

REGISTRES I REVISIONS

Scand J Trauma Resusc Emerg Med. 2015 Jan 24;23(1):7.

EuReCa ONE - 27 Nations, ONE Europe, ONE Registry: a prospective observational analysis over one month in 27 resuscitation registries in Europe - the EuReCa ONE study protocol.

Wnent J1, Masterson S2, Gräsner JT3, Böttiger BW4, Herlitz J5, Koster RW6, Rosell Ortiz F7, Tjelmeland I8, Maurer H9, Bossaert L10.

Abstract

BACKGROUND:

There is substantial variation in the incidence, likelihood of attempted resuscitation and outcomes from out-of-hospital cardiac arrest (OHCA) across Europe. A European, multi-centre study provides the opportunity to uncover differences throughout Europe and may help find explanations for these differences. Results may also have potential to support the development of quality benchmarking between European Emergency Medical Services (EMS).

METHODS/DESIGN:

This prospective European study involves 27 different countries. It provides a common Utstein-based dataset, data collection tool and a common data collection period for all participants. Study research questions will address the following: OHCA incidence in different European regions; incidence of cardiopulmonary resuscitation (CPR); initial presenting rhythm in patients where bystanders or EMS start CPR or any other resuscitation intervention; proportion of patients with any return of spontaneous circulation (ROSC); patient status at the end of pre-hospital treatment i.e. ROSC at handover to hospital, ongoing CPR, dead; proportion of patients still alive 30 days after OHCA; proportion of patients discharged alive from hospital. All patients who suffered an OHCA during October 2014 and were attended and/or treated by an EMS and documented in one of the participating registries will be included in the study. Each National Coordinator is responsible for data collection and quality control in his/her country and will transfer unprocessed anonymised data via secure electronic transfer. Descriptive analysis will be performed at European, national and registry level. For endpoints like ROSC, admission or survival, multivariate logistic regression analysis will be performed.

DISCUSSION:

Documenting differences in epidemiology, treatment and outcome in out-of-hospital cardiac arrest throughout Europe is a first step in finding explanations for these differences. Study results might also support the development of quality benchmarking between Emergency Medical Services (EMS) which in turn will facilitate initiatives to improve OHCA outcome in Europe.

Circ Cardiovasc Qual Outcomes. 2015 Apr 29. pii: CIRCOUTCOMES.115.001864. [Epub ahead of print]

Different Impacts of Time From Collapse to First Cardiopulmonary Resuscitation on Outcomes After Witnessed Out-of-Hospital Cardiac Arrest in Adults.

Hara M1, Hayashi K2, Hikoso S2, Sakata Y2, Kitamura T1.

Abstract

BACKGROUND:

It is well-known that cardiopulmonary resuscitation (CPR) should be attempted as early as possible after out-of-hospital cardiac arrest (OHCA). However, it is unclear about the impact of time to CPR on OHCA outcome by first documented rhythm (pulseless ventricular tachycardia/ventricular fibrillation [pVT/VF], pulseless electric activity [PEA], and asystole).

METHODS AND RESULTS:

We enrolled 257 354 adult witnessed OHCA patients between 2007 and 2012 from a prospective nationwide population-based cohort database in Japan. We evaluated relationships between time from collapse to first CPR and neurologically favorable 1-month survival defined as Glasgow-Pittsburg cerebral performance category 1 or 2 by first

documented rhythm after witnessed OHCA. We used logistic model for the estimation of prognosis. The number of OHCA patients with pVT/VF, PEA, and asystole were 38 661, 96 906, and 121 787, respectively. The overall neurologically favorable 1-month survival rates were 21.3% in patients with pVT/VF, 2.7% PEA, and 0.6% asystole. The proportion of asystole increased as the time from collapse to CPR delayed, whereas those of pVT/VF and PEA decreased (trend $P < 0.001$). Estimated incidences of end-point after OHCA became lower as first CPR delayed irrespective of type of first documented rhythm, but were different by the rhythm. The average percentage point decreases in neurologically favorable 1-month survival probability for each incremental minute of CPR delay were 8.3%, 4.4%, and 6.4% for patients with pVT/VF, PEA, and asystole, respectively.

CONCLUSIONS:

The OHCA outcome differed by time to first CPR and first documented rhythm. Shortening of time to first CPR is crucial for improving the OHCA outcome.

Am J Emerg Med. 2015 Feb;33(2):286-9. doi: 10.1016/j.ajem.2014.10.015. Epub 2014 Oct 16.
Should unobstructed gasping be facilitated and confirmed before administering adrenaline, otherwise, give titrated vasopressin?

Rottenberg EM1.

Abstract

A recent commentary, "Resuscitation That's (Un)Shockable: Time to Get the Adrenaline Flowing", published in the New England Journal of Medicine Journal Watch called attention to a relatively recent study showing that a large and increasing percentage of patients with in-hospital cardiac arrests exhibit initial nonshockable rhythms (asystole or pulseless electrical activity [PEA]; 82% in 2009 vs 69% in 2000) and a most recent study that concluded that neurologically intact survival to hospital discharge after in-hospital cardiac arrest was significantly more likely after earlier epinephrine administration. It was found that delayed administration of epinephrine was associated significantly with lower chance for survival to hospital discharge, in stepwise fashion (12%, 10%, 8%, and 7% survival, respectively, for patients receiving their first epinephrine dose ≤ 3 , 4-6, 7-9, and > 9 minutes after arrest). Although early use of epinephrine to manage patients with nonshockable rhythms lacks strong evidence to support efficacy, focus on time to epinephrine administration-in addition to high-quality chest compressions-might be the best early intervention. However, evidence may strongly support the recommendation that adrenaline needs to be used very early because without effective-depth cardiopulmonary resuscitation (CPR) with complete recoil, epinephrine may only be effective when gasping is present, which is a time-limited phenomenon. However, because very few rescuers can perform effective-depth chest compressions with complete recoil, gasping is critically necessary for adequate ventilation and generation of adequate coronary and cerebral perfusion. However, under academic conditions and high catecholamine levels and/or absence of gasping, vasopressin should be administered instead.

J Intensive Care Med. 2015 Apr 28. pii: 0885066615583651. [Epub ahead of print]
Venoarterial Extracorporeal Membrane Oxygenation in Adults With Cardiac Arrest.
Patel JK1, Schoenfeld E2, Parnia S3, Singer AJ4, Edelman N3.

Abstract

Cardiac arrest (CA) is a major cause of morbidity and mortality worldwide. Despite the use of conventional cardiopulmonary resuscitation (CPR), rates of return of spontaneous circulation and survival with minimal neurologic impairment remain low. Utilization of venoarterial extracorporeal membrane oxygenation (ECMO) for CA in adults is steadily increasing. Propensity-matched cohort studies have reported outcomes associated with ECMO use to be

superior to that of conventional CPR alone in in-hospital patients with CA. In this review, we discuss the mechanism, indications, complications, and evidence for ECMO in CA in adults.

RCP MECÀNICA

Intern Emerg Med. 2015 Apr 28. [Epub ahead of print]

Mechanical chest compression: an alternative in helicopter emergency medical services?

Gässler H1, Kümmerle S, Ventzke MM, Lampl L, Helm M.

