REGISTRES I REVISIONS

1. **Circulation**. 2017 Nov 6. pii: CIR.0000000000000539. doi: 10.1161/CIR.0000000000000539. [Epub ahead of print]

2017 American Heart Association Focused Update on Adult Basic Life Support and Cardiopulmonary Resuscitation Quality: An Update to the American Heart Association Guidelines for Cardio pulmonary Resuscitation and Emergency Cardiovascular Care.

Kleinman ME, Goldberger ZD, Rea T, Swor RA, Bobrow BJ, Brennan EE, Terry M, Hemphill R, Gazmuri RJ, Hazinski MF, Travers AH.

Abstract

Cardiopulmonary resuscitation is a lifesaving technique for victims of sudden cardiac arrest. Despite advances in resuscitation science, basic life support remains a critical factor in determining outcomes. The American Heart Association recommendations for adult basic life support incorporate the most recently published evidence and serve as the basis for education and training for laypeople and healthcare providers who perform cardiopulmonary resuscitation.

Conflict of interest statement

The American Heart Association makes every effort to avoid any actual or potential conflicts of interest that may arise as a result of an outside relationship or a personal, professional, or business interest of a member of the writing panel. Specifically, all members of the writing group are required to complete and submit a Disclosure Questionnaire showing all such relationships that might be perceived as real or potential conflicts of interest.

FREE ARTICLE

2. **Resuscitation**. 2017 May;114:40-46. doi: 10.1016/j.resuscitation.2017.02.018. Epub 2017 Feb 27.

Systematic review of the effectiveness of prehospital critical care following out-of-hospital cardiac arrest.

von Vopelius-Feldt J1, Brandling J2, Benger J3.

Abstract

BACKGROUND: Improving survival after out-of-hospital cardiac arrest (OHCA) is a priority for modern emergency medical services (EMS) and prehospital research. Advanced life support (ALS) is now the standard of care in most EMS. In some EMS, prehospital critical care providers are also dispatched to attend OHCA. This systematic review presents the evidence for prehospital critical care for OHCA, when compared to standard ALS care.

METHODS: We searched the following electronic databases: PubMed, EmBASE, CINAHL Plus and AMED (via EBSCO), Cochrane Database of Systematic Reviews, DARE, Cochrane Central Register of Controlled Trials, NHS Economic Evaluation Database, NIHR Health Technology Assessment Database, Google Scholar and ClinicalTrials.gov. Search terms related to cardiac arrest and prehospital critical care. All studies that compared patient-centred outcomes between prehospital critical care and ALS for OHCA were included.

RESULTS: The review identified six full text publications that matched the inclusion criteria, all of which are observational studies. Three studies showed no benefit from prehospital critical care but were underpowered with sample sizes of 1028-1851. The other three publications showed benefit from prehospital critical care delivered by physicians. However, an imbalance of prognostic factors and hospital treatment in these studies systematically favoured the prehospital critical care group.

CONCLUSION: Current evidence to support prehospital critical care for OHCA is limited by the logistic difficulties of undertaking high quality research in this area. Further research needs an appropriate sample size with adjustments for confounding factors in observational research design.

3. **Resuscitation**. 2017 Nov 1. pii: S0300-9572(17)30677-9. doi: 10.1016/j.resuscitation.2017.10.023. [Epub ahead of print]

Long-Term Survival Trends of Medicare Patients After In-Hospital Cardiac Arrest: Insights from Get With The Guidelines-Resuscitation®.

Thompson LE1, Chan PS2, Tang F2, Nallamothu BK3, Girotra S4, Perman SM5, Bose S6, Daugherty SL7, Bradley SM8; American Heart Association's Get With the Guidelines-Resuscitation Investigators.

Abstract

BACKGROUND: Although rates of survival to hospital discharge after in-hospital cardiac arrest (IHCA) have improved over the last decade, it is unknown if these survival gains are sustained after hospital discharge.

OBJECTIVE: To examine 1-year survival trends overall and by rhythm after IHCA.

METHODS: Using Medicare beneficiaries (age≥65years) with IHCA occurring between 2000 and 2011 at Get With The Guidelines®-Resuscitation Registry participating hospitals we used multivariable regression, to examine temporal trends in risk-adjusted rates of 1-year survival.
RESULTS: Among 45,567 patients with IHCA, the unadjusted 1-year survival was 9.4%. Unadjusted 1-year survival was 21.8% among the 9,223 (20.2%) of patients with Ventricular Fibrillation or Pulseless Ventricular Tachycardia (VF/VT) and 6.2% among the 36,344 (79.8%) of patients with Pulseless Electrical Activity or asystole (PEA/asystole). After adjustment for patient and arrest characteristics, 1-year survival increased over time for all IHCA from 8.9% in 2000-2001 to 15.2% in 2011 (adjusted rate ratio [RR] per year, 1.05; 95% CI, 1.03 to 1.06; P<0.001 for trend). Improvements in 1-year risk adjusted survival were also observed for VF/VT (19.4% in 2000-2001 to 25.6% in 2011 [RR per year, 1.02; 95% CI, 1.01 to 1.04; P 0.004 for trend]) and PEA/asystole arrests (4.7% in 2000-2001 to 10.2% in 2011 [RR per year, 1.07; 95% CI, 1.05 to 1.08; P<0.001 for trend]).
CONCLUSION: Among Medicare beneficiaries in the GWTG-Resuscitation registry, 1-year survival after IHCA has increased for over the past decade. Temporal improvements in survival were noted for both shockable and non-shockable presenting arrest rhythms.

4. **Acute Med Surg**. 2017 Apr 2;4(3):293-299. doi: 10.1002/ams2.273. eCollection 2017 Jul.
Performance review of regional emergency medical service pre-arrival cardiopulmonary resuscitation with or without dispatcher instruction: a population-based observational study.
Fukushima H1, Kawai Y1, Asai H1, Seki T2, Norimoto K3, Urisono Y1, Okuchi K1.
Abstract
Background: To investigate variations in emergency medical service (EMS) pre-arrival cardiopulmonary resuscitation (CPR), including both bystander CPR without dispatch assistance and dispatch-assisted CPR (DACPR).
Methods: We carried out an observational study by implementing EMS pre-arrival CPR reports in three fire agencies. We included adult, non-traumatic, and non-EMS witnessed out-of-hospital cardiac arrests. This reporting system comprised the dispatch instruction process and bystander CPR quality based on evaluations by EMS crews who arrived on the scene. Bystander CPR was categorized as "ongoing CPR" if the bystander was performing CPR when the EMS reached the patient's side and "good-quality CPR" if the CPR was performed proficiently. We compared the frequencies of ongoing and good-quality CPR in the bystander CPR already started without dispatch assistance (CPR in progress) group and DACPR group.
Results: Of 688 out-of-hospital cardiac arrests, CPR was already started in 150 cases (CPR in progress group). Dispatcher CPR instruction was provided in 368 cases. Among these, callers started chest compressions in 162 cases (DACPR group). Ongoing CPR was performed in 220 cases and was more frequent in the DACPR group (128/162 [79.0%] versus 92/150 [61.3%], P < 0.001). Good-quality CPR was more frequent in the CPR in progress group, but the difference was not statistically significant (36/92 [39.1%] versus 42/128 [29.0%], P = 0.888).
Conclusions: Ongoing CPR and good-quality CPR were not frequent in EMS pre-arrival CPR. Detailed analysis of dispatch instructions and bystander CPR can contribute to improvement in EMS pre-arrival CPR.

CAUSES DE L'ACR

1. **Acute Med Surg**. 2017 May 15;4(3):235-245. doi: 10.1002/ams2.282. eCollection 2017 Jul.
Drug-induced anaphylaxis in the emergency room.
Takazawa T1, Oshima K2, Saito S3.
Abstract
Anaphylaxis is a life-threatening, systemic allergic reaction that presents unique challenges for emergency care practitioners. Anaphylaxis occurs more frequently than previously believed. Therefore, proper knowledge regarding the epidemiology, mechanisms, symptoms, diagnosis, and treatment of anaphylaxis is essential. In particular, the initial treatment strategy, followed by correct diagnosis, in the emergency room is critical for preventing fatal anaphylaxis, although making a diagnosis is not easy because of the broad and often atypical presentation of anaphylaxis. To this end, the clinical criteria proposed by the National Institute of Allergy and Infectious Diseases and the Food Allergy and Anaphylaxis Network are useful, which, together with a differential diagnosis, could enable a more accurate diagnosis. Additional in vitro tests, such as plasma histamine and tryptase measurements, are also helpful. It should be emphasized that adrenaline is the only drug recommended as first-line therapy in all published national anaphylaxis guidelines. Most international anaphylaxis guidelines recommend injecting adrenaline by the

intramuscular route in the mid-anterolateral thigh, whereas i.v. adrenaline is an option for patients with severe hypotension or cardiac arrest unresponsive to intramuscular adrenaline and fluid resuscitation. In addition to the route of administration, choosing the appropriate dose of adrenaline is essential, because serious adverse effects can potentially occur after an overdose of adrenaline. Furthermore, to avoid future recurrence of anaphylaxis, providing adrenaline auto-injectors and making an etiological diagnosis, including confirmation of the offending trigger, are recommended for patients at risk of anaphylaxis before their discharge from the emergency room.

