

VENTILACIÓ

1. Emerg Med Australas. 2017 Jan 11. doi: 10.1111/1742-6723.12719. [Epub ahead of print] **Competence in the use of supraglottic airways by Australian surf lifesavers for cardiac arrest ventilation in a manikin.**

Holbery-Morgan L1,2, Angel C2,3, Murphy M1,2, Carew J1, Douglas F1, Murphy R1,2, Hood N4,5, Rechtman A1,6, Scarff C1,7, Simpson N1,8, Stewardson A1,9, Steinfort D1,10, Radford S1,11, Douglas N1,12, Johnson D1,13.

Abstract

OBJECTIVES: Lifesavers in Australia are taught to use pocket mask (PM) rescue breathing and bag valve mask (BVM) ventilation, despite evidence that first responders might struggle with these devices. Novices have successfully used the Laryngeal Mask Airway (LMA) Supreme and iGel devices previously, but there has been no previous comparison of the ability to train lifesavers to use the supraglottic airways compared to standard techniques for cardiac arrest ventilation.

METHODS: The study is a prospective educational intervention whereby 113 lifesavers were trained to use the LMA and iGel supraglottic airways. Comparisons were made to standard devices on plastic manikins. Successful ventilation was defined as achieving visible chest rise.

RESULTS: The median time to first effective ventilation was similar between the PM (16 s, 95% confidence interval 16-17 s), BVM (17 s, 16-17 s) and iGel devices (18 s, 16-20 s), but longer for the LMA (36 s, 33-38 s). The iGel frequently failed to achieve ventilation (10%) compared with the PM (1%, $P < 0.01$) and LMA (3%, $P < 0.01$) but was not worse than the BVM (3%, $P < 0.57$). Hands-off time was similar between the BVM, LMA and iGel (10 s for each device), but worse for the PM (13 s, $P = 0.001$).

CONCLUSION: Lifesavers using the PM and BVM perform ventilation for cardiopulmonary resuscitation well. There appears to be a limited role for supraglottic airway devices because of limitations in terms of time to first effective ventilation and reliability. Clinical validation of manikin data with live resuscitation performance is required.

REGISTRES I REVISIONS

1. Hastings Cent Rep. 2017 Jan;47(1):10-19. doi: 10.1002/hast.664.

After the DNR: Surrogates Who Persist in Requesting Cardiopulmonary Resuscitation.

Robinson EM, Cadge W, Zollfrank AA, Cremens MC, Courtwright AM.

Abstract

Some health care organizations allow physicians to withhold cardiopulmonary resuscitation from a patient, despite patient or surrogate requests that it be provided, when they believe it will be more harmful than beneficial. Such cases usually involve patients with terminal diagnoses whose medical teams argue that aggressive treatments are medically inappropriate or likely to be harmful. Although there is state-to-state variability and a considerable judicial gray area about the conditions and mechanisms for refusals to perform CPR, medical teams typically follow a set of clearly defined procedures for these decisions. The procedures are based on the principle of nonmaleficence and typically include consultation with hospital ethics committees, reflecting the guidelines of relevant professional associations. Ethical debates about when CPR can and should be limited tend to rely more on discussions of theory, principles, and case studies than systematic empirical study of the situations in which such limitations are applied. Sociologists of bioethics call for empirical study, arguing that what ethicists and health professionals believe they are doing when they draft policies or invoke principles does not always mirror what is happening on the ground. In this article, we begin the task of modeling the empirical analyses sociologists call for, focusing on a cohort at Massachusetts General Hospital. We inductively analyzed ethics committee notes and medical records of nineteen patients whose surrogates did not accept the decision to withhold CPR.

2. *Cardiol Young*. 2017 Jan;27(S1):S68-S74. doi: 10.1017/S1047951116002262.

Sudden cardiac arrest in patients following surgery for CHD.

Kanter RJ1.

Abstract

The prevalence of sudden cardiac arrest after surgery for CHD is primarily related to the complexity of the congenital defect and the presence of residual defects, especially ventricular dysfunction. Among all causes of death in patients having CHD, about 19% lead to sudden mortality. The specific risk factors associated with the various congenital defects are poorly understood. The lone exception is tetralogy of Fallot, largely due to its high prevalence and the historically high post-operative survival rate. In tetralogy of Fallot, historical, haemodynamic, and electrical features contribute to risk, and electrophysiologic testing may be helpful, particularly to rule out risk. An implantable cardioverter-defibrillator is highly effective for secondary prevention in most forms of CHD, and future advances will improve its role in primary prevention.

3. *Am J Emerg Med*. 2017 Jan 3. pii: S0735-6757(16)30996-2. doi: 10.1016/j.ajem.2016.12.074. [Epub ahead of print]

Global Registry of Acute Coronary Events risk score predicts mortality and neurological outcome in out-of-hospital cardiac arrest.

Otani T1, Sawano H2, Natsukawa T2, Matsuoka R2, Morita M2, Hayashi Y2.

Abstract

PURPOSE: The aim of this study was to assess the usefulness of the Global Registry of Acute Coronary Events (GRACE) risk score in predicting in-hospital mortality and neurological outcome of patients resuscitated after out-of-hospital cardiac arrest (OHCA).

METHODS: We retrospectively analyzed the data of patients admitted to our hospital between October 2009 and October 2015 with OHCA and shockable initial cardiac rhythm who were resuscitated via conventional cardiopulmonary resuscitation. We calculated the GRACE risk score on admission and assessed its usefulness in predicting in-hospital mortality and neurological outcome.

RESULTS: Among 91 patients, 42 (46%) had acute myocardial infarction (AMI), 19 (21%) died in-hospital, and 52 (57%) had favorable neurological outcome. Among all the study patients, GRACE risk score was lower in survivors than in non-survivors (median 211 [interquartile range 176-240] vs. 266 [219-301], $p < 0.001$, respectively) and in favorable than in unfavorable neurological outcome group (202 [167-237] vs. 242 [219-275], $p < 0.001$, respectively).

Multivariate analysis showed significant association between GRACE risk score and favorable neurological outcome (odds ratio, 0.975; 95% confidence interval, 0.961-0.990). Areas under receiver-operating characteristic curves, that describe the accuracy of GRACE risk score in predicting in-hospital mortality and favorable neurological outcome, were both 0.79.

CONCLUSION: GRACE risk score may predict the in-hospital mortality and neurological outcome associated with resuscitated patients with OHCA and shockable initial cardiac rhythm, regardless of the cause of arrest.

4. *Resuscitation*. 2017 Jan 10. pii: S0300-9572(17)30004-7. doi: 10.1016/j.resuscitation.2016.12.023. [Epub ahead of print]

Patients reviewed by rapid response teams have a high and variable mortality rate, and limitations of care are commonly used. Data on the long-term outcomes of RRT are lacking and needed.

Tirkkonen J1, Tamminen T2, Skrifvars M3.

Abstract

BACKGROUND: An abundance of studies have investigated the impact of rapid response teams (RRTs) on in-hospital cardiac arrest rates. However, existing RRT data appear highly variable in terms of both study quality and reported uses of limitations of care, patient survival and patient long-term outcome.

METHODS: A systematic electronic literature search (January, 1990-March, 2016) of the PubMed and Cochrane databases was performed. Bibliographies of articles included in the full-text review were searched for additional studies. A predefined RRT cohort quality score (range 0-17) was used to evaluate studies independently by two reviewers.

RESULTS: Twenty-nine studies with a total of 157,383 RRT activations were included in this review. The quality of data reporting related to RRT patients was assessed as modest, with a median quality score of 8 (range 2-11). Data from the included studies indicate that a median 8.1% of RRT reviews result in limitations of medical treatment (range 2.1-25%) and 23% (8.2-56%) result in a transfer to intensive care. A median of 29% (6.9-35%) of patients transferred to intensive care died during that admission. The median hospital mortality of patients reviewed by RRT is 26% (12-60%), and the median 30-day mortality rate is 29% (8-39%). Data on long-term survival is minimal. No data on functional outcomes was identified.

CONCLUSIONS: Patients reviewed by rapid response teams have a high and variable mortality rate, and limitations of care are commonly used. Data on the long-term outcomes of RRT are lacking and needed.

5. *Cardiol Young*. 2017 Jan;27(S1):S3-S9. doi: 10.1017/S104795111600216X.

How to develop a clinic for sudden cardiac arrest survivors and families of non-survivors.

Abrams DJ1.

Abstract

The investigation of the aetiology of sudden cardiac arrest or death in a young person combines features of a traditional clinical medical examination with those of forensic medicine. Nuances of the immediate peri-event history, when available, can be paramount. New genetic tools have greatly improved the yield of such investigations, but they must be carefully interpreted by genetic specialists. The approach to surviving patients, their family members, and to family members of non-survivors is best achieved in a structured programme that includes all appropriate specialists and support personnel. As an example, this may include all appropriate paediatric and internal medicine specialists, a geneticist, a genetic counsellor, a clinical psychologist, nurse specialist(s), and a programme coordinator. This family-centred strategy affords the patient, if surviving, and all family members the necessary emotional and medical support while at the same time providing the necessary diagnostic and therapeutic approaches.

FÀRMACS

1. *Am J Emerg Med*. 2017 Jan 3. pii: S0735-6757(16)30969-X. doi: 10.1016/j.ajem.2016.12.066. [Epub ahead of print]

Quick epinephrine administration induces favorable neurological outcomes in out-of-hospital cardiac arrest patients.

Ueta H1, Tanaka H2, Tanaka S3, Sagisaka R 4, Takyu H4.

Abstract

OBJECTIVE: This research is to study if quick administration of adrenaline on OHCA prior to hospitalization has an effect on improving CPC1-2 at one month.

METHODOLOGY: A total 13,326 cases were extracted from 2011 to 2014 Utstein data for this retrospective cohort study, also, EMT reached the patients within 16min after 119 called and adrenaline was then administered within 22min of after contact.

PATIENTS DIVIDED INTO TWO GROUPS: Patients were contacted within 8min of the 119 call (n=6956), and were contacted between 8 and 16min after the call (n=6370). Further divided

into groups in which the adrenaline was administered within/without 10min after contact. Primary outcome was the rate of a good prognosis for cerebral performance (CPC1-2) at 1 month and secondary outcome was the return of spontaneous circulation (ROSC) rate.

RESULTS: The odds ratio of the CPC1-2 at 1month by the EMS reached within 8min after 119 call and then adrenaline administered within 10min was 2.12 (1.54-2.92). Those reached between 8 and 16min was 2.66 (1.97-3.59). However, the ROSC rate was 2.00 (1.79-2.25) for those reached within 8min and also 2.00 (1.79-2.25) for those reached between 8min and 16min.

CONSIDERATIONS: In cases of OHCA, it appears that the CPC1-2 rate after 1month can be improved even in cases where the victim is reached >8min after the 119 call, as long as the victim is reached within 16min and emergency responders administer the adrenaline as quickly as possible.

ECMO

1. Eur J Cardiothorac Surg. 2017 Jan 10. pii: ezw413. doi: 10.1093/ejcts/ezw413. [Epub ahead of print]

Resuscitation of prolonged cardiac arrest from massive pulmonary embolism by extracorporeal membrane oxygenation.

Kim YS1, Choi W2, Hwang J3.

Abstract

Extracorporeal cardiopulmonary resuscitation can be used as a rescue strategy in cases of prolonged cardiac arrest caused by massive pulmonary embolism. We present a case of a male patient who was in prolonged cardiac arrest following massive pulmonary embolism. Veno-arterial extracorporeal membrane oxygenation was initiated approximately 93 min after prolonged cardiopulmonary resuscitation. After resuscitation, bedside echocardiography and a chest computed tomography angiogram revealed a massive pulmonary embolism during extracorporeal membrane oxygenation support. The patient received transcatheter mechanical thrombectomy without haemodynamic instability in extracorporeal membrane oxygenation support. He was also treated with therapeutic hypothermia to improve neurological outcome. Renal replacement therapy for acute kidney injury was continued for 36 days. The patient was discharged at 60 days after admission with no serious complications. This case demonstrates that veno-arterial extracorporeal membrane oxygenation and therapeutic hypothermia are an effective treatment strategy for prolonged cardiac arrest caused by massive pulmonary embolism.

2. Ann Card Anaesth. 2017 Jan;20(Supplement):S4-S10. doi: 10.4103/0971-9784.197790.

Extracorporeal membrane oxygenation for refractory cardiac arrest.

Conrad SA1, Rycus PT2.

Abstract

Extracorporeal cardiopulmonary resuscitation (ECPR) is the use of rapid deployment venoarterial (VA) extracorporeal membrane oxygenation to support systemic circulation and vital organ perfusion in patients in refractory cardiac arrest not responding to conventional cardiopulmonary resuscitation (CPR). Although prospective controlled studies are lacking, observational studies suggest improved outcomes compared with conventional CPR when ECPR is instituted within 30-60 min following cardiac arrest. Adult and pediatric patients with witnessed in-hospital and out-of-hospital cardiac arrest and good quality CPR, failure of at least 15 min of conventional resuscitation, and a potentially reversible cause for arrest are candidates. Percutaneous cannulation where feasible is rapid and can be performed by nonsurgeons (emergency physicians, intensivists, cardiologists, and interventional radiologists). Modern extracorporeal systems are easy to prime and manage and are technically easy to manage with proper training and experience. ECPR can be deployed in the

emergency department for out-of-hospital arrest or in various inpatient units for in-hospital arrest. ECPR should be considered for patients with refractory cardiac arrest in hospitals with an existing extracorporeal life support program, able to provide rapid deployment of support, and with resources to provide postresuscitation evaluation and management

3. *Artif Organs*. 2016 Sep;40(9):904-9. doi: 10.1111/aor.12655. Epub 2015 Dec 18.

Extracorporeal Life Support in Out-of-Hospital Refractory Cardiac Arrest.

Rousse N1, Robin E2, Juthier F1, Hysi I1, Banfi C1, Al Ibrahim M1, Coadou H3,4, Goldstein P3,4, Wiel E3,4, Vincentelli A 5.

