

1. J Pain Symptom Manage. 2016 Nov 15. pii: S0885-3924(16)30785-0. doi: 10.1016/j.jpainsymman.2016.08.023. [Epub ahead of print]

The use of life-sustaining procedures in the last month of life is associated with more depressive symptoms in surviving spouses.

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Abstract

CONTEXT: Family caregivers of individuals with serious illness who undergo intensive life-sustaining medical procedures at the end of life may be at risk of negative consequences including depression.

OBJECTIVE: To determine the association between patients' use of life-sustaining procedures at the end of life and depressive symptoms in their surviving spouses.

METHODS: We used data from the Health and Retirement Study, a longitudinal survey of U.S. residents, linked to Medicare claims data. We included married Medicare beneficiaries aged 65 years and older who died between 2000-2011 (n=1258) and their surviving spouses. The use of life-sustaining procedures (i.e., intubation/mechanical ventilation; tracheostomy; gastrostomy tube insertion; enteral/parenteral nutrition; and cardiopulmonary resuscitation) in the last month of life was measured via claims data. Using propensity score matching, we compared change in depressive symptoms of surviving spouses.

RESULTS: Eighteen percent of decedents underwent one or more life-sustaining procedures in the last month of life. Those whose spouses underwent life-sustaining procedures had a 0.32 point increase in depressive symptoms after death (scale range =0-8) and a greater likelihood of clinically significant depression (OR=1.51) compared to a matched sample of spouses of those who did not have procedures (p<.05).

CONCLUSION: Surviving spouses of those who undergo intensive life-sustaining procedures at the end of life experience a greater magnitude of increase in depressive symptoms than those whose spouses do not undergo such procedures. Further study of the circumstances and decision-making surrounding these procedures is needed to understand their relationship with survivors' negative mental health consequences and how best to provide appropriate support.

2. Resuscitation. 2016 Nov 14. pii: S0300-9572(16)30539-1. doi: 10.1016/j.resuscitation.2016.10.026. [Epub ahead of print]

Time delays to reach dispatch centres in different regions in Europe. Are we losing the window of opportunity? - The EUROCALL study.

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Abstract

AIM: In out of hospital cardiac arrest (OHCA) a single rescuer should start with Cardiopulmonary Resuscitation (CPR) immediately after calling the Emergency Medical Communication Centre (EMCC). The start of CPR may be delayed considerably if the total time to connect to the dispatcher at the EMCC (TT-EMCC) is prolonged. EUROCALL aimed to investigate the TT-EMCC and its components in several European regions using different calling procedures.

METHODS: EUROCALL is a prospective, multicentre randomised study that was performed in April 2013. Conducted from a landline or a mobile phone, calls were randomly allocated to day and time of the call, and to those connecting directly to the EMCC (1-step procedure) and those that needed to be diverted before connecting to the EMCC (2-step procedure).

RESULTS: Twenty-one EMCC's from 11 countries participated in the study. For the 1878 1-step calls, median times were: time from dial to first ringtone 3.7s (IQR 1.0-5.2) and time from first ringtone to response by call-taker 6.4s (IQR 2.9-13.5). The median TT-EMCC was 11.7s (IQR 8.7-18.5). For the 1550 2-step calls, median times were: time to first ringtone 4.0s (IQR 2.4-5.2), from first ringtone to first call-taker 7s (IQR 4.6-11.9) and from first call-taker to EMCC 18.7s (IQR 13.4-29.9). Median TT-EMCC was 33.2s (IQR 24.7-46.1) and was significantly longer than the TT-EMCC that was observed with the 1-step procedure (P<0.0001). Significant differences existed among participating regions between and within different countries both for 1-step and 2-step procedures. No significant differences existed in TT-EMCC between landlines and mobile lines.

CONCLUSION: TT-EMCC was significantly shorter in a 1-step procedure compared to a 2-step procedure. We found regional differences between countries but also within countries. This may be relevant in cases of OHCA and other situations where patient outcome is critically time-dependent.

RCP

1. Emerg Med J. 2016 Nov 15. pii: emermed-2016-205744. doi: 10.1136/emered-2016-205744. [Epub ahead of print]

Chest compression fraction in ambulance while transporting patients with out-of-hospital cardiac arrest to the hospital in rural Taiwan.

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Abstract

INTRODUCTION: Maintaining the standard two-handed chest compression is difficult in high-speed ambulances in rural areas.

METHODS: A retrospective, video-based, observational study was conducted from June to September 2013 in Nantou, a rural county of central Taiwan, to evaluate the chest compression fraction in an ambulance carriage during the travel from the scene to the hospital. The chest compression fraction was calculated as the chest compression time period divided by the ambulance travelling time period; the one-handed and two-handed chest compression fractions were also calculated.

RESULTS: During the 4-month study period, a total of 102 videos that were recorded in an ambulance carriage were reviewed, including 97 cases of manual chest compressions. When there was only one emergency medical technician (EMT) in the carriage, the combined chest compression fraction was 50.6±20.7%; when there were two EMTs, the fraction was 58.3±16.0% and the fraction was 58.3±21.0% in a three-EMT scenario (p=0.221). Moreover, in the carriage, EMTs usually performed one-handed chest compressions.

CONCLUSIONS: The chest compression fraction was low for patients with out-of-hospital cardiac arrest in a moving ambulance, irrespective of the number of providers. Reasons for this observation, as well as the effectiveness of the one-handed chest compression require further evaluation.

VENTILACIÓ

1. Medicine (Baltimore). 2016 Nov;95(44):e5170.

A comparison of a traditional endotracheal tube versus ETViva SL in endotracheal intubation during different emergency conditions: A randomized, crossover cadaver trial.

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Abstract

BACKGROUND: Airway management is a crucial skill essential to paramedics and personnel working in Emergency Medical Services and Emergency Departments: Lack of practice, a difficult airway, or a trauma situation may limit the ability of paramedics to perform direct laryngoscopy during cardiopulmonary resuscitation. Videoscope devices are alternatives for airway management in these situations. The ETViva VivaSight SL (ETViva; ETViva Ltd., Misgav, Israel) is a new, single-lumen airway tube with an integrated high-resolution imaging camera. To assess if the ETViva VivaSight SL can be a superior alternative to a standard endotracheal tube for intubation in an adult cadaver model, both during and without simulated CPR.

METHODS: ETViva VivaSight SL tube was investigated via an interventional, randomized, crossover, cadaver study. A total of 52 paramedics participated in the intubation of human cadavers in three different scenarios: a normal airway at rest without concomitant chest compression (CC) (scenario A), a normal airway with uninterrupted CC (scenario B) and manual in-line stabilization (scenario C). Time and rate of success for intubation, the glottic view scale, and ease-of-use of ETViva vs. sETT intubation were assessed for each emergency scenario.

RESULTS: The median time to intubation using ETViva vs. sETT was compared for each of the aforementioned scenarios. For scenario A, time to first ventilation was achieved fastest for ETViva, 19.5 [IQR, 16.5-22] sec, when compared to that of sETT at 21.5 [IQR, 20-25] sec (p=.013). In scenario B, the time for intubation using ETViva was 21 [IQR, 18.5-24.5] sec

($p < .001$) and sETT was 27 [IQR, 24.5-31.5] sec. Time to first ventilation for scenario C was 23.5 [IQR, 19-25.5] sec for the ETVIEW and 42.5 [IQR, 35-49.5] sec for sETT.

CONCLUSIONS: In normal airways and situations with continuous chest compressions, the success rate for intubation of cadavers and the time to ventilation were improved with the ETVIEW. The time to glottis view, tube insertion, and cuff block were all found to be shorter with the ETVIEW.

2. Resuscitation. 2016 Nov 10. pii: S0300-9572(16)30535-4. doi: 10.1016/j.resuscitation.2016.10.023. [Epub ahead of print]

Airway pressure and outcome of out-of-hospital cardiac arrest: A prospective observational study.

Chalkias A1, Pavlopoulos F2, Koutsovasilis A3, d'Aloja E4, Xanthos T5.

Abstract

AIM: To assess the usefulness of airway pressure as predictor of return of spontaneous circulation (ROSC), as well as to investigate the optimized ventilation compression strategy during cardiopulmonary resuscitation (CPR).

METHODS: In this prospective observational study, 300 out-of-hospital cardiac arrest victims were intubated and resuscitated with the use of a ventilator. Mean airway pressure (mPaw) was measured at pre-defined phases of CPR.