2. **Resuscitation**. 2017 May;114:157-163. doi: 10.1016/j.resuscitation.2016.12.021. Epub 2017 Jan 11.
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.

3. **Ann Cardiol Angeiol** (Paris). 2017 Oct 26. pii: S0003-3928(17)30132-4. doi: 10.1016/j.ancard.2017.10.001. [Epub ahead of print]
[Sudden cardiac death and coronary thrombus].
[Article in French]
Spaulding C1, Karam N2.
Abstract
Out-of-hospital cardiac arrest is most often due to an acute coronary artery occlusion. The cause of coronary thrombosis in cardiac arrest is debated. Plaque erosion could be a trigger leading to immediate thrombus formation followed by ventricular fibrillation or rapid ventricular tachycardia. Coronary artery spasm is frequent: spasm provocation tests should be performed in survivors with normal coronary arteries. Use of drugs such as cocaine can lead to sudden death and blood sampling at arrival is recommended in survivors of out-of-hospital cardiac arrest. Delivery of immediate and effective basic life support remains the most important predictive factor for survival in out-of-hospital cardiac arrest.

DONACIÓ D'ÒRGANS

1. Curr Opin Organ Transplant. 2017 Nov 7. doi: 10.1097/MOT.0000000000000480. [Epub ahead of print]
Donation after circulatory death and its expansion in Spain.
Miñambres E1, Rubio JJ, Coll E, Domínguez-Gil B.
Abstract
PURPOSE OF REVIEW: Donation after circulatory death (DCD) is still performed in a limited number of countries. This article summarizes the development of DCD in Spain and presents recent Spanish contributions to gain knowledge on the potential benefits and the practical use of normothermic regional perfusion (nRP).

RECENT FINDINGS: DCD now contributes to 24% of deceased donors in Spain. The development of DCD has been based on an assessment of practices in the treatment of cardiac arrest and end-of-life care to accommodate the option of DCD; the creation of an adequate regulatory framework; and institutional support, professional training and public education. Appropriate posttransplant outcomes have been obtained with organs from both uncontrolled and controlled DCD donors. nRP is increasingly used, with preliminary data supporting improved results compared with other in-situ preservation/recovery approaches. Mobile teams with portable extracorporeal membrane oxygenation devices are making nRP possible in hospitals without these resources. To avoid the possibility of reestablishing brain circulation after the determination of death, a specific methodology has been validated.
SUMMARY: DCD has been successfully developed in Spain following a streamlined process. nRP may become a standard in DCD, although further evidence on the benefits of this technology is eagerly awaited.

FÀRMACS

1. **Int J Cardiol**. 2017 Jan 15;227:292-298. doi: 10.1016/j.ijcard.2016.11.101. Epub 2016 Nov 9.
Acute hospital administration of amiodarone and/or lidocaine in shockable patients presenting with out-of-hospital cardiac arrest: A nationwide cohort study.
Huang CH1, Yu PH2, Tsai MS1, Chuang PY3, Wang TD4, Chiang CY5, Chang WT1, Ma MH1, Tang CH3, Chen WJ6.
Abstract
BACKGROUND: Terminating ventricular fibrillation (VF) or pulseless ventricular tachyarrhythmia (VT) is critical for successful resuscitation of patients with shockable cardiac arrest. In the event of shock-refractory VF, applicable guidelines suggest use of anti-arrhythmic agents. However, subsequent long-term outcomes remain unclear. A nationwide cohort study was therefore launched, examining 1-year survival rates in patients given amiodarone and/or lidocaine for cardiac arrest.
METHODS: Medical records accruing between years 2004 and 2011 were retrieved from the Taiwan National Health Insurance Research Database (NHIRD) for review. This repository houses all insurance claims data for nearly the entire populace (>99%). Candidates for study included all non-traumatized adults receiving DC shock and cardiopulmonary resuscitation immediately or within 6h of emergency room arrival. Analysis was based on data from emergency rooms and hospitalization.
RESULTS: One-year survival rates by treatment group were 8.27% (534/6459) for amiodarone, 7.15% (77/1077) for lidocaine, 11.10% (165/1487) for combined amiodarone/lidocaine use, and 3.26% (602/18,440) for use of neither amiodarone nor lidocaine (all, $p<0.0001$). Relative to those given neither medication, odds ratios for 1-year survival via multiple regression analysis were 1.84 (95% CI: 1.58-2.13; $p<0.0001$) for amiodarone, 1.88 (95% CI: 1.40-2.53; $p<0.0001$) for lidocaine, and 2.18 (95% CI: 1.71-2.77; $p<0.0001$) for dual agent use.
CONCLUSIONS: In patients with shockable cardiac arrest, 1-year survival rates were improved with association of using amiodarone and/or lidocaine, as opposed to non-treatment. However, outcomes of patients given one or both medications did not differ significantly in intergroup comparisons.

VENTILACIÓ

1. **Resuscitation**. 2017 May;114:121-126. doi: 10.1016/j.resuscitation.2017.03.022. Epub 2017 Mar 20.
A pilot, prospective, randomized trial of video versus direct laryngoscopy for paramedic endotracheal intubation.
Ducharme S1, Kramer B1, Gelbart D1, Colleran C1 , Risavi B2, Carlson JN3.
Abstract
BACKGROUND: Prehospital intubation poses several unique challenges. Video assisted laryngoscopy has been shown to help increase intubation success in the hospital setting; however, little prospective data have examined video assisted laryngoscopy in traditional ground ambulance agencies.
METHODS: We performed a randomized, cross-over, non-blinded trial in ground ambulances comparing first attempt success and overall intubation success between video assisted laryngoscopy using the King Video Laryngoscope (KVL) and direct laryngoscopy (DL). We collected patient and provider demographics along with intubation details. Success rates were compared on a per-protocol and an intention-to-treat analysis.
RESULTS: Over 34 months, a total of 82 intubations were performed with 42 DL and 40 KVL based on the intention-to-treat analysis. First attempt success (28/42, 66.7% vs 25/40, 62.5%, $p=0.69$) and overall success (34/42, 81% vs 29/40, 72.5%, $p=0.37$) were similar between DL and KVL. Cormack-Lehane view

and percentage of glottic opening were similar between devices. These results were consistent in the per-protocol analysis.
CONCLUSIONS: **In our study utilizing two ground EMS agencies, video assisted laryngoscopy with the KVL had similar first attempt success rates to direct laryngoscopy.**

ECOGRAFIA A LA RCP

1. **Resuscitation**. 2017 May;114:92-99. doi: 10.1016/j.resuscitation.2017.02.021. Epub 2017 Mar 2.
Accuracy of point-of-care focused echocardiography in predicting outcome of resuscitation in cardiac arrest patients: A systematic review and meta-analysis.
Tsou PY1, Kurbedin J2, Chen YS3, Chou EH2, Lee MG4, Lee MC5, Ma MH4, Chen SC4, Lee CC6.
Abstract
OBJECTIVE: We aim to summarize current evidence on the value of point-of-care (POC) focused echocardiography in the assessment of short-term survival in patients with cardiac arrest.
METHODS: PubMed and EMBASE were searched from inception to July 2016 for eligible studies that evaluated the utility of POC echocardiography in patients with cardiac arrest. Modified QUADAS was used to appraise the quality of included studies. A random-effect bivariate model and a hierarchical summary receiving operating curve were used to summarize the performance characteristics of focused echocardiography.
RESULTS: Initial search identified 961 citations of which 15 were included in our final analysis. A total of 1695 patients had POC echocardiography performed during resuscitation. Ultrasonography was mainly utilized to detect spontaneous cardiac movement (SCM) and identify reversible causes of cardiac arrest. Subcostal, apical and parasternal views were used to identify cardiac tamponade, pulmonary embolism, and pleural view for tension pneumothorax. Results of meta-analysis showed that SCM detected by focused echocardiography had a pooled sensitivity (0.95, 95%CI: 0.72-0.99) and specificity (0.80, 95%CI: 0.63-0.91) in predicting return of spontaneous circulation (ROSC) during cardiac arrest, with a positive likelihood ratio of 4.8 (95% CI: 2.5-9.4) and a negative likelihood ratio of 0.06 (95%CI: 0.01-0.39).
CONCLUSION: POC focused echocardiography can be used to identify reversible causes and predict short-term outcome in patients with cardiac arrest. In patients with a low pretest probability for ROSC, absence of SCM on echocardiography can predict a low likelihood of survival and guide the decision of resuscitation termination.