Abstract

Out-of-Hospital refractory Cardiac Arrest (OHRCA) has a mortality rate between 90 and 95%. Since 2009, French medical academic societies have recommended the use of extracorporeal life support (ECLS) for OHRCA. According to these guidelines, patients were eligible for ECLS support if vital signs were still present during cardiopulmonary resuscitation (CPR), or if cardiac arrest was secondary to intoxication or hypothermia ($\leq 32^{\circ}\text{C}$). Otherwise, patients would receive ECLS if (i) no-flow duration was less than 5 min; (ii) time delays from CPR to ECLS start (low flow) were less than 100 min; and (iii) expiratory end tidal CO_2 (ETCO_2) was more than 10 mm Hg 20 min after initiating CPR. We have reported here our experience with ECLS in OHRCA according to the previous guidelines. We retrospectively analyzed mortality rates of patients supported with ECLS in case of OHRCA. From December 2009 to December 2013, 183 patients were assisted with ECLS, among which 32 cases were of OHRCA. Mean age for the OHRCA patients was 43.6 years. Over two-thirds were male (71.9%). Causes of OHRCA included intoxication, isolated hypothermia $< 32^{\circ}\text{C}$, acute coronary syndrome, pulmonary edema, and other cardiac pathology. Despite adherence to protocols, only two patients (6.2%) with hypothermia and acute myocardium ischemia, respectively, could be discharged from hospital after cardiac recovery. Causes of death were brain death and multiple organ failure. Despite ECLS support setting in accordance with French guidelines in case of refractory OHRCA, mortality rates remained high. French ECLS support recommendations for OHRCA due to presumed cardiac cause should be re-examined through new studies. Low flow duration should be improved by a shorter time of CPR before hospital transfer.

POST RCE

1. *Resuscitation*. 2016 May;102:127-35. doi: 10.1016/j.resuscitation.2016.01.016. Epub 2016 Feb 3.

Association of early withdrawal of life-sustaining therapy for perceived neurological prognosis with mortality after cardiac arrest.

Elmer J1, Torres C2, Aufderheide TP3, Austin MA4, Callaway CW5, Golan E6, Herren H7, Jasti J3, Kudenchuk PJ8, Scales DC9, Stub D10, Richardson DK11, Zive DM12; Resuscitation Outcomes Consortium.

Comment in: Does early withdrawal of life-sustaining treatment increase mortality after cardiac arrest? [*Resuscitation*. 2016]

Abstract

BACKGROUND: Withdrawing life-sustaining therapy because of perceived poor neurological prognosis (WLST-N) is a common cause of hospital death after out-of-hospital cardiac arrest (OHCA). Although current guidelines recommend against WLST-N before 72h (WLST-N $<$ 72), this practice is common and may increase mortality. We sought to quantify these effects. **METHODS:** In a secondary analysis of a multicenter OHCA trial, we evaluated survival to hospital discharge and survival with favorable functional status (modified Rankin Score ≤ 3) in adults alive $>$ 1h after hospital admission. Propensity score modeling the probability of exposure to WLST-N $<$ 72 based on pre-exposure covariates was used to match unexposed subjects with those exposed to WLST-N $<$ 72. We determined the probability of survival and

functionally favorable survival in the unexposed matched cohort, fit adjusted logistic regression models to predict outcomes in this group, and then used these models to predict outcomes in the exposed cohort. Combining these findings with current epidemiologic statistics we estimated mortality nationally that is associated with WLST-N<72.

RESULTS: Of 16,875 OHCA subjects, 4265 (25%) met inclusion criteria. WLST-N<72 occurred in one-third of subjects who died in-hospital. Adjusted analyses predicted that exposed subjects would have 26% survival and 16% functionally favorable survival if WLST-N<72 did not occur. Extrapolated nationally, WLST-N<72 may be associated with mortality in approximately 2300 Americans each year of whom nearly 1500 (64%) might have had functional recovery.

CONCLUSIONS: After OHCA, death following WLST-N<72 may be common and is potentially avoidable. Reducing WLST-N<72 has national public health implications and may afford an opportunity to decrease mortality after OHCA.

TARGETED TEMPERATURE MANAGEMENT

1. Int J Cardiol. 2017 Jan 6. pii: S0167-5273(17)30082-7. doi: 10.1016/j.ijcard.2017.01.050. [Epub ahead of print]

Endothelial function impairment in STEMI patients with out-of-hospital cardiac arrest under therapeutic hypothermia treatment.

Brugaletta S1, Scalone G2, Dantas AP2, Ortega-Paz L2, Garabito M2, Roqué M2, Martin V2, Masotti M2, Freixa X2, Sabaté M2.

Abstract

BACKGROUND: Therapeutic hypothermia (HT) in out-of-hospital cardiac arrest STEMI patients aims to improve their neurological prognosis, but it has been associated with slow coronary flow and cardiac thrombotic events. We sought to serially assess endothelial function during the first 48h after admission in out-of-hospital cardiac arrest STEMI patients, under therapeutic hypothermia (HT).

METHODS: From January 2015 to August 2015, eighteen consecutive out-of-hospital cardiac arrest STEMI patients eligible for primary PCI received HT at admission and were included in the study (HT group). During the same time period, eight consecutive patients with large anterior STEMI who received primary PCI but not HT were included as control group. Serial endothelial function by measuring flow-mediated dilatation (FMD) in the brachial artery, biomarkers of endothelial function and oxidative stress were assessed during the first 48h after admission in both groups.

RESULTS: HT group showed worse FMD as compared to the control group ($p<0.001$). Glutathione peroxidase-3 (GPx-3) values were higher in control as compared to HT group ($p=0.019$), without any interaction between time of observation and HT ($p=0.864$). A significant interaction between time and HT was found in the levels of sVCAM-1, which reached an earlier peak in control than in HT group ($p=0.019$). ET-1 values generally increase overtime ($p=0.005$), but without any main effect of HT ($p=0.175$).

CONCLUSIONS: HT is associated with endothelial dysfunction in out-of-hospital cardiac arrest STEMI patients during the first 48h after admission. This vascular dysfunction may be related to increased oxidative stress due to deficiency of GPx-3 in HT patients.

PEDIATRIA

1. Emerg Med J. 2016 May;33(5):368. doi: 10.1136/emered-2016-205807.3.

BET 3: The efficacy of chest compressions in paediatric traumatic arrest.

Bowles F1, Rawlinson K1.

Abstract

A short-cut review was carried out to establish whether cardiac compressions are beneficial in children in traumatic cardiac arrest. Forty-eight unique papers were found using the reported

searches but none were relevant to the clinical question. It is concluded that there is no evidence available to answer the question posed and that local guidelines should be followed.

ELECTROFISIOLOGIA I FV

1. PLoS One. 2017 Jan 13;12(1):e0170193. doi: 10.1371/journal.pone.0170193. eCollection 2017.

A Common Variant in SCN5A and the Risk of Ventricular Fibrillation Caused by First ST-Segment Elevation Myocardial Infarction.

Jabbari R1, Glinge C1, Jabbari J1, Risgaard B 1, Winkel BG1, Terkelsen CJ2, Tilsted HH3, Jensen LO4, Hougaard M4, Haunsø S1,5 , Engstrøm T1, Albert CM6, Tfelt-Hansen J1.

Abstract

BACKGROUND: Several common genetic variants have been associated with either ventricular fibrillation (VF) or sudden cardiac death (SCD). However, replication efforts have been limited. Therefore, we aimed to analyze whether such variants may contribute to VF caused by first ST-elevation myocardial infarction (STEMI).

METHODS: We analyzed 27 single nucleotide polymorphisms (SNP) previously associated with SCD/VF in other cohorts, and examined whether these SNPs were associated with VF caused by first STEMI in the GENetic causes of Ventricular Arrhythmias in patients with first ST-elevation Myocardial Infarction (GEVAMI) study on ethnical Danes. The GEVAMI study is a prospective case-control study involving 257 cases (STEMI with VF) and 537 controls (STEMI without VF).

RESULTS: Of the 27 candidate SNPs, one SNP (rs11720524) located in intron 1 of SCN5A which was previously associated with SCD was significantly associated with VF caused by first STEMI. The major C-allele of rs11720524 was present in 64% of the cases and the C/C genotype was significantly associated with VF with an odds ratio (OR) of 1.87 (95% CI: 1.12-3.12; P = 0.017). After controlling for clinical differences between cases and controls such as age, sex, family history of sudden death, alcohol consumption, previous atrial fibrillation, statin use, angina, culprit artery, and thrombolysis in myocardial infarction (TIMI) flow, the C/C genotype of rs11720524 was still significantly associated with VF with an OR of 1.9 (95% CI: 1.05-3.43; P = 0.032). Marginal associations with VF were also found for rs9388451 in HEY2 gene. The CC genotype showed an insignificant risk for VF with OR = 1.50 (95% CI: 0.96-2.40; P = 0.070). **CONCLUSION:** One common intronic variant in SCN5A suggested an association with VF caused by first STEMI. Further studies into the functional abnormalities associated with the noncoding variant in SCN5A may lead to important insights into predisposition to VF during STEMI.

2. Resuscitation. 2017 Jan 10. pii: S0300-9572(17)30002-3. doi: 10.1016/j.resuscitation.2016.12.021. [Epub ahead of print]

Incidence and survival outcome according to heart rhythm during resuscitation attempt in out-of-hospital cardiac arrest patients with presumed cardiac etiology.

Rajan S1, Folke F2, Hansen SM3, Hansen CM4, Kragholm K5, Gerds TA6, Lippert FK7, Karlsson L8, Møller S8, Køber L9, Gislason GH10, Torp-Pedersen C11, Wissenberg M12.

Abstract

BACKGROUND: Knowledge about heart rhythm conversion from non-shockable to shockable rhythm during resuscitation attempt after out-of-hospital cardiac arrest (OHCA) and following chance of survival is limited and inconsistent.

METHODS: We studied 13,860 patients with presumed cardiac-caused OHCA not witnessed by the emergency medical services from the Danish Cardiac Arrest Register (2005-2012). Patients were stratified according to rhythm: shockable, converted shockable (based on receipt of subsequent defibrillation) and sustained non-shockable rhythm. Multiple logistic regression was used to identify predictors of rhythm conversion and to compute 30-day survival chances.

RESULTS: Twenty-five percent of patients who received pre-hospital defibrillation by ambulance personnel were initially found in non-shockable rhythms. Younger age, males, witnessed arrest, shorter response time, and heart disease were significantly associated with conversion to shockable rhythm, while psychiatric- and chronic obstructive pulmonary disease were significantly associated with sustained non-shockable rhythm. Compared to sustained non-shockable rhythms, converted shockable rhythms and initial shockable rhythms were significantly associated with increased 30-day survival (Adjusted odds ratio (OR) 2.6, 95% confidence interval (CI): 1.8-3.8; and OR 16.4, 95% CI 12.7-21.2, respectively). From 2005 to 2012, 30-day survival chances increased significantly for all three groups: shockable rhythms, from 16.3% (CI: 14.2%-18.7%) to 35.7% (CI: 32.5%-38.9%); converted rhythms, from 2.1% (CI: 1.6%-2.9%) to 5.8% (CI: 4.4%-7.6%); and sustained non-shockable rhythms, from 0.6% (CI: 0.5%-0.8%) to 1.8% (CI: 1.4%-2.2%).

CONCLUSION: Converting to shockable rhythm during resuscitation attempt was common and associated with nearly a three-fold higher odds of 30-day survival compared to sustained non-shockable rhythms.

RECERCA EXPERIMENTAL

1. Biomed Pharmacother. 2017 Jan 8;87:503-508. doi: 10.1016/j.biopha.2017.01.007. [Epub ahead of print]

Rosuvastatin improves myocardial and neurological outcomes after asphyxial cardiac arrest and cardiopulmonary resuscitation in rats.

Qiu Y1, Wu Y1, Meng M1, Luo M1, Zhao H1, Sun H2, Gao S3.

Abstract

Rosuvastatin, a potent HMG-CoA reductase inhibitor, is cholesterol-lowering drugs and reduce the risk of myocardial infarction and stroke. This study is to explore whether rosuvastatin improves outcomes after cardiac arrest in rats. Male Sprague-Dawley rats were subjected to 8min of cardiac arrest (CA) by asphyxia and randomly assigned to three experimental groups immediately following successful resuscitation: Sham; Control; and Rosuvastatin. The survival, hemodynamics, myocardial function, neurological outcomes and apoptosis were assessed. The 7-d survival rate was greater in the rosuvastatin treated group compared to the Control group ($P=0.019$ by log-rank test). Myocardial function, as measured by cardiac output and ejection fraction, was significantly impaired after CA and notably improved in the animals treated with rosuvastatin beginning at 60min after return of spontaneous circulation (ROSC) ($P<0.05$). Moreover, rosuvastatin treatment significantly ameliorated brain injury after ROSC, which was characterized by the increase of neurological function scores, and reduction of brain edema in cortex and hippocampus ($P<0.05$). Meanwhile, the levels of cardiac troponin T and neuron-specific enolase and the caspase-3 activity were significantly decreased in the Rosuvastatin group when compared with the Control group ($P<0.05$). In conclusion, rosuvastatin treatment substantially improves the 7-d survival rate as well as myocardial function and neurological outcomes after ROSC.

CASE REPOSRTS

1. J La State Med Soc. 2014 Jul-Aug;166(4):176-8. Epub 2014 Aug 12.

ECG Case of the Month. Out-of-Hospital Cardiac Arrest. DIAGNOSIS: Atrial fibrillation with a rapid ventricular response (150 beats/minute) and right bundle branch block.

El Hajj SC1, Bordelon CJ1, Glancy DL2.

Abstract

A muscular-appearing 50-year-old man was found down in his home by family members. Paramedics documented pulseless electrical activity and began cardiopulmonary resuscitation that included placement of an endotracheal tube. The resuscitation was continued in the

hospital emergency department (ED), and after 20 minutes, an arterial pulse returned. An electrocardiogram (ECG) was obtained (Figure 1). Meanwhile, a past history established that the patient was a personal trainer who seemed fit and healthy until 10 days earlier, when he came to the ED because he had begun to lose his balance and fall frequently. Computed tomography (CT) at that time revealed lytic lesions in the fifth lumbar vertebra and extensive retroperitoneal lymphadenopathy involving the aortic, iliac, and obturator chains and the perirectal region. Arrangements had then been made for outpatient workup of a presumed malignancy

REGISTRES I REVISIONS

1. Health Serv Res. 2017 Jan 18. doi: 10.1111/1475-6773.12651. [Epub ahead of print]

Hospital Variation in Utilization of Life-Sustaining Treatments among Patients with Do Not Resuscitate Orders.

Walkey AJ1, Weinberg J2, Wiener RS3,4, Cooke CR5, Lindenauer PK6.

Abstract

OBJECTIVE: To determine between-hospital variation in interventions provided to patients with do not resuscitate (DNR) orders.

