32% females), 64% were pronounced dead at the scene with the remaining transported to hospital. Males more often underwent intra-arrest transport than females (36.7% vs. 34.0%). After adjustment, males had 1.2 greater odds of being transported to hospital than females (95% CI 1.04, 1.37). CONCLUSIONS: We did not detect an association between sex and bystander CPR or chest compression rate. In those who did not achieve prehospital ROSC, males had 1.2-fold greater odds of being transported to hospital compared to females.

4. Resuscitation. 2020 Jan 24. pii: S0300-9572(20)30032-0. doi: 10.1016/j.resuscitation.2020.01.011. [Epub ahead of print]

The CAHP (Cardiac Arrest Hospital Prognosis) score: A tool for risk stratification after out-of-hospital cardiac arrest in elderly patients.

Sauneuf B(1), Dupeyrat J(2), Souloy X(1), Leclerc M(3), Courteille B(4), Canoville B(4), Ramakers M(3), Goddé F(4), Beygui F(5), du Cheyron D(2), Daubin C(2).

Abstract

BACKGROUND: Older age is associated with worse outcome after out-of-hospital cardiac arrest (OHCA). Therefore, we tested the performance of CAHP score, to predict neurological outcome in elderly OHCA patients and to select patients most likely to benefit from coronary angiogram (CAG). MATERIALS AND METHODS: The present study was a retrospective multicentre observational study at 3 non-university hospitals and 1 university hospital. CAHP score was calculated, and its performance to predict outcomes was evaluated. Factors associated with the use of CAG were analysed and the rate of CAG across each CAHP score risk group reported. RESULTS: One hundred seventy-six patients fulfilled inclusion criteria (median age of 81, [79-84]), among which a cardiac cause was presumed for 99 patients. The hospital unfavourable outcome was 91%. The ROC-AUC values for hospital neurological outcome prediction of CAHP score was 0.81 [0.68-0.94], showing good discrimination performance. ST-segment elevation in ECG and initial shockable rhythm were independent factors for performing early CAG, whereas age and distance from the percutaneous coronary intervention centre were independently associated with the absence of early CAG. The percentages of patients receiving early CAG in the low, medium and high CAHP score risk groups were 64%, 33% and 34%, respectively, and differed significantly between low CAHP score risk group and other groups (p = 0.02). CONCLUSIONS: The CAHP score exhibited a good discrimination performance to predict neurological outcome in elderly OHCA patients. This score could represent a helpful tool for treatment allocation. A simple prognostication score could permit avoiding unnecessary procedures in patients with minimal chances of survival.

CURES POST

1. Am J Emerg Med. 2020 Jan 23. pii: S0735-6757(20)30038-3. doi: 10.1016/j.ajem.2020.01.038. [Epub ahead of print]

The optimal peripheral oxygen saturation may be 95-97% for post-cardiac arrest patients: A retrospective observational study.

Zhou DW(1), Li ZM(1), Zhang SL(1), Wu L(1), Li YY(1), Zhou JX(1), Shi GZ(2).

Abstract

BACKGROUND: Current post-resuscitation guidelines recommend oxygen titration in adults with the return of spontaneous circulation after cardiac arrest. However, the optimal peripheral oxygen saturation (SpO2) is still unclear for post-cardiac arrest care. METHODS: We conducted a retrospective observational study of prospectively collected data of all cardiac arrest patients admitted to the intensive care units between 2014 and 2015. The main exposure was SpO2, which were interfaced from bedside vital signs monitors as 1-min averages, and archived as 5-min median values. The proportion of time spent in different SpO2 categories was included in separate multivariable regression models along with covariates. The primary outcome measure was hospital mortality and the proportion of discharged home as the secondary outcome was reported. RESULTS: 2836 post-cardiac arrest patients in ICUs of 156 hospitals were included. 1235 (44%) patients died during hospitalization and 818 (29%) patients discharged home. With multivariate regression analysis, the proportion of time spent in SpO2 of ≤89%, 90%, 91%, and 92% were associated with higher hospital mortality. The proportion of time spent in SpO2 of 95%, 96%, and 97% were associated with a higher proportion of discharged home outcome, but not associated with hospital mortality. CONCLUSIONS: In this retrospective observational study, the optimal SpO2 for patients admitted to the intensive care unit after cardiac arrest may be 95 97%. Further investigation is warranted to determine if targeting SpO2 of 95-97% would improve patient-centered outcomes after cardiac arrest.

2. Ann Neurol. 2020 Jan 29. doi: 10.1002/ana.25690. [Epub ahead of print]

Independent functional outcomes after prolonged coma following cardiac arrest: a mechanistic hypothesis.

Forgacs PB(1)(2)(3), Devinsky O(4), Schiff ND(1)(2)(3).