Abstract

Mechanical chest compression devices are mentioned in the current guidelines of the European Resuscitation Council (ERC) as an alternative in long-lasting cardiopulmonary resuscitations (CPR) or during transport with ongoing CPR. We compared manual chest compression with mechanical devices in a rescue-helicopter-based scenario using a resuscitation manikin. Manual chest compression was compared with the mechanical devices LUCAS™ 2, AutoPulse™ and animax mono (10 series each) using the resuscitation manikin AmbuMan MegaCode Wireless, which was intubated endotracheally and controlled ventilated during the entire scenario. The scenario comprised the installation of each device, transport and loading phases, as well as a 10-min phase inside the helicopter (type BK 117). We investigated practicability as well as measured compression quality. All mechanical devices could be used readily in a BK 117 helicopter. The LUCAS 2 group was the only one that fulfilled all recommendations of the ERC (frequency 102 ± 0.1 min⁻¹, compression depth 54 ± 3 mm, hands-off time 2.5 ± 1.6 %). Performing adequate manual chest compression was barely possible (fraction of correct compressions 21 ± 15 %). In all four groups, the total hands-off time was <10 %. Performing manual chest compressions during rescue-helicopter transport is barely possible, and only of poor quality. If rescuers are experienced, mechanical chest compression devices could be good alternatives in this situation. We found that the LUCAS 2 system complied with all recommendations of ERC guidelines, and all three tested devices worked consistently during the entire scenario.

CJEM. 2015 Apr 27:1-4. [Epub ahead of print]

Use of computed tomography and mechanical CPR in cardiac arrest to confirm pulmonary embolism: a case study.

Schubert EC1, Kanz KG2, Linsenmaier U3, Bogner V4, Wirth S3, Angstwurm M5.

Abstract

Precise therapeutic decision-making is vital in managing out-of-hospital cardiac arrest. We present an interesting approach where suspected pulmonary embolism could be confirmed by early computed tomography in cardiac arrest. Chest compressions were performed automatically by mechanical devices also during the acquisition of computed tomography data and subsequent thrombolysis.

Resuscitation 2015;92:32–7

A quality improvement initiative to optimize use of a mechanical chest compression device within a high-performance CPR approach to out-of-hospital cardiac arrest resuscitation.

Levy M1, Yost D2, Walker RG3, Scheunemann E1, Mendive SR1.

Abstract

BACKGROUND:

Minimizing the chest compression pause associated with application of a mechanical CPR device is a key component of optimal integration into the overall resuscitation process. As part of a multi-agency implementation project, Anchorage Fire Department deployed LUCAS CPR devices on BLS and ALS fire apparatus for initiation early in resuscitation efforts. A 2012 report identified the pause interval for device application as a key opportunity for quality improvement (QI). In early 2013 we began a QI initiative to reduce device application time

interval and optimize the overall CPR process. To assess QI initiative effectiveness, we compared key CPR process metrics from before to during and after its implementation.

METHODS:

We included all cases of EMS-treated out-of-hospital cardiac arrest during 2012 and 2013 in which a mechanical CPR device was used and the defibrillator electronic record was available. Continuous ECG and impedance data were analyzed to measure chest compression fraction, duration of the pause from last manual to first mechanical compression, and duration of the longest overall pause in the resuscitation effort.

RESULTS:

Compared to cases from 2012 (n=61), median duration of the pause prior to first mechanical compression for cases from 2013 (n=71) decreased from 21 (15, 31) to 7 (4, 12)s ($p<0.001$), while median chest compression fraction increased from 0.90 (0.88, 0.93) to 0.95 (0.93, 0.96) ($p<0.001$). Median duration of the longest pause decreased from 25 (20, 35) to 13 (10, 20)s ($p<0.001$), while the proportion of cases where the longest pause was for mechanical CPR application decreased from 74% to 31% ($p<0.001$).

CONCLUSIONS:

Our QI initiative substantially reduced the duration of the pause prior to first mechanical compression. Combined with the simultaneous significant increase in compression fraction and significant decrease in duration of the longest pause, this finding strongly suggests a large improvement in mechanical CPR device application efficiency within an overall high-performance CPR process.

PEDIATRIA

Resuscitation. 2015 Apr 24. pii: S0300-9572(15)00163-X. doi: 10.1016/j.resuscitation.2015.04.010. [Epub ahead of print]

A Quantitative Analysis of Out-of-Hospital Pediatric and Adolescent Resuscitation Quality-A Report from the ROC Epistry-Cardiac Arrest.

Abstract

AIM:

High-quality cardiopulmonary resuscitation (CPR) may improve survival. The quality of CPR performed during pediatric out-of-hospital cardiac arrest (p-OHCA) is largely unknown. The main objective of this study was to describe the quality of CPR performed during p-OHCA resuscitation attempts.

METHODS:

Prospective observational multi-center cohort study of p-OHCA patients ≥ 1 and <19 years of age registered in the Resuscitation Outcomes Consortium (ROC) Epistry database. The primary outcome was an a priori composite variable of compliance with American Heart Association (AHA) guidelines for both chest compression (CC) rate and CC fraction (CCF). Event compliance was defined as a case with 60% or more of its minute epochs compliant with AHA targets (rate 100-120min⁻¹; depth ≥ 38 mm; and CCF ≥ 0.80). In a secondary analysis, multivariable logistic regression was used to evaluate the association between guideline compliance and return of spontaneous circulation (ROSC). Results Between December 2005 and December 2012, 2,564 pediatric events were treated by EMS providers, 390 of which were included in the final cohort. Of these events, 22% achieved AHA compliance for both rate and CCF, 36% for rate alone, 53% for CCF alone, and 58% for depth alone. Over time, there was a significant increase in CCF ($p<0.001$) and depth ($p=0.03$). After controlling for potential confounders, there was no significant association between AHA guideline compliance and ROSC. Conclusions In this multi-center study, we have established that there are opportunities for professional rescuers to improve prehospital CPR quality. Encouragingly, CCF and depth both increased significantly over time.

DESFIBRIL·LACIÓ

Scand J Trauma Resusc Emerg Med. 2015 Apr 17;23(1):34.

The number of prehospital defibrillation shocks and 1-month survival in patients with out-of-hospital cardiac arrest.

Hasegawa M1, Abe T2, Nagata T3, Onozuka D4, Hagihara A5.

Abstract

BACKGROUND:

The relationship between the number of pre-hospital defibrillation shocks and treatment outcome in patients with out-of-hospital cardiac arrest (OHCA) presenting with ventricular fibrillation (VF) is unknown currently. We examined the association between the number of pre-hospitalization defibrillation shocks and 1-month survival in OHCA patients.

METHODS:

We conducted a prospective observational study using national registry data obtained from patients with OHCA between January 1, 2009 and December 31, 2012 in Japan. The study subjects were ≥ 18 -110 years of age, had suffered from an OHCA before arrival of EMS personnel, had a witnessed collapse, had an initial rhythm that was shockable [VF/ventricular tachycardia (pulseless VT)], were not delivered a shock using a public automated external defibrillator (AED), received one or more shocks using a biphasic defibrillator by EMS personnel, and were transported to a medical institution between January 1, 2009 and December 31, 2012. There were 20,851 OHCA cases which met the inclusion criteria during the study period. Signal detection analysis was used to identify the cutoff point in the number of prehospital defibrillation shocks most closely related to one-month survival. Variables related to the number of defibrillations or one-month survival in OHCA were identified using multiple logistic regression analysis.

RESULTS:

A cutoff point in the number of pre-hospital defibrillation shocks most closely associated with 1-month OHCA survival was between two and three ($\chi^2 = 209.61$, $p < 0.0001$). Among those patients who received two shocks or less, 34.48% survived for at least 1 month, compared with 24.75% of those who received three shocks or more. The number of defibrillations (odds ratio [OR] = 1.19, 95% CI: 1.03, 1.38), OHCA origin (OR = 2.81, 95% CI: 2.26, 3.49), use of ALS devices (OR = 0.68, 95% CI: 0.59, 0.79), use of epinephrine (OR = 0.33, 95% CI: 0.28, 0.39), interval between first defibrillation and first ROSC (OR = 1.45, 95% CI: 1.18, 1.78), and chest compression (OR = 1.21, 95% CI: 1.06, 1.38) were associated significantly with 1-month OHCA survival.