ORGANITZACIÓ I FORMACIÓ

1. **Resuscitation**. 2017 Oct 28;121:135-140. doi: 10.1016/j.resuscitation.2017.10.024. [Epub ahead of print]
Children saving lives: Training towards CPR excellence levels in chest compression based on age and physical characteristics.
Mpotos N1, Iserbyt P2.
Abstract
BACKGROUND: The World Health Organization's endorsement of the "Kids save lives" statement fosters the implementation of cardiopulmonary resuscitation (CPR) training for school children worldwide. However, not every child achieves and maintains the recommended chest compression depth of 5-6cm.
PURPOSE: To investigate the variability in compression depth for three age groups (grade 1: 12-14; grade 2: 14-16; grade 3: 16-18 years) as a function of physical characteristics and to define minimal compression excellence levels for training.
METHODS: Compression depth of 265 subjects (111 girls, 154 boys) aged 12-18 years from one secondary school was individually assessed and reported in percentiles per age group. Pearson correlations between physical characteristics and CPR variables were calculated. Excellence level was defined as the percentage compressions with depth 5-6cm.
RESULTS: In grade 1 (12-14 years), achieved excellence levels were 1% for girls and 23% for boys at the 75th percentile. In grade 2 (14-16 years), it increased to 24% for girls and 80% for boys. In grade 3 (16-18 years) finally, it was 59% for girls and 87% for boys. Significant positive correlations were found between CPR and physical variables ($p<0.05$), especially weight >50kg ($p<0.01$).
CONCLUSION: A minimal excellence level of 25% is achievable by boys 12-14year and girls 14-16year and can be gradually improved to 60% and 90% according to age and gender. This might necessitate more exertion and training for some younger children, especially girls, and will probably be more easily achieved for children weighing >50kg.

2. **J Emerg Med**. 2017 Oct 31. pii: S0736-4679(17)30771-0. doi: 10.1016/j.jemermed.2017.08.065. [Epub ahead of print]

Team-focused Cardiopulmonary Resuscitation: Prehospital Principles Adapted for Emergency Department Cardiac Arrest Resuscitation.

Johnson B1, Runyon M1, Weekes A1, Pearson D1.

Abstract

BACKGROUND: Out-of-hospital cardiac arrest has high rates of morbidity and mortality, and a growing body of evidence is redefining our approach to the resuscitation of these high-risk patients.

OBJECTIVES: Team-focused cardiopulmonary resuscitation (TFCPR), most commonly deployed and described by prehospital care providers, is a focused approach to cardiac arrest care that emphasizes early defibrillation and high-quality, minimally interrupted chest compressions while de-emphasizing endotracheal intubation and intravenous drug administration. TFCPR is associated with statistically significant increases in survival to hospital admission, survival to hospital discharge, and survival with good neurologic outcome; however, the adoption of similar streamlined resuscitation approaches by emergency physicians has not been widely reported. In the absence of a deliberately streamlined approach, such as TFCPR, other advanced therapies and procedures that have not shown similar survival benefit may be prioritized at the expense of simpler evidence-based interventions.

DISCUSSION: This review examines the current literature on cardiac arrest resuscitation. The recent prehospital success of TFCPR is highlighted, including the associated improvements in multiple patient-centered outcomes. The adaptability of TFCPR to the emergency department (ED) setting is also discussed in detail. Finally, we discuss advanced interventions frequently performed during ED cardiac arrest resuscitation that may interfere with early defibrillation and effective high-quality chest compressions.

CONCLUSION: TFCPR has been associated with improved patient outcomes in the prehospital setting. The data are less compelling for other commonly used advanced resuscitation tools and procedures. Emergency physicians should consider incorporating the TFCPR approach into ED cardiac arrest resuscitation to optimize delivery of those interventions most associated with improved outcomes.

3. **Am J Emerg Med**. 2017 Nov;35(11):1601-1606. doi: 10.1016/j.ajem.2017.04.072. Epub 2017 Apr 28.

Preceding national early warnings scores among in-hospital cardiac arrests and their impact on survival.

Roberts D1, Djärv T2.

Abstract

OBJECTIVES: In-hospital cardiac arrests (IHCAs) are often preceded by abnormal vital signs. Preceding abnormal vital signs might lower the physiological reserve capacity and therefore decrease survival after an IHCA.

AIM: To assess the preceding national early warning score (NEWS) and its relation to survival after an IHCA.

MATERIAL AND METHODS:

All patients ≥18years suffering an IHCA at Karolinska University Hospital between 1st January 2014 and 31st December 2015 were included. Data regarding the IHCA, patient characteristics, calculated NEWS and 30-day survival were obtained from electronic patient records. Parameters included in NEWSs were assessed up to 12h before the IHCA. Differences in survival were assessed with adjusted logistic regression models and presented as Odds Ratios with 95% Confidence Intervals (OR, 95% CI) between patients with NEWSs of 0-4 points (low) versus those with at least 5 points (moderate) and 7 points (high). Adjustments included hospital site, sex, co-morbidities, first rhythm and location of the IHCA.

RESULTS: In all, 358 patients suffered an IHCA, of whom 109 (30%) survived at least 30days and 296 (83%) had sufficient vital sign documentation to calculate NEWS before the IHCA. The 87 patients with a medium NEWS had a fourfold chance and those 78 with a high NEWS (22%) had an almost tenfold chance of dying after the IHCA compared to those with a low NEWS (Adjusted OR 4.43, 95% CI 1.81-10.83 and OR 9.88 95% C.I. 2.77-35.26, respectively).

CONCLUSION: The NEWS can be a probable proxy for estimating physiological reserve capacity since high NEWS is associated to high change of death in case of an IHCA. This information can be used when discussing prognosis with patients and relatives. But even more importantly, it stresses the need for better preventive strategies in IHCAs.

4. **Acute Med Surg.** 2017 Aug 7;4(4):439-445. doi: 10.1002/ams2.303. eCollection 2017 Oct.

Effectiveness of dispatcher training in increasing bystander chest compression for out-of-hospital cardiac arrest patients in Japan.

Tsunoyama T1, Nakahara S1, Yoshida M1, Kitamura M1, Sakamoto T1.

Abstract

Aim: The Japanese government has developed a standardized training program for emergency call dispatchers to improve their skills in providing oral guidance on chest compression to bystanders who have witnessed out-of-hospital cardiac arrests (OHCAs). This study evaluated the effects of such a training program for emergency call dispatchers in Japan.
Methods: The analysis included all consecutive non-traumatic OHCA patients transported to hospital by eight emergency medical services, where the program was implemented as a pilot project. We compared the provision of oral guidance and the incidence of chest compression applications by bystanders in the 1-month period before and after the program. Data collection was undertaken from October 2014 to March 2015.
Results: The 532 non-traumatic OHCA cases were used for analysis: these included 249 cases before and 283 after the guidance intervention. Most patients were over 75 years old and were men. After the program, provision of oral guidance to callers slightly increased from 63% of cases to 69% (P = 0.13) and implementation of chest compression on patients by bystanders significantly increased from 40% to 52% (P = 0.01). Appropriate chest compression also increased from 34% to 47% (P = 0.01). In analysis stratified by the provision of oral guidance, increased chest compressions were observed only under oral guidance.
Conclusions: We found increased provision of oral guidance by dispatchers and increased appropriate chest compressions by bystanders after the training program for dispatchers had been rolled out. Long-term observation and further data analysis, including patient outcomes, are needed.