DATA SOURCES/SETTING: United States Agency of Healthcare Research and Quality, Healthcare Cost and Utilization Project, California State Inpatient Database.

STUDY DESIGN: Retrospective cohort study including hospitalized patients aged 40 and older with potential indications for invasive treatments: in-hospital cardiac arrest (indication for CPR), acute respiratory failure (mechanical ventilation), acute renal failure (hemodialysis), septic shock (central venous catheterization), and palliative care. Hierarchical logistic regression to determine associations of hospital "early" DNR rates (DNR order placed within 24 hours of admission) with utilization of invasive interventions.

DATA COLLECTION/EXTRACTION METHODS: California State Inpatient Database, year 2011.

PRINCIPAL FINDINGS: Patients with DNR orders at high-DNR-rate hospitals were less likely to receive invasive mechanical ventilation for acute respiratory failure or hemodialysis for acute renal failure, but more likely to receive palliative care than DNR patients at low-DNR-rate hospitals. Patients without DNR orders experienced similar rates of invasive interventions regardless of hospital DNR rates.

CONCLUSIONS: Hospitals vary widely in the scope of invasive or organ-supporting treatments provided to patients with DNR orders.

2. BJOG. 2017 Jan 21. doi: 10.1111/1471-0528.14569. [Epub ahead of print]

Tipping our CAPS for the UKOSS Cardiac Arrest in Pregnancy Study.

Mhyre JM1, Bateman BT2.

Abstract

Cardiac arrest in pregnancy is a devastating complication, but one which is difficult to study because of its low prevalence. Large healthcare utilization databases provide ample statistical power to analyze this rare outcome, but lack clinical detail, and cannot provide information about key questions, such as the timing of arrest relative to delivery, the cause of the arrest as determined by clinicians, and the impact of the location of arrest and time to perimortem cesarean delivery on survival. The UKOSS Cardiac Arrest in Pregnancy Study (CAPS), published in this month's issue of the journal, addresses all of these questions and more.

3. J Emerg Med. 2017 Jan 17. pii: S0736-4679(16)31115-5. doi:

10.1016/j.jemermed.2016.11.060. [Epub ahead of print]

Acute Respiratory Compromise in the Emergency Department: A Description and Analysis of 3571 Events from the Get With the Guidelines-Resuscitation® Registry.

Karlsson CM1, Donnino MW2, Kirkegaard H3, Cocchi MN4, Chase M5, Andersen LW6; American Heart Association's Get With the Guidelines-Resuscitation® Investigators.

Abstract

BACKGROUND: Respiratory events requiring the use of assisted ventilation are relatively common in the emergency department (ED), and can be associated with substantial morbidity and mortality.

OBJECTIVE: The aim of this study was to describe and elucidate patient and event characteristics associated with mortality and progression to cardiac arrest in ED patients with acute respiratory compromise.

METHODS: Data were obtained from the multicenter Get With the Guidelines-Resuscitation® registry. We included patients with acute respiratory compromise defined as absent, agonal, or inadequate respiration that required emergency assisted ventilation. All adult patients between January 2005 and December 2014 with an index event in the ED were included. We used multivariable logistic regression models to assess the association between patient and event characteristics and in-hospital mortality, with cardiac arrest during the event as a secondary outcome.

RESULTS: A total of 3571 events were included. The in-hospital mortality was 34%. Twelve percent of events progressed to cardiac arrest, with a subsequent 82% in-hospital mortality. When adjusting for patient and event characteristics, we found no temporal changes in in-hospital mortality from 2005 to 2014. Several characteristics were associated with increased mortality, such as pre-event hypotension, septicemia, and acute stroke. Similarly, multiple characteristics, including pre-event hypotension, were associated with progression to cardiac arrest.

CONCLUSIONS: Patient with acute respiratory compromise in the ED had an in-hospital mortality of 34% in the current study. These patients also have a high risk of progressing to cardiac arrest, with a subsequent increase in in-hospital mortality to 82%. Potentially reversible characteristics, such as hypotension before the event, showed a strong association to in-hospital mortality, along with multiple other patient and event characteristics.

4. Resuscitation. 2017 Jan 16. pii: S0300-9572(17)30009-6. doi: 10.1016/j.resuscitation.2016.12.026. [Epub ahead of print]

Long-term Clinical Outcomes and Predictors for Survivors of Out-of-Hospital Cardiac Arrest.

Shuvy M1, Morrison LJ2, Koh M3, Qiu F3, Buick JE4, Dorian P5, Scales DC6, Tu JV7, Verbeek PR8, Wijeyesundera HC7, Ko DT7.

Abstract

AIMS: Improvement in resuscitation efforts has translated to an increasing number of survivors after out-of-hospital cardiac arrest (OHCA). Our objectives were to assess the long-term outcomes and predictors of mortality for patients who survived OHCA.

METHODS: We conducted a population-based cohort study linking the Toronto RescuNET cardiac arrest database with administrative databases in Ontario, Canada. We included patients with non-traumatic OHCA from December 1, 2005 to December 31, 2014. The primary outcomes were mortality at 1 year and 3 years. Cox proportional hazard models were constructed to evaluate the predictors of mortality.

RESULTS: Among the 28,611 OHCA patients who received treatment at the scene of arrest, 1,591 patients survived to hospital discharge. During hospitalization, 36% received coronary revascularizations and 27% received an implantable cardioverter defibrillator. At one year after discharge, 12.6% of patients had died and 37.3% were readmitted. At 3 years, mortality rate was 20% and all-cause readmission rate was 54.2%. Older age and a history of cancer were associated with higher risk of 3-year mortality. Shockable rhythm at presentation (hazard ratio [HR] 0.62, 95% CI 0.45 to 0.85), use of coronary revascularization (HR 0.37, 95% CI 0.28 to 0.51) or implantable cardioverter defibrillator (HR 0.28, 95% CI 0.20 to 0.41) was associated with

substantially lower 3-year mortality. Prior cardiac conditions and other arrest characteristics were not associated with long-term mortality.

CONCLUSIONS: Survivors of OHCA face significant morbidity and mortality after hospital discharge. Clinical trials are needed to evaluate the potential benefits of invasive cardiac procedures in OHCA survivors.

5. Resuscitation. 2017 Jan 16. pii: S0300-9572(17)30010-2. doi: 10.1016/j.resuscitation.2016.12.027. [Epub ahead of print]

Survival, Expenditure and Disposition in Patients Following Out-of-Hospital Cardiac Arrest: 1995-2013.

Eid SM1, Abougergi MS2, Albaeni A3, Chandra-Strobos N3.

Abstract

AIMS: To investigate trends in survival to hospital discharge, in-hospital expenditures, and post-acute-care disposition following out-of-hospital cardiac arrest (OHCA) in the United States.

METHODS: We performed this nationwide serial cross-sectional study using data from the National Inpatient Sample on all patients (age >18years) hospitalized with OHCA between January 1, 1995, and December 31, 2013. Our main outcome measure was survival to hospital discharge. We fitted multivariable regression models with survival, in-hospital expenditures, and post-acute-care disposition as our dependent variables.

RESULTS: Of 247,684 patients included in this study, 58.8% were men; mean age was 67 years. Overall trend of survival to discharge was unchanged (Ptrend=0.56) but a non-significant linear trend increase (49.9% [95% CI, 39.8%-60.0%] in 1995 to 54.0% [95% CI 46.3%-61.8%] in 2013) was noted. Survival improved for patients with VF arrest rhythm but not for those with non-VF arrest rhythm. Increasing age, female gender, non-Caucasian race, high comorbidity burden, non-private primary insurance, non-VF-arrest rhythm and weekend arrest were all negatively associated with neurologically-intact survival. The cost of hospitalization increased from \$18,287 (\$683) in 2001 to \$21,092 (\$514) in 2013 at an average annual rate of \$261 (Ptrend<0.001). No change in post-acute discharge disposition was observed except for transfer to a short-term hospital (Ptrend<0.01).

CONCLUSIONS: Overall survival to discharge following out-of-hospital cardiac arrest remained static between 1995 and 2013. Renewed national efforts are needed to warrant better knowledge translation and wider implementation of the best available science in order to improve outcomes.

6. Ann Am Thorac Soc. 2017 Jan 18. doi: 10.1513/AnnalsATS.201610-798OC. [Epub ahead of print]

Association between Do Not Resuscitate/Do Not Intubate Status and Resident Physician Decision-making: A National Survey.

Stevenson EK1, Mehter HM2, Walkey AJ3, Wiener RS 4,5.

Abstract

RATIONALE: Compared to their Full Code counterparts, patients with Do Not Resuscitate/Do Not Intubate (DNR/DNI) status receive fewer interventions and have higher mortality than predicted by clinical characteristics.

OBJECTIVES: To assess whether internal medicine residents, the front-line providers for many hospitalized patients, would manage hypothetical patients differently based on code status. We hypothesized respondents would be less likely to provide a variety of interventions to DNR/DNI patients than Full Code patients.

METHODS: Cross-sectional, randomized survey of United States internal medicine residents. We created two versions of an internet survey, each containing four clinical vignettes followed by questions regarding possible interventions; versions were identical except for varying code

status of the vignettes. Residency programs were randomly allocated between the two versions.

MEASUREMENTS AND MAIN RESULTS: 533 residents responded to the survey. As determined by Chi-squared and Fisher's exact test, decisions to intubate or perform cardiopulmonary resuscitation were largely dictated by patient code status (>94% if Full Code, <5% if DNR/DNI, $p < 0.0001$ for all scenarios). Resident proclivity to deliver noninvasive interventions (e.g., blood cultures, medications, imaging) was uniformly high (>90%) and unaffected by code status. However, decisions to pursue other aggressive or invasive options (e.g., dialysis, bronchoscopy, surgical consultation, transfer to intensive care unit) differed significantly based on code status in most vignettes.

CONCLUSIONS: Residents appear to assume that patients who would refuse cardiopulmonary resuscitation would prefer not to receive other interventions. Without explicit clarification of the patient's goals of care, potentially beneficial care may be withheld against the patient's wishes.

7. J Nurs Scholarsh. 2017 Jan 19. doi: 10.1111/jnu.12273. [Epub ahead of print]

Family Presence During Resuscitation: A Double-Edged Sword.

Hassankhani H1, Zamanzadeh V2, Rahmani A3, Haririan H4, Porter JE5.

Abstract

PURPOSE: To illuminate the meaning of the lived experiences of resuscitation team members with the presence of the patient's family during resuscitation in the cultural context of Iran.

DESIGN: An interpretative phenomenology was used to discover the lived experiences of the nurses and physicians of Tabriz hospitals, Iran, with family presence during resuscitation (FPDR). A total of 12 nurses and 9 physicians were interviewed over a 6-month period.

METHODS: The interviews were audio recorded and semistructured, and were transcribed verbatim. Van Manen's technique was used for data analysis.

FINDINGS: Two major themes and 10 subthemes emerged, including destructive presence (cessation of resuscitation, interference in resuscitation, disruption to the resuscitation team's focus, argument with the resuscitation team, and adverse mental image in the family) and supportive presence (trust in the resuscitation team, collaboration with the resuscitation team, alleviating the family's concern and settling their nerves, increasing the family's satisfaction, and reducing conflict with resuscitation team members).

CONCLUSIONS: Participants stated that FPDR may work as a double-edged sword for the family and resuscitation team, hurting or preserving quality. It is thus recommended that guidelines be created to protect patients' and families' rights, while considering the positive aspects of the phenomenon for hospitals.

CLINICAL RELEVANCE: A liaison support person would act to decrease family anxiety levels and would be able to de-escalate any potentially aggressive or confrontational events during resuscitation. Well-trained and expert cardiopulmonary resuscitation team members do not have any stress in the presence of family during resuscitation. Resuscitation events tend to be prolonged when family members are allowed to be present.

8. Emerg Med Australas. 2017 Jan 16. doi: 10.1111/1742-6723.12715. [Epub ahead of print]

Paramedic resuscitation competency: A survey of Australian and New Zealand emergency medical services.

Dyson K1,2, Bray JE1,3,4, Smith K1,5,6, Bernard S1,7,8, Straney L1, Finn J1,4,6.

Abstract

OBJECTIVE: We have previously established that paramedic exposure to out-of-hospital cardiac arrest (OHCA) is relatively rare, therefore clinical exposure cannot be relied on to maintain resuscitation competency. We aimed to identify the current practices within emergency medical services (EMS) for developing and maintaining paramedic resuscitation competency.

METHODS: We developed and conducted an online cross-sectional survey of Australian and New Zealand EMS in 2015. The survey was piloted by one EMS and targeted at education managers.

RESULTS: A total of nine of the 10 EMS responded to the survey. All EMS reported that they provide resuscitation training to paramedics at the commencement of their employment (median 16 h, interquartile range [IQR]: 7-80). With the exception of one EMS that did not provide any refresher training, a median of 4 h (IQR: 1-7) resuscitation training was provided to paramedics annually. All EMS used cardiac arrest simulations and skill stations to train paramedics. Paramedic exposure to OHCA was not taken into account to determine their training needs. Resuscitation competency was tested by EMS: annually (3/9), biennially (4/9) or not at all (2/9). Two EMS used CPR-feedback devices in clinical practice and only one EMS regularly performed formal debriefing after OHCA cases. Barriers to resuscitation competency included: difficulty removing paramedics from clinical duties for training and a lack of paramedic exposure to OHCA.

CONCLUSION: All of the surveyed EMS provided initial resuscitation training to paramedics, but competency testing and refresher training practices varied between services. A lack of individual exposure to cardiac arrest and training time were identified as barriers to resuscitation competency.

FÀRMACS

1. Sci Rep. 2017 Jan 18;7:40875. doi: 10.1038/srep40875.

Dantrolene versus amiodarone for cardiopulmonary resuscitation: a randomized, double-blinded experimental study.

Abstract

Dantrolene was introduced for treatment of malignant hyperthermia. It also has antiarrhythmic properties and may thus be an alternative to amiodarone for the treatment of ventricular fibrillation (VF). Aim of this study was to compare the return of spontaneous circulation (ROSC) with dantrolene and amiodarone in a pig model of cardiac arrest. VF was induced in anesthetized pigs. After 8 min of untreated VF, chest compressions and ventilation were started and one of the drugs (amiodarone 5 mg kg⁻¹, dantrolene 2.5 mg kg⁻¹ or saline) was applied. After 4 min of initial CPR, defibrillation was attempted. ROSC rates, hemodynamics and cerebral perfusion measurements were measured. Initial ROSC rates were 7 of 14 animals in the dantrolene group vs. 5 of 14 for amiodarone, and 3 of 10 for saline). ROSC persisted for the 120 min follow-up in 6 animals in the dantrolene group, 4 after amiodarone and 2 in the saline group (n.s.). Hemodynamics were comparable in both dantrolene group amiodarone group after obtaining ROSC. Dantrolene and amiodarone had similar outcomes in our model of prolonged cardiac arrest, However, hemodynamic stability was not significantly improved using dantrolene. Dantrolene might be an alternative drug for resuscitation and should be further investigated.