CONCLUSIONS:

The cutoff point in the number of defibrillations of patients with OHCA most closely related to one-month survival was between 2 and 3, and the likelihood of non-survival 1 month after an OHCA was increased when ≥ 3 shocks were needed. Further studies are needed to verify this finding.

Heart. 2015 Apr 29. pii: heartjnl-2015-307624. doi: 10.1136/heartjnl-2015-307624. [Epub ahead of print]

Public knowledge and confidence in the use of public access defibrillation.

Brooks B1, Chan S1, Lander P1, Adamson R1, Hodgetts GA2, Deakin CD3.

Abstract

INTRODUCTION:

Growing numbers of public access defibrillators aim to improve the effectiveness of bystander cardiopulmonary resuscitation prior to ambulance arrival. In the UK, however, public access defibrillators are only deployed successfully in 1.7% of out-of-hospital cardiac arrests. We

aimed to understand whether this was due to a lack of devices, lack of awareness of their location or a reflection of lack of public knowledge and confidence to use a defibrillator.

METHODS:

Face-to-face semistructured open quantitative questionnaire delivered in a busy urban shopping centre, to identify public knowledge relating to public access defibrillation.

RESULTS:

1004 members of the public aged 9-90 years completed the survey. 61.1% had been first aid trained to a basic life support level. 69.3% claimed to know what an automatic external defibrillator was and 26.1% reported knowing how to use one. Only 5.1% knew where or how to find their nearest public access defibrillator. Only 3.3% of people would attempt to locate a defibrillator in a cardiac arrest situation, and even fewer (2.1%) would actually retrieve and use the device.

CONCLUSIONS:

These findings suggest that a lack of public knowledge, confidence in using a defibrillator and the inability to locate a nearby device may be more important than a lack of defibrillators themselves. Underused public access defibrillation is a missed opportunity to save lives, and improving this link in the chain of survival may require these issues to be addressed ahead of investing more funds in actual defibrillator installation.

RCP DE QUALITAT

Am J Emerg Med. 2015 Apr 10. pii: S0735-6757(15)00251-X. doi: 10.1016/j.ajem.2015.04.007. [Epub ahead of print]

Compressing with dominant hand improves quality of manual chest compressions for rescuers who performed suboptimal cardiopulmonary resuscitation in manikins.

Wang J1, Tang C2, Zhang L3, Gong Y2, Yin C3, Li Y4.

Abstract

OBJECTIVE:

The question of whether the placement of the dominant hand against the sternum could improve the quality of manual chest compressions remains controversial. In the present study, we evaluated the influence of dominant vs nondominant hand positioning on the quality of conventional cardiopulmonary resuscitation (CPR) during prolonged basic life support (BLS) by rescuers who performed optimal and suboptimal compressions.

METHODS:

Six months after completing a standard BLS training course, 101 medical students were instructed to perform adult single-rescuer BLS for 8 minutes on a manikin with a randomized hand position. Twenty-four hours later, the students placed the opposite hand in contact with the sternum while performing CPR. Those with an average compression depth of less than 50 mm were considered suboptimal.

RESULTS:

Participants who had performed suboptimal compressions were significantly shorter (170.2 ± 6.8 vs 174.0 ± 5.6 cm, $P = .008$) and lighter (58.9 ± 7.6 vs 66.9 ± 9.6 kg, $P < .001$) than those who performed optimal compressions. No significant differences in CPR quality were observed between dominant and nondominant hand placements for these who had an average compression depth of greater than 50 mm. However, both the compression depth (49.7 ± 4.2 vs 46.5 ± 4.1 mm, $P = .003$) and proportion of chest compressions with an appropriate depth ($47.6\% \pm 27.8\%$ vs $28.0\% \pm 23.4\%$, $P = .006$) were remarkably higher when compressing the chest with the dominant hand against the sternum for those who performed suboptimal CPR.

CONCLUSIONS:

Chest compression quality significantly improved when the dominant hand was placed against the sternum for those who performed suboptimal compressions during conventional CPR.

REGISTRES | REVISIONS

Resuscitation. 2015 Apr 29. pii: S0300-9572(15)00171-9. doi: 10.1016/j.resuscitation.2015.04.016. [Epub ahead of print]

Managing cardiac arrest with refractory ventricular fibrillation in the emergency department: Conventional cardiopulmonary resuscitation versus extracorporeal cardiopulmonary resuscitation.

Siao FY1, Chiu CC2, Chiu CW2, Chen YC3, Chen YL3, Hsieh YK3, Lee CH3, Wu CT2, Chou CC2, Yen HH4.

Abstract

AIM:

Refractory ventricular fibrillation, resistant to conventional cardiopulmonary resuscitation (CPR), is a life threatening rhythm encountered in the emergency department. Although previous reports suggest the use of extracorporeal CPR can improve the clinical outcomes in patients with prolonged cardiac arrest, the effectiveness of this novel strategy for refractory ventricular fibrillation is not known. We aimed to compare the clinical outcomes of patients with refractory ventricular fibrillation managed with conventional CPR or extracorporeal CPR in our institution.

METHOD:

This is a retrospective chart review study from an emergency department in a tertiary referral medical center. We identified 209 patients presenting with cardiac arrest due to ventricular fibrillation between September 2011 and September 2013. Of these, 60 patients were enrolled with ventricular fibrillation refractory to resuscitation for more than 10min. The clinical outcome of patients with ventricular fibrillation received either conventional CPR, including defibrillation, chest compression, and resuscitative medication (C-CPR, n=40) or CPR plus extracorporeal CPR (E-CPR, n=20) were compared.

RESULTS:

The overall survival rate was 35%, and 18.3% of patients were discharged with good neurological function. The mean duration of CPR was longer in the E-CPR group than in the C-CPR group (69.90±49.6min vs 34.3±17.7min, p=0.0001). Patients receiving E-CPR had significantly higher rates of sustained return of spontaneous circulation (95.0% vs 47.5%, p=0.0009), and good neurological function at discharge (40.0% vs 7.5%, p=0.0067). The survival rate in the E-CPR group was higher (50% vs 27.5%, p=0.1512) at discharge and (50% vs 20%, p=0.0998) at 1 year after discharge.

CONCLUSIONS:

The management of refractory ventricular fibrillation in the emergency department remains challenging, as evidenced by an overall survival rate of 35% in this study. Patients with refractory ventricular fibrillation receiving E-CPR had a trend toward higher survival rates and significantly improved neurological outcomes than those receiving C-CPR.

Am J Emerg Med. 2015 Apr 15. pii: S0735-6757(15)00263-6. doi: 10.1016/j.ajem.2015.04.018. [Epub ahead of print]

Comparison of different techniques for cardiopulmonary resuscitation in microgravity-a simple mathematic estimation of cardiopulmonary resuscitation quality for space environment.

Braunecker S1, Douglas B2, Hinkelbein J3.

Abstract

BACKGROUND:

Since astronauts are selected carefully, are usually young, and are intensively observed before and during training, relevant medical problems are rare. Nevertheless, there is a certain risk for a cardiac arrest in space requiring cardiopulmonary resuscitation (CPR). Up to now, there

are 5 known techniques to perform CPR in microgravity. The aim of the present study was to analyze different techniques for CPR during microgravity about quality of CPR.

MATERIAL AND METHODS:

To identify relevant publications on CPR quality in microgravity, a systematic analysis with defined searching criteria was performed in the PubMed database (<http://www.pubmed.com>). For analysis, the keywords ("reanimation" or "CPR" or "resuscitation") and ("space" or "microgravity" or "weightlessness") and the specific names of the techniques ("Standard-technique" or "Straddling-manoevre" or "Reverse-bear-hug-technique" or "Evetts-Russomano-technique" or "Hand-stand-technique") were used. To compare quality and effectiveness of different techniques, we used the compression product (CP), a mathematical estimation for cardiac output.