Abstract

OBJECTIVE: Survivors of prolonged (> 2 weeks) post-cardiac arrest (CA) coma are expected to remain permanently disabled. We aimed to investigate three outlier patients who ultimately achieved independent functional outcomes after prolonged post-CA coma to identify electroencephalographic (EEG) markers of their recovery potential. For validation purposes, we also aimed to evaluate these markers in an independent cohort of post-CA patients. METHODS: We identified three patients with late recovery from coma (17-37 days) following CA who recovered to functionally independent behavioral levels. We performed spectral power analyses of available EEGs during prominent burst suppression patterns (BSP) present in all three patients. Using identical methods, we also assessed the relationship of intra-burst spectral power and outcomes in a prospectively enrolled cohort of post-CA patients. We performed chart reviews of common clinical, imaging, EEG prognostic variables and clinical outcomes for all patients. RESULTS: All three patients with late recovery from coma lacked evidence of overwhelming cortical injury but demonstrated prominent BSP on EEG. Spectral analyses revealed a prominent theta (~4-7Hz) feature dominating the bursts during BSP in these patients. In the prospective cohort, similar intra-burst theta spectral features were evident in patients with favorable outcomes; patients

with BSP and unfavorable outcomes showed either no features, transient burst features or decreasing intra-burst frequencies with time. INTERPRETATION: BSP with theta (~4-7Hz) peak intra-burst spectral power after CA may index a recovery potential. We discuss our results in the context of optimizing metabolic substrate availability and stimulating the cortico-thalamic system during recovery from prolonged post-CA coma. This article is protected by copyright. All rights reserved.

3. Eur Heart J Acute Cardiovasc Care. 2020 Jan 31:2048872619900095. doi: 10.1177/2048872619900095. [Epub ahead of print]

A randomised double-blind pilot trial comparing a mean arterial pressure target of 65 mm Hg versus 72 mm Hg after out-of-hospital cardiac arrest.

Grand J(1), Meyer AS(1), Kjaergaard J(1), Wiberg S(1), Thomsen JH(1), Frydland M(1), Ostrowski SR(2), Johansson PI(2), Hassager C(1).

Abstract

BACKGROUND: After resuscitation from out-of-hospital cardiac arrest, mean arterial pressure below 65 mm Hg is avoided with vasopressors. A higher blood-pressure target could potentially improve outcome. The aim of this pilot trial was to investigate the effect of a higher mean arterial pressure target on biomarkers of organ injury. METHODS: This was a single-centre, double-blind trial of 50 consecutive, comatose out-of-hospital cardiac arrest patients randomly assigned in a 1:1 ratio to a mean arterial pressure target of 65 mm Hg (MAP65) or 72 mm Hg (MAP72). Modified blood pressure modules with a -10% offset were used, enabling a double-blind study design. End-points were biomarkers of organ injury including markers of endothelial integrity (soluble trombomodulin) brain damage (neuron-specific enolase) and renal function (estimated glomerular filtration rate). RESULTS: Mean arterial pressure was significantly higher in MAP72 with a mean difference of 5 mm Hg (pgroup=0.03). After 48 h, soluble trombomodulin (median (interquartile range)) was 8.2 (6.7-12.9) ng/ml and 8.3 (6.0-10.8) ng/ml (p=0.29), neuron-specific enolase was 20 (13-31 µg/l) and 18 (13-44 µg/l) p=0.79) and estimated glomerular filtration rate (mean (±standard deviation)) was 61±19 ml/min/1.73m2 and 48±22 ml/min/1.73 m2 (p=0.08) for the MAP72 and MAP65 groups, respectively. Renal replacement therapy was needed in eight patients (31%) in MAP65 and three patients (13%) in MAP72 (p=0.14). CONCLUSIONS: Double-blind allocation to different mean arterial pressure targets is feasible in comatose out-of-hospital cardiac arrest patients. A mean arterial pressure target of 72 mm Hg compared to 65 mm Hg did not result in improved biomarkers of organ injury. We observed a trend towards preserved renal function in the MAP72 group.

4. Eur Heart J Acute Cardiovasc Care. 2020 Jan 31:2048872619895126. doi: 10.1177/2048872619895126. [Epub ahead of print]

Acute respiratory failure and inflammatory response after out-of-hospital cardiac arrest: results of the Post-Cardiac Arrest Syndrome (PCAS) pilot study.

Czerwińska-Jelonkiewicz K(1), Grand J(2), Tavazzi G(3), Sans-Rosello J(4), Wood A(5), Oleksiak A(6), Buszman P(1), Krysiński M(1), Sionis A(4), Hassager C(2), Stępińska J(6).