ECMO

1. Prehosp Emerg Care. 2017 Jan 19:1-4. doi: 10.1080/10903127.2016.1263372. [Epub ahead of print]

Extracorporeal Cardiopulmonary Resuscitation (ECPR) in the Prehospital Setting: An Illustrative Case of ECPR Performed in the Louvre Museum.

Lamhaut L, Hutin A, Deutsch J, Raphalen JH, Jouffroy R, Orsini JP, Baud F, Carli P.

Abstract

INTRODUCTION: Extracorporeal Cardiopulmonary Resuscitation (ECPR) is now considered for the treatment of refractory cardiac arrest.

CASE REPORT: In an urban city like Paris, extraction times of in-hospital ECPR can be long for patients presenting with refractory cardiac arrest. Using the medicalized prehospital system, we developed a possible early prehospital ECPR implementation. This case report is an example of ECPR prehospital implementation in the Louvre Museum.

CONCLUSION: Patients eligible for ECPR must be selected according to strict criteria. Further research is necessary to compare prehospital and in-hospital implementation.

POST PCR

1. PLoS One. 2017 Jan 18;12(1):e0168894. doi: 10.1371/journal.pone.0168894. eCollection 2017.

Single versus Serial Measurements of Neuron-Specific Enolase and Prediction of Poor Neurological Outcome in Persistently Unconscious Patients after Out-Of-Hospital Cardiac Arrest - A TTM-Trial Substudy.

Wiberg S1, Hassager C1, Stammet P2, Winther-Jensen M1, Thomsen JH1, Erlinge D3, Wanscher M1, Nielsen N4, Pellis T5, Åneman A6, Friberg H7, Hovdenes J8, Horn J9, Wetterslev J10, Bro-Jeppesen J1, Wise MP11, Kuiper M12, Cronberg T13, Gasche Y14, Devaux Y15, Kjaergaard J1.

Abstract

BACKGROUND: Prediction of neurological outcome is a crucial part of post cardiac arrest care and prediction in patients remaining unconscious and/or sedated after rewarming from targeted temperature management (TTM) remains difficult. Current guidelines suggest the use of serial measurements of the biomarker neuron-specific enolase (NSE) in combination with other predictors of outcome in patients admitted after out-of-hospital cardiac arrest (OHCA). This study sought to investigate the ability of NSE to predict poor outcome in patients remaining unconscious at day three after OHCA. In addition, this study sought to investigate if serial NSE measurements add incremental prognostic information compared to a single NSE measurement at 48 hours in this population.

METHODS: This study is a post-hoc sub-study of the TTM trial, randomizing OHCA patients to a course of TTM at either 33°C or 36°C. Patients were included from sites participating in the TTM-trial biobank sub study. NSE was measured at 24, 48 and 72 hours after ROSC and follow-up was concluded after 180 days. The primary end point was poor neurological function or death defined by a cerebral performance category score (CPC-score) of 3 to 5.

RESULTS: A total of 685 (73%) patients participated in the study. At day three after OHCA 63 (9%) patients had died and 473 (69%) patients were not awake. In these patients, a single NSE measurement at 48 hours predicted poor outcome with an area under the receiver operating characteristics curve (AUC) of 0.83. A combination of all three NSE measurements yielded the highest discovered AUC (0.88, $p = .0002$). Easily applicable combinations of serial NSE measurements did not significantly improve prediction over a single measurement at 48 hours (AUC 0.58-0.84 versus 0.83).

CONCLUSION: NSE is a strong predictor of poor outcome after OHCA in persistently unconscious patients undergoing TTM, and NSE is a promising surrogate marker of outcome in clinical trials. While combinations of serial NSE measurements may provide an increase in overall prognostic information, it is unclear whether actual clinical prognostication with low false-positive rates is improved by application of serial measurements in persistently unconscious patients. The findings of this study should be confirmed in another prospective cohort.

TRIAL REGISTRATION: NCT01020916.

TARGET TEMPERATURE MANAGEMENT

1. BMJ Case Rep. 2017 Jan 20;2017. pii: bcr2016012806. doi: 10.1136/bcr-2016-012806.

Novel approach for independent control of brain hypothermia and systemic normothermia: cerebral selective deep hypothermia for refractory cardiac arrest.

Wang CH1, Lin YT1, Chou HW1, Wang YC 1, Hwang JJ1, Gilbert JR2, Chen YS1.

Abstract

A 38-year-old man was found unconscious, alone in the driver's seat of his car. The emergency medical team identified his condition as pulseless ventricular tachycardia. Defibrillation was attempted but failed. Extracorporeal membrane oxygenation (ECMO) was started in the emergency room 52 min after the estimated arrest following the extracorporeal cardiopulmonary resuscitation (ECPR) protocol in our center. The initial prognosis under the standard protocol was <25% chance of survival. A novel adjunctive to our ECPR protocol, cerebral selective deep (<30°C) hypothermia (CSDH), was applied. CSDH adds a second independent femoral access extracorporeal circuit, perfusing cold blood into the patient's common carotid artery. The ECMO and CSDH circuits demonstrated independent control of cerebral and core temperatures. Nasal temperature was lowered to below 30°C for 12 hours while core was maintained at normothermia. The patient was discharged without significant neurological deficit 32 days after the initial arrest.

PEDIATRIA

1. Anaesthesist. 2017 Jan 13. doi: 10.1007/s00101-016-0256-2. [Epub ahead of print]

[Recommendation on temperature management after cardiopulmonary arrest and severe traumatic brain injury in childhood beyond the neonatal period : Statement of the German Society for Neonatology and Pediatric Intensive Care Medicine (GNPI) and the scientific Working Group for Paediatric Anaesthesia (WAKKA) of the German Society of Anaesthesiology and Intensive Care (DGAI)].

[Article in German]

Abstract

The available data on the effectiveness of therapeutic hypothermia in different patient groups are heterogeneous. Although the benefits have been proven for some collectives, recommendations for the use of hypothermia treatment in other groups are based on less robust data and conclusions by analogy. This article gives a review of the current evidence of temperature management in all age groups and based on this state of knowledge, recommends active temperature management with the primary aim of strict normothermia (36-36.5 °C) for 72 hours after cardiopulmonary arrest or severe traumatic brain injury for children beyond the neonatal period.

FV I ELECTROFISIOLOGIA

1. Resuscitation. 2017 Jan 16. pii: S0300-9572(17)30008-4. doi:

10.1016/j.resuscitation.2016.12.025. [Epub ahead of print]

Novel CPR System That Predicts Return of Spontaneous Circulation from Amplitude Spectral Area Before Electric Shock in Ventricular Fibrillation.

Nakagawa Y1, Amino M2, Inokuchi S2, Hayashi S3, Wakabayashi T3, Noda T4.

Abstract

AIM: Amplitude spectral area (AMSA), an index for analysing ventricular fibrillation (VF) waveforms, is thought to predict the return of spontaneous circulation (ROSC) after electric shocks, but its validity is unconfirmed. We developed an equation to predict ROSC, where the change in AMSA (Δ AMSA) is added to AMSA measured immediately before the first shock (AMSA1). We examine the validity of this equation by comparing it with the conventional AMSA1-only equation.

METHOD: We retrospectively investigated 285 VF patients given prehospital electric shocks by emergency medical services. Δ AMSA was calculated by subtracting AMSA1 from last AMSA

immediately before the last prehospital electric shock. Multivariate logistic regression analysis was performed using post-shock ROSC as a dependent variable.

RESULTS: Analysis data were subjected to receiver operating characteristic curve analysis, goodness-of-fit testing using a likelihood ratio test, and the bootstrap method. AMSA1 (odds ratio (OR) 1.151, 95% confidence interval (CI) 1.086-1.220) and Δ AMSA (OR 1.289, 95% CI 1.156-1.438) were independent factors influencing ROSC induction by electric shock. Area under the curve (AUC) for predicting ROSC was 0.851 for AMSA1-only and 0.891 for AMSA1+ Δ AMSA. Compared with the AMSA1-only equation, the AMSA1+ Δ AMSA equation had significantly better goodness-of-fit (likelihood ratio test $P < .001$) and showed good fit in the bootstrap method.

CONCLUSIONS: Post-shock ROSC was accurately predicted by adding Δ AMSA to AMSA1. AMSA-based ROSC prediction enables application of electric shock to only those patients with high probability of ROSC, instead of interrupting chest compressions and delivering unnecessary shocks to patients with low probability of ROSC.

2. BMC Emerg Med. 2017 Jan 19;17(1):3. doi: 10.1186/s12873-017-0114-9.

A qualitative study to identify barriers to deployment and student training in the use of automated external defibrillators in schools.

Zinckernagel L1,2, Hansen CM3,4, Rod MH5, Folke F3,6, Torp-Pedersen C7, Tjørnhøj-Thomsen T5.

Abstract

BACKGROUND: Student training in use of automated external defibrillators and deployment of such defibrillators in schools is recommended to increase survival after out-of-hospital cardiac arrest. Low implementation rates have been observed, and even at schools with a defibrillator, challenges such as delayed access have been reported. The purpose of this study was to identify barriers to the implementation of defibrillator training of students and deployment of defibrillators in schools.

METHODS: A qualitative study based on semi-structured individual interviews and focus groups with a total of 25 participants, nine school leaders, and 16 teachers at eight different secondary schools in Denmark (2012-2013). Thematic analysis was used to identify regular patterns of meaning using the technology acceptance model and focusing on the concepts of perceived usefulness and perceived ease of use.

RESULTS: School leaders and teachers are concerned that automated external defibrillators are potentially dangerous, overly technical, and difficult to use, which was related to their limited familiarity with them. They were ambiguous about whether or not students are the right target group or which grade is suitable for defibrillator training. They were also ambiguous about deployment of defibrillators at schools. Those only accounting for the risk of students, considering their schools to be small, and that time for professional help was limited, found the relevance to be low. Due to safety concerns, some recommended that defibrillators at schools should be inaccessible to students. They lacked knowledge about how they work and are operated, and about the defibrillators already placed at their campuses (e.g., how to access them). Prior training and even a little knowledge about defibrillators were crucial to their perception of student training but not for their considerations on the relevance of their placement at schools.

CONCLUSIONS: It is crucial for implementation of automated external defibrillators in schools to inform staff about how they work and are operated and that students are an appropriate target group for defibrillator training. Furthermore, it is important to provide schools with a basis for decision making about when to install defibrillators, and to ensure that school staff and students are informed about their placement.

CASE REPORTS

1. Int J Surg Case Rep. 2017 Jan 3;31:24-26. doi: 10.1016/j.ijscr.2016.12.025. [Epub ahead of print]

Pulmonary emboli cardiac arrest with CPR complication: Liver laceration and massive abdominal bleed, a case report.

Lundqvist J1, Jakobsson JG2.

Abstract

INTRODUCTION: Massive pulmonary emboli may cause right ventricular failure and backward stasis with parenchymal organ swelling thus increasing the risk for laceration, e.g. if CPR is needed.

PRESENTATION OF CASE: A 28-year-old Colombian female with no medical history but taking contraceptive pills and having had a recent longer flight was admitted to Danderyds hospital Emergency Department because of respiratory failure. She developed cardiac arrest in the emergence department following the emergent diagnosis of pulmonary emboli. Cardio-pulmonary resuscitation was initiated, initially with manual and subsequent mechanical compressions with a so called LUCAS device. Patients did not respond properly to the CPR and showed signs of hypovolemia. Emergent ultrasound raised suspicion of abdominal bleed. Emergent laparotomy confirmed liver laceration and massive haemorrhage.

CONCLUSION: Pulmonary emboli with subsequent right ventricular failure may cause backwards stasis, and parenchymal organ e.g. liver enlargement. The risk for laceration injuries and internal bleed must be acknowledged when applying external forces as in case of cardiac arrest and need for resuscitation. Frequent and vigilant control of positioning of manual as well as mechanical compressions is of importance.

2. Catheter Cardiovasc Interv. 2017 Jan 19. doi: 10.1002/ccd.26872. [Epub ahead of print]

The use of hemodynamic support in massive pulmonary embolism.

Kumar Bhatia N1, Dickert NW1, Samady H1, Babaliaros V1.

Abstract

Massive pulmonary embolism is life threatening and can present as cardiogenic shock and cardiac arrest. We report a case of a 47-year-old male who arrested during his postoperative hospitalization and was found to have a massive pulmonary embolism with bilateral involvement of the pulmonary arteries. Given his profound shock and right ventricular failure, an Impella RP was used to stabilize his acute right ventricular failure while percutaneous embolectomy and thrombolysis was used to treat the pulmonary embolism. The patient underwent the procedure successfully with reduction in vasopressors and thrombus burden and recovery of right ventricular function.

RCP

1. Emerg Med J. 2017 Jan 27. pii: emermed-2016-205952. doi: 10.1136/emered-2016-205952. [Epub ahead of print]

Can surf-lifeguards perform a quality cardiopulmonary resuscitation sailing on a lifeboat? A quasi-experimental study.

Barcala-Furelos R1,2, Abelairas-Gomez C3,4, Palacios-Aguilar J5, Rey E1, Costas-Veiga J4, Lopez-Garcia S6, Rodriguez-Nunez A2,7.

Abstract

PURPOSE: Drowning is a high-priority public health problem around the world. The European Resuscitation Council Guidelines for Resuscitation 2015 put special emphasis on special environments like open waters. Stopping the drowning process as soon as possible and starting an early cardiopulmonary resuscitation (CPR) improve survival. Inflatable rescue boats

(IRBs) are used around the world in the water rescue of drowning victims. Our objective was to test the quality of CPR performed by surf-lifeguards while sailing on an IRB.

METHODS: A quasi-experimental simulation trial was conducted in Tenerife (Canary Islands-Spain) on September 2015. Ten surf-lifeguards were asked to perform a 2 min CPR on manikins in four different scenarios: (1) onshore, (2) on adrift boat, (3) on a boat sailing at 5 knots and (4) on a boat sailing at 10 knots. CPR was performed individually and was measured by means of CPRmeter (Laerdal, Norway) located on the standard manikin. Repeated measures analysis of variance was used in order to analyse the differences between scenarios.