RESULTS:

Using the predefined keywords for literature search, 4 different publications were identified (parabolic flight or under simulated conditions on earth) dealing with CPR efforts in microgravity and giving specific numbers. No study was performed under real-space conditions. Regarding compression depth, the handstand (HS) technique as well as the reverse bear hug (RBH) technique met parameters of the guidelines for CPR in 1G environments best (HS ratio, 0.91 ± 0.07 ; RBH ratio, 0.82 ± 0.13). Concerning compression rate, 4 of 5 techniques reached the required compression rate (ratio: HS, 1.08 ± 0.11 ; Evetts-Russomano [ER], 1.01 ± 0.06 ; standard side straddle, 1.00 ± 0.03 ; and straddling maneuver, 1.03 ± 0.12). The RBH method did not meet the required criteria (0.89 ± 0.09). The HS method showed the highest cardiac output (69.3% above the required CP), followed by the ER technique (33.0% above the required CP).

CONCLUSIONS:

In some environmental conditions where this technique cannot be used, the ER technique is a good alternative because CPR quality is only slightly lower.

Am J Emerg Med. 2015 Mar 25. pii: S0735-6757(15)00196-5. doi: 10.1016/j.ajem.2015.03.050. [Epub ahead of print]

Cardiac arrest with initial arrest rhythm of pulseless electrical activity: do rhythm characteristics correlate with outcome?

Hauck M1, Studnek J2, Heffner AC3, Pearson DA4.

Abstract

OBJECTIVES:

Cardiac arrest is a leading cause of death in the United States, with pulseless electrical activity (PEA) as a common initial arrest rhythm. We sought to determine if rate of electrical activity and QRS width correlate with survival in patients who present with PEA out-of-hospital cardiac arrest.

METHODS AND RESULTS:

This is a retrospective review of patients with PEA out-of-hospital cardiac arrest with first documented cardiac rhythm of PEA from January 2010 to September 2013. Demographic, arrest and initial rhythm characteristics, and patient outcome were abstracted via systematic chart review. The initial 20 seconds of each rhythm strip were used to ascertain electrical rate and QRS width. Primary outcome was survival to hospital discharge. Four hundred fourteen patients were eligible for the study. One hundred fifty-two patients did not have sufficient data for analysis. Two hundred sixty-two patients were included in the final analysis with mean age, 66 years. There were 23 (8.8%) survivors and 17 (6.5%) neurologically intact survivors. Mean heart rate was 58 (confidence interval, 54-63) beats per minute, and mean QRS interval was 100 (confidence interval, 95-106) milliseconds. Twenty-nine point seven percent of patients had wide QRS complexes, and 70.3% were narrow. There was no difference in survival in patients based on heart rate (13.1% vs 7.4%, $P = .16$) or QRS interval (8.7% vs 7.7%, $P = .79$).

CONCLUSIONS:

In this single emergency medical services agency study, neither PEA electrical rate nor QRS width correlated with survival or neurologic outcome.

Circulation. 2015 May 4. pii: CIRCULATIONAHA.114.011366. [Epub ahead of print]

Return to Work in Out-of-Hospital Cardiac Arrest Survivors: A Nationwide Register-Based Follow-Up Study.

Kragholm K1, Wissenberg M2, Mortensen RN3, Fonager K4, Jensen SE4, Rajan S2, Lippert FK5, Christensen EF6, Hansen PA5, Lang-Jensen T5, Hendriksen OM5, Køber L7, Gislason G8, Torp-Pedersen C3, Rasmussen BS9.

Abstract

BACKGROUND:

Data on long-term function of out-of-hospital cardiac arrest survivors are sparse. We examined return to work as proxy of preserved function without major neurological deficits in survivors.

METHODS AND RESULTS:

In Denmark, out-of-hospital cardiac arrests are systematically reported to the Danish Cardiac Arrest Register since 2001. During 2001-2011, we identified 4,354 patients employed before arrest among 12,332 working age patients (18-65 years), of which 796 survived to day 30. Among 796 survivors (median age 53 years [Q1-Q3 46-59]; 81.5% men), 610 (76.6%) returned to work in a median time of 4 months [Q1-Q3 1-19] with a median time of 3 years spent back at work, of which 74.6% (N=455) remained employed without sick leaves during the first six months after return to work. This latter proportion of survivors returning to work increased over time (66.1% in 2001-2005 versus 78.1% in 2006-2011, P=0.002). In multivariable Cox regression analysis, factors associated with return to work with ≥ 6 months of sustainable employment were 1] arrest during 2006-2011 versus 2001-2005, HR 1.38 (95% CI, 1.05-1.82); 2] male gender, HR 1.48 (CI 95%, 1.06-2.07); 3] age of 18-49 versus 50-65 years, HR 1.32 (95% CI, 1.02-1.68); 4] bystander-witnessed arrest, HR 1.79 (95% CI, 1.17-2.76); and 5] bystander cardiopulmonary resuscitation, HR 1.38 (95% CI, 1.02-1.87).

CONCLUSIONS:

Of 30-day survivors employed before arrest, 76.6% returned to work. The percentage of survivors returning to work increased significantly along with improved survival during 2001-2011 suggesting an increase in proportions of survivors with preserved function over time.

CURES POST

Circ Cardiovasc Qual Outcomes. 2015 May 5. pii: CIRCOUTCAMES.115.001767. [Epub ahead of print]

Prognostic Implications of Level-of-Care at Tertiary Heart Centers Compared With Other Hospitals After Resuscitation From Out-of-Hospital Cardiac Arrest.

Søholm H1, Kjaergaard J2, Bro-Jeppesen J2, Hartvig-Thomsen J2, Lippert F2, Køber L2, Nielsen N2, Engsig M2, Steensen M2, Wanscher M2, Karlens FM2, Hassager C2.

Abstract

BACKGROUND:

Studies have found higher survival rates after out-of-hospital cardiac arrest and admission to tertiary heart centers. The aim was to examine the level-of-care at tertiary centers compared with nontertiary hospitals and the association with outcome after out-of-hospital cardiac arrest.

METHODS AND RESULTS:

Consecutive out-of-hospital cardiac arrest patients (n=1078) without ST-segment-elevation myocardial infarction admitted to tertiary centers (54%) and nontertiary hospitals (46%) were included (2002-2011). Patient charts were reviewed focusing on level-of-care and comorbidity. Survival to discharge differed significantly with 45% versus 24% of patients discharged alive (P<0.001), and after adjustment for prognostic factors admissions to tertiary centers were still

associated with lower 30-day mortality (hazard ratio, 0.78 [0.64-0.96; P=0.02]), independent of comorbidity. The adjusted odds of predefined markers of level-of-care were higher in tertiary centers: admission to intensive care unit (odds ratio [OR], 1.8 [95% confidence interval, 1.2-2.5]), temporary pacemaker (OR, 6.4 [2.2-19]), vasoactive agents (OR, 1.5 [1.1-2.1]), acute (<24 hours) and late coronary angiography (OR, 10 [5.3-22] and 3.8 [2.5-5.7]), neurophysiological examination (OR, 1.8 [1.3-2.6]), and brain computed tomography (OR, 1.9 [1.4-2.6]), whereas no difference in therapeutic hypothermia was noted. Patients at tertiary centers were more often consulted by a cardiologist (OR, 8.6 [5.0-15]), had an echocardiography (OR, 2.8 [2.1-3.7]), and survivors more often had implantable cardioverter defibrillator's implanted (OR, 2.1 [1.2-3.6]).