RESULTS: A significant difference in mPaw was observed between survivors and non-survivors after the onset of the third minute of CPR. An mPaw value of 42.5mbar during CPR had specificity and sensitivity of 0.788 and 0.804, respectively, for return of spontaneous circulation (AUC=0.668, $p=0.047$). During CPR, we found statistically significant differences in mean airway pressure at phases zero ($F=4.526$, $p=0.002$), two ($F=4.506$, $p=0.002$), four ($F=8.187$, $p<0.0001$), five ($F=2.871$, $p=0.024$), and six ($F=5.364$, $p<0.0001$).

CONCLUSION: Mean airway pressure was higher in survivors. A value of 42.5mbar was associated with ROSC

POST ATURADA

1. Resuscitation. 2016 Nov 10;110:85-89. doi: 10.1016/j.resuscitation.2016.10.022. [Epub ahead of print]

Middle cerebral artery flow, the critical closing pressure, and the optimal mean arterial pressure in comatose cardiac arrest survivors-An observational study.

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Abstract

AIM: This study estimated the critical closing pressure (CrCP) of the cerebrovascular circulation during the post-cardiac arrest syndrome and determined if CrCP differs between survivors and non-survivors. We also compared patients after cardiac arrest to normal controls.

METHODS: A prospective observational study was performed at the ICU of a tertiary university hospital in Nijmegen, the Netherlands. We studied 11 comatose patients successfully resuscitated from a cardiac arrest and treated with mild therapeutic hypothermia and 10 normal control subjects. Mean flow velocity (MFV) in the middle cerebral artery was measured by transcranial Doppler at several time points after admission to the ICU. CrCP was determined by a cerebrovascular impedance model.

RESULTS: MFV was similar in survivors and non-survivors upon admission to the ICU, but increased stronger in non-survivors compared to survivors throughout the observation period ($P<0.001$). MFV was significantly lower in survivors immediately after cardiac arrest compared to normal controls ($P<0.001$), with a gradual restoration toward normal values. CrCP decreased significantly from 61.4[51.0-77.1]mmHg to 41.7[39.9-51.0]mmHg in the first 48h, after which it remained stable ($P<0.001$). CrCP was significantly higher in survivors compared to non-survivors ($P=0.002$). CrCP immediately after cardiac arrest was significantly higher compared to the control group ($P=0.02$).

CONCLUSIONS: CrCP is high after cardiac arrest with high cerebrovascular resistance and low MFV. This suggests that cerebral perfusion pressure should be maintained at a sufficient high level to avoid secondary brain injury. Failure to normalize the cerebrovascular profile may be a parameter of poor outcome.

2. Crit Care. 2016 Nov 14;20(1):368.

The impact of extracerebral organ failure on outcome of patients after cardiac arrest: an observational study from the ICON database.

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Abstract

BACKGROUND: We used data from a large international database to assess the incidence and impact of extracerebral organ dysfunction on prognosis of patients admitted after cardiac arrest (CA).

METHODS: This was a sub-analysis of the Intensive Care Over Nations (ICON) database, which contains data from all adult patients admitted to one of 730 participating intensive care units (ICUs) in 84 countries from 8-18 May 2012, except admissions for routine postoperative surveillance. For this analysis, patients admitted after CA (defined as those with "post-anoxic coma" or "cardiac arrest" as the reason for ICU admission) were included. Data were collected daily in the ICU for a maximum of 28 days; patients were followed up for outcome data until death, hospital discharge, or a maximum of 60 days in-hospital. Favorable neurological outcome was defined as alive at hospital discharge with a last available neurological Sequential Organ Failure Assessment (SOFA) subscore of 0-2.

RESULTS: Among the 469 patients admitted after CA, 250 (53 %) had had out-of-hospital CA; 210 (45 %) patients died in the ICU and 357 (76 %) had an unfavorable neurological outcome. Non-survivors had a higher incidence of renal (43 vs. 16 %), cardiovascular (56 vs. 45 %), and respiratory (62 vs. 48 %) failure on admission and during the ICU stay than survivors (all $p < 0.05$). Similar results were found for patients with unfavorable vs. favorable neurological outcomes. In multivariable analysis, independent predictors of ICU mortality were renal failure on admission, high admission Simplified Acute Physiology Score (SAPS) II, high maximum serum lactate levels within the first 24 h after ICU admission, and development of sepsis. Independent predictors of unfavorable neurological outcome were mechanical ventilation on admission, high admission SAPS II score, and neurological dysfunction on admission.

CONCLUSIONS: In this multicenter cohort, extracerebral organ dysfunction was common in CA patients. Renal failure on admission was the only extracerebral organ dysfunction independently associated with higher ICU mortality.

3. Resuscitation. 2016 Nov 10. pii: S0300-9572(16)30533-0. doi: 10.1016/j.resuscitation.2016.10.021. [Epub ahead of print]

Factors associated with post-arrest withdrawal of life-sustaining therapy.

Grossestreuer AV1, Gaieski DF2, Abella BS3, Wiebe DJ4, Moskowitz A5, Ikeda DJ3, Haukoos JS6, Perman SM7.

Abstract

INTRODUCTION: Most successfully resuscitated cardiac arrest patients do not survive to hospital discharge. Many have withdrawal of life sustaining therapy (WLST) as a result of the perception of poor neurologic prognosis. The characteristics of these patients and differences in their post-arrest care are largely unknown.

METHODS: Utilizing the Penn Alliance for Therapeutic Hypothermia Registry, we identified a cohort of 1311 post-arrest patients from 26 hospitals from 2010 to 2014 who remained comatose after return of spontaneous circulation. We stratified patients by whether they had WLST post-arrest and analyzed demographic, arrest, and post-arrest variables.

RESULTS: In our cohort, 565 (43%) patients had WLST. In multivariate regression, patients who had WLST were less likely to go to the cardiac catheterization lab (OR 0.40; 95% CI: 0.26-0.62) and had shorter hospital stays (OR 0.93; 95% CI: 0.91-0.95). When multivariate regression was limited to patient demographics and arrest characteristics, patients with WLST were older (OR 1.18; 95% CI: 1.07-1.31 by decade), had a longer arrest duration (OR 1.14; 95% CI: 1.05-1.25 per 10min), more likely to be female (OR: 1.41; 95% CI: 1.01-1.96), and less likely to have a witnessed arrest (OR 0.65; 95% CI: 0.42-0.98).

CONCLUSION: Patients with WLST differ in terms of demographic, arrest, and post-arrest characteristics and treatments from those who did not have WLST. Failure to account for this variability could affect both clinical practice and the interpretation of research.

1. Prehosp Emerg Care. 2016 Nov 18:1-6. [Epub ahead of print]

Rise and Shock: Optimal Defibrillator Placement in a High-rise Building.

Chan TC.

Abstract

OBJECTIVE: Out-of-hospital cardiac arrests (OHCA) in high-rise buildings experience lower survival and longer delays until paramedic arrival. Use of publicly accessible automated external defibrillators (AED) can improve survival, but "vertical" placement has not been studied. We aim to determine whether elevator-based or lobby-based AED placement results in shorter vertical distance travelled ("response distance") to OHCA in a high-rise building.

METHODS: We developed a model of a single-elevator, n-floor high-rise building. We calculated and compared the average distance from AED to floor of arrest for the two AED locations. We modeled OHCA occurrences using floor-specific Poisson processes, the risk of OHCA on the ground floor (λ_1) and the risk on any above-ground floor (λ). The elevator was modeled with an override function enabling direct travel to the target floor. The elevator location upon override was modeled as a discrete uniform random variable. Calculations used the laws of probability.

RESULTS: Elevator-based AED placement had shorter average response distance if the number of floors (n) in the building exceeded three quarters of the ratio of ground-floor OHCA risk to above-ground floor risk (λ_1/λ) plus one half ($n \geq 3\lambda_1/4\lambda + 0.5$). Otherwise, a lobby-based AED had shorter average response distance. If OHCA risk on each floor was equal, an elevator-based AED had shorter average response distance.

CONCLUSIONS: Elevator-based AEDs travel less vertical distance to OHCA in tall buildings or those with uniform vertical risk, while lobby-based AEDs travel less vertical distance in buildings with substantial lobby, underground, and nearby street-level traffic and OHCA risk.

REBOA

1. Eur J Trauma Emerg Surg. 2016 Nov 16. [Epub ahead of print]

Endovascular solutions for the management of penetrating trauma: an update on REBOA and axillo-subclavian injuries.