RESULTS: The composite of all CPR variables was over 84% in all conditions, but it was lower when CPR was performed on board: onshore ($96.49\pm 3.58\%$) versus adrift (91.80 ± 3.56 , $p=0.04$), sailing at 5 knots (88.65 ± 5.54 , $p=0.03$) and sailing at 10 knots (84.74 ± 5.56 , $p=0.001$).

CONCLUSION: Surf-lifeguards are able to deliver good-quality CPR even on a moving IRB, but their performance is lower than onshore. This fact should be considered in real cases to balance the risk and benefits of CPR on board.

2. Resuscitation. 2017 Jan 18. pii: S0300-9572(17)30016-3. doi: 10.1016/j.resuscitation.2017.01.005. [Epub ahead of print]

Impact of cardiopulmonary resuscitation duration on neurologically favourable outcome after out-of-hospital cardiac arrest: A population-based study in Japan.

Matsuyama T1, Kitamura T2, Kiyohara K3, Nishiyama C4, Nishiuchi T5, Hayashi Y6, Kawamura T7, Ohta B1, Iwami T7.

Abstract

BACKGROUND: The optimal cardiopulmonary resuscitation (CPR) duration for patients with out-of-hospital cardiac arrest (OHCA) remains unclear. We aimed to assess the association between CPR duration and outcome after OHCA.

METHODS: This prospective, population-based observational study conducted in Osaka, Japan enrolled 6981 adult patients with non-traumatic witnessed OHCA who achieved return of spontaneous circulation (ROSC) from January 2005 through December 2012. CPR duration was defined as the time of CPR initiation by emergency medical service personnel to the ROSC in pre-hospital settings or after hospital admission. The primary outcome was one-month survival with neurologically favourable outcome (cerebral performance category scale 1 or 2).

RESULTS: Overall, median CPR duration was 25min (interquartile range: 15-34) and the proportion of neurologically favourable outcome was 12.5% (875/6,981). The proportion of neurologically favourable outcome among the CPR duration ≥ 31 min group was significantly lower compared with that among the 0-5min group (55.1% [320/581] versus 2.2% [54/2424], adjusted odds ratio [AOR] 0.04; 95% confidence interval [CI] 0.03-.05 in all patients, 78.4% [240/306] versus 11.4% [30/264], AOR 0.04; 95% CI 0.02-0.06 in the shockable group, 29.1% [80/275] versus 1.1% [24/2160], and AOR 0.03; 95% CI 0.02-0.05 in the non-shockable group). The cumulative proportion for neurologically favourable outcome reached 99% after 44, 41, and 43min of CPR in all patients, the shockable group, and the non-shockable group, respectively.

CONCLUSION: The proportion of patients with neurologically favourable outcome declined with increasing CPR duration, but some OHCA patients could benefit from prolonged CPR duration >30 min.

3. Front Physiol. 2017 Jan 9;7:665. doi: 10.3389/fphys.2016.00665. eCollection 2016.

Not Bad: Passive Leg Raising in Cardiopulmonary Resuscitation-A New Modeling Study.

Zhang Y1, Jiménez-Herrera M2, Axelsson C3, Cheng Y1.

Abstract

Aim: To evaluate, using a simulated haemodynamic circulation model, whether passive leg raising (PLR) is able to improve the effect during cardiopulmonary resuscitation (CPR); to expose the possible reasons why PLR works or not. **Materials and Methods:** We adapted a

circulatory model for CPR with PLR. First we compared cardiac output (CO), coronary perfusion pressure (CPP), blood flow to heart (Qheart), and blood flow to neck and brain (Qhead) of standard chest compression-only CPR with and without PLR; second we simulated the effects of PLR in different situations, by varying the thoracic pump factor (TPF) from 0 to 1; third we simulated the effects when the legs are lifted to the different heights. Finally, we compared our results with those obtained from a published clinical study. Results: According to the simulation model, (1) When TPF is in the interval (0,1), CPP, CO, Qheart, and Qhead are improved with PLR, among them with half-thoracic/half-cardiac pump effect (TPF is 0.5), CPP, CO, Qhead, and Qheart increase the most (by 14, 14, 15, and 17%). (2) When TPF is 1 (pure thoracic pump, with an emphysema or extremely thick thorax), PLR has almost no effect on CPP, CO, and Qheart (-1, 2, and 0%), whereas Q head is increased by 9%; (3) Regardless of whether there is a cardiac or thoracic pump effect, PLR is able to increase Qhead by 9-15%. (4) When the legs are lifted to 30° to the ground, the volume transferred from legs to upper body is 36% of the initial volume in legs; when the legs are lifted to 45°, the volume transferred is 43%; when the legs are lifted to 60°, the volume transferred is 47%; when the legs are lifted to 90°, the volume transferred is 50%. Conclusion: Generally PLR is able to achieve improved cerebral perfusion and coronary perfusion. In some extreme situations, it has no effect on cardiac output and coronary perfusion, but still improves cerebral perfusion. PLR could be a beneficial supplement to CPR, and it is not necessary to lift the legs too high above the ground.

REGISTRES I REVISIONS

1. Ann Thorac Surg. 2017 Jan 19. pii: S0003-4975(16)31482-5. doi: 10.1016/j.athoracsur.2016.10.033. [Epub ahead of print]

The Society of Thoracic Surgeons Expert Consensus for the Resuscitation of Patients Who Arrest After Cardiac Surgery.

Society of Thoracic Surgeons Task Force on Resuscitation After Cardiac Surgery.

Collaborators: (18)

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Abstract

EXECUTIVE SUMMARY: The Society of Thoracic Surgeons Task Force on Resuscitation After Cardiac Surgery provides this professional society perspective on resuscitation in patients who arrest after cardiac surgery. This document was created using a multimodal methodology for evidence generation and includes information from existing guidelines, from the International Liaison Committee on Resuscitation, from our own structured literature reviews on issues particular to cardiac surgery, and from an international survey on resuscitation hosted by CTSNet. In gathering evidence for this consensus paper, searches were conducted using the MEDLINE keywords "cardiac surgery," "resuscitation," "guideline," "thoracic surgery," "cardiac arrest," and "cardiac massage." Weight was given to clinical studies in humans, although some case studies, mannequin simulations of potential protocols, and animal models were also considered. Consensus was reached using a modified Delphi method consisting of two rounds of voting until 75% agreement on appropriate wording and strength of the opinions was reached. The Society of Thoracic Surgeons Workforce on Critical Care was enlisted in this process to provide a wider variety of experiences and backgrounds in an effort to reinforce the opinions provided. We start with the premise that external massage is ineffective for an arrest due to tamponade or hypovolemia (bleeding), and therefore these subsets of patients will receive inadequate cerebral perfusion during cardiac arrest in the absence of re sternotomy. Because these two situations are common causes for an arrest after cardiac surgery, the inability to provide effective external cardiopulmonary resuscitation highlights the importance of early emergency re sternotomy within 5 minutes. In addition, because internal massage is

more effective than external massage, it should be used preferentially if other quickly reversible causes are not found. We present a protocol for the cardiac arrest situation that includes the following recommendations: (1) successful treatment of a patient who arrests after cardiac surgery is a multidisciplinary activity with at least six key roles that should be allocated and rehearsed as a team on a regular basis; (2) patients who arrest with ventricular fibrillation should immediately receive three sequential attempts at defibrillation before external cardiac massage, and if this fails, emergency resternotomy should be performed; (3) patients with asystole or extreme bradycardia should undergo an attempt to pace if wires are available before external cardiac massage, then optionally external pacing followed by emergency resternotomy; and (4) pulseless electrical activity should receive prompt resternotomy after quickly reversible causes are excluded. Finally, we recommend that full doses of epinephrine should not be routinely given owing to the danger of extreme hypertension if a reversible cause is rapidly resolved. Protocols are given for excluding reversible airway and breathing complications, for left ventricular assist device emergencies, for the nonsternotomy patient, and for safe emergency resternotomy. We believe that all cardiac units should have accredited policies and protocols in place to specifically address the resuscitation of patients who arrest after cardiac surgery.

2. *Adv Med Educ Pract.* 2017 Jan 9;8:43-50. doi: 10.2147/AMEP.S114726. eCollection 2017.

Attitude and skill levels of graduate health professionals in performing cardiopulmonary resuscitation.

Gebreegiabher Gebremedhn E1, Berhe Gebregergs G2, Anderson BB3, Nagaratnam V1.

Abstract

BACKGROUND: Cardiopulmonary resuscitation (CPR) is an emergency procedure used to treat victims following cardiopulmonary arrest. Graduate health professionals at the University of Gondar Teaching Hospital manage many trauma and critically ill patients. The chance of survival after cardiopulmonary arrest may be increased with sufficient attitude and skill levels. The study aimed to assess the attitude and skill levels of graduate health professionals in performing CPR.

METHODS: A hospital-based cross-sectional study was conducted from May 1 to 30, 2013, at the University of Gondar Teaching Hospital. The mean attitude and skill scores were compared for sex, original residence, and department of the participants using Student's t-test and analysis of variance (Scheffe's test). P-values <0.05 were considered to be statistically significant.

RESULTS: Of the 506 graduates, 461 were included in this study with a response rate of 91.1%. The mean attitude scores of nurse, interns, health officer, midwifery, anesthesia, and psychiatric nursing graduates were 1.15 (standard deviation [SD] =1.67), 8.21 (SD =1.24), 7.2 (SD =1.49), 6.69 (SD =1.83), 8.19 (SD =1.77), and 7.29 (SD =2.01), respectively, and the mean skill scores were 2.34 (SD =1.95), 3.77 (SD =1.58), 1.18 (SD =1.52), 2.16 (SD =1.93), 3.88 (SD =1.36), and 1.21 (SD =1.77), respectively.

CONCLUSION AND RECOMMENDATIONS: Attitude and skill level of graduate health professionals with regard to CPR were insufficient. Training on CPR for graduate health professionals needs to be given emphasis.

3. *Sports Health.* 2017 Jan 1:1941738116686782. doi: 10.1177/1941738116686782. [Epub ahead of print]

Sports-Related Emergency Preparedness in Oregon High Schools.

Johnson ST1, Norcross MF1, Bovbjerg VE1, Hoffman MA1, Chang E1, Koester MC2.

Abstract

BACKGROUND: Best practice recommendations for sports-related emergency preparation include implementation of venue-specific emergency action plans (EAPs), access to early defibrillation, and first responders-specifically coaches-trained in cardiopulmonary

resuscitation and automated external defibrillator (AED) use. The objective was to determine whether high schools had implemented these 3 recommendations and whether schools with a certified athletic trainer (AT) were more likely to have done so.

HYPOTHESIS: Schools with an AT were more likely to have implemented the recommendations.

STUDY DESIGN: Cross-sectional study.

LEVEL OF EVIDENCE: Level 4.

METHODS: All Oregon School Activities Association member school athletic directors were invited to complete a survey on sports-related emergency preparedness and AT availability at their school. Chi-square and Fisher exact tests were used to analyze the associations between emergency preparedness and AT availability.

RESULTS: In total, 108 respondents (37% response rate) completed the survey. Exactly half reported having an AT available. Only 11% (95% CI, 6%-19%) of the schools had implemented all 3 recommendations, 29% (95% CI, 21%-39%) had implemented 2, 32% (95% CI, 24%-42%) had implemented 1, and 27% (95% CI, 19%-36%) had not implemented any of the recommendations. AT availability was associated with implementation of the recommendations ($\chi^2 = 10.3$, $P = 0.02$), and the proportion of schools with ATs increased with the number of recommendations implemented ($\chi^2 = 9.3$, $P < 0.01$). Schools with an AT were more likely to implement venue-specific EAPs (52% vs 24%, $P < 0.01$) and have an AED available for early defibrillation (69% vs 44%, $P = 0.02$) but not more likely to require coach training (33% vs 28%, $P = 0.68$).

CONCLUSIONS: Despite best practice recommendations, most schools were inadequately prepared for sports-related emergencies. Schools with an AT were more likely to implement some, but not all, of the recommendations. Policy changes may be needed to improve implementation.

CLINICAL RELEVANCE: Most Oregon high schools need to do more to prepare for sports-related emergencies. The results provide evidence for sports medicine professionals and administrators to inform policy changes that ensure the safety of athletes.

4. Am J Bioeth. 2017 Feb;17(2):26-34. doi: 10.1080/15265161.2016.1265163.

Irrational Exuberance: Cardiopulmonary Resuscitation as Fetish.

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Abstract

The Institute of Medicine and the American Heart Association have issued a "call to action" to expand the performance of cardiopulmonary resuscitation (CPR) in response to out-of-hospital cardiac arrest. Widespread advertising campaigns have been created to encourage more members of the lay public to undergo training in the technique of closed-chest compression-only CPR, based upon extolling the virtues of rapid initiation of resuscitation, untempered by information about the often distressing outcomes, and hailing the "improved" results when nonprofessional bystanders are involved. We describe this misrepresentation of CPR as a highly effective treatment as the fetishization of this valuable, but often inappropriately used, therapy. We propose that the medical profession has an ethical duty to inform the public through education campaigns about the procedure's limitations in the out-of-hospital setting and the narrow clinical indications for which it has been demonstrated to have a reasonable probability of producing favorable outcomes.

5. Resuscitation. 2017 Jan 18. pii: S0300-9572(17)30013-8. doi: 10.1016/j.resuscitation.2017.01.003. [Epub ahead of print]

Drones may be used to save lives in out of hospital cardiac arrest due to drowning.

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Abstract

BACKGROUND: Drowning leading to out-of-hospital cardiac arrest (OHCA) and death is a major public health concern. Submersion with duration of less than 10min is associated with favorable neurological outcome and nearby bystanders play a considerable role in rescue and resuscitation. Drones can provide a visual overview of an accident scene, their potential as lifesaving tools in drowning has not been evaluated.

AIM: The aim of this simulation study was to evaluate the efficiency of a drone for providing earlier location of a submerged possible drowning victim in comparison with standard procedure.

METHOD: This randomized simulation study used a submerged manikin placed in a shallow (<2m) 100×100-m area at Tylösand beach, Sweden. A search party of 14 surf-lifeguards (control) was compared to a drone transmitting video to a tablet (intervention). Time from start to contact with the manikin was the primary endpoint.