Abstract

BACKGROUND: Although the lungs are potentially highly susceptible to post-cardiac arrest syndrome injury, the issue of acute respiratory failure after out-of-hospital cardiac arrest has not been investigated. The objectives of this analysis were to determine the prevalence of acute respiratory failure after out-of-hospital cardiac arrest, its association with post-cardiac arrest syndrome inflammatory response and to clarify its importance for early

mortality. METHODS: The Post-Cardiac Arrest Syndrome (PCAS) pilot study was a prospective, observational, six-centre project (Poland 2, Denmark 1, Spain 1, Italy 1, UK 1), studying patients resuscitated after out-of-hospital cardiac arrest of cardiac origin. Primary outcomes were: (a) the profile of organ failure within the first 72 hours after out-of-hospital cardiac arrest; (b) in-hospital and short-term mortality, up to 30 days of follow-up. Respiratory failure was defined using a modified version of the Berlin acute respiratory distress syndrome definition. Inflammatory response was defined using leukocytes (white blood cells), platelet count and C-reactive protein concentration. All parameters were assessed every 24 hours, from admission until 72 hours of stay. RESULTS: Overall, 148 patients (age 62.9±15.27 years; 27.7% women) were included. Acute respiratory failure was noted in between 50 (33.8%) and 75 (50.7%) patients over the first 72 hours. In-hospital and short-term mortality was 68 (46.9%) and 72 (48.6%), respectively. Inflammation was significantly associated with the risk of acute respiratory failure, with the highest cumulative

odds ratio of 748 at 72 hours (C-reactive protein 1.035 (1.001-1.070); 0.043, white blood cells 1.086 (1.039-1.136); 0.001, platelets 1.004 (1.001-1.007); <0.005). Early acute respiratory failure was related to in-hospital mortality (3.172, 95% confidence interval 1.496-6.725; 0.002) and to short-term mortality (3.335 (1.815-6.129); 0.0001). CONCLUSIONS: An inflammatory response is significantly associated with acute respiratory failure early after out-of-hospital cardiac arrest. Acute respiratory failure is associated with a worse early prognosis after out-of-hospital cardiac arrest.

5. Resuscitation. 2020 Jan 28. pii: S0300-9572(20)30035-6. doi: 10.1016/j.resuscitation.2020.01.013. [Epub ahead of print]

The association between duration of mechanical ventilation and survival in post cardiac arrest patients.

Lundin A(1), Karlsson T(2), Herlitz J(3), Lundgren P(4), Rylander C(5).

Abstract

PURPOSE: To assess the association between the duration of mechanical ventilation during post resuscitation care and 30-day survival after cardiac arrest. METHODS: We conducted a retrospective observational study using data from two national registries. Comatose cardiac arrest patients admitted to general intensive care in Swedish hospitals between 2011 and 2016 were eligible. Based on the median duration of mechanical ventilation for patients who did not survive to hospital discharge, used as a proxy for the endurance of post resuscitation care, the hospitals were divided into four ordered groups for which association with 30-day survival was analyzed. RESULTS: In total, 5.113 patients in 56 hospitals were included. Median duration of mechanical ventilation for patients who did not survive to hospital discharge ranged from 17 hours in hospital group 1 to 51 hours in hospital group 4. After adjustment for baseline characteristics, 30-day survival in the entire cohort was positively and independently associated with ordered hospital group: (adjusted odds ratio (95%CI); 1.12 (1.02,1.23); p = 0.02). Thus, hospitals with a longer duration of mechanical ventilation among non-survivors had better survival rate among patients admitted to ICU after a cardiac arrest. However, in a secondary analysis restricted to patients with length of stay in the intensive care unit ≥ 48 hours, there was no significant association between 30-day survival and ordered hospital group. CONCLUSION: A tendency for longer duration of post resuscitation care in the ICU was associated with higher 30-day survival in comatose patients admitted to intensive care after cardiac arrest.

TARGETED TEMPERATURE MANAGEMENT

1. Crit Care. 2020 Jan 28;24(1):27. doi: 10.1186/s13054-020-2731-z.

Effects of endovascular and surface cooling on resuscitation in patients with cardiac arrest and a comparison of effectiveness, stability, and safety: a systematic review and meta-analysis.

Liao X(1), Zhou Z(1), Zhou M(2), Tang H(1), Feng M(1), Kou B(1), Zhu N(1), Liao F(1), Wu L(1).

Abstract

OBJECTIVES: This study conducted a meta-analysis to assess the effectiveness, stability, and safety of mild therapeutic hypothermia (TH) induced by endovascular cooling (EC) and surface cooling (SC) and its effect on ICU, survival rate, and neurological function integrity in adult CA patients. METHODS: We developed inclusion criteria, intervention protocols, results, and data collection. The results included outcomes during target temperature management as well as ICU stay, survival rate, and neurological functional integrity. The