Branco BC1, DuBose JJ2.

Abstract

PURPOSE: Endovascular procedures continue to gain acceptance as management options for penetrating traumatic injuries. Currently, several areas of potential endovascular application are being investigated. However, the bulk of the literature on this topic is still limited to case series or small retrospective studies. Therefore, we performed a review of the published experience involving the application of endovascular therapy to trauma patients who have sustained penetrating injuries with focus on outcomes of resuscitative endovascular balloon occlusion of the aorta (REBOA) and endovascular repair of axillo-subclavian injuries.

METHODS: Published case reports, retrospective and prospective studies of REBOA and axillo-subclavian injuries were systematically reviewed.

RESULTS: A total of 7 studies on REBOA and 10 studies on endovascular repair of axillo-subclavian injuries were included. Overall, REBOA was used as an adjunct for hemorrhage control and resuscitation in patients at risk of cardiopulmonary arrest, preventing further cardiovascular collapse successfully. For axillo-subclavian injuries, endovascular stent placement had efficacy comparable to the traditional open repair.

CONCLUSION: REBOA is a safe and effective alternative to open thoracotomy in critically ill trauma patients at risk of death due to torso hemorrhage. Endovascular repair outcomes are comparable to open repair after axillo-subclavian injuries. Long-term results of endovascular repair remain to be defined in this patient population.

TRAUMA

1. Resuscitation. 2016 Nov 14. pii: S0300-9572(16)30538-X. doi: 10.1016/j.resuscitation.2016.11.001. [Epub ahead of print]

Epidemiology and aetiology of traumatic cardiac arrest in England and Wales - A retrospective database analysis.

Barnard E1, Yates D2, Edwards A2, Fragoso-Iñiguez M2, Jenks T2, Smith JE3.

Abstract

BACKGROUND: Historically, reported survival from traumatic cardiac arrest (TCA) was extremely low. More recent publications have recorded survival to discharge of up to 8%. This improvement is likely to be multi-factorial; however, there are currently no published data describing the epidemiology or aetiology of TCA in England and Wales to guide future practice improvement.

METHODS: Population-based analysis of 2009-2015 Trauma Audit and Research Network (TARN) data. The primary aim was to describe the 30-day survival following TCA. Patients of all ages with traumatic cardiac arrest pre-hospital or in the emergency department (ED) were included. Data are described as number (%), and median [interquartile range]. Two-group analysis with Chi-squared test was performed.

RESULTS: During the study period 227,944 patients were included in the TARN database. Seven hundred and five (0.3%) suffered TCA: 74.3% were male, aged 44.3 [25.2-83.2] years, ISS 29 [21-75], and 601 (85.2%) had blunt injuries. 612 (86.8%) had a severe traumatic brain injury and or severe haemorrhage. Overall 30-day survival was 7.5% (95%CI 5.6-9.5) - 'pre-hospital only' TCA 11.5%, 'ED only' TCA 3.9%, $p < 0.02$. No patients who were in TCA both pre-hospital and in the ED survived.

CONCLUSION: This study has shown that short-term survival from TCA in this large civilian registry is 7.5%. Early and aggressive management of patients with TCA, using protocols that target the reversible causes of TCA, should be initiated. Further work to establish novel ways to manage patients with reversible causes of TCA is indicated. Resuscitation in this patient group is not futile.

PEDIATRIA

1. *Pediatr Crit Care Med.* 2016 Nov 15. [Epub ahead of print]

Long-Term Follow-Up on Health-Related Quality of Life After Mechanical Circulatory Support in Children.

Fleck TP1, Dangel G, Bächle F, Benk C, Grohmann J, Kroll J, Siepe M, Höhn R, Kirschner J, Beyersdorf F, Stiller B.

Abstract

OBJECTIVE: The objective of this study was to evaluate health-related quality of life in long-term survivors of mechanical circulatory support after acute cardiopulmonary failure.

DESIGN: Prospective follow-up study.

SETTING: Single-institutional in a center for congenital heart disease and pediatric cardiology.

PATIENTS: Fifty patients who underwent 58 mechanical circulatory support therapies in our institution from 2001 to 2012. Median age was 2 (0-213) months, and median supporting time was 5 (1-234) days. Indication groups: 1) extracorporeal life support in low cardiac output: 30 cases (52%); 2) extracorporeal cardiopulmonary resuscitation: 13 cases (22%); 3) extracorporeal membrane oxygenation in acute respiratory distress syndrome: four cases (7%); and 4) ventricular assist devices: 11 cases (19%).

INTERVENTIONS: Health-related quality of life was measured using standardized questionnaires according to the age group and completed by either parent proxies in children under 7 years old or the survivors themselves.

MEASUREMENTS AND MAIN RESULTS:

Fifty percentage of the patients were discharged home, and 22 long-term survivors (44%) were studied prospectively for health-related quality of life. Median follow-up period was 4.5 (0.3-11.3) years. Median age at follow-up was 5 (0.6-29) years old. Nineteen long-term survivors filled in the health-related quality of life questionnaires and were classified into three age groups: 0-4 years ($n = 7$): median health-related quality of life score, 69 (59-86) points; 4-12 years ($n = 7$): median health-related quality of life score, 50 (48-85) points; older than 12 years ($n = 5$): median health-related quality of life score, 90 (80-100) points.

CONCLUSION: Long-term survivors' health-related quality of life as reported by their parents is lower than that of healthy children. However, the self-assessed health-related quality of life of the patients older than 12 years in our group is comparable to a healthy control population.

FARMACS

1. Int J Cardiol. 2016 Nov 9. pii: S0167-5273(16)33559-8. doi: 10.1016/j.ijcard.2016.11.101. [Epub ahead of print]

Acute hospital administration of amiodarone and/or lidocaine in shockable patients presenting with out-of-hospital cardiac arrest: A nationwide cohort study.

Huang CH1, Yu PH2, Tsai MS1, Chuang PY3, Wang TD4, Chiang CY5, Chang WT1, Ma MH1, Tang CH3, Chen WJ6.

Abstract

BACKGROUND: Terminating ventricular fibrillation (VF) or pulseless ventricular tachyarrhythmia (VT) is critical for successful resuscitation of patients with shockable cardiac arrest. In the event of shock-refractory VF, applicable guidelines suggest use of anti-arrhythmic agents. However, subsequent long-term outcomes remain unclear. A nationwide cohort study was therefore launched, examining 1-year survival rates in patients given amiodarone and/or lidocaine for cardiac arrest.

METHODS: Medical records accruing between years 2004 and 2011 were retrieved from the Taiwan National Health Insurance Research Database (NHIRD) for review. This repository houses all insurance claims data for nearly the entire populace (>99%). Candidates for study included all non-traumatized adults receiving DC shock and cardiopulmonary resuscitation immediately or within 6h of emergency room arrival. Analysis was based on data from emergency rooms and hospitalization.

RESULTS: One-year survival rates by treatment group were 8.27% (534/6459) for amiodarone, 7.15% (77/1077) for lidocaine, 11.10% (165/1487) for combined amiodarone/lidocaine use, and 3.26% (602/18,440) for use of neither amiodarone nor lidocaine (all, $p < 0.0001$). Relative to those given neither medication, odds ratios for 1-year survival via multiple regression analysis were 1.84 (95% CI: 1.58-2.13; $p < 0.0001$) for amiodarone, 1.88 (95% CI: 1.40-2.53; $p < 0.0001$) for lidocaine, and 2.18 (95% CI: 1.71-2.77; $p < 0.0001$) for dual agent use.

CONCLUSIONS: In patients with shockable cardiac arrest, 1-year survival rates were improved with association of using amiodarone and/or lidocaine, as opposed to non-treatment. However, outcomes of patients given one or both medications did not differ significantly in intergroup comparisons.

2. Circulation. 2016 Nov 12. pii: CIRCULATIONAHA.116.024088. [Epub ahead of print]

Neuroprotective Effects of the Glucagon-Like Peptide-1 Analog Exenatide After Out-of-Hospital Cardiac Arrest: A Randomized Controlled Trial.

Wiberg S1, Hassager C2, Schmidt H3, Thomsen JH 2, Frydland M2, Lindholm MG2, Høfsten DE2, Engstrøm T2, Køber L2, Møller JE 4, Kjaergaard J2.