5. **Resuscitation**. 2017 May;114:127-132. doi: 10.1016/j.resuscitation.2017.03.014. Epub 2017 Mar 18.
Integration of in-hospital cardiac arrest contextual curriculum into a basic life support course: a randomized, controlled simulation study.
Hunt EA1, Duval-Arnould JM2, Chime NO3, Jones K4, Rosen M3, Hollingsworth M5, Aksamit D6, Twilley M6, Camacho C7, Nogee DP8, Jung J9, Nelson-McMillan K10, Shilkofski N10, Perretta JS11.
Abstract
OBJECTIVE: The objective was to compare resuscitation performance on simulated in-hospital cardiac arrests after traditional American Heart Association (AHA) Healthcare Provider Basic Life Support course (TradBLS) versus revised course including in-hospital skills (HospBLS).
DESIGN: This study is a prospective, randomized, controlled curriculum evaluation.
SETTING: Johns Hopkins Medicine Simulation Center.
SUBJECTS: One hundred twenty-two first year medical students were divided into fifty-nine teams.
INTERVENTION: HospBLS course of identical length, containing additional content contextual to hospital environments, taught utilizing Rapid Cycle Deliberate Practice (RCDP).
MEASUREMENTS: The primary outcome measure during simulated cardiac arrest scenarios was chest compression fraction (CCF) and secondary outcome measures included metrics of high quality resuscitation.
MAIN RESULTS: Out-of-hospital cardiac arrest HospBLS teams had larger CCF: [69% (65-74) vs. 58% (53-62), p<0.001] and were faster than TradBLS at initiating compressions: [median (IQR): 9s (7-12) vs. 22s (17.5-30.5), p<0.001]. In-hospital cardiac arrest HospBLS teams had larger CCF: [73% (68-75) vs. 50% (43-54), p<0.001] and were faster to initiate compressions: [10s (6-11) vs. 36s (27-63), p<0.001]. All teams utilized the hospital AED to defibrillate within 180s per AHA guidelines [HospBLS: 122s (103-149) vs. TradBLS: 139s (117-172), p=0.09]. HospBLS teams performed more hospital-specific maneuvers to optimize compressions, i.e. utilized: CPR button to flatten bed: [7/30 (23%) vs. 0/29 (0%), p=0.006], backboard: [21/30 (70%) vs. 5/29 (17%), p<0.001], stepstool: [28/30 (93%) vs. 8/29 (28%), p<0.001], lowered bedrails: [28/30 (93%) vs. 10/29 (34%), p<0.001], connected oxygen appropriately: [26/30 (87%) vs. 1/29 (3%), p<0.001] and used oral airway and/or two-person bagging when traditional bag-mask-ventilation unsuccessful: [30/30 (100%) vs. 0/29 (0%), p<0.001].
CONCLUSION: A hospital focused BLS course utilizing RCDP was associated with improved performance on hospital-specific quality measures compared with the traditional AHA course.

CURES POST-RCE

1**. Eur Radiol**. 2017 Nov 9. doi: 10.1007/s00330-017-5117-0. [Epub ahead of print]
Use of whole body CT to detect patterns of CPR-related injuries after sudden cardiac arrest.
Dunham GM1, Perez-Girbes A2, Bolster F3, Sheehan K4, Linnau KF4.
Abstract
AIMS AND OBJECTIVES: We have recently implemented a dedicated sudden cardiac arrest (SCA) - whole-body computed tomography (WBCT) protocol to evaluate SCA patients with return of spontaneous

circulation (ROSC) following cardiopulmonary resuscitation (CPR). The aim of this study is to evaluate the number and pattern of CPR-related injuries in ROSC patients with SCA-WBCT.
METHODS AND MATERIALS: Single-centre retrospective review of 39 patients (13 female; 20 male, mean age 51.8 years) with non-traumatic, out-of-hospital SCA and ROSC and evaluation with dedicated SCA-WBCT over a 10-month period.
RESULTS: In-hospital mortality was 54%. CPR-related injuries were detected in 85% (33/39). Chest injuries were most common on WBCT: 85% (33) subjects had rib fractures (mean of 8.5 fractures/subject); 31% (12) sternal fractures; 13% (5) mediastinal haematoma; 10% (4) pneumothorax; 8% (3) pneumomediastinum and 3% (1) haemothorax. Three subjects (8%) had abdominal injuries on WBCT, including one hepatic haematoma with active haemorrhage.
CONCLUSION: CPR-related injuries on WBCT after ROSC are common, with serial rib fractures detected most commonly. An unexpectedly high rate of abdominal injuries was detected on SCA-WBCT. Radiologists need to be attuned to the spectrum of CPR-related injuries in WBCT, including abdominal injuries and subtle rib fractures.

2**. J Cardiovasc Thorac Res**. 2017;9(3):175-178. doi: 10.15171/jcvtr.2017.30. Epub 2017 Sep 30.
24-Hour survival after cardiopulmonary resuscitation is reduced in patients with diabetes mellitus.
Movahedi A1,2, Mirhafez SR3, Behnam-Voshani H4, Reihani H 5, A Ferns G6, Malekzadeh J7.
Abstract
Introduction: Diabetes mellitus is a risk factor for cardiovascular disease. Some recent studies have shown an association between diabetes and out-of-hospital cardiac arrest incidence and survival. We aimed to investigate whether there is an association between the presence of diabetes mellitus and survival after cardiopulmonary resuscitation (CPR) in patients with an in-hospital cardiac arrest. Methods: A cross-sectional study was conducted during the period of January to February 2014, among 80 cases of cardiopulmonary arrest in patients at Qaem hospital of Mashhad, Iran. A code 99 was announced after a cardiac arrest was identified, and CPR was performed by the cardiac arrest team. Twenty four hour survival was compared in diabetic and non-diabetic patients who had a return to spontaneous circulation after CPR. We used SPSS statistics for Windows version 16 for data analysis. Results: The return to spontaneous circulation in the diabetic group was not significantly lower than for the non-diabetic group (42.9% versus 61.0% [P = 0.15]). However, the 24-hour survival in the diabetic group was significantly lower than for the non-diabetic group (19.0% versus 44.1% [P = 0.04]). Conclusion: The presence of diabetes mellitus is associated with a significantly lower rate of survival after CPR.

3**. Am J Emerg Med**. 2017 Nov;35(11):1617-1623. doi: 10.1016/j.ajem.2017.04.077. Epub 2017 May 1.
Disseminated intravascular coagulation is associated with the neurologic outcome of cardiac arrest survivors.
Lee DH1, Lee BK2, Jeung KW1, Jung YH1, Lee SM1, Cho YS1, Yun SW3, Min YI1.
Abstract
PURPOSE: We aimed to examine the serial changes in coagulofibrinolytic markers that occurred after the restoration of spontaneous circulation (ROSC) in cardiac arrest patients, who were treated with targeted temperature management (TTM). We also evaluated the association between the disseminated intravascular coagulation (DIC) score and clinical outcomes.
METHODS: This was a single-centre, retrospective observational study that included cardiac arrest patients who were treated with TTM from May 2012 to December 2015. The prothrombin time (PT) and partial thromboplastin time (PTT), along with the levels of fibrinogen, fibrin degradation products (FDP), and D-dimer were obtained after ROSC and on day 1, 2, and 3. The DIC score was calculated after ROSC. The primary outcome was the neurologic outcome at discharge and the secondary outcome was the 6-month mortality.
RESULTS: This study included 317 patients. Of these, 222 (70.0%) and 194 (61.2%) patients had a poor neurologic outcome at discharge and 6-month mortality, respectively. The PT, PTT, and fibrinogen level significantly increased over time, while the FDP and D-dimer levels decreased during first three days after ROSC. Multivariate logistic analyses revealed that the DIC score remained a significant predictor for poor neurologic outcome (odds ratio [OR], 1.800; 95% confidence interval [CI], 1.323-2.451) and 6-month mortality (OR, 1.773; 95% CI, 1.307-2.405).
CONCLUSION: The activity of coagulation and fibrinolysis decreased over time. An increased DIC score was an independent prognostic factor for poor neurologic outcome and 6-month mortality.

4. **Resuscitation**. 2017 May;114:53-58. doi: 10.1016/j.resuscitation.2017.03.006. Epub 2017 Mar 6.

Initial arterial carbon dioxide tension is associated with neurological outcome after resuscitation from cardiac arrest.

Tolins ML1, Henning DJ2, Gaieski DF3, Grossestreuer AV4, Jaworski A5, Johnson NJ6.

Abstract

STUDY OBJECTIVES: To determine the relationships between partial pressure of arterial carbon dioxide (PaCO2), prescribed minute ventilation (MV), and neurologic outcome in patients resuscitated from cardiac arrest.

METHODS: This was a retrospective cohort study utilizing a multicenter database of adult patients with return of spontaneous circulation (ROSC) after cardiac arrest. The primary outcome was neurologic status at hospital discharge, defined by Cerebral Performance Category (CPC) score: CPC 1-2 was favorable, CPC 3-5 was poor. We compared rates of initial normocarbia (PaCO2 31-49mmHg) and mean sequential PaCO2 measurements obtained over the first 24h. We also assessed the influence of MV on the PaCO2 at initial, 6, 12, 18, and 24h after cardiac arrest using univariate linear regression.

RESULTS: One hundred and fourteen patients from 3 institutions met inclusion criteria. Overall, 46/114 (40.4%, 95% CI: 31.4-49.4%) patients survived to hospital discharge, and 33/114 (28.9%, 20.6-37.2%) had CPC 1-2 at the time of discharge. A total of 38.9% (95% CI: 29.9-47.9%) of patients had initial normocarbia; 43.2% (28.6-57.8%) of these patients were discharged with CPC 1-2, compared with 20.3% (10.8-29.8%) of dyscarbic patients. By 6h, neurologic outcomes were not significantly associated with PaCO2. Prescribed MV was not associated with PaCO2 at any time point with the exception of a weak correlation at hour 18.