CONCLUSION:

Admissions to tertiary centers were associated with significantly higher survival after out-of-hospital cardiac arrest in patients without ST-segment-elevation myocardial infarction in the Copenhagen area even after adjustment for prognostic factors including comorbidity. Level-of-care seems higher in tertiary centers both in the early phase, during the intensive care unit admission, and in the workup before discharge. The varying level-of-care may contribute to the survival difference; however, differences in comorbidity do not seem to matter significantly.

Eur Heart J Acute Cardiovasc Care. 2015 May 5. pii: 2048872615585519. [Epub ahead of print] **Is the pre-hospital ECG after out-of-hospital cardiac arrest accurate for the diagnosis of ST-elevation myocardial infarction?**

Salam I1, Hassager C1, Thomsen JH2, Langkjær S1, Sjøholm H1, Bro-Jeppesen J1, Bang L1, Holmvang L1, Erlinge D3, Wanscher M4, Lippert FK5, Køber L1, Kjaergaard J1.

Abstract

BACKGROUND:

Current guidelines recommend that comatose out-of-hospital cardiac arrest patients with ST-segment elevations (STEs) following return of spontaneous circulation (ROSC) should be referred for an acute coronary angiography. We sought to investigate the diagnostic value of the pre-hospital ROSC-ECG in predicting ST-elevation myocardial infarction (STEMI).

METHOD:

ROSC-ECGs of 145 comatose survivors of out-of-hospital cardiac arrest, randomly assigned in the Target Temperature Management trial, were classified according to the current STEMI ECG criteria (third universal definition of myocardial infarction).

RESULTS:

STEs were present in the pre-hospital ROSC-ECG of 78 (54%) patients. A final diagnosis revealed that 69 (48%) patients had STEMI, 31 (21%) patients had non-STEMI and 45 (31%) patients had no myocardial infarction. STE in ROSC-ECGs had a sensitivity of 74% (95% confidence interval (CI) 62-84), specificity of 65% (95% CI 53-75) and a positive and negative predictive value of 65% (95% CI 54-76) and 73% (95% CI 61-83) in predicting STEMI. Time to ROSC was significantly longer (24 minutes vs. 19 minutes, P=0.02) in STE compared with no STE patients. Percutaneous coronary intervention was successful in 68% versus 36% (P<0.001) of STE compared to no STE patients. No significant difference was found in 180-day mortality rates between STE and no STE patients (36% vs. 30%, Plogrank=0.37).

CONCLUSION:

The pre-hospital ROSC-ECG is a suboptimal diagnostic tool to predict STEMI and therefore not a sensitive tool for triage to cardiac centres. This supports the incentive of referring all comatose survivors of out-of-hospital cardiac arrest of suspected cardiac origin to a tertiary heart centre with the availability of acute coronary angiography, even in the absence of STEs.

ENTRENAMIENTO

Am J Emerg Med. 2015 Apr 21. pii: S0735-6757(15)00262-4. doi: 10.1016/j.ajem.2015.04.017. [Epub ahead of print]

Comparison of intubation through the McGrath MAC, GlideScope, AirTraq, and Miller Laryngoscope by paramedics during child cardiopulmonary resuscitation: a randomized crossover manikin trial.

Szarpak L1, Karczewska K2, Evrin T3, Kurowski A4, Czyzewski L5.

Abstract

BACKGROUND:

Advanced airway management and endotracheal intubation (ETI) during cardiopulmonary resuscitation (CPR) is more difficult than, for example, during anesthesia. However, new devices such as video laryngoscopes should help in such circumstances. The aim of this study was to compare the performance of 4 intubation devices in pediatric manikin-simulated CPR.

METHODS:

One hundred two paramedics participated in this study. None had prior experience in video laryngoscopy. After a standardized audiovisual lecture lasting 45 minutes, the paramedics participated in a practical demonstration using the advanced pediatric patient simulator PediaSIM CPR (FCAE HealthCare, Sarasota, FL), which was designed to be an accurate representation of a 6-year-old child. Cardiopulmonary resuscitation was performed using LUCAS-2 (Physio-Control, Redmond, WA). Afterward, paramedics were instructed to perform ETI using 4 intubation devices (MacGrathMAC, GlideScope, AirTraq, and Miller Laryngoscope Blade [Miller]) in a randomized sequence. The primary outcome was the success rate of tracheal intubation. The secondary outcome was the time to intubation.

RESULTS:

The mean time to intubation was 30.7 ± 15.3 , 28.6 ± 15.9 , 24.1 ± 5.0 , and 39.3 ± 14.7 seconds (McGrath, GlideScope, AirTraq, and Miller, respectively); and the success ratio of intubation for the devices was 100% vs 100% vs 100% vs 77.5%, respectively.

CONCLUSIONS:

Child ETI performed by paramedics during uninterrupted chest compression often has a low success rate. In contrast, McGrath, GlideScope, and AirTraq intubation devices are fast, safe, and easy to use. Within the limitations of a manikin study, this study suggests that inexperienced medical staff might benefit from using video laryngoscopy devices for child emergency airway management.

DESFIBRILACIÓN

Resuscitation. 2015 Apr 28. pii: S0300-9572(15)00180-X. doi: 10.1016/j.resuscitation.2015.04.023. [Epub ahead of print]

Pre-shock chest compression pause effects on termination of ventricular fibrillation/tachycardia and return of organized rhythm within mechanical and manual cardiopulmonary resuscitation.

Olsen JA1, Brunborg C2, Steinberg M3, Persse D4, Sterz F5, Lozano M Jr6, Westfall M7, Travis DT6, Lerner EB8, Brouwer MA9, Wik L10.

Abstract

BACKGROUND:

Shorter manual chest compression pauses prior to defibrillation attempts is reported to improve the defibrillation success rate. Mechanical load-distributing band (LDB-) CPR enables shocks without compression pause. We studied pre-shock pause and termination of ventricular fibrillation/pulseless ventricular tachycardia 5s post-shock (TOF) and return of organized rhythm (ROOR) with LDB and manual (M-) CPR.

METHODS:

In a secondary analysis from the Circulation Improving Resuscitation Care trial, patients with initial shockable rhythm and interpretable post-shock rhythms were included. Pre-shock rhythm, pause duration (if any), and post-shock rhythm were obtained for each shock. Associations between TOF/ROOR and pre-shock pause duration, including no pause cases with LDB-CPR, were analyzed with Chi-square test. A p-value <0.05 was considered statistically significant.

RESULTS:

For TOF and ROOR analyses we included 417 LDB-CPR patients with 1476 and 1438 shocks, and 495 M-CPR patients with 1839 and 1796 shocks, respectively. For first shocks with LDB-CPR, pre-shock pause was associated with TOF (p=0.049) with lowest TOF (77%) for shocks given without pre-shock compression pause. This association was not significant when all shocks were included (p=0.07) and not for ROOR. With M-CPR there were no significant associations between shock-related chest compression pause duration and TOF or ROOR.

CONCLUSION:

For first shocks with LDB-CPR, termination of fibrillation was associated with pre-shock pause duration. There was no association for the rate of return of organized rhythm. For M-CPR, where no shocks were given during continuous chest compressions, there were no associations between pre-shock pause duration and TOF or ROOR.

VENTILACIÓ

Crit Care. 2015 May 8;19(1):215. [Epub ahead of print]

Management and outcome of mechanically ventilated patients after cardiac arrest.

Sutherasan Y1,2, Peñuelas O3, Muriel A4, Vargas M5, Frutos-Vivar F6, Brunetti I7, Raymondos K8, D'Antini D9, Nielsen N10, Ferguson ND11, Böttiger BW12, Thille AW13, Davies AR14, Hurtado J15, Rios F16, Apezteguía C17, Violi DA18, Cakar N19, González M20, Du B21, Kuiper MA22, Soares MA23, Koh Y24, Moreno RP25, Amin P26, Tomicic V27, Soto L28, Bülow HH29, Anzueto A30, Esteban A31, Pelosi P32; VENTILA GROUP.