Abstract

BACKGROUND: -In-hospital mortality in comatose patients resuscitated from out-of-hospital cardiac arrest (OHCA) is $\approx 50\%$. In OHCA patients, the leading cause of death is neurological injury secondary to ischemia and reperfusion. Glucagon-like peptide-1 analogs are approved for type 2 diabetes mellitus; preclinical and clinical data have suggested their organ-protective effects in patients with ischemia and reperfusion injury. The aim of this trial was to investigate the neuroprotective effects of the glucagon-like peptide-1 analog exenatide in resuscitated OHCA patients.

METHODS: -We randomly assigned 120 consecutive comatose patients resuscitated from OHCA in a double-blind, 2-center trial. They were administered 17.4 μg exenatide (Byetta) or placebo over a 6-hour and 15-minute infusion, in addition to standardized intensive care including targeted temperature management. The coprimary end points were feasibility, defined as initiation of the study drug in $>90\%$ patients within 240 minutes of return of spontaneous circulation, and efficacy, defined as the geometric area under the neuron-specific enolase curve from 24 to 72 hours after admission. The main secondary end points included a composite end point of death and poor neurological function, defined as a Cerebral Performance Category score of 3 to 5 assessed at 30 and 180 days.

RESULTS: -The study drug was initiated within 240 minutes of return of spontaneous circulation in 96% patients. The median blood glucose 8 hours after admission in patients receiving exenatide was lower than that in patients receiving placebo (5.8 [5.2-6.7] mmol/L versus 7.3 [6.2-8.7] mmol/L, $P < 0.0001$). However, there were no significant differences in the area under the neuron-specific enolase curve, or a composite end point of death and poor neurological

function between groups. Adverse events were rare with no significant difference between groups.

CONCLUSIONS: -Acute administration of exenatide to comatose patients in the intensive care unit after OHCA is feasible and safe. Exenatide did not reduce neuron-specific enolase levels and did not significantly improve a composite end point of death and poor neurological function after 180 days.

TTM

1. Ther Hypothermia Temp Manag. 2016 Nov 18. [Epub ahead of print]

Time to Awakening Is Often Delayed in Patients Who Receive Targeted Temperature Management After Cardiac Arrest.

Zanyk-McClean K1, Sawyer KN2, Paternoster R1, Shievitz R2, Devlin W3, Swor R2.

Abstract

Post cardiac arrest, neuroprognostication remains a complex and clinically challenging issue for critical care providers. For this reason, our primary objective in this study was to determine the frequency of survival and favorable neurological outcomes in post-cardiac arrest patients with delayed time to awakening. To assess whether early withdrawal of care may adversely impact survival, we also sought to describe the time to withdrawal of care of non-surviving patients. We performed a retrospective study of patients resuscitated after cardiac arrest in two large academic community hospitals. We performed a structured chart review of patients treated with therapeutic hypothermia (TH) at one hospital from 2009 to 2015 and at a second hospital from 2013 to 2015. Demographics and Utstein style variables were recorded on all patients, as well as temporal variables to characterize the time interval from Return of Spontaneous Circulation (ROSC) to awakening as recorded by ICU nurses and defined as Glasgow Coma Scale (GCS) of >8. Descriptive data were also captured regarding time to withdrawal of care. We pre-hoc defined delayed awakening as >72 hours post ROSC or >72 hours post rewarming. Our primary outcome was survival to hospital discharge with a secondary outcome of a favorable cerebral performance category of 1 or 2. During this study period, 321 patients received TH, with 111 (34.6%) discharged alive and, of these, 67 (68.5%) experienced a good neurological outcome. Awakening more than 72 hours after return of circulation was common with 31 patients surviving to discharge. Of these, 16 of 31 (51.6%) were found to have a good neurological outcome on hospital discharge. Of the patients who died before discharge, 54 (29.5%) had care withdrawn less than 72 hours after ROSC. A delayed time to awakening is not infrequently associated with a good neurological outcome after TH in patients resuscitated from cardiac arrest.

RECERCA EXPERIMENTAL

1. JACC Cardiovasc Interv. 2016 Nov 4. pii: S1936-8798(16)31466-2. doi: 10.1016/j.jcin.2016.08.040. [Epub ahead of print]

Importance of Both Early Reperfusion and Therapeutic Hypothermia in Limiting Myocardial Infarct Size Post-Cardiac Arrest in a Porcine Model.

Kern KB1, Hanna JM2, Young HN2, Ellingson CJ2, White JJ2, Heller B2, Illindala U3, Hsu CH2, Zuercher M4.

Abstract

OBJECTIVES: The aim of this study was to test the hypothesis that hypothermia and early reperfusion are synergistic for limiting infarct size when an acutely occluded coronary is associated with cardiac arrest.

BACKGROUND: Cohort studies have shown that 1 in 4 post-cardiac arrest patients without ST-segment elevation has an acutely occluded coronary artery. However, many interventional cardiologists remain unconvinced that immediate coronary angiography is needed in these patients.

METHODS: Thirty-two swine (mean weight 35 ± 5 kg) were randomly assigned to 1 of the following 4 treatment groups: group A, hypothermia and reperfusion; group B, hypothermia and no reperfusion; group C, no hypothermia and reperfusion; and group D, no hypothermia and no reperfusion. The left anterior descending coronary artery was occluded with an intracoronary balloon, and ventricular fibrillation was electrically induced. Cardiopulmonary resuscitation was

begun after 4 min of cardiac arrest. Defibrillation was attempted after 2 min of cardiopulmonary resuscitation. Resuscitated animals randomized to hypothermia were rapidly cooled to 34°C, whereas those randomized to reperfusion had such after 45 min of left anterior descending coronary artery occlusion.

RESULTS: At 4 h, myocardial infarct size was calculated. Group A had the smallest infarct size at $16.1 \pm 19.6\%$ ($p < 0.05$). Group C had an intermediate infarct size at $29.5 \pm 20.2\%$, whereas groups B and D had the largest infarct sizes at $41.5 \pm 15.5\%$ and $41.1 \pm 15.0\%$, respectively.

CONCLUSIONS: Acute coronary occlusion is often associated with cardiac arrest, so treatment of resuscitated patients should include early coronary angiography for potential emergent reperfusion, while providing hypothermia for both brain and myocardial protection. Providing only early hypothermia, while delaying coronary angiography, is not optimal.

2. Transplantation. 2016 Dec;100(12):2621-2629.

Pathophysiological Trends During Withdrawal of Life Support: Implications for Organ Donation After Circulatory Death.

Iyer A1, Chew HC, Gao L, Villanueva J, Hicks M, Doyle A, Kumarasinghe G, Jabbour A, Jansz PC, Feneley MP, Harvey RP, Graham RM, Dhital KK, Macdonald PS.

Abstract

BACKGROUND: Donation after circulatory death (DCD) provides an alternative pathway to deceased organ transplantation. Although clinical DCD lung, liver, and kidney transplantation are well established, transplantation of hearts retrieved from DCD donors has reached clinical translation only recently. Progress has been limited by concern regarding the viability of DCD hearts. The aim of this study was to document the pathophysiological changes that occur in the heart and circulation during withdrawal of life (WLS) support.

METHODS: In a porcine asphyxia model, we characterized the hemodynamic, volumetric, metabolic, biochemical, and endocrine changes after WLS for up to 40 minutes. Times to circulatory arrest and electrical asystole were recorded.

RESULTS: After WLS, there was rapid onset of profound hypoxemia resulting in acute pulmonary hypertension and right ventricular distension. Concurrently, progressive systemic hypotension occurred with a fall in left atrial pressure and little change in left ventricular volume. Mean times to circulatory arrest and electrical asystole were 8 ± 1 and 16 ± 2 minutes, respectively. Hemodynamic changes were accompanied by a rapid fall in pH, and rise in blood lactate, troponin-T, and potassium. Plasma noradrenaline and adrenaline levels rose rapidly with dramatic increases in coronary sinus levels indicative of myocardial release.

CONCLUSIONS: These findings provide insight into the nature and tempo of the damaging events that occur in the heart and in particular the right ventricle during WLS, and give an indication of the limited timeframe for the implementation of potential postmortem interventions that could be applied to improve organ viability.

3. Shock. 2016 Nov 10. [Epub ahead of print]

High versus low blood-pressure target in experimental ischemic prolonged cardiac arrest treated with Extra Corporeal Life Support.

Fritz C1, Kimmoun A, Vanhuyse F, Trifan BF, Orlowski S, Falanga A, Marie V, Groubatch F, Albuissou E, Tran N, Levy B.