CONCLUSION: Initial normocarbia was associated with favorable neurological outcome in patients resuscitated from cardiac arrest. This relationship was not seen at subsequent time points. There was no significant association between prescribed MV and PaCO2 or neurologic outcome.

5. **Acta Anaesthesiol Scand.** 2017 Nov 10. doi: 10.1111/aas.13033. [Epub ahead of print]

Lactate improves SAPS 3 prognostication.

Andersson P1,2, Frigyesi A1,2.

Abstract

INTRODUCTION: Lactate concentration is known to be a strong predictor of mortality, but is not included in any of the major intensive care scorings systems such as the Simplified Acute Physiology Score (SAPS 3). The objective of this study was to investigate the prognostic value of lactate concentration when combined with SAPS 3.

MATERIALS AND METHODS: In the period of 2008 to June 2017 the general intensive care unit at Skåne University Hospital in Lund, Sweden had 5141 first-time admissions. Of these, 3039 patients had lactate concentrations analysed within 1 h of admission.

RESULTS: As expected, lactate concentration was found to be strongly related to 30-day mortality. Lactate concentration was found to be a SAPS 3 independent predictor of mortality (odds ratio 1.08, 95% confidence interval 1.05-1.11, $P < 0.001$), but did not improve the area under the receiver operating characteristic curve (AUC) (AUC 78.9% vs. 78.7%, $P = 0.053$). However, we found that lactate added prognostic value to SAPS 3 for patients with cardiac arrest (AUC 79.6% vs. 76.4%, $P = 0.0082$) and sepsis (AUC 75.1% vs. 72.7%, $P = 0.033$).

CONCLUSION: Even compared to our current prognostication model, SAPS 3, lactate concentration was found to be an independent predictor for all diagnoses, cardiac arrest and sepsis. The addition of lactate concentration level improved the AUC for cardiac arrest and sepsis, but not for all diagnoses.

6. **Resuscitation**. 2017 Nov 6. pii: S0300-9572(17)30715-3. doi: 10.1016/j.resuscitation.2017.11.033. [Epub ahead of print]

The impact of global hemodynamics, oxygen and carbon dioxide on epileptiform EEG activity in comatose survivors of out-of-hospital cardiac arrest.

Moonen C1, Lemmens R2, Van Paesschen W2, Wilmer A3, Eertmans W4, Ferdinande B5, Dupont M5, De Deyne C4, Dens J6, Janssens S7, Ameloot K8.

Abstract

AIM: To study the association between global hemodynamics, blood gases, epileptiform EEG activity and survival after out-of-hospital CA (0HCA).

METHODS: We retrospectively analyzed 195 comatose post-CA patients. At least one EEG recording per patient was evaluated to diagnose epileptiform EEG activity. Refractory epileptiform EEG activity was defined as persisting epileptic activity on EEG despite the use of 2 or more anti-epileptics. The time weighted average mean arterial pressure 48hours (TWA-MAP48), the percentage of time with a MAP

below 65 and above 85mmHg and the percentage of time with normoxia, hypoxia (<70mmHg), hyperoxia (>150mmHg), normocapnia, hypocapnia (<35mmHg) and hypercapnia (>45mmHg) were calculated.
RESULTS: We observed epileptiform EEG activity in 57 patients (29%). A shockable rhythm was associated with a decreased likelihood of epileptic activity on the EEG (OR: 0.41, 95%CI 0.22-0.79). We did not identify an association between the TWA-MAP48, the percentage of time with MAP below 65mmHg or above 85mmHg, blood gas variables and the risk of post-CA epileptiform EEG activity. The presence of epileptiform activity decreased the likelihood of survival independently (OR: 0.10, 95% CI: 0.04-0.24). Interestingly, survival rates of patients in whom the epileptiform EEG resolved (n=20), were similar compared to patients without epileptiform activity on EEG (60% vs 67%,p=0.617). Other independent predictors of survival were presence of basic life support (BLS) (OR:5.08, 95% CI 1.98-13.98), presence of a shockable rhythm (OR: 7.03, 95% CI: 3.18- 16.55), average PaO2 (OR=0.93, CI 95% 0.90-0.96) and % time MAP < 65mmHg (OR: 0.96, CI 95% 0.94 -0.98).
CONCLUSION: Epileptiform EEG activity in post-CA patients is independently and inversely associated with survival and this effect is mainly driven by patients in whom this pattern is refractory over time despite treatment with anti-epileptic drugs. We did not identify an association between hemodynamic factors, blood gas variables and epileptiform EEG activity after CA, although both hypotension, hypoxia and epileptic EEG activity were predictors of survival.

TARGET TEMPERATURE MANAGEMENT

1. **Resuscitation**. 2017 May;114:106-112. doi: 10.1016/j.resuscitation.2017.03.011. Epub 2017 Mar 16.
Increasing or fluctuating bispectral index values during post-resuscitation targeted temperature management can predict clinical seizures after rewarming.
Ochiai K1, Shiraishi A2, Otomo Y1, Koido Y3, Kanemura T4, Honma M5.
Abstract
AIM: To investigate whether an increasing bispectral index (BIS) value during targeted temperature management (TTM) correlates with increased clinical seizures after TTM or worse neurological prognoses after TTM.
METHODS: We performed a retrospective prognostication study of patients who were treated with TTM after recovery of spontaneous circulation from cardiac arrest at a tertiary care hospital. We recorded the BIS regularly during TTM and calculated the correlations of the mean BIS values, standard deviations of the BIS values, and linear regression coefficient of the trend of the BIS values over time as index tests. Study outcomes included the occurrence of clinical seizures after TTM and unfavourable neurological outcomes (defined as a Cerebral Performance Scale score of 3-5). Receiver operating characteristics (ROC) analyses evaluated the predictability of the index tests for the study outcomes.
RESULTS: Of 534 patients with post-cardiac arrest who were admitted to the intensive care unit, 103 were enrolled in this study. Thirty-one patients (30.1%) experienced sequelae in the form of clinical seizures, and 52 (50.5%) had unfavourable neurological outcomes at 30days post-resuscitation. The standard deviation (area under the ROC curve [AUC]=0.763) and the regression coefficient (AUC=0.763) had higher predictability of clinical seizures than the mean BIS value (AUC=0.657); in contrast, the low mean BIS value best predicted unfavourable neurological outcomes (AUC=0.861) compared to the standard deviation (AUC=0.532) and regression coefficient (AUC=0.501).
CONCLUSION: An increase of, or greater fluctuation in, BIS during hypothermia may predict clinical seizures after TTM.

2. **Resuscitation**. 2017 May;114:146-151. doi: 10.1016/j.resuscitation.2017.01.017. Epub 2017 Feb 3.
Prognostic significance of clinical seizures after cardiac arrest and target temperature management.
Lybeck A1, Friberg H2, Aneman A3, Hassager C4, Horn J5, Kjærgaard J6, Kuiper M7, Nielsen N8, Ullén S9, Wise MP10, Westhall E11, Cronberg T12; TTM-trial Investigators.
Abstract
AIM: Clinical seizures are common after cardiac arrest and predictive of a poor neurological outcome. Seizures may be myoclonic, tonic-clonic or a combination of seizure types. This study reports the incidence and prognostic significance of clinical seizures in the target temperature management (TTM) after cardiac arrest trial. Our hypotheses were that seizures are associated with a poor prognosis and that the incidence of seizures is not affected by the target temperature.
METHODS: Post-hoc analysis of reported clinical seizures during day 1-7 in the TTM-trial including their treatment, EEG-findings, and long-term neurological outcome. The trial randomised 939 comatose survivors to TTM at 33°C or 36°C with strict criteria for withdrawal of life-sustaining therapies. Sensitivity, specificity and false positive rate for poor outcome were reported for different types of seizures.

RESULTS: Clinical seizures were registered in 268 patients (29%), similarly distributed in both intervention arms. Early and late seizures were equally predictive of poor outcome. Myoclonic seizures were the most common (240 patients, 26%) and the most predictive of a poor outcome (sensitivity 36.1%, false positive rate 4.3%). Two patients with status myoclonus regained consciousness, one with a good neurological outcome, generating a false positive rate of poor outcome of 0.2% (95%CI 0.0-1.0).
CONCLUSION: Clinical seizures are common after cardiac arrest and indicate poor outcome with limited specificity. Prolonged seizures are a very grave sign but occasional patients may have a good outcome. The level of the target temperature does not affect the prevalence or prognostic significance of seizures.