characteristics of the included population and each study were analyzed. RESULTS: Four thousand nine hundred thirteen participants met the inclusion criteria. Those receiving EC had a better cooling efficiency (cooling rates MD = 0.31[0.13, 0.50], p < 0.01; induced cooling times MD = - 90.45[- 167.57, - 13.33], p = 0.02; patients achieving the target temperature RR = 1.60[1.19, 2.15], p < 0.01) and thermal stability during the maintenance phase (maintenance time MD = 2.35[1.22, 3.48], p < 0.01; temperature fluctuation MD = - 0.68[- 1.03, - 0.33], p < 0.01; overcooling RR = 0.33[0.23, 0.49], p < 0.01). There were no differences in ICU survival rate (RR = 1.22[0.98, 1.52], p = 0.07, I2 = 0%) and hospital survival rate (RR = 1.02 [0.96, 1.09], p = 0.46, I2 = 0%), but EC reduced the length of stay in ICU (MD = - 1.83[- 3.45, - 0.21], p = 0.03, I2 = 49%) and improved outcome of favorable neurological function at discharge (RR = 1.15[1.04, 1.28], p < 0.01, I2 = 0%). EC may delay the hypothermia initiation time, and there was no significant difference between the two cooling methods in the time from the start of patients' cardiac arrest to achieve the target temperature (MD = - 46.64[- 175.86, 82.58]). EC was superior to non-ArcticSun in terms of cooling efficiency. Although there was no statistical difference in ICU survival rate, ICU length of stay, and hospitalization survival rate, in comparison to non-ArcticSun, EC improved rates of neurologically intact survival (RR = 1.16 [1.01, 1.35], p = 0.04, I2 = 0%). CONCLUSIONS: Among adult patients receiving cardiopulmonary resuscitation, although there is no significant difference between the two cooling methods in the time from the start of cardiac arrest to achieve the target temperature, the faster cooling rate and more stable cooling process in EC shorten patients' ICU hospitalization time and help more patients obtain good neurological prognosis compared with patients receiving SC. Meanwhile, although EC has no significant difference in patient outcomes compared with ArcticSun, EC has improved rates of neurologically intact survival.
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ELECTROFISIOLOGIA I DESFIBRIL·LACIÓ

1. Circ J. 2020 Jan 30. doi: 10.1253/circj.CJ-19-0856. [Epub ahead of print]
Osborn Wave Is Related to Ventricular Fibrillation and Tachycardia in Hypothermic Patients.
Okada N(1), Matsuyama T(1), Morita S(2), Ehara N(3), Miyamae N(4), Okada Y(5), Jo T(6), Sumida Y(7), Watanabe M(1), Nozawa M(8), Tsuruoka A(9), Fujimoto Y(3), Okumura Y(10), Hamanaka K(11), Kitamura T(12), Nishiyama K(11), Ohta B(1).
Abstract
BACKGROUND: The Osborn wave (OW) is often observed in hypothermic patients; however, whether OW in hypothermic patients is related to the development of fatal ventricular arrhythmia, including ventricular fibrillation (VF) and pulseless ventricular tachycardia (VT),remains undetermined. This study aimed to estimate the association between OW and the incidence of fatal ventricular arrhythmias.Methods and Results: This retrospective study used the Japanese Accidental Hypothermia Network registry database and included 572 hypothermic patients. Patients were divided into the OW group (those with OW) and non-OW group (those without OW). The relationship between the development of fatal arrhythmias and presence of OW was assessed using the chi-squared test. All patients who developed VF/VT (n=10) had OW on electrocardiogram upon hospital arrival. The presence of OW had a sensitivity of 100%, specificity of 47.8%, positive predictive value of 4.0%, and negative predictive value of 100% for VF/VT development. The in-hospital mortality rate was 22.3% in the OW group and 21.2% in the non-OW group (P=0.781). CONCLUSIONS: OW

was observed in all hypothermic patients with VF/VT. The occurrence of ventricular arrhythmias is highly unlikely in the absence of OW on the electrocardiogram. Although the presence of OW might be used to predict these fatal arrhythmias in hypothermic patients, there was no association between the presence of OW and in-hospital mortality.
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ECLS

1. Eur Heart J Acute Cardiovasc Care. 2020 Jan 31:2048872619900090. doi: 10.1177/2048872619900090. [Epub ahead of print]
Cost-utility of venoarterial extracorporeal membrane oxygenation in cardiogenic shock and cardiac arrest.
Jäämaa-Holmberg S(1)(2), Salmela B(3), Suojaranta R(1), Lemström KB(1)(2), Lommi J(1).
Abstract
BACKGROUND: The use of venoarterial extracorporeal membrane oxygenation in cardiogenic shock keeps increasing, but its cost-utility is unknown. METHODS: We studied retrospectively the cost-utility of venoarterial extracorporeal membrane oxygenation in a five-year cohort of consequent patients treated due to refractory cardiogenic shock or cardiac arrest in a transplant centre in 2013-2017. In our centre, venoarterial extracorporeal membrane oxygenation is considered for all cardiogenic shock patients potentially eligible for heart transplantation, and for selected postcardiotomy patients. We assessed the costs of the index hospitalization and of the one-year hospital costs, and the patients' health-related quality of life (response rate 71.7%). Based on the data and the population-based life expectancies, we calculated the amount and the costs of quality-adjusted life years gained both without discount and with an annual discount of 3.5%. RESULTS: The cohort included 102 patients (78 cardiogenic shock; 24 cardiac arrest) of whom 67 (65.7%) survived to discharge and 66 (64.7%) to one year. The effective costs per one hospital survivor were 242,303€. Median in-hospital costs of the index hospitalization per patient were 129,967€ (interquartile range 150,340€). Mean predicted number of quality-adjusted life years gained by the treatment was 20.9 (standard deviation 9.7) without discount, and the median cost per quality-adjusted life year was 7474€ (interquartile range 10,973€). With the annual discount of 3.5%, 13.0 (standard deviation 4.8) quality-adjusted life years were gained with the cost of 12,642€ per quality-adjusted life year (interquartile range 15,059€). CONCLUSIONS: We found the use of venoarterial extracorporeal membrane oxygenation inrefractor y cardiogenic shock and cardiac arrest justified from the cost-utility point of view in a transplant centre setting.