Abstract

BACKGROUND: There is currently no recommendation for the mean arterial pressure target in the particular setting of Extracorporeal Cardiopulmonary Resuscitation (ECPR) in the first hours following cardiogenic shock complicated by cardiac arrest. This study aimed to assess the effects of two different levels of mean arterial pressure on macrocirculatory, microcirculatory and metabolic functions.

DESIGN: Randomized animal study.

SETTING: University research laboratory.

INTERVENTION: Ventricular fibrillation was induced in fourteen male pigs by surgical ligation of the interventricular coronary artery. After twenty minutes of cardiopulmonary resuscitation, Extracorporeal Life Support (ECLS) was initiated to restore circulatory flow. Thereafter, animals were randomly allocated to a high mean arterial pressure group (High-MAP, 80-85 mmHg) or to a standard mean arterial pressure group (Standard-MAP, 65-70 mmHg). Assessments conducted

at baseline, immediately following and six hours after ECLS initiation were focused on 1) lactate evolution, 2) amount of infused fluid and 3) microcirculatory parameters.

RESULTS: There was no significant difference between the two groups at time of ECLS initiation and at six hours with regard to lactate levels (High-MAP vs. Standard-MAP: 8.8 [6.7-12.9] vs. 9.6 [9.1-9.8] mmol.l, $p=0.779$ and 8.9 [4.3-11.1] vs. 3.3 [2.4-11] mmol.l, $p=0.603$). Infused fluid volume did not significantly differ between the two groups (4000 [3500-12000] vs. 5000 [2500-18000] ml, $p=0.977$). There was also no significant difference between the two groups regarding renal and liver functions, and sublingual capillary microvascular flow index assessed by Sidestream Dark Field imaging.

CONCLUSION: Compared to a standard mean arterial pressure regimen, targeting a high mean arterial pressure in the first hours of an experimental ECPR model did not result in any haemodynamic improvement nor in a decrease in the amount of infused fluid

REGISTRES I REVISIONS

1. Clin Microbiol Infect. 2016 Nov 26. pii: S1198-743X(16)30602-4. doi: 10.1016/j.cmi.2016.11.018. [Epub ahead of print]

Cardiac arrest among patients with infections: Causes, Clinical Practice and Research Implications.

Leoni D1, Rello J2.

Abstract

The incidence of sepsis is increasing, and the condition is now the leading cause of death in general intensive care units (ICUs). Our review failed to identify studies of the causes of cardiac arrest among infected patients, even though non-cardiac causes represent 15% of out-of-hospital cardiac arrests and though one-third of events have positive blood cultures. Sudden cardiac arrest is the result of local damage to the heart and of the impact of systemic and pulmonary conditions on cardiac performance, and its danger is underestimated. Necropsy findings in sudden death often identify myocarditis as an unexpected cause. The role of hypoxemia, severe pulmonary thromboembolism with subsequent pulseless cardiac activity, alterations of electrolytes and hydrogen concentrations, distort fluid distribution with reduced preload, direct myocyte damage and adverse cardiac effects related to antibiotic use need to be defined. Many cardiac arrests might be preventable. Because cardiopulmonary resuscitation is challenging and usually unsuccessful in patients with sepsis, research is needed to help predict which patients are at risk. Only half of pneumonia patients with cardiac arrest in the ward receive prior ECG monitoring. Telemedicine and non-invasive monitoring in the ward, avoidance of antibiotics associated with prolonged QT syndrome, and adequate hemodynamic resuscitation might be important in preventing in-hospital arrests among patients with infections.

2. Resuscitation. 2016 Nov 25;110:146-153. doi: 10.1016/j.resuscitation.2016.11.009. [Epub ahead of print]

Hospital characteristics and favourable neurological outcome among patients with out-of-hospital cardiac arrest in Osaka, Japan.

Matsuyama T1, Kiyohara K2, Kitamura T3, Nishiyama C4, Nishiuchi T5, Hayashi Y6, Kawamura T7, Ohta B1, Iwami T7.

Abstract

OBJECTIVE: To assess the association between favourable neurological outcome and hospital characteristics such as hospital volume and number of critical care centres (CCMCs) after out-of-hospital cardiac arrest (OHCA).

METHODS: This retrospective, population-based observational study conducted in Osaka Prefecture, Japan included adult patients with OHCA, aged ≥ 18 years who were transported to acute care hospitals between January 2005 and December 2012. We divided acute care hospitals into CCMCs or non-CCMCs, the latter of which were divided into the following three groups according to the annual average number of transported OHCA cases: low-volume (≤ 10 cases), middle-volume (11-39 cases), and high-volume (≥ 40 cases) groups. Random effects logistic

regression models, with hospital treated as a random effect, were used to assess factors potentially associated with a favourable neurological outcome.

RESULTS: A total of 44,474 patients were eligible. The proportions of favourable neurological outcome from OHCA were 0.9% (31/3559) in the low-volume group, 1.2% (106/9171) in the middle-volume group, 1.6% (222/14,007) in the high-volume group, and 4.3% (766/17,737) in the CCMC group ($P<0.001$). In the multivariable analysis, transport to CCMCs was significantly associated with favourable neurological outcome, compared with transport to non-CCMCs (adjusted odds ratio 1.63; 95% confidence interval, 1.60-1.66). Among the non-CCMC group, there was no significant relationship between hospital volume and favourable neurological outcome.

CONCLUSIONS: In this population, transport of OHCA patients to CCMCs led to significantly higher one-month survival rates with favourable neurological outcome from OHCA, whereas no significant association was noted among the hospitals with different volumes.

3. Resuscitation. 2016 Nov 24. pii: S0300-9572(16)30544-5. doi: 10.1016/j.resuscitation.2016.11.004. [Epub ahead of print]

Psychological wellbeing in survivors of cardiac arrest, and its relationship to neurocognitive function.

Davies SE1, Rhys M2, Voss SE3, Greenwood R 4, Thomas M1, Bengler JR5.

Abstract

OBJECTIVE: To characterise psychological wellbeing in survivors of out-of-hospital cardiac arrest (OHCA), and examine its relationship to cognitive function.

PATIENTS: Forty-one highly functioning cardiac arrest survivors were drawn from the follow-up cohort of a randomised controlled trial of initial airway management in OHCA (ISRCTN:18528625).

DESIGN: Psychological wellbeing was assessed with a self-report questionnaire (the Depression Anxiety and Stress Scale; DASS) and cognitive function was examined using the Delayed Matching to Samples (DMS) test from the Cambridge Neuropsychological Test Automated Battery (CANTAB).

RESULTS: Mean anxiety levels were significantly higher in this patient group than normative data drawn from the general population ($p=0.046$). Multiple regression analyses showed that cognitive function, measured by the DMS, did not predict any of the DASS scales.

CONCLUSIONS: Anxiety plays an important role in determining perceived QoL in high functioning survivors, but psychological wellbeing is unrelated to cognitive function in this group. To achieve a comprehensive assessment of wellbeing, resuscitation research should consider outcomes beyond neurological function alone.

4. Scand J Trauma Resusc Emerg Med. 2016 Dec 3;24(1):141.

Warming the head of hypothermic patient - is it always safe?

Podsiadło P1,2, Darocha T3,4,5, Kosiński S4,6,7.

Abstract

The head warming in hypothermic victims is an alternative way of heat donation, which does not inhibit shivering and does not impede the access to the patient's chest. It seems to be a safe method in mild hypothermia. The authors of the review article "Accidental hypothermia - an update" suggest this way of heat donation, without indicating precisely, in which group of patients it can be applied. In severe hypothermia, the brain-protective effect of cold is well known. The decreased need of oxygen allows good neurological outcome after long lasting cardiac arrest. Therefore, in deep hypothermia, the brain tissue should be rather insulated from the heat source than warmed.

5. Semin Neurol. 2016 Dec;36(6):542-549. Epub 2016 Dec 1.

Critical Care Management after Cardiac Arrest.

Friberg H1, Cronberg T2.

Abstract

Sudden cardiac arrest is a devastating event with high mortality and substantial morbidity among survivors. Early recognition and intervention to restore circulation is the primary goal; once that is achieved, the path toward a meaningful recovery starts. Initial in-hospital care is

focused on emergency cardiac care, but soon there is a change to a more brain-oriented critical care including targeted temperature management, brain monitoring, sedation, and repeated neurologic assessments. In patients who show early signs of awakening from coma once sedation has been stopped, the prognosis is generally good. In patients with early seizures and prolonged coma after sedation has been weaned, the prognosis is often poor. A structured model for neuroprognostication using several prognostication tools such as imaging, neurophysiology, biomarkers, and above all repeated clinical investigations is fundamental for the ability to properly assess the comatose cardiac arrest patient and to enable accurate and trustworthy decisions on level of care. The authors present a model for critical care management after cardiac arrest and a neuroprognostication algorithm, both in use at their institution.