RESULTS: Twenty searches were performed in total, 10 for each group. The median time from start to contact with the manikin was 4:34min (IQR 2:56-7:48) for the search party (control) and 0:47min (IQR 0:38-0:58) for the drone-system (intervention) respectively ($p < 0.001$). The median time saved by using the drone was 3:38min (IQR 2:02-6:38).

CONCLUSION: A drone transmitting live video to a tablet is feasible, time saving in comparison to traditional search parties and may be used for providing earlier location of submerged victims at a beach. Drone search can possibly contribute to earlier onset of CPR in drowning victims.

VENTILACIÓ

1. Int J Emerg Med. 2017 Dec;10(1):1. doi: 10.1186/s12245-017-0129-8. Epub 2017 Jan 25.

The effectiveness of rapid sequence intubation (RSI) versus non-RSI in emergency department: an analysis of multicenter prospective observational study.

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Abstract

BACKGROUND: Although rapid sequence intubation (RSI) is the method of choice in emergency department (ED) airway management, data to support the use of RSI remain scarce. We sought to compare the effectiveness of airway management between RSI and non-RSI (intubation with sedative agents only or without medications) in the ED.

METHODS: Secondary analysis of the data from a multicenter prospective observational registry at 13 Japanese EDs. All non-cardiac-arrest patients who underwent intubation with RSI or non-RSI were included for the analysis. Outcomes of interest were the success rate of intubation and intubation-related complications.

RESULTS: Of 2365 eligible patients, 761 (32%) underwent intubations with RSI and 1,604 (68%) with non-RSI. Intubations with RSI had a higher success rate on the first attempt compared to those with non-RSI (73 vs. 63%; $P < 0.0001$). By contrast, the complication rates did not differ significantly between RSI and non-RSI groups (12 vs. 13%; $P = 0.59$). After adjusting for age, sex, estimated weight, principal indication, device, specialties and training level of the intubator, and clustering of patients within EDs, intubation with RSI was associated with a significantly higher success rate on the first attempt (OR, 2.3; 95% CI, 1.8-2.9; $P < 0.0001$) while that with RSI was not associated with the risk of complications (OR, 0.9; 95% CI, 0.6-1.2; $P = 0.31$).

CONCLUSIONS: In this large multicenter study of ED airway management, we found that intubation with RSI was independently associated with a higher success rate on the first attempt but not with the risk of complications.

2. JAMA. 2017 Jan 24. doi: 10.1001/jama.2016.20165. [Epub ahead of print]

Association Between Tracheal Intubation During Adult In-Hospital Cardiac Arrest and Survival.

Andersen LW1, Granfeldt A2, Callaway CW3, Bradley SM4, Soar J5, Nolan JP6, Kurth T7, Donnino MW8; American Heart Association's Get With The Guidelines—Resuscitation Investigators.

Abstract

Importance: Tracheal intubation is common during adult in-hospital cardiac arrest, but little is known about the association between tracheal intubation and survival in this setting.

Objective: To determine whether tracheal intubation during adult in-hospital cardiac arrest is associated with survival to hospital discharge.

Design, Setting, and Participants: Observational cohort study of adult patients who had an in-hospital cardiac arrest from January 2000 through December 2014 included in the Get With The Guidelines-Resuscitation registry, a US-based multicenter registry of in-hospital cardiac arrest. Patients who had an invasive airway in place at the time of cardiac arrest were excluded. Patients intubated at any given minute (from 0-15 minutes) were matched with patients at risk of being intubated within the same minute (ie, still receiving resuscitation) based on a time-dependent propensity score calculated from multiple patient, event, and hospital characteristics.

Exposure: Tracheal intubation during cardiac arrest.

Main Outcomes and Measures: The primary outcome was survival to hospital discharge.

Secondary outcomes included return of spontaneous circulation (ROSC) and a good functional outcome. A cerebral performance category score of 1 (mild or no neurological deficit) or 2 (moderate cerebral disability) was considered a good functional outcome.

Results: The propensity-matched cohort was selected from 108 079 adult patients at 668 hospitals. The median age was 69 years (interquartile range, 58-79 years), 45 073 patients (42%) were female, and 24 256 patients (22.4%) survived to hospital discharge. Of 71 615 patients (66.3%) who were intubated within the first 15 minutes, 43 314 (60.5%) were matched to a patient not intubated in the same minute. Survival was lower among patients who were intubated compared with those not intubated: 7052 of 43 314 (16.3%) vs 8407 of 43 314 (19.4%), respectively (risk ratio [RR] = 0.84; 95% CI, 0.81-0.87; $P < .001$). The proportion of patients with ROSC was lower among intubated patients than those not intubated: 25 022 of 43 311 (57.8%) vs 25 685 of 43 310 (59.3%), respectively (RR = 0.97; 95% CI, 0.96-0.99; $P < .001$). Good functional outcome was also lower among intubated patients than those not intubated: 4439 of 41 868 (10.6%) vs 5672 of 41 733 (13.6%), respectively (RR = 0.78; 95% CI, 0.75-0.81; $P < .001$). Although differences existed in prespecified subgroup analyses, intubation was not associated with improved outcomes in any subgroup.

Conclusions and Relevance: Among adult patients with in-hospital cardiac arrest, initiation of tracheal intubation within any given minute during the first 15 minutes of resuscitation, compared with no intubation during that minute, was associated with decreased survival to hospital discharge. Although the study design does not eliminate the potential for confounding by indication, these findings do not support early tracheal intubation for adult in-hospital cardiac arrest.

ENTRENAMENT

1. Orv Hetil. 2017 Jan;158(4):147-152. doi: 10.1556/650.2017.30631.

[At what age can children perform effective cardiopulmonary resuscitation? - Effectiveness of cardiopulmonary resuscitation skills among primary school children in Hungary].

[Article in Hungarian]

Bánfai B1, Pandur A1, Pék E1, Csonka H2, Betlehem J3.

Abstract

INTRODUCTION: In cardiac arrest life can be saved by bystanders.

AIM: Our aim was to determine at what age can schoolchildren perform correct cardiopulmonary resuscitation.

METHOD: 164 schoolchildren (age 7-14) were involved in the study. A basic life support training consisted of 45 minutes education in small groups (8-10 children). They were tested during a 2-minute-long continuous cardiopulmonary resuscitation scenario using the "AMBU CPR Software".

RESULTS: Average depth of chest compression was 44.07 ± 12.6 mm. 43.9% of participants were able to do effective chest compressions. Average ventilation volume was 0.17 ± 0.31 liter. 12.8% of participants were able to ventilate effectively the patient. It was significant correlation between the chest compression depth ($p < 0.001$) and ventilation ($p < 0.001$) and the children's age, weight, height and BMI.

CONCLUSIONS: Primary school children are able to learn cardiopulmonary resuscitation. The ability to do effective chest compressions and ventilation depended on the children's physical capability.

2. World J Emerg Med. 2017;8(1):12-18. doi: 10.5847/wjem.j.1920-8642.2017.01.002.

The association of layperson characteristics with the quality of simulated cardiopulmonary resuscitation performance.

Leary M1, Buckler DG2, Ikeda DJ2, Saraiva DA1, Berg RA3, Nadkarni VM3, Blewer AL2, Abella BS2.

Abstract

BACKGROUND: Few studies have examined the association of layperson characteristics with cardiopulmonary resuscitation (CPR) provision. Previous studies suggested provider characteristics, including age and gender, were associated with CPR quality, particularly chest compression (CC) depth. We sought to determine the association of subject characteristics, including age and gender with layperson CPR quality during an unannounced simulated CPR event. We hypothesized shallower CC depth in females, and older-aged subjects.

METHODS: As part of a larger multicenter randomized controlled trial of CPR training for cardiac patients' caregivers, CPR skills were assessed 6 months after training. We analyzed associations between subject characteristics and CC rate, CC depth and no-flow time. Each variable was analyzed independently; significant predictors determined via univariate analysis were assessed in a multivariate regression model.

RESULTS: A total of 521 laypersons completed a 6-month CPR skills assessment and were included in the analysis. Mean age was 51.8 ± 13.7 years, 75% were female, 57% were Caucasian. Overall, mean CC rate was 88.5 ± 25.0 per minute, CC depth was 50.9 ± 2.0 mm, and mean no-flow time was 15.9 ± 2.7 sec/min. CC depth decreased significantly in subjects > 62 years ($P < 0.001$). Male subjects performed deeper CCs than female subjects (47.5 ± 1.7 vs. 41.9 ± 0.6 , $P < 0.001$).

CONCLUSION: We found that layperson age > 62 years and female gender are associated with shallower CC depth.

LESIONS PER RCP

1. Scand J Trauma Resusc Emerg Med. 2017 Jan 26;25(1):8. doi: 10.1186/s13049-017-0352-6.

Investigation of complications secondary to chest compressions before and after the 2010 cardiopulmonary resuscitation guideline changes by using multi-detector computed tomography: a retrospective study.

Beom JH1, You JS1, Kim MJ1, Seung MK2, Park YS3, Chung HS1, Chung SP1, Park I1.

Abstract

BACKGROUND: The purpose of this study was to identify the relationship between the deeper and faster chest compressions suggested by the 2010 cardiopulmonary resuscitation guidelines and complications arising from chest compressions, using multi-detector computed tomography.

METHODS: We performed a retrospective analysis of prospective registry data. This study was conducted with in- and out-of-hospital cardiac arrest patients who underwent successful resuscitation in the emergency departments of two academic tertiary care centres from October 2006 to September 2010 (pre-2010 group) and from October 2011 to September 2015 (post-2010 group). We examined chest injuries related to chest compressions, classified as follows: rib fracture, sternal fracture, and other uncommon complications.

RESULTS: We enrolled 185 patients in this study. The most frequent complication to occur in both groups was rib fracture: 27 (62.8%) and 112 (78.9%) patients in the pre-2010 and post-2010 groups, respectively ($p = 0.03$). However, we observed no statistical differences in sternum fracture, the second most common complication ($p = 0.80$). Retrosternal and mediastinal haematoma were not reported in the pre-2010 group but 13 patients (9.1%) in the post-2010 group were reported to have haematoma ($p = 0.04$). Nine serious, life-threatening complications occurred, all in the post-2010 group. Among the younger group (less than 65 years old), 8 (38.1%) patients in the pre-2010 group and 40 (64.5%) in the post-2010 group sustained rib fractures.

DISCUSSION: The deeper and faster chest compressions for enhancing ROSC are associated with increased occurrence of complications. Additional studies are needed to compensate for the limitations of our study design.

CONCLUSIONS: This study found that the 2010 guidelines, recommending deeper and faster chest compressions, led to an increased proportion of rib fractures and retrosternal and mediastinal haematoma.

ECMO

1. World J Emerg Med. 2017;8(1):5-11. doi: 10.5847/wjem.j.1920-8642.2017.01.001.

Comparison of extracorporeal and conventional cardiopulmonary resuscitation: A meta-analysis of 2 260 patients with cardiac arrest.

Wang GN¹, Chen XF¹, Qiao L¹, Mei Y¹, Lv JR¹, Huang XH¹, Shen B¹, Zhang JS¹.

Abstract

BACKGROUND: This meta-analysis aimed to determine whether extracorporeal cardiopulmonary resuscitation (ECPR), compared with conventional cardiopulmonary resuscitation (CCPR), improves outcomes in adult patients with cardiac arrest (CA).

DATA RESOURCES: PubMed, EMBASE, Web of Science, and China Biological Medicine Database were searched for relevant articles. The baseline information and outcome data (survival, good neurological outcome at discharge, at 3-6 months, and at 1 year after CA) were collected and extracted by two authors. Pooled risk ratios (RRs) and 95% confidence intervals (CIs) were calculated using Review Manager 5.3.

RESULTS: In six studies 2 260 patients were enrolled to study the survival rate to discharge and long-term neurological outcome published since 2000. A significant effect of ECPR was observed on survival rate to discharge compared to CCPR in CA patients (RR 2.37, 95%CI 1.63-3.45, $P < 0.001$), and patients who underwent ECPR had a better long-term neurological outcome than those who received CCPR (RR 2.79, 95%CI 1.96-3.97, $P < 0.001$). In subgroup analysis, there was a significant difference in survival to discharge favoring ECPR over CCPR group in OHCA patients (RR 2.69, 95%CI 1.48-4.91, $P = 0.001$). However, no significant difference was found in IHCA patients (RR 1.84, 95%CI 0.91-3.73, $P = 0.09$).

CONCLUSION: ECPR showed a beneficial effect on survival rate to discharge and long-term neurological outcome over CCPR in adult patients with CA.

2. PLoS One. 2017 Jan 23;12(1):e0170711. doi: 10.1371/journal.pone.0170711. eCollection 2017.

Association between Body Temperature Patterns and Neurological Outcomes after Extracorporeal Cardiopulmonary Resuscitation.

Ryu JA1, Park TK2, Chung CR1, Cho YH3, Sung K3, Suh GY1,4, Lee TR5, Sim MS5, Yang JH1,2.

Abstract

We evaluated the association of body temperature patterns with neurological outcomes after extracorporeal cardiopulmonary resuscitation (ECPR). Between December 2013 and December 2015, we enrolled 48 patients with cardiac arrest who survived for at least 24 hours after ECPR. Based on their body temperature patterns and the intention to control fever, we divided the patients into those in whom fever was actively controlled (N = 25), those with normothermia (N = 17), and those with unintended hypothermia (N = 6). The primary outcome was the Cerebral Performance Categories (CPC) scale at discharge. Of the 48 ECPR patients, 23 patients (47.9%) had good neurological outcomes (CPC 1 and 2) and 27 patients (56.3%) survived to discharge. The normothermia group showed a pattern of higher temperatures compared with the other groups during 48 hours after ECPR. Not only poor neurological outcomes but also intensive care unit (ICU) mortality occurred more often in the unintended hypothermia group than in the other two groups, regardless of the fever control strategy ($p = 0.023$ and $p = 0.002$, respectively). There were no differences in neurological outcomes and ICU mortality between the actively controlled fever group and the normothermia group ($p = 0.845$ and $p = 0.616$, respectively). Unintentionally sustained hypothermia may be associated with poor neurological outcomes after ECPR. These findings suggest that patients who are unable to generate a fever following ECPR may incur severe hypoxic brain injury.

3. Herz. 2017 Jan 26. doi: 10.1007/s00059-016-4523-4. [Epub ahead of print]

ECMO in cardiac arrest and cardiogenic shock.

Napp LC1, Kühn C2, Bauersachs J3.