2. J Emerg Med. 2020 Jan 28. pii: S0736-4679(19)31106-0. doi: 10.1016/j.jemermed.2019.12.004. [Epub ahead of print]
Exploratory Observational Study of Extracorporeal Cardiopulmonary Resuscitation for Nonshockable Out-Of-Hospital Cardiac Arrest Occurring After an Emergency Medical Services Arrival: SOS-KANTO 2012 Study Report.
Yoshida T(1), Fujitani S(1), Wakatake H(1), Kitano Y(1), Yoshida M(1), Tsutsumi K(1), Masui Y(1), Taira Y(1).
Abstract
BACKGROUND: The outcomes of patients with nonshockable out-of-hospital cardiac arrest (OHCA) are poor, but may be improved by extracorporeal cardiopulmonary resuscitation (E-CPR). OBJECTIVE: To examine the effects of veno-arterial extracorporeal membranous

oxygenation (ECMO) as E-CPR in patients with nonshockable OHCA after emergency medical services (EMS) arrival for whom satisfactory cardiopulmonary resuscitation (CPR) was immediately performed. METHODS: Among 16,452 patients enrolled in the SOS-KANTO 2012 study, we examined data on 531 patients aged ≥ 18 years who performed activities of daily living (ADL) well or had moderate disability before the onset of cardiac arrest (CA) and those with normal spontaneous respiration or pulse palpation upon EMS arrival. CPR was performed immediately after CA onset, and advanced life support was provided upon hospital arrival for these patients. We divided patients into ECMO and non-ECMO groups. We retrospectively analyzed background factors and clinical outcomes. RESULTS: E-CPR was performed on 38 (7.2%) patients. In the univariate analysis, the mean age of the ECMO group was lower, ADL function before onset was more favorable, mean body weight was higher, and the mean interval from onset until hospital arrival was shorter than those in the non-ECMO group. One-to 3-month survival or favorable cerebral function outcome rates were higher in the ECMO group than in the non-ECMO group. In the multivariate analysis, ECMO use and the interval from onset until hospital arrival were independent prognostic factors for favorable cerebral functional outcomes at 1 and 3 months. CONCLUSION: E-CPRmay be associated with favorable outcomes in carefully selected patients with nonshockable OHCA.

3. Resuscitation. 2020 Jan 23;148:121-127. doi: 10.1016/j.resuscitation.2020.01.015. [Epub ahead of print]

The differential neurologic prognosis of low-flow time according to the initial rhythm in patients who undergo extracorporeal cardiopulmonary resuscitation.

Ko RE(1), Ryu JA(1), Cho YH(2), Sung K(2), Jeon K(3), Suh GY(3), Park TK(4), Lee JM(4), Song YB(4), Hahn JY(4), Choi JH(4), Choi SH(4), Gwon HC(4), Carriere KC(5), Ahn J(6), Yang JH(7).

Abstract

BACKGROUND: Limited data is available on the association between low-flow time and neurologic outcome according to the initial arrest rhythm in patients underwent extracorporeal cardiopulmonary resuscitation (ECPR). METHODS: Between September 2004 and December 2018, 294 patients with in-hospital cardiac arrest (IHCA) were included in this analysis. We classified the patients into asystole (n = 42), pulseless electrical activity (PEA, n = 163) and shockable rhythm (n = 89) according to their initial rhythm. Primary outcome was poor neurologic outcome defined as Cerebral Performance Categories scores of 3, 4, and 5. RESULTS: One-hundred ninety IHCA patients (64.6%) had poor neurologic outcomes. There was significantly worse neurologic outcomes among IHCA patients according to their initial rhythm (asystole [88.1%], PEA [66.3%], and shockable rhythm [50.6%], $p < 0.001$). The PEA group and the shockable rhythm group showed a significant association between low-flow time and neurologic outcomes while this relationship was not observed in the asystole group: PEA [$\rho = 0.224$, $p = 0.005$], shockable rhythm [$\rho = 0.298$, $p = 0.006$]), and asystole [$\rho = -0.091$, $p = 0.590$]. The best discriminative CPR to pump-on time for neurologic outcome was 22 min in the PEA group (area under the curve 0.687, 95% confidence interval [CI] 0.610-0.758, $p < 0.001$) and 46 min in the shockable rhythm group (area under the curve 0.671, 95% CI 0.593-0.743, $p < 0.001$). CONCLUSIONS: The effect of interplay between arrest rhythm and low-flow time might be helpful for decisions about team activation and management for ECPR and could provide information for early neurologic prognosis.