ELECTROFISIOLOGIA I DESFIRIL·LACIÓ

1. **Resuscitation**. 2017 May;114:100-105. doi: 10.1016/j.resuscitation.2017.03.012. Epub 2017 Mar 18.
New signs to encourage the use of Automated External Defibrillators by the lay public.
Smith CM1, Colquhoun MC2, Samuels M3, Hodson M3, Mitchell S2, O'Sullivan J3.
Abstract
INTRODUCTION: Public Access Defibrillation - the use of Automated External Defibrillators (AEDs) by lay bystanders before the arrival of Emergency Medical Services - is an important strategy in delivering prompt defibrillation to victims of out-of-hospital cardiac arrest and can greatly improve survival rates. Such public-access AEDs are used rarely: one barrier might be poor understanding and content of current signage to indicate their presence. The aim of this project was to develop a sign, with public consultation, that better indicated the function of an AED, and an associated poster to encourage its use.
METHODS: Two public surveys were undertaken, in July and December 2015, to investigate perceptions of the current AED location sign recommended for use in the UK and to produce an improved location sign and associated information poster.
RESULTS: There were 1895 and 2115 respondents to the surveys. Fewer than half (47.9%, 895/1870) understood what the current location sign indicated. One of four design options for a location sign best explained the indication for (preferred by 56.0%, 1023/1828) and best encouraged the use of a public AED (51.8%, 946/1828). 83.5% (1766/2115) preferred an illustration of a stylised heart trace to the lightning bolt used at present. From five wording options, 'Defibrillator - Heart Restarter' was the most popular (29.4%, 622/2115). An associated poster was developed using design features from the new location sign, findings from the surveys and expert group input regarding its content.
CONCLUSIONS: This is the first time that public consultation has been used to design a public AED location sign. Effective signage has the potential to help break down the barriers to more widespread use of AEDs in public places.

2. **Resuscitation**. 2017 Nov 6. pii: S0300-9572(17)30717-7. doi: 10.1016/j.resuscitation.2017.11.035. [Epub ahead of print]
An automatic system for the comprehensive retrospective analysis of cardiac rhythms in resuscitation episodes.
Rad AB1, Eftestøl T2, Irusta U3, Kvaløy JT4, Wik L5, Kramer-Johansen J5, Katsaggelos AK6, Engan K2.
Abstract
AIM: An automatic resuscitation rhythm annotator (ARA) would facilitate and enhance retrospective analysis of resuscitation data, contributing to a better understanding of the interplay between therapy and patient response. The objective of this study was to define, implement, and demonstrate an ARA architecture for complete resuscitation episodes, including chest compression pauses (CC-pauses) and chest compression intervals (CC-intervals).
METHODS: We analyzed 126.5h of ECG and accelerometer-based chest-compression depth data from 281 out-of-hospital cardiac arrest (OHCA) patients. Data were annotated by expert reviewers into asystole (AS), pulseless electrical activity (PEA), pulse-generating rhythm (PR), ventricular fibrillation (VF), and ventricular tachycardia (VT). Clinical pulse annotations were based on patient-charts and impedance measurements. An ARA was developed for CC-pauses, and was used in combination with a chest compression artefact removal filter during CC-intervals. The performance of the ARA was assessed in terms of the unweighted mean of sensitivities (UMS).
RESULTS: The UMS of the ARA were 75.0% during CC-pauses and 52.5% during CC-intervals, 55-points and 32.5-points over a random guess (20% for five categories). Filtering increased the UMS during CC-intervals by 5.2-points. Sensitivities for AS, PEA, PR, VF, and VT were 66.8%, 55.8%, 86.5%, 82.1% and 83.8% during CC-pauses; and 51.1%, 34.1%, 58.7%, 86.4%, and 32.1% during CC-intervals.
CONCLUSIONS: A general ARA architecture was defined and demonstrated on a comprehensive OHCA dataset. Results showed that semi-automatic resuscitation rhythm annotation, which may involve further

revision/correction by clinicians for quality assurance, is feasible. The performance (UMS) dropped significantly during CC-intervals and sensitivity was lowest for PEA.

ECMO

1. **PLoS One.** 2017 Oct 19;12(10):e0184995. doi: 10.1371/journal.pone.0184995. eCollection 2017.
Impact of dynamic changes of elevated bilirubin on survival in patients on veno-arterial extracorporeal life support for acute circulatory failure.
Freundt M1, Lunz D2, Philipp A1, Panholzer B3, Lubnow M4, Friedrich C3, Rupprecht L1, Hirt S1, Haneya A1,3.
Abstract
AIMS: Veno-arterial extracorporeal life support (ECLS) is an established method to stabilize acute circulatory failure. Parameters and data on when to ideally wean circulatory support are limited. Bilirubin is a marker of end-organ damage. Therefore, the purpose of this large study was to evaluate the impact of dynamic changes of elevated bilirubin levels on survival in patients on ECLS.
METHODS AND RESULTS: We reviewed 502 consecutive cases of ECLS from 2007 to 2015. Bilirubin levels were recorded before implantation and until six days after explantation. Dynamic bilirubin changes, and hemodynamic and laboratory outcome parameters were compared in survivors and nonsurvivors. Reason for ECLS implantation was cardiac arrest with ongoing resuscitation in 230 (45.8%), low cardiac output in 174 (34.7%) and inability to wean off cardiopulmonary bypass in 98 (19.5%) patients. 307 (61.2%) patients were weaned off ECLS, however, 206 (41.0%) survived. Mean duration of ECLS was 3 (2-6) days, and survivors received significantly longer ECLS (5 vs 3 days, $p < 0.001$). Survivors had significantly lower baseline bilirubin levels ($p = 0.003$). Bilirubin started to rise from day 2 in all patients. In survivors, bilirubin levels had trended down on the day of ECLS explantation and stayed at an acceptable level. However, in weaned patients who did not survive and patients who died on ECLS bilirubin levels continued to rise during the recorded period.
CONCLUSION: ECLS support improves survival in patients with acute circulatory failure. Down trending bilirubin levels on veno-arterial ECLS indicate improved chances of successful weaning and survival in hemodynamically stable patients.
FREE ARTICLE

2. **Am J Emerg Med**. 2017 Nov;35(11):1789.e1-1789.e2. doi: 10.1016/j.ajem.2017.08.015. Epub 2017 Aug 5.
Extracorporeal cardiopulmonary resuscitation for blunt cardiac rupture.
Kudo S1, Tanaka K2, Okada K2, Takemura T3.
Abstract
Extracorporeal cardiopulmonary resuscitation (ECPR) followed by operating room sternotomy, rather than resuscitative thoracotomy, might be life-saving for patients with blunt cardiac rupture and cardiac arrest who do not have multiple severe traumatic injuries. A 49-year-old man was injured in a vehicle crash and transferred to the emergency department. On admission, he was hemodynamically stable, but a plain chest radiograph revealed a widened mediastinum, and echocardiography revealed hemopericardium. A computed tomography scan revealed hemopericardium and mediastinal hematoma, without other severe traumatic injuries. However, the patient's pulse was lost soon after he was transferred to the intensive care unit, and cardiopulmonary resuscitation was initiated. We initiated ECPR using femorofemoral veno-arterial extracorporeal membrane oxygenation (ECMO) with heparin administration, which achieved hemodynamic stability. He was transferred to the operating room for sternotomy and cardiac repair. Right ventricular rupture and pericardial sac laceration were identified intraoperatively, and cardiac repair was performed. After repairing the cardiac rupture, the cardiac output recovered spontaneously, and ECMO was discontinued intraoperatively. The patient recovered fully and was discharged from the hospital on postoperative day 7. In this patient, ECPR rapidly restored brain perfusion and provided enough time to perform operating room sternotomy, allowing for good surgical exposure of the heart. Moreover, open cardiac massage was unnecessary. ECPR with sternotomy and cardiac repair is advisable for patients with blunt cardiac rupture and cardiac arrest who do not have severe multiple traumatic injuries.

3. **Vasc Med**. 2017 Nov 1:1358863X17739697. doi: 10.1177/1358863X17739697. [Epub ahead of print]
Extra-corporeal membrane oxygenation and outcomes in massive pulmonary embolism: Two eras at an urban tertiary care hospital.

Ain DL1, Albaghdadi M2, Giri J3, Abtahian F4 , Jaff MR5, Rosenfield K6, Roy N6, Villavicencio-Theoduloz M6, Sundt T7, Weinberg I6.