Abstract

Cardiogenic shock is an acute emergency, which is classically managed by medical support with inotropes or vasopressors and frequently requires invasive ventilation. However, both catecholamines and ventilation are associated with a worse prognosis, and many patients deteriorate despite all efforts. Mechanical circulatory support is increasingly considered to allow for recovery or to bridge until making a decision or definite treatment. Of all devices, extracorporeal membrane oxygenation (ECMO) is the most widely used. Here we review features and strategical considerations for the use of ECMO in cardiogenic shock and cardiac arrest.

4. BMC Anesthesiol. 2017 Jan 6;17(1):4. doi: 10.1186/s12871-016-0293-z.

Effect of ultrasonography and fluoroscopic guidance on the incidence of complications of cannulation in extracorporeal cardiopulmonary resuscitation in out-of-hospital cardiac arrest: a retrospective observational study.

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Abstract

BACKGROUND: It remains unclear which cannulation method is best in cases of extracorporeal cardiopulmonary resuscitation (ECPR) for out-of-hospital cardiac arrest. We assessed the effect of ultrasound- and fluoroscopy-guided percutaneous cannulation on complication incidence, compared with that using only ultrasound guidance.

METHODS: This single-center retrospective observational study was conducted between February 2011 and December 2015. In the comparison group, cannulation was performed percutaneously using only ultrasound guidance. In the exposure group, cannulation was performed percutaneously using fluoroscopy and ultrasound guidance. The primary outcome assessed was whether complications were associated with cannulation. The secondary outcome assessed was the duration from hospital arrival to extracorporeal circulation start. In addition to univariate analysis, multivariate logistic-regression analysis for cannulation complications was performed to adjust for several presumed confounders.

RESULTS: Of the patients who underwent ECPR, 73 were eligible; the comparison group included 50 cases and the exposure group included 23 cases. Univariate analysis showed that the complication incidence of the exposure group was significantly lower than that of the comparison group (8.7 vs. 36.0%, $p = 0.022$). Duration from hospital arrival to extracorporeal circulation start was almost the same in both groups (median, 17.0 min vs. 17.0 min, $p = 0.92$). After multivariate logistic regression analysis, cannulation using fluoroscopy and ultrasound was independently associated with a lower complication incidence (adjusted odds ratio, 0.14; $p = 0.024$).

CONCLUSIONS: Ultrasound- and fluoroscopy-guided cannulation may reduce the complication incidence of cannulation without delaying extracorporeal circulation.

POST ATURADA

1. Resuscitation. 2017 Jan 23. pii: S0300-9572(17)30023-0. doi: 10.1016/j.resuscitation.2017.01.011. [Epub ahead of print]

The association between diabetes status and survival following an out-of-hospital cardiac arrest: A retrospective cohort study.

Parry M1, Danielson K2, Brennenstuhl S2, Drennan IR3, Morrison LJ4.

Abstract

BACKGROUND: Sudden cardiac arrest (SCA), confirmed absence of cardiac mechanical activity, is the leading cause of heart-related death in the US. Almost 85% of SCA occur out-of-hospital (OHCA), with very poor rates of return of spontaneous circulation (ROSC) and survival to hospital discharge. We sought to determine if diabetes status was associated with survival or ROSC following an OHCA.

METHODS: We completed a retrospective cohort study using data from the Toronto Regional RescuNet Epistry dataset, based upon data definitions defined by the Resuscitation Outcomes Consortium (ROC) Epistry-Cardiac Arrest and the Strategies for Post Arrest Resuscitation Care (SPARC) network datasets. Adults ≥ 18 years of age who experienced an OHCA, had data on diabetes status, and were treated by Emergency Medical Services (EMS) between 2012-2014 were included in the analysis ($n=10,097$). We used bivariate analyses to examine relationships between diabetes status, Utstein elements and outcomes, and logistic regression to determine predictors of survival.

RESULTS: Diabetes prevalence was 27.8% (95% CI: 27.0-28.7). A larger proportion of those with diabetes had a non-shockable initial rhythm (28.8% vs. 25.1%; $p < 0.01$) and did not survive to hospital discharge (92.1% vs. 89.2%, $p < 0.001$). Diabetes status is associated with a decrease in survival, independent from a number of Utstein elements (adjusted OR=0.76; 95% CI: 0.64-0.91, $p=0.003$).

CONCLUSIONS: This is the first Canadian study to examine the association between diabetes status and OHCA outcomes. Our findings suggest that diabetes status prior to arrest is associated with decreased survival. The growing prevalence of diabetes globally suggests a future burden related to OHCAs.

2. Resuscitation. 2017 Jan 18. pii: S0300-9572(17)30018-7. doi: 10.1016/j.resuscitation.2017.01.007. [Epub ahead of print]

Impact of mean arterial pressure on clinical outcomes in comatose survivors of out-of-hospital cardiac arrest: Insights from the University of Ottawa Heart Institute Regional Cardiac Arrest Registry (CAPITAL-CARe).

Russo JJ1, James TE1, Hibbert B1, Yousef A1, Osborne C1, Wells GA1, Froeschl MP1, So DY1, Chong AY1, Labinaz M1, Glover CA1, Marquis JF1, Dick A1, Bernick J1, Le May MR2; CAPITAL Investigators1.

Abstract

AIM OF THE STUDY: We sought to assess the relationship between mean arterial pressure (MAP) and clinical outcomes in comatose survivors of out-of-hospital cardiac arrest (OHCA). **METHODS:** We identified consecutive comatose survivors of OHCA with an initial shockable rhythm treated with targeted temperature management. We examined clinical outcomes in relation to mean MAP (measured hourly) during the first 96h of hospitalization. Mean MAP was examined as both a continuous variable and a categorical variable consisting of 3 pre-specified strata: <70mmHg, 70 to <80mmHg, and ≥80mmHg. Co-primary outcomes were the rates of death and severe neurological dysfunction at discharge.

RESULTS: We identified 122 patients meeting inclusion criteria. Death occurred in 29 patients (24%) and severe neurological dysfunction in 39 (32%). Higher mean MAPs were associated with lower odds of death (OR 0.55 per 5mmHg increase; 95%CI 0.38-0.79; p=0.002) and severe neurological dysfunction (OR 0.66 per 5mmHg increase; 95%CI 0.48-0.90; p=0.01). After adjustment for differences in patient, index event, and treatment characteristics, higher mean MAPs remained associated with lower odds of death (OR 0.60 per 5mmHg increase; 95%CI 0.40-0.89; p=0.01) but not severe neurological dysfunction (OR 0.73 per 5mmHg increase; 95%CI 0.51-1.03; p=0.07). The relationship between mean MAP and the odds of death (p-interaction=0.03) and severe neurological dysfunction (p-interaction=0.03) was attenuated by increased patient age.

CONCLUSION: In comatose survivors of OHCA treated with target temperature management, a higher mean MAP during the first 96h of admission is associated with increased survival. The association between mean MAP and clinical outcomes appears to be attenuated by increased age.

3. Resuscitation. 2017 Jan 23. pii: S0300-9572(17)30019-9. doi: 10.1016/j.resuscitation.2016.12.029. [Epub ahead of print]

Characterization of mitochondrial injury after cardiac arrest (COMICA).

Donnino MW1, Liu X2, Andersen LW3, Rittenberger JC4, Abella BS5, Gaieski DF6, Ornato JP7, Gazmuri RJ8, Grossestreuer AV2, Cocchi MN9, Abbate A10, Uber A2, Clore J10, Peberdy MA11, Callaway C4; National Post Arrest Research Consortium NPARC Investigators.

Abstract

INTRODUCTION: Mitochondrial injury post-cardiac arrest has been described in pre-clinical settings but the extent to which this injury occurs in humans remains largely unknown. We hypothesized that increased levels of mitochondrial biomarkers would be associated with mortality and neurological morbidity in post-cardiac arrest subjects.

METHODS: We performed a prospective multicenter study of post-cardiac arrest subjects. Inclusion criteria were comatose adults who suffered an out-of-hospital cardiac arrest.

Mitochondrial biomarkers were measured at 0, 12, 24, 36 and 48h after return of spontaneous circulation as well as in healthy controls.

RESULTS: Out of 111 subjects enrolled, 102 had evaluable samples at 0h. Cardiac arrest subjects had higher baseline cytochrome c levels compared to controls (2.18ng/mL [0.74, 7.74] vs. 0.16ng/mL [0.03, 0.91], p<0.001), and subjects who died had higher 0h cytochrome c levels compared to survivors (3.66ng/mL [1.40, 14.9] vs. 1.27ng/mL [0.16, 2.37], p<0.001). There were significantly higher RNAase P (3.3 [1.2, 5.7] vs. 1.2 [0.8, 1.2], p<0.001) and B2M (12.0 [1.0, 22.9], vs. 0.6 [0.6, 1.3], p<0.001) levels in cardiac arrest subjects at baseline compared to

the control subjects. There were no differences between survivors and non-survivors for mitochondrial DNA, nuclear DNA, or cell free DNA.

CONCLUSIONS: Cytochrome c was increased in post- cardiac arrest subjects compared to controls, and in post-cardiac arrest non-survivors compared to survivors. Nuclear DNA and cell free DNA was increased in plasma of post-cardiac arrest subjects. There were no differences in mitochondrial DNA, nuclear DNA, or cell free DNA between survivors and non-survivors. Mitochondrial injury markers showed mixed results in post-arrest period. Future research needs to investigate these differences.

PEDIATRIA

1. An Pediatr (Barc). 2017 Jan 18. pii: S1695-4033(16)30308-3. doi: 10.1016/j.anpedi.2016.11.004. [Epub ahead of print]

[The latest in paediatric resuscitation recommendations].

[Article in Spanish]

López-Herce J1, Rodríguez A2, Carrillo A3, de Lucas N4, Calvo C5, Civantos E6, Suárez E7, Pons S8, Manrique I9.

Abstract

Cardiac arrest has a high mortality in children. To improve the performance of cardiopulmonary resuscitation, it is essential to disseminate the international recommendations and the training of health professionals and the general population in resuscitation. This article summarises the 2015 European Paediatric Cardiopulmonary Resuscitation recommendations, which are based on a review of the advances in cardiopulmonary resuscitation and consensus in the science and treatment by the International Council on Resuscitation. The Spanish Paediatric Cardiopulmonary Resuscitation recommendations, developed by the Spanish Group of Paediatric and Neonatal Resuscitation, are an adaptation of the European recommendations, and will be used for training health professionals and the general population in resuscitation. This article highlights the main changes from the previous 2010 recommendations on prevention of cardiac arrest, the diagnosis of cardiac arrest, basic life support, advanced life support and post-resuscitation care, as well as reviewing the algorithms of treatment of basic life support, obstruction of the airway and advanced life support.

2. N Engl J Med. 2017 Jan 26;376(4):318-329. doi: 10.1056/NEJMoa1610493. Epub 2017 Jan 24.

Therapeutic Hypothermia after In-Hospital Cardiac Arrest in Children.

Moler FW1, Silverstein FS1, Holubkov R1, Slomine BS1, Christensen JR1, Nadkarni VM1, Meert KL1, Browning B1, Pemberton VL1, Page K1, Gildea MR1, Scholefield BR1, Shankaran S1, Hutchison JS1, Berger JT1, Ofori-Amanfo G1, Newth CJ1, Topjian A1, Bennett KS1, Koch JD1, Pham N1, Chanani NK1, Pineda JA1, Harrison R1, Dalton HJ1, Alten J1, Schleien CL1, Goodman DM1, Zimmerman JJ1, Bhalala US1, Schwarz AJ1, Porter MB1, Shah S1, Fink EL1, McQuillen P1, Wu T1, Skellett S1, Thomas NJ1, Nowak JE1, Baines PB1, Pappachan J1, Mathur M1, Lloyd E1, van der Jagt EW1, Dobyms EL1, Meyer MT1, Sanders RC Jr1, Clark AE1, Dean JM1; THAPCA Trial Investigators.

Abstract

Background: Targeted temperature management is recommended for comatose adults and children after out-of-hospital cardiac arrest; however, data on temperature management after in-hospital cardiac arrest are limited.

Methods: In a trial conducted at 37 children's hospitals, we compared two temperature interventions in children who had had in-hospital cardiac arrest. Within 6 hours after the return of circulation, comatose children older than 48 hours and younger than 18 years of age were randomly assigned to therapeutic hypothermia (target temperature, 33.0°C) or

therapeutic normothermia (target temperature, 36.8°C). The primary efficacy outcome, survival at 12 months after cardiac arrest with a score of 70 or higher on the Vineland Adaptive Behavior Scales, second edition (VABS-II, on which scores range from 20 to 160, with higher scores indicating better function), was evaluated among patients who had had a VABS-II score of at least 70 before the cardiac arrest.

Results: The trial was terminated because of futility after 329 patients had undergone randomization. Among the 257 patients who had a VABS-II score of at least 70 before cardiac arrest and who could be evaluated, the rate of the primary efficacy outcome did not differ significantly between the hypothermia group and the normothermia group (36% [48 of 133 patients] and 39% [48 of 124 patients], respectively; relative risk, 0.92; 95% confidence interval [CI], 0.67 to 1.27; P=0.63). Among 317 patients who could be evaluated for change in neurobehavioral function, the change in VABS-II score from baseline to 12 months did not differ significantly between the groups (P=0.70). Among 327 patients who could be evaluated for 1-year survival, the rate of 1-year survival did not differ significantly between the hypothermia group and the normothermia group (49% [81 of 166 patients] and 46% [74 of 161 patients], respectively; relative risk, 1.07; 95% CI, 0.85 to 1.34; P=0.56). The incidences of blood-product use, infection, and serious adverse events, as well as 28-day mortality, did not differ significantly between groups.

Conclusions: Among comatose children who survived in-hospital cardiac arrest, therapeutic hypothermia, as compared with therapeutic normothermia, did not confer a significant benefit in survival with a favorable functional outcome at 1 year. (Funded by the National Heart, Lung, and Blood Institute; THAPCA-IH ClinicalTrials.gov number, NCT00880087 .).

FV I ELECTROFISIOLOGIA

1. Resuscitation. 2017 Jan 18. pii: S0300-9572(17)30017-5. doi: 10.1016/j.resuscitation.2017.01.006. [Epub ahead of print]

Survival in ventricular fibrillation with emphasis on the number of defibrillations in relation to other factors at resuscitation.

Holmén J1, Hollenberg J2, Claesson A3, Herrera MJ4, Azeli Y5, Herlitz J6, Axelsson C7.

Abstract

INTRODUCTION: Mortality after out of hospital cardiac arrest (OHCA) is high and a shockable rhythm is a key predictor of survival. A concomitant need for repeated shocks appears to be associated with less favorable outcome.