PEDIATRIA

1. BMC Pediatr. 2020 Jan 30;20(1):46. doi: 10.1186/s12887-020-1925-5.

Cost effectiveness of a novel device for improving resuscitation of apneic newborns.

Ali A(1)(2)(3), Nudel J(4)(5), Heberle CR(1)(2), Santorino D(6)(7), Olson KR(8)(9), Hur C(10)(11)(12)(13).

Abstract

BACKGROUND: Intrapartum-related hypoxic events are a major cause of morbidity and mortality in low resource countries. Neonates who receive proper resuscitation may go on to live otherwise healthy lives. However, even when a birth attendant is present, these babies frequently receive suboptimal ventilation with poor outcomes. The Augmented Infant Resuscitator (AIR) is a low-cost, reusable device designed to provide birth attendants real-time objective feedback on measures of ventilation quality during resuscitations and is intended for use in training and at the point of care. The goal of our study was to determine the impact and cost-effectiveness of AIR deployment in conjunction with existing resuscitation training programs in low resource settings. METHODS: We developed a simulation model of the natural history of intrapartum-related neonatal hypoxia and resuscitation deriving parameters from published literature and model calibration. Simulations estimated the number of disability-adjusted life years (DALYs) averted with use of the AIR by birth attendants if deployed at the point of care. Potential decreases in neonatal mortality and long-term subsequent morbidity from disability were modeled over a lifetime horizon. The primary outcome for the analysis was the cost per DALY averted. Model parameters were specific to the Mbeya region of Tanzania. RESULTS: Implementation of the AIR strategy resulted in an additional cost of $24.44 (4.80, 73.62) per DALY averted on top of the cost of existing, validated resuscitation programs. Per hospital, this adds an extra $656 to initial training costs and averts approximately 26.84 years of disability in the cohort of children born in the first year, when projected over a lifetime. The findings were robust to sensitivity analyses. Total roll-out costs for AIR are estimated at $422,688 for the Mbeya region, averting approximately 9018 DALYs on top of existing resuscitation programs, which are estimated to cost $202,240 without AIR. CONCLUSION: Our modeling analysis finds that use of the AIR device may be both an effective and cost-effective tool when used as a supplement to existing resuscitation training programs. Implementation of this strategy in multiple settings will provide data to improve our model parameters and potentially confirm our findings.

FREE FULL TEXT

2. Resuscitation. 2020 Jan 23. pii: S0300-9572(20)30031-9. doi: 10.1016/j.resuscitation.2020.01.010. [Epub ahead of print]

Survival after delivery room cardiopulmonary resuscitation: A national registry study.

Foglia EE(1), Jensen EA(2), Wyckoff MH(3), Sawyer T(4), Topjian A(5), Ratcliffe SJ(6); American Heart Association's Get With The Guidelines-Resuscitation Investigators.

Abstract

AIMS: Survival after delivery room cardiopulmonary resuscitation (DR-CPR) is not well characterized in full-term infants, and survival outcomes after DR-CPR have not been defined across the spectrum of gestation. The study objectives were to define gestational age (GA) specific survival following DR-CPR and to assess the association between GA and DR-CPR characteristics and survival outcomes. METHODS: Retrospective cohort study of prospectively collected data in the American Heart Association Get With the Guidelines-Resuscitation registry. Newborn infants without congenital abnormalities who received

greater than 1 minute of chest compressions for DR-CPR were included. GA was stratified by categorical subgroups: ≥36 weeks; 33-356/7 weeks; 29-326/7 weeks; 25-286/7 weeks; 22-246/7 weeks. The primary outcome was survival to hospital discharge; the secondary outcome was return of circulation (ROC). RESULTS: Among 1,022 infants who received DR-CPR, 83% experienced ROC and 64% survived to hospital discharge. GA-stratified hospital survival rates were 83% (> = 36 weeks), 66% (33-35 weeks), 60% (29-32 weeks), 52% (25-28 weeks), and 25% (22-
24 weeks). Compared with GA > = 36 weeks, lower GA wasindependently associated with decreasing odds of survival (33-35 weeks: adjusted Odds
Ratio [aOR] 0.46, 95% Confidence Interval [CI] 0.26-0.81; 29-32 weeks: aOR 0.40, 95% CI 0.23-0.69; 25-28 weeks: aOR 0.21, 95% CI 0.11-0.41; 22-24 weeks: aOR 0.06, 95% CI 0.03-0.10). CONCLUSIONS: In this national registry of infants who received delivery room cardiopulmonary resuscitation (DR-CPR), 83% survived the event and two-thirds survived to hospital discharge. These results contribute to defining survival outcomes following DR-CPR across the continuum of gestation.