Abstract

INTRODUCTION:

The aim of this study was to describe and compare the changes in ventilator management and complications over time as well as variables associated with 28-day hospital mortality in patients receiving mechanical ventilation (MV) after cardiac arrest.

METHODS:

Secondary analysis of three prospective, observational multicenter studies conducted in 1998, 2004 and 2010 in 927 intensive care units (ICUs) from 40 countries. We screened 18,302 patients receiving MV for longer than 12 hours during a one-month period. We included 812 patients receiving MV after cardiac arrest. We collected demographics, daily ventilator settings, complications during ventilation and outcomes. Multivariate logistic regression analysis was performed to calculate odds ratios determining that which variables within 24 hours of hospital admission were associated with 28-day hospital mortality and the occurrence of ARDS and pneumonia acquired during ICU stay at 48 hours after admission.

RESULTS:

Among 812 patients, 100 were included from 1998, 239 from 2004 and 473 from 2010. Ventilatory management changed over time with decreased tidal volumes (VT) [from a mean 8.9 (standard deviation 2) ml/kg actual body weight (ABW) in 1998 to 6.7(2) ml/kg ABW in 2010 and from 9(2.3) ml/kg predicted body weight (PBW) in 2004 to 7.95(1.7) ml/kg PBW in 2010] and increased positive end-expiratory pressure (PEEP) [from 3.5(3) in 1998 to 6.5(3) in 2010] (p <0.001). Patients included in 2010 had more sepsis, cardiovascular dysfunction and neurologic failure but 28-day hospital mortality was similar over the time (52% in 1998, 57% in 2004 and 52% in 2010). Variables independently associated with 28-day hospital mortality

were: older age, PaO₂ < 60 mmHg, cardiovascular dysfunction and less use of sedative agents. Higher VT, and plateau pressure with lower PEEP were associated with the occurrence of ARDS and pneumonia acquired during ICU stay.

CONCLUSIONS:

Protective mechanical ventilation with lower VT and higher PEEP is more commonly used after cardiac arrest. The incidence of pulmonary complications decreased, while other non-respiratory organ failures increased with time. The application of protective mechanical ventilation and the prevention of single and multiple organ failure may be considered to improve outcome in patients after cardiac arrest.

RCP

Resuscitation. 2015 May 11. pii: S0300-9572(15)00200-2. doi: 10.1016/j.resuscitation.2015.05.002. [Epub ahead of print]

Amplitude-Spectral Area and Chest Compression Release Velocity Independently Predict Hospital Discharge and Good Neurological Outcome in Ventricular Fibrillation Out-of-Hospital Cardiac Arrest.

Indik JH1, Conover Z2, McGovern M2, Silver AE3, Spaite DW4, Bobrow BJ5, Kern KB2.

Abstract

OBJECTIVE:

In out-of-hospital cardiac arrest (OHCA) with ventricular fibrillation (VF) the frequency-based waveform characteristic, amplitude-spectral area (AMSA) is associated with hospital discharge and good neurological outcome, yet AMSA is also known to increase in response to chest compressions (CC). In addition to rate and depth, well performed CC provides good chest recoil without leaning, reflected in the release velocity (RV). We hypothesized that AMSA is associated with hospital discharge and good neurological outcome independent of CC quality.

METHODS:

OHCA patients (age ≥18), with initial rhythm of VF from an Utstein-Style database were analyzed. AMSA was measured prior to each shock, and averaged for each subject (AMSA-avg). Primary endpoint was hospital discharge and secondary endpoint was a good neurological outcome. Univariate and stepwise multivariable logistic regression, and receiver-operator-characteristic (ROC) analyses were performed. Factors analyzed were age, sex, witnessed status, time from dispatch to monitor/defibrillator application, number of shocks, first shock AMSA (AMSA1), AMSA-avg, averaged pre-shock pause, CC rate, depth, and RV.

RESULTS:

140 subjects were analyzed. Hospital discharge was 31% and with good neurological outcome in 24% (77% of those discharged). AMSA-avg (p<0.001), RV (p=0.002), and age (p=0.029) were independently associated with hospital discharge, with a non-significant trend for witnessed status (p=0.069), with AUC=0.846 for the multivariate model. For good neurological outcome, AMSA-avg (p=0.001) and RV (p=0.001) remained independently significant, with AUC=0.782.

CONCLUSION:

In OHCA with an initial rhythm of VF, AMSA-avg and CC RV are both highly and independently associated with hospital discharge and good neurological outcome.

REGISTRES | REVISIONS

Am J Cardiol. 2015 Mar 15;115(6):730-7. doi: 10.1016/j.amjcard.2014.12.033. Epub 2015 Jan 6.

Predictors of survival and favorable functional outcomes after an out-of-hospital cardiac arrest in patients systematically brought to a dedicated heart attack center (from the Harefield Cardiac Arrest Study).

Iqbal MB1, Al-Hussaini A2, Rosser G2, Salehi S2, Phylactou M2, Rajakulasingham R2, Patel J2, Elliott K2, Mohan P2, Green R2, Whitbread M3, Smith R2, Ilesley C2.

Abstract

Despite advances in cardiopulmonary resuscitation (CPR), survival remains low after out-of-hospital cardiac arrest (OOHCA). Acute coronary ischemia is the predominating precipitant, and prompt delivery of patients to dedicated facilities may improve outcomes. Since 2011, all patients experiencing OOHCA in London, where a cardiac etiology is suspected, are systematically brought to heart attack centers (HACs). We determined the predictors for survival and favorable functional outcomes in this setting. We analyzed 174 consecutive patients experiencing OOHCA from 2011 to 2013 brought to Harefield Hospital—a designated HAC in London. We analyzed (1) all-cause mortality and (2) functional status using a modified Rankin scale (mRS 0 to 6, where mRS0-3(+) = favorable functional status). The overall survival rates were 66.7% (30 days) and 62.1% (1 year); and 54.5% had mRS0-3(+) at discharge. Patients with mRS0-3(+) had reduced mortality compared to mRS0-3(-): 30 days (1.2% vs 72.2%, $p < 0.001$) and 1 year (5.3% vs 77.2%, $p < 0.001$). Multivariate analyses identified lower patient comorbidity, absence of cardiogenic shock, bystander CPR, ventricular tachycardia/ventricular fibrillation as initial rhythm, shorter duration of resuscitation, prehospital advanced airway, absence of adrenaline and inotrope use, and intra-aortic balloon pump use as predictors of mRS0-3(+). Consistent predictors of increased mortality were the presence of cardiogenic shock, advanced airway use, increased duration of resuscitation, and absence of therapeutic hypothermia. A streamlined delivery of patients experiencing OOHCA to dedicated facilities is associated with improved functional status and survival. Our study supports the standardization of care for such patients with the widespread adoption of HACs.

Laeknabladid. 2015 Mar;101(3):137-41.

[Results of pre-hospital cardiac resuscitation in the Reykjavik area 2004-2007].

[Article in Icelandic]

Mogensen BA, Bjornsson HM, Thorgeirsson G, Haraldsson GE, Mogensen B.

Abstract

INTRODUCTION:

In the Reykjavik area, a physician staffed ambulance -responded to cardiac arrests from 1982-2007. The aim of this study was to assess the outcome of attempted pre-hospital cardiac resuscitations in the period from 2004-2007 and compare to previous studies.

MATERIAL AND METHODS:

All cases of attempted prehospital resuscitations in cardiac arrests of presumed cardiac etiology. Data was gathered according to the Utstein template.