LESIONS PER LA RCP

1. Turk J Emerg Med. 2016 May 9;16(2):77-79. eCollection 2016.

Liver laceration related to cardiopulmonary resuscitation.

Beydilli H1, Balci Y2, Erbas M3, Acar E1, Isik S2, Savran B3.

Abstract

Cardiopulmonary resuscitation (CPR) is recognized as a medical procedure performed to maintain vital functions of a person whose cardiac and respiratory functions have stopped. Chest compression is the most essential component of CPR and it is performed on the lower half of the sternum. During CPR, many complications may occur because of chest compressions, especially chest injuries including sternum and rib fractures. Rarely tracheal injury, rupture of the stomach, or liver or spleen injury may also occur as complications. In this study, we present two cases of liver injury caused by resuscitation. With this article, we want to emphasize the importance of making correct chest compressions

TRAUMA

1. Crit Care Clin. 2017 Jan;33(1):55-70. doi: 10.1016/j.ccc.2016.08.011.

Resuscitative Endovascular Balloon Occlusion of the Aorta: Indications, Outcomes, and Training.

Napolitano LM1.

Abstract

Exsanguinating torso hemorrhage is a leading killer of trauma patients. The most appropriate means of hemorrhage control must be used. Trauma surgeons should have expertise with all approaches for prompt hemorrhage control [laparotomy, thoracotomy, resuscitative endovascular balloon occlusion of the aorta (REBOA), and resuscitative thoracotomy]. REBOA is an exciting adjunct for hemorrhage control as it can be deployed quickly and placed percutaneously. Balloon inflation can vary dependent on patient physiology. REBOA is effective in hemorrhagic shock as a bridge to definitive hemostasis. Endovascular training is important for trauma surgeons caring for patients at high risk of death from traumatic hemorrhage.

2. Resuscitation. 2016 Nov 30. pii: S0300-9572(16)30553-6. doi: 10.1016/j.resuscitation.2016.11.011. [Epub ahead of print]

Resuscitation attempts and duration in traumatic out-of-hospital cardiac arrest.

Beck B1, Bray JE2, Cameron P3, Straney L4, Andrew E5, Bernard S6, Smith K7.

Abstract

BACKGROUND:This study aimed to understand factors associated with paramedics' decision to attempt resuscitation in traumatic out-of-hospital cardiac arrest (OHCA) and to characterise resuscitation attempts ≤ 10 min in patients who die at the scene.

METHODS: The Victorian Ambulance Cardiac Arrest Registry (VACAR) was used to identify all cases of traumatic OHCA between July 2008 and June 2014. We excluded cases < 16 years of age or with a mechanism of hanging or drowning.

RESULTS:

Of the 2334 cases of traumatic OHCA, resuscitation was attempted in 28% of cases and this rate remained steady over time ($p=0.10$). Multivariable logistic regression revealed that the arresting rhythm [shockable (adjusted odds ratio (AOR)=18.52, 95% confidence interval (CI):6.68-51.36) or pulseless electrical activity (AOR=12.58, 95%CI:9.06-17.45) relative to asystole] and

mechanism of injury [motorcycle collision (AOR=2.49, 95%CI:1.60-3.86), fall (AOR=1.91, 95%CI:1.17-3.11) and shooting/stabbing (AOR=2.25, 95%CI:1.17-4.31) relative to a motor vehicle collision] were positively associated with attempted resuscitation. Arrests occurring in rural regions had a significantly lower odds of attempted resuscitation relative to those in urban regions (AOR=0.64, 95%CI:0.46-0.90). Resuscitation attempts ≤ 10 min represented 34% of cases in which resuscitation was attempted but the patient died at the scene. When these resuscitation attempts were selectively excluded from the overall EMS treated population, survival to hospital discharge non-significantly increased from 3.8% to 5.0% ($p=0.314$).

CONCLUSION: Survival in our study was consistent with existing literature, however the large proportion of cases with resuscitation attempts ≤ 10 min may under-represent survival in those patients that receive full resuscitation attempts.

FÀRMACS

1. Circulation. 2016 Dec 1. pii: CIRCULATIONAHA.116.025459. [Epub ahead of print]

Hospital Variation in Time to Epinephrine for Non-Shockable In-Hospital Cardiac Arrest.

Khera R1, Chan PS2, Donnino MW3, Girotra S4; American Heart Association's Get With The Guidelines-Resuscitation Investigators.

Abstract

BACKGROUND: -For patients with in-hospital cardiac arrests due to non-shockable rhythms, delays in epinephrine administration beyond 5 minutes is associated with worse survival. However, the extent of hospital variation in delayed epinephrine administration and its impact on hospital-level outcomes is unknown.

METHODS: -Within Get with the Guidelines-Resuscitation, we identified 103,932 adult patients (≥ 18 years) at 548 hospitals with an in-hospital cardiac arrest due to a non-shockable rhythm who received at least 1 dose of epinephrine between 2000 to 2014. We constructed two-level hierarchical regression models to quantify hospital variation in rates of delayed epinephrine administration (>5 minutes) and its association with hospital rates of survival to discharge and survival with functional recovery.

RESULTS: -Overall, 13,213 (12.7%) patients had delays to epinephrine, and this rate varied markedly across hospitals (range: 0% to 53.8%). The odds of delay in epinephrine administration were 58% higher at one randomly selected hospital compared to a similar patient at another randomly selected hospitals (median odds ratio [OR] 1.58; 95% C.I. 1.51 - 1.64). Median risk-standardized survival rate was 12.0% (range: 5.4% to 31.9%) and risk-standardized survival with functional recovery was 7.4% (range: 0.9% to 30.8%). There was an inverse correlation between a hospital's rate of delayed epinephrine administration and its risk-standardized rate of survival to discharge ($\rho = -0.22$, $P < 0.0001$) and survival with functional recovery ($\rho = -0.14$, $P = 0.001$). Compared to a median survival rate of 12.9% (interquartile range 11.1% to 15.4%) at hospitals in the lowest quartile of epinephrine delay, risk-standardized survival was 16% lower at hospitals in the quartile with the highest rate of epinephrine delays (10.8%, interquartile range: 9.7% to 12.7%).

CONCLUSIONS: -Delays in epinephrine administration following in-hospital cardiac arrest are common and varies across hospitals. Hospitals with high rates of delayed epinephrine administration had lower rates of overall survival for in-hospital cardiac arrest due to non-shockable rhythm. Further studies are needed to determine if improving hospital performance on time to epinephrine administration, especially at hospitals with poor performance on this metric will lead to improved outcomes.

DESFIBRIL·LACIÓ I ELECTROFISIOLOGIA

1. J Geriatr Cardiol. 2016 Sep;13(9):789-797.

Epidemiology and genetics of ventricular fibrillation during acute myocardial infarction.

Glinge C1, Sattler S1, Jabbari R1, Tfelt-Hansen J1.

Abstract

Sudden cardiac death (SCD) from ventricular fibrillation (VF) during coronary artery disease (CAD) is a leading cause of total and cardiovascular mortality, and in more than half of SCD cases VF occurs as the first symptom of CAD. Several epidemiological studies have shown that sudden

death of a family member is a risk factor for SCD and VF during acute myocardial infarction (MI), independent of traditional risk factors including family history of MI, suggesting a genetic component in the susceptibility to VF. To prevent SCD and VF due to MI, we need a better understanding of the genetic and molecular mechanisms causing VF in this apparently healthy population. Even though new insights and technologies have become available, the genetic predisposition to VF during MI remains poorly understood. Findings from a variety of different genetic studies have failed to reach reproducibility, although several genetic variants, both common and rare variants, have been associated to either VF or SCD. For this review, we searched PubMed for potentially relevant articles, using the following MeSH-terms: "sudden cardiac death", "ventricular fibrillation", "out-of-hospital cardiac arrest", "myocardial infarction, myocardial ischemia", "coronary artery disease", and "genetics". This review describes the epidemiology and evidence for genetic susceptibility to VF due to MI.