RECERCA EXPERIMENTAL

1. Analyst. 2020 Jan 27. doi: 10.1039/c9an01950b. [Epub ahead of print]

Real-time neurochemical measurement of dynamic metabolic events during cardiac arrest and resuscitation in a porcine model.

Gowers SAN(1), Samper IC(1), Murray DRK(1), Smith GK(1), Jeyaprakash S(1), Rogers ML(1), Karlsson M(2), Olsen MH(3), Møller K(3), Boutelle MG(1).

Abstract

This work describes a fully-integrated portable microfluidic analysis system for real-time monitoring of dynamic changes in glucose and lactate occurring in the brain as a result of cardiac arrest and resuscitation. Brain metabolites are sampled using FDA-approved microdialysis probes and coupled to a high-temporal resolution 3D printed microfluidic chip housing glucose and lactate biosensors. The microfluidic biosensors are integrated with a wireless 2-channel potentiostat forming a compact analysis system that is ideal for use in a crowded operating theatre. Data are transmitted to a custom-written app running on a tablet for real-time visualisation of metabolic trends. In a proof-of-concept porcine model of cardiac arrest, the integrated analysis system proved reliable in a challenging environment resembling a clinical setting; noise levels were found to be comparable with those seen in the lab and were not affected by major clinical interventions such as defibrillation of the heart. Using this system, we were able, for the first time, to measure changes in brain glucose and lactate levels caused by cardiac arrest and resuscitation; the system was sensitive to clinical interventions such as infusion of adrenaline. Trends suggest that cardiopulmonary resuscitation alone does not meet the high energy demands of the brain as metabolite levels only return to their values preceding cardiac arrest upon return of spontaneous circulation.

2. J Therm Biol. 2020 Jan;87:102466. doi: 10.1016/j.jtherbio.2019.102466. Epub 2019 Nov 26.

Effects of regional body temperature variation during asphyxial cardiac arrest on mortality and brain damage in a rat model.

Kim YS(1), Cho JH(2), Shin MC(2), Park Y(2), Park CW(2), Tae HJ(3), Cho JH(3), Kim IS(3), Lee TK(4), Park YE(4), Ahn JH(5), Park JH(6), Kim DW(7), Won MH(8), Lee JC(9).

Abstract
To date, hypothermia has focused on improving rates of resuscitation to increase survival in patients sustaining cardiac arrest (CA). Towards this end, the role of body temperature in neuronal damage or death during CA needs to be determined. However, few studies have investigated the effect of regional temperature variation on survival rate and neurological outcomes. In this study, adult male rats (12 week-old) were used under the following four conditions: (i) whole-body normothermia (37 ± 0.5 °C) plus (+) no asphyxial CA, (ii) whole-body normothermia + CA, (iii) whole-body hypothermia (33 ± 0.5 °C)+CA, (iv) body hypothermia/brain normothermia + CA, and (v) brain hypothermia/body normothermia + CA. The survival rate after resuscitation was significantly elevated in groups exposed to whole-body hypothermia plus CA and body hypothermia/brain normothermia plus CA, but not in groups exposed to whole-body normothermia combined with CA and brain hypothermia/body normothermia plus CA. However, the group exposed to hypothermia/brain normothermia combined with CA exhibited higher neuroprotective effects against asphyxial CA injury, i.e. improved neurological deficit and neuronal death in the hippocampus compared with those involving whole-body normothermia combined with CA. In addition, neurological deficit and neuronal death in the group of rat exposed to brain hypothermia/body normothermia and CA were similar to those in the rats subjected to whole-body normothermia and CA. In brief, only brain hypothermia during CA was not associated with effective survival rate, neurological function or neuronal protection compared with those under body (but not brain) hypothermia during CA. Our present study suggests that regional temperature in patients during CA significantly affects the outcomes associated with survival rate and neurological recovery.

CASE REPORTS

1. BMC Cardiovasc Disord. 2020 Jan 30;20(1):30. doi: 10.1186/s12872-020-01325-3.
A case report of sinoatrial arrest caused by temporal lobe epilepsy in subclinical glioblastoma.
Reifart J(1), Tschernatsch M(2)(3), Hamm CW(4)(5), Sperzel J(4), Hain A(4).
Abstract
BACKGROUND: Atrial fibrillation with symptomatic bradycardia, higher grade atrioventricular block, and sinus node disease are all common indications for permanent pacemaker implantation. The most frequent causes of sinus node disease treated with pacemaker implantation involve degenerative structural changes of the sinus node; less often, extrinsic causes (such as damage due to myocardial infarction or heightened parasympathetic nervous system activity) lead to pacemaker implantation. CASE PRESENTATION: A 50-year-old patient with syncope and documented sinoatrial arrest was referred. Neurologic exams (including CT and EEG) revealed no pathologies, so a pacemaker was implanted. Postoperatively, syncope occurred again due to a focal seizure during which sinus rhythm transitioned to atrial pacing by the device. Further neurologic testing revealed focal epilepsy. Six months later, stage IV glioblastoma was diagnosed and the patient was treated surgically. CONCLUSION: Intracerebral tumors should be considered in the differential diagnosis for patients with unexplained sinoatrial block, as well as in patients with repeat syncope after pacemaker implantation. Cranial MRI could aid the diagnostic workup of such cases.
FREE FULL TEXT