RESULTS:

Of a total of 289 cases in cardiac arrest, resuscitation was attempted in 279 and 200 of those were presumed to have a cardiac etiology. Men were 76% of the patients and the average age was 67.7 years. Average response time was 6.3 min. One hundred and seven (54%) survived to hospital admission and 50 (25%) survived to discharge compared to 16-19% in previous studies ($p=0.16$). The presenting rhythm was ventricular fibrillation/ventricular tachycardia (VF/VT) in 50% of the cases, 30% was in asystole and 20% in pulseless electrical activity (PEA). Of those admitted to intensive care unit/ department and had ventricular fibrillation on the first rhythm strip 70% were discharged during 2004-2007 compared to 49% during 1999-2002 ($p=0.01$). Bystander CPR was provided in 62% of witnessed cases compared to 54% in a previous study ($p=0.26$). One hundred and twenty (60%) were witnessed cases of which 37 (31%) survived to hospital discharge compared to 5 (8%) of non witnessed cases ($p < 0.01$).

CONCLUSION:

One in every four cardiac arrest patients in the Reykjavik area survives to discharge. This is similar to previous studies in the area (16-19%) and high compared to international studies 3-16%. Survival of those admitted to intensive care unit/ department and had ventricular fibrillation on the first rhythm strip was significantly higher compared to previous studies. Survival was found to be significantly higher if the cardiac arrest was witnessed.

Crit Care Med. 2015 Apr;43(4):889-96. doi: 10.1097/CCM.0000000000000820.

Active compression-decompression resuscitation and impedance threshold device for out-of-hospital cardiac arrest: a systematic review and metaanalysis of randomized controlled trials.

Wang CH1, Tsai MS, Chang WT, Huang CH, Ma MH, Chen WJ, Fang CC, Chen SC, Lee CC.

Abstract

OBJECTIVE:

Active compression-decompression resuscitation and impedance threshold device are proposed to improve survival of patients of cardiac arrest by lowering intrathoracic pressure and increasing cardiac output. The results of clinical studies of active compression-decompression resuscitation or impedance threshold device were controversial. This metaanalysis pooled results of randomized controlled trials to examine whether active compression-decompression resuscitation or impedance threshold device would improve outcomes of out-of-hospital cardiac arrest in comparison with standard cardiopulmonary resuscitation and to explore factors modifying these effects.

DATA SOURCES:

Medline and Embase were searched from inception to September 2013.

STUDY SELECTION:

Randomized controlled trials comparing active compression-decompression resuscitation or impedance threshold device with standard cardiopulmonary resuscitation in out-of-hospital cardiac arrest patients were selected. There were no restrictions for language, population, or publication year.

DATA EXTRACTION:

Data on study characteristics, including patients, intervention details, and outcome measures, were independently extracted.

DATA SYNTHESIS:

Fifteen trials, including 16,088 patients, were identified from 331 potentially relevant references. Return of spontaneous circulation was designated as the primary outcome. The pooled result showed no significant improvement in return of spontaneous circulation by active compression-decompression resuscitation or impedance threshold device in comparison with standard cardiopulmonary resuscitation (risk ratio, 1.04; 95% CI, 0.93-1.16; I, 46%). There was also no significant difference in survival or neurologic outcome at hospital discharge between active compression-decompression resuscitation or impedance threshold device and standard cardiopulmonary resuscitation. The meta-regression indicated that this minimal effect might be modified by two important prognostic factors, that is, witnessed status and response time. After adjustment of these two factors, impedance threshold device appeared to improve return of spontaneous circulation, which could be further augmented by advanced airway use.

CONCLUSIONS:

Active compression-decompression resuscitation or impedance threshold device seemed not to improve return of spontaneous circulation in out-of-hospital cardiac arrest patients. The meta-regression indicated two probable prognostic factors causing this minimal effect. Nonetheless, these findings referred to differences between trials and could not necessarily be extrapolated to individual patients. The individual patient-level extrapolation may need to be solved by a future randomized controlled trial.

Crit Care Med. 2015 Apr;43(4):840-848, April 2015.

Chest Compression Rates and Survival Following Out-of-Hospital Cardiac Arrest

Objective: Guidelines for cardiopulmonary resuscitation recommend a chest compression rate of at least 100 compressions/min. A recent clinical study reported optimal return of spontaneous circulation with rates between 100 and 120/min during cardiopulmonary resuscitation for out-of-hospital cardiac arrest. However, the relationship between compression rate and survival is still undetermined. Design: Prospective, observational study. Setting: Data is from the Resuscitation Outcomes Consortium Prehospital Resuscitation Impedance threshold device and Early versus Delayed analysis clinical trial. Participants: Adults with out-of-hospital cardiac arrest treated by emergency medical service providers. Interventions: None. Measurements Main Results: Data were abstracted from monitor-defibrillator recordings for the first five minutes of emergency medical service cardiopulmonary resuscitation. Multiple logistic regression assessed odds ratio for survival by compression rate categories (<80, 80-99, 100-119, 120-139, >=140), both unadjusted and adjusted for sex, age, witnessed status, attempted bystander cardiopulmonary resuscitation, location of arrest, chest compression fraction and depth, first rhythm, and study site. Compression rate data were available for 10,371 patients; 6,399 also had chest compression fraction and depth data. Age (mean +/- SD) was 67 +/- 16 years. Chest compression rate was 111 +/- 19 per minute, compression fraction was 0.70 +/- 0.17, and compression depth was 42 +/- 12 mm. Circulation was restored in 34%; 9% survived to hospital discharge. After adjustment for covariates without chest compression depth and fraction (n = 10,371), a global test found no significant relationship between compression rate and survival (p = 0.19). However, after adjustment for covariates including chest compression depth and fraction (n = 6,399), the global test found a significant relationship between compression rate and survival (p = 0.02), with the reference group (100-119 compressions/min) having the greatest likelihood for survival. Conclusions: After adjustment for chest compression fraction and depth, compression rates between 100 and 120 per minute were associated with greatest survival to hospital discharge. Copyright (C) by 2015 by the Society of Critical Care Medicine and Wolters Kluwer Health, Inc. All Rights Reserved.

CURES POST-RCE

Intensive Care Med. 2015 May 14. [Epub ahead of print]

Acute kidney injury after out-of-hospital cardiac arrest: risk factors and prognosis in a large cohort.

Geri G1, Guillemet L, Dumas F, Charpentier J, Antona M, Lemiale V, Bougouin W, Lamhaut L, Mira JP, Vinsonneau C, Cariou A.

Abstract

PURPOSE:

Characteristics of acute kidney injury (AKI) occurring after out-of-hospital cardiac arrest (OHCA) are incompletely described. We aimed to evaluate the prevalence of AKI, identifying risk factors and assessing the impact of AKI on outcome after OHCA.

METHODS:

Single-center study between 2007 and 2012 in a cardiac arrest center in Paris, France. All consecutive OHCA patients with at least one weight measurement and one serum creatinine level available and treated by therapeutic hypothermia were included, except those with chronic kidney disease and those dead on arrival. AKI was defined as stage 3 of the Acute Kidney Injury Network (AKIN) classification. Main outcome was day-30 mortality. Factors associated with AKI occurrence and day-30 mortality were evaluated by logistic regression.

RESULTS:

580 patients (71.3 % male, median age 59.3 years, initial shockable rhythm in 56.9 % of cases) were included in the analysis. AKI stage 3 occurred in 280 (48.3 %) patients. Age, male gender, resuscitation duration, post-resuscitation shock, public setting, and initial rhythm were associated with AKI stage 3. AKI stage 3 was associated with a significantly higher day-30 mortality rate [OR 1.60; 95 % CI (1.05, 2.43); p = 0.03]. No independent association between AKI and neurologic outcome was observed. At day 30, 67 patients had a normal kidney function (eGFR >75 mL/min/1.73 m²), and five remained dialysis-dependent. Patients with eGFR higher than 75 mL/min/1.73 m² at day 30 were younger and more frequently male.