Abstract

Mortality associated with high-risk pulmonary embolism (PE) remains high. Extra-corporeal membrane oxygenation (ECMO) allows for acute hemodynamic stabilization and potentially for administration of other disease process altering therapies. We sought to compare two eras: pre-ECMO and post-ECMO in relation to high-risk PE treatment and mortality. A single-center retrospective chart review was conducted of high-risk PE patients. High-risk PE was defined as acute PE and cardiac arrest or shock. A total of 60 patients were identified, 31 in the pre-ECMO era and 29 in the post-ECMO era. Mean age was 56.1±21.1 years and 51.7% were women. More patients in the post-ECMO era were identified with computed tomography (82.8% vs 51.6%, p=0.011) and more patients in the post-ECMO era had right ventricular dysfunction on echocardiography (96.4% vs 78.3%, p=0.045). No other differences were noted in baseline characteristics or clinical, laboratory and imaging data between the two groups. In total, ECMO was used in 13 (44.8%) patients in the post-ECMO era. There was greater utilization of catheter-directed therapies in the post-ECMO era compared to the pre-ECMO era (n = 7 (24.1%) vs n = 1 (3.2%), p=0.024). Thirty-day survival increased from 17.2% in patients who presented in the pre-ECMO era to 41.4% in the post-ECMO era (p=0.043). While more work is necessary to better identify those PE patients who stand to benefit from mechanical circulatory support, our findings have important implications for the management of such patients.

4. **Resuscitation**. 2017 May;114:1-6. doi: 10.1016/j.resuscitation.2017.02.007. Epub 2017 Feb 16.

Association between delay to coronary reperfusion and outcome in patients with acute coronary syndrome undergoing extracorporeal cardiopulmonary resuscitation.

Kuroki N1, Abe D2, Iwama T1, Suzuki K1, Sugiyama K3, Akashi A3, Hamabe Y3, Aonuma K4, Sato A4.

Abstract

AIM: The prognostic effect of early coronary reperfusion therapy with extracorporeal cardiopulmonary resuscitation (ECPR) in patients with cardiac arrest due to acute coronary syndrome (ACS) has yet to be clarified. We investigated the relationship between time interval from collapse to start of ECPR (CtoE) and coronary reperfusion (CtoR) time and neurological outcome in patients with cardiac arrest due to ACS.

METHODS: A cohort of 119 consecutive patients (63±12 years old) with ACS who underwent ECPR and percutaneous coronary intervention(PCI) at our hospital was registered from January 2005 to June 2016. We analyzed patient clinical outcome, which was defined as survival with good neurological outcome at 30 days. We divided the patients into four groups according to CtoR time: Group 1 (time<60min: n=19), Group 2 (60≤time<90min: n=19), Group 3 (time≥90min: n=70) and Group 4 (unsuccessful coronary reperfusion: n=11).

RESULTS: One hundred patients (84%) were successful of PCI. A Kaplan-Meier curve showed that Group 1 had the best outcome among the four groups (good neurological outcome at 30 days; 74% vs 37% vs 23% vs 9%, P<0.0001). In receiver operating characteristics analysis for good neurological outcome at 30 days, the cutoff values for CtoE was 40min. The delay CtoE and CtoR time were independent predictors of poor neurological outcome at 30 days after adjusting multiple confounders (CtoE time; Hazard ratio (HR):1.026, 95% confidential intervals(CI): 1.011-1.042, P=0.001), (CtoR time; HR: 1.004, 95% CI: 1.001-1.008, P=0.020).

CONCLUSIONS: A shorter CtoE and CtoR predicts better clinical outcome in patients with ACS undergoing ECPR.

PEDIATRIA

1. **Circulation**. 2017 Nov 6. pii: CIR.0000000000000540. doi: 10.1161/CIR.0000000000000540. [Epub ahead of print]

2017 American Heart Association Focused Update on Pediatric Basic Life Support and Cardiopulmonary Resuscitation Quality: An Update to the American Heart Association Guidelines for Cardio pulmonary Resuscitation and Emergency Cardiovascular Care.

Atkins DL, de Caen AR, Berger S, Samson RA, Schexnayder SM, Joyner BL Jr, Bigham BL, Niles DE, Duff JP, Hunt EA, Meaney PA.

Abstract

This focused update to the American Heart Association guidelines for cardiopulmonary resuscitation (CPR) and emergency cardiovascular care follows the Pediatric Task Force of the International Liaison Committee on Resuscitation evidence review. It aligns with the International Liaison Committee on

Resuscitation's continuous evidence review process, and updates are published when the International Liaison Committee on Resuscitation completes a literature review based on new science. This update provides the evidence review and treatment recommendation for chest compression-only CPR versus CPR using chest compressions with rescue breaths for children <18 years of age. Four large database studies were available for review, including 2 published after the "2015 American Heart Association Guidelines Update for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care." Two demonstrated worse 30-day outcomes with chest compression-only CPR for children 1 through 18 years of age, whereas 2 studies documented no difference between chest compression-only CPR and CPR using chest compressions with rescue breaths. When the results were analyzed for infants <1 year of age, CPR using chest compressions with rescue breaths was better than no CPR but was no different from chest compression-only CPR in 1 study, whereas another study observed no differences among chest compression-only CPR, CPR using chest compressions with rescue breaths, and no CPR. CPR using chest compressions with rescue breaths should be provided for infants and children in cardiac arrest. If bystanders are unwilling or unable to deliver rescue breaths, we recommend that rescuers provide chest compressions for infants and children.

Conflict of interest statement

The American Heart Association makes every effort to avoid any actual or potential conflicts of interest that may arise as a result of an outside relationship or a personal, professional, or business interest of a member of the writing panel. Specifically, all members of the writing group are required to complete and submit a Disclosure Questionnaire showing all such relationships that might be perceived as real or potential conflicts of interest.

FREE ARTICLE

2. **Resuscitation**. 2017 May;114:47-52. doi: 10.1016/j.resuscitation.2017.03.001. Epub 2017 Mar 2.

Pediatric extracorporeal cardiopulmonary resuscitation during nights and weekends.

Burke CR1, Chan T2, Brogan TV2, McMullan DM3.

Abstract

AIM: Extracorporeal cardiopulmonary resuscitation (ECPR) is a lifesaving rescue therapy for patients with refractory cardiac arrest. Previous studies suggest that maintaining a 24/7 in-house surgical team may reduce ECPR initiation time and improve survival in adult patients. However, an association between cardiac arrest occurring during off-hours and ECPR outcome has not been established in children.

METHODS: This is a single institution, retrospective review of all pediatric patients who received ECPR from December 2008 to August 2015.

RESULTS: During the study period, ECPR was performed 54 times in 53 patients (20 weekday, 34 night/weekend). Interval from ECPR activation to initiation of extracorporeal life support was significantly longer during night/weekends (49min night/weekend vs. 33min weekday, p<0.001) as was the interval from ECPR activation to incision for cannulation (26min night/weekend vs. 14min Weekday, p<0.001). Rate of central nervous system (CNS) injury was higher in the night/weekend group (43% night/weekend vs. 15% weekday, p=0.04), with associated 75% mortality prior to hospital discharge. Time of arrest did not impact survival to hospital discharge (44% night/weekend vs. 55% weekday, p=0.57), one-year survival (33% night/weekend vs. 44% weekday, p=0.44), or neurologic outcome (Pediatric Cerebral Performance Score at 1-year post-ECPR, 1.45 weekday vs. 1.50 night/weekend, p=0.82).

CONCLUSIONS: Cardiac arrest occurring at night or during weekend hours is associated with a longer ECPR initiation time and higher rates of CNS injury. However, prolonged pre-ECPR support associated with off-hours cardiac arrest does not appear to impact survival or functional outcome in pediatric patients.

3. **Korean J Thorac Cardiovasc Surg.** 2017 Oct;50(5):317-325. doi: 10.5090/kjtcs.2017.50.5.317. Epub 2017 Oct 5.

Outcomes of Extracorporeal Membrane Oxygenation in Children: An 11-Year Single-Center.

Abstract

Background: Extracorporeal membrane oxygenation (ECMO) has become an important treatment modality in pediatric patients with cardiopulmonary failure, but few studies have been conducted in Korea.

Methods: We conducted a retrospective review of pediatric patients younger than 18 years who were placed on ECMO between January 2004 and December 2014 at Samsung Medical Center.

Results: We identified 116 children on ECMO support. The overall rate of successful weaning was 51.7%, and the survival to discharge rate was 37.1%. There were 39, 61, and 16 patients on ECMO for respiratory, cardiac, and extracorporeal cardiopulmonary resuscitation, respectively. The weaning rate in each group was 48.7%, 55.7%, and 43.8%, respectively. The survival rate was 43.6%, 36.1%, and 25.0%, respectively.