PEDIATRIA

1. Resuscitation. 2016 Nov 26. pii: S0300-9572(16)30552-4. doi: 10.1016/j.resuscitation.2016.11.010. [Epub ahead of print]

Public access defibrillation and outcomes after pediatric out-of-hospital cardiac arrest.

Fukuda T1, Ohashi-Fukuda N2, Kobayashi H3, Gunshin M 4, Sera T5, Kondo Y6, Yahagi N2.

Abstract

BACKGROUND: Use of automated external defibrillators (AEDs) has been recommended for pediatric out-of-hospital cardiac arrest (OHCA). However, there are no conclusive studies that elucidated the effectiveness of public-access defibrillation (PAD) in children.

METHODS: This was a nationwide, population-based, propensity score-matched study of pediatric OHCA in Japan from 2011 to 2012, based on data from the All-Japan Utstein Registry. We included pediatric OHCA patients (aged 1-17 years) who received bystander cardiopulmonary resuscitation. The primary outcome was a favorable neurological state 1 month after OHCA defined as a Glasgow-Pittsburgh cerebral performance category (CPC) score of 1-2 (corresponding to a Pediatric CPC score of 1-3).

RESULTS: A total of 1193 patients were included in the final cohort; 57 received PAD and 1136 did not. Among 1193 patients, 188 (15.8%) survived with a favorable neurological status 1 month after OHCA. The odds of neurologically favorable survival were significantly higher for patients receiving PAD after adjusting for potential confounders: propensity score matching, OR 3.17 (95% CI 1.40-7.17), and multivariable logistic regression modeling, OR_{adjusted} 5.10 (95% CI 2.01-13.70). Similar findings were observed for the secondary outcomes (i.e., neurologically favorable survival with a CPC score of 1, one-month survival, and prehospital return of spontaneous circulation). In subgroup analyses, there were no significant differences in neurologically favorable survival between the PAD group and non-PAD group in the unwitnessed cohort (OR_{adjusted} 7.76 [0.75-81.90]) or the non-cardiac etiology cohort (OR_{adjusted} 6.65 [0.64-66.24]).

CONCLUSIONS: PAD was associated with an increased chance of neurologically favorable survival in pediatric OHCA (aged 1-17 years) who received bystander CPR, except for in cases of unwitnessed or non-cardiac etiology.

2. Resuscitation. 2016 Nov 25. pii: S0300-9572(16)30549-4. doi: 10.1016/j.resuscitation.2016.11.007. [Epub ahead of print]

Characteristics of bystander cardiopulmonary resuscitation for paediatric out-of-hospital cardiac arrests: A national observational study from 2012 to 2014.

Chang I1, Kwak YH2, Shin SD3, Ro YS4, Kim DK5.

Abstract

OBJECTIVES: This study evaluated the associations between the provision of bystander cardiopulmonary resuscitation (BCPR) and both the relationship of bystanders with paediatric out-of-hospital cardiac arrest (OHCA) victims and the community educational level.

METHODS: This observational study was conducted using the Korean national OHCA registry of paediatric OHCA (<19years old) between 2012 and 2014. The main factor was the relationship between the bystander and the OHCA victim. The primary endpoint was the provision of BCPR. The association between BCPR provision and community educational level was also examined.

Multivariable logistic regression and interaction analyses were performed to determine whether community educational level affected BCPR provision.

RESULTS: Among the 1477 enrolled patients, 725 (49.1%) received BCPR. Family members provided BCPR in 458 (57.4%) cases. The adjusted odds ratios and corresponding 95% confidence intervals (AORs, 95% CIs) for the provision of BCPR by family members or first responders compared with strangers were 1.75 (1.31-2.34) and 8.90 (5.00-15.84). The AORs for BCPR provision in communities with the middle and lowest educational levels compared with the highest were 0.70 (0.53-0.92) and 1.11 (0.79-1.55). The interaction analysis showed that the AORs of family members or first responders providing BCPR compared with strangers were 1.32 (0.79-2.19) and 5.90 (1.98-17.63), 1.98 (1.31-2.98) and 10.88 (4.20-28.16), and 1.87 (1.18-2.96) and 9.89 (3.88-25.21) in communities with the lowest, middle and highest educational levels, respectively.

CONCLUSION: In paediatric OHCA cases, family members were more likely than strangers to perform BCPR except in communities with the lowest educational level.

3. *J Pediatr.* 2016 Nov 29. pii: S0022-3476(16)31240-9. doi: 10.1016/j.jpeds.2016.11.012. [Epub ahead of print]

Cardiac Arrest in Pediatric Patients Receiving Azithromycin.

Valdés SO1, Kim JJ2, Niu MC3, de la Uz CM2, Miyake CY2, Moffett BS4.

Abstract

OBJECTIVE: To compare outcomes of pediatric patients treated with azithromycin compared with penicillin or cephalosporin. We hypothesized that azithromycin use would not be associated with increased cardiac mortality in the pediatric population.

STUDY DESIGN: Retrospective cohort study from the Pediatric Health Information System database between 2008 and 2012. Patients <19 years of age with a principal diagnosis of community-acquired pneumonia who received an antibiotic were included. Primary outcomes were cardiopulmonary resuscitation (CPR) and mortality. Secondary outcomes were ventricular arrhythmias incidences and readmission for ventricular arrhythmia. Statistical analysis was performed with the χ^2 test. Multivariable analysis was performed to control for potential confounders among patient, event, and treatment characteristics.

RESULTS: A total of 82 982 patients (54.3% males) met study criteria. Median age was 2.6 years (IQR 1.2-5.9 years) and median length of stay was 2 days (IQR 2-4 days). Azithromycin was used in 5039 (6.1%); penicillin or cephalosporin was used in 77 943 (93.9%). Overall prevalence of antibiotic-associated CPR was 0.14%. Patients receiving a macrolide antibiotic had a lower prevalence of CPR compared with patients receiving a penicillin or cephalosporin (0.04% vs 0.14%, $P = .04$), and there was no difference in mortality. Multivariable analysis did not find an association between macrolide use and CPR.

CONCLUSIONS: In contrast to recent adult studies, among children hospitalized for community-acquired pneumonia, azithromycin use was not associated with a greater prevalence of cardiac arrest compared with penicillin or cephalosporin use.

TARGET TEMPERATUR MANAGEMENT

1. *Crit Care Nurse.* 2016 Dec;36(6):33-40.

Use of Neuromuscular Blockers During Therapeutic Hypothermia After Cardiac Arrest: A Nursing Protocol.

Boulila C1,2,3,4,5, Ben Abdallah S1,2,3,4,5, Marincamp A1,2,3,4,5, Coic V1,2,3,4,5, Lauerjat R1,2,3,4,5, Ericher N1,2,3,4,5, Bougouin W1,2,3,4,5, Mira JP1,2,3,4,5, Cariou A6,7,8,9,10, Geri G1,2,3,4,5.

Abstract

BACKGROUND: Neuromuscular blockers used to prevent shivering during therapeutic hypothermia in comatose patients after out-of-hospital cardiac arrest are associated with adverse events.

OBJECTIVE:

To assess the influence of a nurse-implemented protocol on use of neuromuscular blockers in patients treated with 24-hour therapeutic hypothermia after out-of-hospital cardiac arrest.

METHODS: A before and after study was done in a 24-bed cardiac arrest center. During the before period, paralysis was maintained by continuous infusion of vecuronium during

therapeutic hypothermia. During the after period, a nurse-implemented protocol was used to strictly control use of neuromuscular blockers. The primary outcome measure was duration of infusion of neuromuscular blockers; secondary end points included rates of ventilator-associated pneumonia and intensive care unit mortality.

RESULTS: Among the 22 patients in the before group and the 23 patients in the after group, most were men (78%) with a median age of 66 years. Baseline characteristics were similar between the 2 groups. Median duration of sedation was 36 hours, shorter in the after group (34 hours) than in the before group (38 hours; $P = .02$). Median duration of infusion of neuromuscular blockers was significantly shorter in the after group (6 hours) than in the before group (33 hours; $P < .001$). Ventilator-associated pneumonia occurred more frequently in the before group (45%) than in the after group (13%; $P = .02$). Overall intensive care unit mortality rate was 58%, similar in both groups ($P = .44$).

CONCLUSION: Use of a nurse-implemented protocol to reduce use of neuromuscular blockers is feasible

2. Scand J Trauma Resusc Emerg Med. 2016 Nov 28;24(1):138.

A statistical analysis protocol for the time-differentiated target temperature management after out-of-hospital cardiac arrest (TTH48) clinical trial.