2. Korean J Anesthesiol. 2019 Apr;72(2):178-183. doi: 10.4097/kja.d.17.00075. Epub 2018 May 9.

Combination of extracorporeal membrane oxygenation and inline hemofiltration for the acute hyperkalemic cardiac arrest in a patient with Duchenne muscular dystrophy following orthopedic surgery -a case report.

Kim SH(1)(2), Song JH(2), Jung KT(1)(2).

Abstract

BACKGROUND: Duchenne muscular dystrophy (DMD) is the most common childhood muscular dystrophy that anesthesiologists can encounter in the operation room, and patients with DMD are susceptible to complications such as rhabdomyolysis, hyperkalemic cardiac arrest, and hyperthermia during the perioperative period. Acute onset of hyperkalemic cardiac arrest is a crisis because of the difficulty in achieving satisfactory resuscitation owing to the sustained hyperkalemia accompanied by rhabdomyolysis. CASE: We here report a case of a 13-year-old boy who had multiple leg fractures and other trauma after a car accident and who had suffered from acute hyperkalemic cardiac arrest. He was refractory to cardiopulmonary resuscitation and showed sustained hyperkalemia. With extracorporeal membrane oxygenation and in-line hemofiltration, he recovered from repeated cardiac arrest and hyperkalemia. CONCLUSIONS: Combining ECMO and in-line hemofiltration might be a safe and effective technique for refractory hyperkalemic cardiac arrest and rhabdomyolysis in patients with DMD.

FREE FULL TEXT

3. Mol Genet Genomic Med. 2020 Jan 28:e1151. doi: 10.1002/mgg3.1151. [Epub ahead of print]

Cardiac arrest in a mother and daughter and the identification of a novel RYR2 variant, predisposing to low penetrant catecholaminergic polymorphic ventricular tachycardia in a four-generation Canadian family.

Tung M(1), Van Petegem F(2), Lauson S(3), Collier A(4), Hodgkinson K(5), Fernandez B(4)(6), Connors S(7), Leather R(1), Sanatani S(8), Arbour L(3)(9)(10).

Abstract

BACKGROUND: Catecholaminergic polymorphic ventricular tachycardia (CPVT) is a rare inherited arrhythmia syndrome characterized by adrenergically driven ventricular arrhythmia predominantly caused by pathogenic variants in the cardiac ryanodine receptor (RyR2). We describe a novel variant associated with cardiac arrest in a mother and daughter. METHODS: Initial sequencing of the RYR2 gene identified a novel variant (c.527G > T, p.R176L) in the index case (the mother), and her daughter. Structural analysis demonstrated the variant was located within the N-terminal domain of RyR2, likely leading to a gain-of-function effect facilitating enhanced calcium ion release. Four generation cascade genetic and clinical screening was carried out. RESULTS: Thirty-eight p.R176L variant carriers wereidentified of 94 family members with genetic testing, and 108 family members had clinical evaluations. Twelve carriers were symptomatic with previous syncope and 2 additional survivors of cardiac arrest were identified. Thirty-two had clinical features suggestive of CPVT. Of 52 noncarriers, 11 had experienced previous syncope with none exhibiting any clinical features of CPVT. A documented arrhythmic event rate of 2.89/1000 person-years across all carriers was calculated. CONCLUSION: The substantial variability in phenotype and the lower than previously reported penetrance is illustrative of the importance of exploring family variants beyond first-degree relatives.

FREE FULL TEXT

4. Saudi J Anaesth. 2020 Jan-Mar;14(1):123-126. doi: 10.4103/sja.SJA_165_19. Epub 2020 Jan 6.

Prone cardiopulmonary resuscitation in elderly undergoing posterior spinal fusion with laminectomy.

Al Harbi MK(1), Alattas KA(1), Alnajar M(1), Albuthi MF(1).

Abstract

An 80-year-old male patient presented with 2 weeks history of low back pain undergoing posterior spinal fusion with laminectomy in the prone position. The patient was induced with fentanyl, propofol, and rocuronium, and then he was positioned in the prone position. After 6 h of starting the surgery, the patient started to be hypotension and bradycardia followed by pulseless electrical activity (PEA). Code blue was activated intraoperatively with immediate initiation of cardiopulmonary resuscitation (CPR) in the prone position and multiple epinephrine boluses. Fortunately, the patient had return of spontaneous circulation. After stabilization, he was taken for computed tomography scan which showed massive pulmonary embolization and management was continued in the intensive care unit. CPR in the prone position has shown to be effective for return of spontaneous circulation after PEA.