CONCLUSION:

AKI stage 3 was frequent after OHCA and was associated with poorer outcome. Improvement strategies in post-resuscitation care should consider AKI as a potential target of treatment.

ENTRENAMENT

Resuscitation. 2015 May 8. pii: S0300-9572(15)00197-5. doi: 10.1016/j.resuscitation.2015.04.031. [Epub ahead of print]

Measuring and Improving Cardiopulmonary Resuscitation Quality inside the Emergency Department.

Crowe C1, Bobrow BJ2, Vadeboncoeur TF3, Dameff C4, Stolz U5, Silver A6, Roosa J7, Page R8, LoVecchio F9, Spaite DW10.

Abstract

AIM OF STUDY:

To evaluate CPR quality during cardiac resuscitation attempts in an urban emergency department (ED) and determine the influence of the combination of scenario-based training, real-time audiovisual feedback (RTAVF), and post-event debriefing on CPR quality.

METHODS:

CPR quality was recorded using an R Series monitor-defibrillator (ZOLL Medical) during the treatment of adult cardiac arrest patients. Phase 1 (P1; 11/01/2010-11/15/2012) was an observation period of CPR quality. Phase 2 (P2; 11/15/2012-11/08/2013) was after a 60-minute psychomotor skills CPR training and included RTAVF and post-event debriefing.

RESULTS:

A total of 52 cardiac arrest patients were treated in P1 (median age 56 yrs, 63.5% male) and 49 in P2 (age 60 yrs, 83.7% male). Chest compression (CC) depth increased from 46.7±3.8mm in P1 to 61.6±2.8mm in P2 (p<0.001), with the percentage of CC ≥51mm increasing from 30.6% in P1 to 87.4% in P2 (p<0.001). CC release velocity increased from 314±25mm/s in P1 to 442±20mm/s in P2 (p<0.001). No significant differences were identified in CC fraction (84.3% P1 vs 88.4% P2, p=0.1), CC rate (125±3 cpm P1 vs. 125±3 cpm P2, p=0.7), or pre-shock pause (9.7sec P1 vs. 5.9sec P2, p=0.5), though CC fraction and pre-shock pause were within guideline recommendations.

CONCLUSION:

Implementation of the bundle of scenario-based training, real-time audiovisual CPR feedback, and post-event debriefing was associated with improved CPR quality and compliance with CPR guidelines in this urban teaching emergency department.

HIPOTÈRMIA

J Am Coll Cardiol. 2015 May 19;65(19):2104-14. doi: 10.1016/j.jacc.2015.03.538.

Neuron-Specific Enolase as a Predictor of Death or Poor Neurological Outcome After Out-of-Hospital Cardiac Arrest and Targeted Temperature Management at 33°C and 36°C.

Stammet P1, Collignon O2, Hassager C3, Wise MP4, Hovdenes J5, Åneman A6, Horn J7, Devaux Y8, Erlinge D9, Kjaergaard J3, Gasche Y10, Wanscher M11, Cronberg T12, Friberg H13, Wetterslev J14, Pellis T15, Kuiper M16, Gilson G17, Nielsen N18; TTM-Trial Investigators.

Abstract

BACKGROUND:

Neuron-specific enolase (NSE) is a widely-used biomarker for prognostication of neurological outcome after cardiac arrest, but the relevance of recommended cutoff values has been questioned due to the lack of a standardized methodology and uncertainties over the influence of temperature management.

OBJECTIVES:

This study investigated the role of NSE as a prognostic marker of outcome after out-of-hospital cardiac arrest (OHCA) in a contemporary setting.

METHODS:

A total of 686 patients hospitalized after OHCA were randomized to targeted temperature management at either 33°C or 36°C. NSE levels were assessed in blood samples obtained 24, 48, and 72 h after return of spontaneous circulation. The primary outcome was neurological outcome at 6 months using the cerebral performance category score.

RESULTS:

NSE was a robust predictor of neurological outcome in a baseline variable-adjusted model, and target temperature did not significantly affect NSE values. Median NSE values were 18 ng/ml versus 35 ng/ml, 15 ng/ml versus 61 ng/ml, and 12 ng/ml versus 54 ng/ml for good versus poor outcome at 24, 48, and 72 h, respectively ($p < 0.001$). At 48 and 72 h, NSE predicted neurological outcome with areas under the receiver-operating curve of 0.85 and 0.86, respectively. High NSE cutoff values with false positive rates $\leq 5\%$ and tight 95% confidence intervals were able to reliably predict outcome.

CONCLUSIONS:

High, serial NSE values are strong predictors of poor outcome after OHCA. Targeted temperature management at 33°C or 36°C does not significantly affect NSE levels. (Target Temperature Management After Cardiac Arrest [TTM]; NCT01020916).

DESFIBRIL·LACIÓ

Prehosp Emerg Care. 2015 May 13. [Epub ahead of print]

Double Sequential Defibrillation for Refractory Ventricular Fibrillation: A Case Report.

Lybeck AM, Moy HP, Tan DK.

Abstract

A 40-year-old male struck his chest against a pole during a basketball game and had sudden out-of-hospital cardiac arrest. After bystander cardiopulmonary resuscitation, fire and emergency medical services personnel provided six defibrillation attempts prior to emergency department arrival. A 7th attempt in the emergency department using a different vector was unsuccessful. On the 8th attempt, using a second defibrillator with defibrillator pads placed adjacent to the primary set of defibrillator pads, two shocks were administered in near simultaneous fashion. The double sequential defibrillation was successful and the patient had return of spontaneous circulation at the next pulse check. He recovered in the intensive care unit, was discharged home 1 month later, and continues to follow up in clinic over 1 year later with a Cerebral Performance Category score of 1 (short-term memory deficits).

Resuscitation. 2015 May 6. pii: S0300-9572(15)00178-1. doi: 10.1016/j.resuscitation.2015.04.022. [Epub ahead of print]

Public knowledge of automatic external defibrillators in a large U.S. urban community.

Gonzalez M1, Leary M1, Blewer AL1, Cinousis M1, Sheak K1, Ward M1, Becker L1, Abella BS2.

Abstract

BACKGROUND:

Sudden cardiac arrest (SCA) strikes over 40,000 people in the public environment annually in the U.S., but despite evidence-based interventions such as prompt CPR and defibrillation, less than 25% of patients survive public SCA events. Effective use of automated external defibrillators (AEDs), especially by lay bystanders, represents an important strategy to improve survival rates. Previous investigations in Europe and Asia have demonstrated poor public awareness of AEDs; public knowledge of AEDs in the U.S. is poorly characterized.

OBJECTIVE:

To measure public understanding of AEDs among the general public, at multiple sites within a busy urban transportation system.

METHODS:

Surveys were administered at two high-volume train stations in Philadelphia, Pennsylvania.

RESULTS:

A total of 514 surveys were completed. Two thirds (66%) of respondents were able to correctly identify an AED and its purpose, and just over half (58%) of respondents reported willingness to use an AED in an emergency situation. Less than 10% of respondents presented with a hypothetical SCA scenario spontaneously mentioned using an AED when asked what actions they would take.

CONCLUSIONS:

In this cross-sectional survey, public knowledge about AEDs and their use was high; however, only a very small number of respondents expressed thoughts of using the device in an emergency situation and demonstrated willingness to serve as a responder. Increased education and training efforts, as well as potential interventions such as 911 dispatcher-assisted AED use may help improve bystander response in SCA events.