Kirkegaard H1,2, Pedersen AR3, Pettilä V4,5,6, Hjort J7, Rasmussen BS8,9, de Haas I8, Nielsen JF3, Ilkjær S10, Kaltoft A11, Jeppesen AN10,12, Grejs AM10,12, Duez CH10,12, Larsen AI13,14, Toome V15, Arus U 16, Taccone FS17, Storm C18, Laitio T19,20, Skrifvars MB4,5,21, Søreide E22,23.

Abstract

BACKGROUND: The TTH48 trial aims to determine whether prolonged duration (48 hours) of targeted temperature management (TTM) at 33 (± 1) °C results in better neurological outcomes compared to standard duration (24 hours) after six months in comatose out-of-hospital cardiac arrest (OHCA) patients.

METHODS: TTH48 is an investigator-initiated, multicentre, assessor-blinded, randomised, controlled superiority trial of 24 and 48 hours of TTM at 33 (± 1) °C performed in 355 comatose OHCA patients aged 18 to 80 years who were admitted to ten intensive care units (ICUs) in six Northern European countries. The primary outcome of the study is the Cerebral Performance Category (CPC) score observed at six months after cardiac arrest. CPC scores of 1 and 2 are defined as good neurological outcomes, and CPC scores of 3, 4 and 5 are defined as poor neurological outcomes. The secondary outcomes are as follows: mortality within six months after cardiac arrest, CPC at hospital discharge, Glasgow Coma Scale (GCS) score on day 4, length of stay in ICU and at hospital and the presence of any adverse events such as cerebral, circulatory, respiratory, gastrointestinal, renal, metabolic measures, infection or bleeding. With the planned sample size, we have 80% power to detect a 15% improvement in good neurological outcomes at a two-sided statistical significance level of 5%.

DISCUSSION: We present a detailed statistical analysis protocol (SAP) that specifies how primary and secondary outcomes should be evaluated. We also predetermine covariates for adjusted analyses and pre-specify sub-groups for sensitivity analyses. This pre-planned SAP will reduce analysis bias and add validity to the findings of this trial on the effect of length of TTM on important clinical outcomes after cardiac arrest

3. Ther Hypothermia Temp Manag. 2016 Dec;6(4):208-217. Epub 2016 Oct 19.

Time to Cooling Is Associated with Resuscitation Outcomes.

Schock RB1, Janata A2, Peacock WF3, Deal NS3, Kalra S4, Sterz F2.

Abstract

Our purpose was to analyze evidence related to timing of cooling from studies of targeted temperature management (TTM) after return of spontaneous circulation (ROSC) after cardiac arrest and to recommend directions for future therapy optimization. We conducted a preliminary review of studies of both animals and patients treated with post-ROSC TTM and hypothesized that a more rapid cooling strategy in the absence of volume-adding cold infusions would provide improved outcomes in comparison with slower cooling. We defined rapid cooling as the achievement of 34°C within 3.5 hours of ROSC without the use of volume-adding cold infusions, with a $\geq 3.0^\circ\text{C}/\text{hour}$ rate of cooling. Using the PubMed database and a previously published systematic review, we identified clinical studies published from 2002 through 2014

related to TTM. Analysis included studies with time from collapse to ROSC of 20-30 minutes, reporting of time from ROSC to target temperature and rate of patients in ventricular tachycardia or ventricular fibrillation, and hypothermia maintained for 20-24 hours. The use of cardiopulmonary bypass as a cooling method was an exclusion criterion for this analysis. We compared all rapid cooling studies with all slower cooling studies of ≥ 100 patients. Eleven studies were initially identified for analysis, comprising 4091 patients. Two additional studies totaling 609 patients were added based on availability of unpublished data, bringing the total to 13 studies of 4700 patients. Outcomes for patients, dichotomized into faster and slower cooling approaches, were determined using weighted linear regression using IBM SPSS Statistics software. Rapid cooling without volume-adding cold infusions yielded a higher rate of good neurological recovery than slower cooling methods. Attainment of a temperature below 34°C within 3.5 hours of ROSC and using a cooling rate of more than 3°C/hour appear to be beneficial.

4. *Anaesth Crit Care Pain Med.* 2016 Nov 29. pii: S2352-5568(16)30223-5. doi: 10.1016/j.accpm.2016.08.009. [Epub ahead of print]

A comparison between intravascular and traditional cooling for inducing and maintaining temperature control in patients following cardiac arrest. Traditional or modern therapeutic hypothermia after cardiac arrest.

Rosman J1, Hentzien M2, Dramé M3, Roussel V1, Just B4, Jolly D3, Mateu P5.

Abstract

Therapeutic temperature control has been widely used during the last decade to improve clinical outcomes. We conducted this retrospective observational study to compare traditional cooling with endovascular cooling in post-cardiac arrest comatose survivors and to compare results with current guidelines.

PATIENTS AND METHODS: All patients admitted to our ICU for cardiac arrest and for whom temperature control was performed were included. Traditional cooling included cold infusions, ice packs and cooling blankets. Endovascular cooling consisted in the insertion of a catheter in which cold fluid circulates in a closed circuit provided by a heat exchanger. Temperature control was started at a target temperature of 32 °C to 34 °C. Rewarming was performed passively in the traditional group and via computer-assistance in endovascular group. We evaluated the delay prior to and speed of cooling, thermic stability during the maintenance phase and the speed of rewarming.

RESULTS: Thirty four patients were included. The speed of cooling was faster with the endovascular (-0.66 ± 0.35 °C/h) compared to the traditional (-0.35 ± 0.38 °C/h, $p = 0.006$) technique, with target temperatures reached in 4.0 and 6.0h, respectively ($p = 0.14$). Temperatures were more stable with the endovascular technique (0.03 ± 0.05 °C²) than with the traditional technique (0.26 ± 0.16 °C², $p < 10^{-4}$). There were more deviations from the guideline target range in the traditional group (64.7% versus 17.6%, $p = 0.008$). Rewarming was faster in the traditional group ($+0.64 \pm 0.33$ °C/h, versus $+0.36 \pm 0.12$ °C/h, $p = 0.01$). No significant difference was found concerning mortality or length of stay in the ICU.

CONCLUSION: Temperature control with a cooling catheter was associated with faster cooling, improved thermic stability in the target range, less overcooling or overheating and slower rewarming in comparison with traditional techniques.

RECERCA EXPERIMENTAL

1. *Crit Care Resusc.* 2016 Dec;18(4):255-260.

Direct cerebral perfusion and cooling in experimental cardiac arrest.

Bellomo R1, Marino B2, Angelopoulos P2, Carson S2, Eastwood G3, Kosaka J2, Iguchi N2, Hilton A3, May C4.

Abstract

BACKGROUND: Cerebral protection is a key priority during cardiac arrest (CA). However, current approaches are suboptimal.

OBJECTIVE: To test whether direct perfusion and cooling of the anterior cerebral circulation by means of cerebral vessel cannulation and extracorporeal membrane oxygenation (ECMO) increases cerebral oxygenation and induces cerebral hypothermia during CA.

METHODS: We performed proof-of-concept animal experiments in sheep. We cannulated the carotid artery (for antegrade perfusion) or the jugular vein (for retrograde perfusion) for direct

perfusion and cooling, and the jugular vein on the opposite side for drainage. We connected these cannulae to an ECMO circuit. We induced CA and, after 10 minutes, and during open-chest cardiac massage, we provided ECMO-based perfusion and cooling. We measured cerebral tissue oxygen saturation (SctO₂) by near infrared spectroscopy (NIRS) and cerebral temperature by means of invasively inserted tissue temperature probes.

RESULTS: In the antegrade perfusion experiments (n = 2), CA markedly decreased the SctO₂ to below 40% over 10 minutes, despite open-chest cardiac massage. ECMO-based cerebral perfusion and cooling increased SctO₂ levels to 60% and lowered cerebral temperature to 25°C within about 3 minutes. With retrograde perfusion (n = 2), ECMO-based cerebral perfusion and cooling was less effective; ECMO increased SctO₂ levels slowly and to a much lesser extent and similarly decreased cerebral temperature slowly and to a lesser extent.

CONCLUSIONS: During experimental CA, cerebral perfusion and cooling are possible by means of an ECMO circuit connected to the anterior cerebral circulation. Antegrade perfusion appears to be superior. Further investigations of the antegrade perfusion technique appear justified.