AIM: To, among patients found in ventricular fibrillation (VF) or pulseless ventricular tachycardia (pVT) describe: (a) factors associated with 30-day survival with emphasis on the number of defibrillatory shocks delivered; (b) the distribution of and the characteristics of patients in relation to the number of defibrillatory shocks that were delivered.

METHODS: Patients who were reported to The Swedish Register for Cardiopulmonary Resuscitation (SRCR) between January 1 1990 and December 31 2015 and who were found in VF/pVT took part in the survey.

RESULTS: In all there were 19,519 patients found in VF/pVT. The 30-day survival decreased with an increasing number of shocks among all patients regardless of witnessed status and regardless of time period in the survey. In a multivariate analysis there were 12 factors that were associated with the chance of 30-day survival one of which was the number of shocks that was delivered. For each shock that was added the chance of survival decreased. Factors associated with an increased 30-day survival included CPR before arrival of EMS, female sex, cardiac etiology and year of OHCA (increasing survival over years). Factors associated with a decreased chance of 30-day survival included: increasing age, OHCA at home, the use of adrenaline and intubation and an increased delay to CPR, defibrillation and EMS arrival. In all 1455 patients (7.5%) required more than 10 shocks. With regard to patients age, sex and

various factors at resuscitation most of them were associated with the number of shocks in a univariate analysis.

CONCLUSION: Among patients found in VF/pVT, 7.5% required more than 10 shocks. For each shock that was added the chance of 30-day survival decreased. There was an increase in 30-day survival over time regardless of the number of shocks. On top of the number of defibrillations, eleven further factors were associated with 30-day survival.

FEEDBACK

1. CJEM. 2017 Jan 24:1-8. doi: 10.1017/cem.2016.410. [Epub ahead of print]

Real-time visual feedback during training improves laypersons' CPR quality: a randomized controlled manikin study.

Baldi E1, Cornara S1, Contri E1, Epis F1, Fina D1, Zelaschi B1, Dossena C1, Fichtner F1, Tonani M1, Di Maggio M1, Zambaiti E1, Somaschini A1.

Abstract

OBJECTIVE: The chances of surviving an out-of-hospital cardiac arrest depend on early and high-quality cardiopulmonary resuscitation (CPR). Our aim is to verify whether the use of feedback devices during laypersons' CPR training improves chest compression quality.

METHODS: Laypersons totalling 450 participating in Basic Life Support and Automated External Defibrillation (BLS/AED) courses were randomly divided into three groups: group No Feedback (NF) attended a course without any feedback, group Short Feedback (SF) a course with 1-minute training with real-time visual feedback, and group Long Feedback (LF) a course with 10-minute training with real-time visual feedback. At the end of each course, we recorded 1 minute of compression-only CPR. The primary end point was the difference in the percentage of compressions performed with correct depth.

RESULTS: There was a significant improvement in the percentage of compressions with correct depth in the groups receiving feedback compared to the other (NF v. LF, $p=0.022$; NF v. SF, $p=0.005$). This improvement was also present in the percentage of compressions with a complete chest recoil (71.7% in NF, 86.6% in SF, and 88.8% in LF; $p<0.001$), compressions with the correct hand position (93.2% in NF, 98.2% in SF, and 99.3% in LF; $p<0.001$), and in the Total CPR Score (79.4% in NF, 90.2% in SF, and 92.5% in LF; $p<0.001$). There were no significant differences for all of the parameters between group SF and group LF.

CONCLUSIONS: Real-time visual feedback improves laypersons' CPR quality, and we suggest its use in every BLS/AED course for laypersons because it can help achieve the goals emphasized by the International Liaison Committee on Resuscitation recommendations.

2. J Clin Monit Comput. 2017 Jan 27. doi: 10.1007/s10877-017-9975-4. [Epub ahead of print]

In vivo investigation of ear canal pulse oximetry during hypothermia.

Budidha K1, Kyriacou PA2.

Abstract

Pulse oximeters rely on the technique of photoplethysmography (PPG) to estimate arterial oxygen saturation (SpO_2 [Formula: see text]). In conditions of poor peripheral perfusion such as hypotension, hypothermia, and vasoconstriction, the PPG signals detected are often weak and noisy, or in some cases unobtainable. Hence, pulse oximeters produce erroneous SpO_2 [Formula: see text] readings in these circumstances. The problem arises as most commercial pulse oximeter probes are designed to be attached to peripheral sites such as the finger or toe, which are easily affected by vasoconstriction. In order to overcome this problem, the ear canal was investigated as an alternative site for measuring reliable SpO_2 [Formula: see text] on the hypothesis that blood flow to this central site is preferentially preserved. A novel miniature ear canal PPG sensor was developed along with a state of the art PPG processing unit to investigate PPG measurements from the bottom surface of the ear canal. An in vivo

study was carried out in 15 healthy volunteers to validate the developed technology. In this comparative study, red and infrared PPGs were acquired from the ear canal and the finger of the volunteers, whilst they were undergoing artificially induced hypothermia by means of cold exposure (10 [Formula: see text]C). Normalised Pulse Amplitude (NPA) and SpO₂ [Formula: see text] was calculated from the PPG signals acquired from the ear canal and the finger. Good quality baseline PPG signals with high signal-to-noise ratio were obtained from both the PPG sensors. During cold exposure, significant differences were observed in the NPA of the finger PPGs. The mean NPA of the red and infrared PPGs from the finger have dropped by >80%. Contrary to the finger, the mean NPA of red and infrared ear canal PPGs had dropped only by 0.2 and 13% respectively. The SpO₂ [Formula: see text]s estimated from the finger sensor have dropped below 90% in five volunteers (failure) by the end of the cold exposure. The ear canal sensor, on the other hand, had only failed in one volunteer. These results strongly suggest that the ear canal may be used as a suitable alternative site for monitoring PPGs and arterial blood oxygen saturation at times where peripheral perfusion is compromised.

TRAUMA

1. Am J Emerg Med. 2017 Jan 12. pii: S0735-6757(17)30010-4. doi: 10.1016/j.ajem.2017.01.010. [Epub ahead of print]

The role of resuscitative endovascular balloon occlusion of the aorta (REBOA) as an adjunct to ACLS in non-traumatic cardiac arrest: A review of key concepts, physiology, current evidence, and future directions.

Daley J1, Morrison JJ2, Sather J3, Hile L4.

Abstract

Non-traumatic cardiac arrest is a major public health problem that carries an extremely high mortality rate. If we hope to increase the survivability of this condition, it is imperative that alternative methods of treatment are given due consideration. Balloon occlusion of the aorta can be used as a method of circulatory support in the critically ill patient. Intra-aortic balloon pumps have been used to temporize patients in cardiogenic shock for decades. More recently, resuscitative endovascular balloon occlusion of the aorta (REBOA) has been utilized in the patient in hemorrhagic shock or cardiac arrest secondary to trauma. Aortic occlusion in non-traumatic cardiac arrest has the effect of reducing the vascular volume that the generated cardiac output is distributed across. This augments myocardial and cerebral perfusion, increasing the probability of a return to a good quality of life for the patient. This phenomenon has been the subject of numerous animal studies dating back to the early 1980s; however, the human evidence is limited to several small case series. Animal research has demonstrated improvements in cerebral and coronary perfusion pressure during ACLS that lead to statistically significant differences in mortality. Several case series in humans have replicated these findings, suggesting the efficacy of this procedure. The objectives of this review are to: 1) introduce the reader to REBOA 2) review the physiology of NTCA and examine the current limitations of traditional ACLS 3) summarize the literature regarding the efficacy and feasibility of aortic balloon occlusion to support traditional ACLS.

CASE REPORTS

1. Int J Emerg Med. 2017 Dec;10(1):3. doi: 10.1186/s12245-017-0132-0. Epub 2017 Jan 26.

Hyperkalemia masked by pseudo-stemi infarct pattern and cardiac arrest.

Peerbhai S1, Masha L2, DaSilva-DeAbreu A1, Dhoble A3,4.

Abstract

BACKGROUND: Hyperkalemia is a common electrolyte abnormality and has well-recognized early electrocardiographic manifestations including PR prolongation and symmetric T wave peaking. With severe increase in serum potassium, dysrhythmias and atrioventricular and

bundle branch blocks can be seen on electrocardiogram. Although cardiac arrest is a worrisome consequence of untreated hyperkalemia, rarely does hyperkalemia electrocardiographically manifest as acute ischemia.

CASE PRESENTATION: We present a case of acute renal failure complicated by malignant hyperkalemia and eventual ventricular fibrillation cardiac arrest. Recognition of this disorder was delayed secondary to an initial ECG pattern suggesting an acute ST segment elevation myocardial infarction (STEMI). Emergent coronary angiography performed showed no evidence of coronary artery disease.

CONCLUSIONS: Pseudo-STEMI patterns are rarely seen in association with acute hyperkalemia and are most commonly described with patient without acute cardiac symptomatology. This is the first such case presenting concurrently with cardiac arrest. A brief review of this rare pseudo-infarct pattern is also given.

2. J Med Case Rep. 2017 Jan 22;11(1):21. doi: 10.1186/s13256-016-1177-z.

Adenosine induced ventricular fibrillation in a structurally normal heart: a case report.

Rajkumar CA1, Qureshi N1, Ng FS2,3, Panoulas VF1, Lim PB1.

Abstract

BACKGROUND: Adenosine is the first-line pharmacotherapy for termination of supraventricular tachycardia through its action on the atrioventricular node. However, pro-arrhythmic effects of adenosine are also recognised, most notably in the presence of pre-excited atrial fibrillation. In this case report, we describe the induction of ventricular fibrillation in a patient with no demonstrable accessory pathway, nor any other structural heart disease. This rare, idiosyncratic reaction has never previously been reported and is of relevance given the widespread and routine use of adenosine in clinical practice.

CASE PRESENTATION: A 26-year-old woman of Cypriot origin presented to our emergency department with a sudden onset of palpitations and chest discomfort. She was healthy, with no previous medical history and no regular medications. An electrocardiogram demonstrated a narrow complex tachycardia with a rate of 194 beats per minute. Following failure of vagal maneuvers to terminate the tachycardia, the assessing physician administered a single intravenous dose of 6 mg adenosine. Our patient instantaneously developed coarse ventricular fibrillation and circulatory collapse. Cardiopulmonary resuscitation was initiated and our patient was rapidly defibrillated to sinus rhythm with a single 150 J direct current shock. A 900-mg loading dose of intravenous amiodarone was commenced and our patient was managed in the cardiac high dependency unit. No further arrhythmias were identified on continuous cardiac monitoring. On review, her presenting electrocardiogram had demonstrated rapidly conducted atrial fibrillation with no evidence of ventricular pre-excitation. Concordantly, her resting electrocardiogram was not suggestive of any accessory pathway. This was conclusively excluded on invasive electrophysiology study, with negative programmed ventricular stimulation up to three extrastimuli. Extensive laboratory investigations were unremarkable and failed to identify an underlying cause for her episode of atrial fibrillation. Furthermore, cardiac magnetic resonance imaging demonstrated a structurally normal heart, with no edema, fibrosis or infarction as well as normal coronary artery anatomy.

CONCLUSIONS: Adenosine remains a safe and highly efficacious therapy for supraventricular tachycardia. However, this unusual case demonstrates the ability of adenosine to induce circulatory collapse and reminds the clinician that prompt access to resuscitation, defibrillation, and transcutaneous pacing equipment is mandatory with every administration of this drug.

3. J Neurointerv Surg. 2017 Jan 25. pii: neurintsurg-2016-012806.rep. doi: 10.1136/neurintsurg-2016-012806.rep. [Epub ahead of print]

Novel approach for independent control of brain hypothermia and systemic normothermia: cerebral selective deep hypothermia for refractory cardiac arrest.

Wang CH1, Lin YT1, Chou HW1, Wang YC1, Hwang JJ1, Gilbert JR2, Chen YS1.

Abstract

A 38-year-old man was found unconscious, alone in the driver's seat of his car. The emergency medical team identified his condition as pulseless ventricular tachycardia. Defibrillation was attempted but failed. Extracorporeal membrane oxygenation (ECMO) was started in the emergency room 52 min after the estimated arrest following the extracorporeal cardiopulmonary resuscitation (ECPR) protocol in our center. The initial prognosis under the standard protocol was <25% chance of survival. A novel adjunctive to our ECPR protocol, cerebral selective deep (<30°C) hypothermia (CSDH), was applied. CSDH adds a second independent femoral access extracorporeal circuit, perfusing cold blood into the patient's common carotid artery. The ECMO and CSDH circuits demonstrated independent control of cerebral and core temperatures. Nasal temperature was lowered to below 30°C for 12 hours while core was maintained at normothermia. The patient was discharged without significant neurological deficit 32 days after the initial arrest.

4. Int J Emerg Med. 2017 Dec;10(1):4. doi: 10.1186/s12245-017-0131-1. Epub 2017 Jan 26.

How to manage tension gastrothorax: a case report of tension gastrothorax with multiple trauma due to traumatic diaphragmatic rupture.

Bunya N1, Sawamoto K2, Uemura S2, Toyohara T 2, Mori Y2, Kyan R2, Miyata K2, Irifune H2, Harada K2, Narimatsu E2.

Abstract

BACKGROUND: Tension gastrothorax is a kind of obstructive shock with prolapse and distention of the stomach into the thoracic cavity. Progressive gastric distension leads to mediastinal shift, reduced venous return, decreased cardiac output, and ultimately cardiac arrest. Therefore, it is crucial to decompress the stomach distension for the initial resuscitation of tension gastrothorax.

CASE PRESENTATION: A 75-year-old female was transported to our resuscitation bay due to motor vehicle crash. At the time of arrival to our hospital, the patient developed cardiac arrest. While undergoing cardiopulmonary resuscitation, an unstable pelvic ring was recognized, so we performed a resuscitative thoracotomy to control hemorrhage and to perform direct cardiac massage. Once we performed the thoracotomy, the stomach and omentum prolapsed out of the thoracotomy site and through the diaphragm rupture site and spontaneous circulation was recovered. Neither the descending aorta nor the heart was collapsed. Although we had continued the treatment for severe pelvic fracture (including blood transfusions), the patient died. Given that (1) the stomach prolapsed out of the body at the time of the thoracotomy; (2) at the same timing, spontaneous circulation returned; and (3) the descending aorta and heart did not collapse, we hypothesized that the main cause of the initial cardiac arrest was tension gastrothorax.