Sixteen patients on ECMO had functional single ventricle physiology; in this group, the weaning rate was 43.8% and the survival rate was 31.3%. Ten patients were on ECMO as a bridge to transplantation (8 for heart and 2 for lung). In patients with heart transplantation, the rate of survival to transplantation was 50.0%, and the overall rate of survival to discharge was 37.5%.
Conclusion: An increasing trend in pediatric ECMO utilization was observed. The outcomes were favorable considering the early experiences that were included in this study and the limited supply of specialized equipment for pediatric patients.

5. **Simul Healthc**. 2017 Nov 8. doi: 10.1097/SIH.0000000000000267. [Epub ahead of print]
The Development and Validation of a Concise Instrument for Formative Assessment of Team Leader Performance During Simulated Pediatric Resuscitations.
Nadkarni LD1, Roskind CG, Auerbach MA, Calhoun AW, Adler MD, Kessler DO.
Abstract
AIM: The aim of this study was to assess the validity of a formative feedback instrument for leaders of simulated resuscitations.
METHODS: This is a prospective validation study with a fully crossed (person × scenario × rater) study design. The Concise Assessment of Leader Management (CALM) instrument was designed by pediatric emergency medicine and graduate medical education experts to be used off the shelf to evaluate and provide formative feedback to resuscitation leaders. Four experts reviewed 16 videos of in situ simulated pediatric resuscitations and scored resuscitation leader performance using the CALM instrument. The videos consisted of 4 pediatric emergency department resuscitation teams each performing in 4 pediatric resuscitation scenarios (cardiac arrest, respiratory arrest, seizure, and sepsis). We report on content and internal structure (reliability) validity of the CALM instrument.
RESULTS: Content validity was supported by the instrument development process that involved professional experience, expert consensus, focused literature review, and pilot testing. Internal structure validity (reliability) was supported by the generalizability analysis. The main component that contributed to score variability was the person (33%), meaning that individual leaders performed differently. The rater component had almost zero (0%) contribution to variance, which implies that raters were in agreement and argues for high interrater reliability.
CONCLUSIONS: These results provide initial evidence to support the validity of the CALM instrument as a reliable assessment instrument that can facilitate formative feedback to leaders of pediatric simulated resuscitations.

RECERCA EXPERIMENTAL

1. **J Am Heart Assoc**. 2017 Nov 4;6(11). pii: e006749. doi: 10.1161/JAHA.117.006749.
Real-Time Ventricular Fibrillation Amplitude-Spectral Area Analysis to Guide Timing of Shock Delivery Improves Defibrillation Efficacy During Cardiopulmonary Resuscitation in Swine.
Aiello S1, Perez M1, Cogan C1, Baetiong A2, Miller SA1, Radhakrishnan J2, Kaufman CL3, Gazmuri RJ4,5.
Abstract
BACKGROUND: The ventricular fibrillation amplitude spectral area (AMSA) predicts whether an electrical shock could terminate ventricular fibrillation and prompt return of spontaneous circulation. We hypothesized that AMSA can guide more precise timing for effective shock delivery during cardiopulmonary resuscitation.
METHODS AND RESULTS: Three shock delivery protocols were compared in 12 pigs each after electrically induced ventricular fibrillation, with the duration of untreated ventricular fibrillation evenly stratified into 6, 9, and 12 minutes: AMSA-Driven (AD), guided by an AMSA algorithm; Guidelines-Driven (GD), according to cardiopulmonary resuscitation guidelines; and Guidelines-Driven/AMSA-Enabled (GDAE), as per GD but allowing earlier shocks upon exceeding an AMSA threshold. Shocks delivered using the AD, GD, and GDAE protocols were 21, 40, and 62, with GDAE delivering only 2 AMSA-enabled shocks. The corresponding 240-minute survival was 8/12, 6/12, and 2/12 (log-rank test, P=0.035) with AD exceeding GDAE (P=0.026). The time to first shock (seconds) was (median [Q1-Q3]) 272 (161-356), 124 (124-125), and 125 (124-125) (P<0.001) with AD exceeding GD and GDAE (P<0.05); the average coronary perfusion pressure before first shock (mm Hg) was 16 (9-30), 10 (6-12), and 3 (-1 to 9) (P=0.002) with AD exceeding GDAE (P<0.05); and AMSA preceding the first shock (mV·Hz, mean±SD) was 13.3±2.2, 9.0±1.6, and 8.6±2.0 (P<0.001) with AD exceeding GD and GDAE (P<0.001). The AD protocol delivered fewer unsuccessful shocks (ie, less shock burden) yielding less postresuscitation myocardial dysfunction and higher 240-minute survival.

CONCLUSIONS: The AD protocol improved the time precision for shock delivery, resulting in less shock burden and less postresuscitation myocardial dysfunction, potentially improving survival compared with time-fixed, guidelines-driven, shock delivery protocols.

2. **Am J Emerg Med**. 2017 Nov;35(11):1645-1652. doi: 10.1016/j.ajem.2017.05.013. Epub 2017 May 11.
Comparison of early sequential hypothermia and delayed hypothermia on neurological function after resuscitation in a swine model.
Yuan W1, Wu JY1, Zhao YZ1, Li J2, Li JB3, Li ZH4, Li CS5.
Abstract
BACKGROUND: We utilized a porcine cardiac arrest model to compare early sequential hypothermia (ESH) with delayed hypothermia (DH) and no hypothermia (NH) to investigate the different effects on cerebral function after resuscitation.
METHODS: After return of spontaneous circulation (ROSC), resuscitated 24 pigs divided into three groups. The ESH group implemented early sequential hypothermia immediately, and the DH group implemented delayed hypothermia at 1 h after ROSC. The core temperature, hemodynamic parameters and oxygen metabolism were recorded. Cerebral metabolism variables and neurotransmitter in the extracellular fluid were collected through the microdialysis tubes. The bloods were analyzed for venous jugular bulb oxygen saturation, lactate and neuron specific nolase. The cerebral function was evaluated using the cerebral performance category and neurologic deficit score at 72h after ROSC and cerebral histology in the right posterior frontal lobe were collected.
RESULTS: ESH reached the target temperature earlier and showed more favorable outcomes of neurological function than DH. Specifically, early sequential hypothermia reduced cerebral oxygen and energy consumption and decreased extracellular accumulation of neurotransmitters after resuscitation and protected the integrity of the BBB during reperfusion.
CONCLUSIONS: Early sequential hypothermia could increase the protection of neurological function after resuscitation and produce better neurological outcomes.

3. **Perfusion**. 2017 Nov 1:267659117742478. doi: 10.1177/0267659117742478. [Epub ahead of print]
Twenty minutes of normothermic cardiac arrest in a pig model: the role of short-term hypothermia for neurological outcome.
Foerster K1, Benk C1, Beyersdorf F1, Cristina Schmitz H1, Wittmann K1, Taunyane I1, Heilmann C1, Trummer G1.
Abstract
INTRODUCTION: Cardiopulmonary resuscitation restores circulation, but with inconsistent blood-flow and pressures. Our recent approach using an extracorporeal life support system, named "controlled integrated resuscitation device" (CIRD), may lead to improved survival and neurological recovery after cardiac arrest (CA). The basic idea is to provide a reperfusion tailored to the individual patient by control of the conditions of reperfusion and the composition of the reperfusate. Hypothermia is one aspect of this concept. Here, we investigated the role of immediate short-term blood cooling after experimental CA and its influence on survival and neurological recovery.
METHODS: Twenty-one pigs were exposed to 20 minutes of normothermic CA. Afterwards, CIRD was immediately started for 60 minutes in all animals and the heart was converted to a sinus rhythm. The pigs either received normothermic reperfusion (37°C, n=11) or the temperature was maintained at 32°C for the first 30 minutes (n=10). Thermometric, hemodynamic and serologic data were collected during the experiment. After weaning from CIRD, neurological recovery was assessed daily by a species-specific neurological deficit score (NDS; 0: normal; 500: brain death).
RESULTS: One pig in each group could not be successfully resuscitated. Due to severe neurological deficits, only 6/11 animals in the normothermic group finished the observation time of seven days with an NDS of 37±34. In the hypothermic group, all nine surviving animals reached day seven with an NDS of 16±13. Analogous to the lower NDS, animals in the hypothermic group also showed lower neuron-specific enolase end values as a marker of brain injury.
CONCLUSIONS: Within this experimental setting, immediate moderate and short-term hypothermia after CA improves survival and seems to result in statistically non-significant better neurological recovery.

4. **BMC Anesthesiol**. 2017 Feb 2;17(1):18. doi: 10.1186/s12871-017-0309-3.
Supplement of levosimendan to epinephrine improves initial resuscitation outcomes from asphyxial cardiac arrest.
Wu B1, Peng YG2, Zhao S1, Bao N1, Pan L1, Dong J1, Xu X3,4, Wang Q5,6.
Abstract

BACKGROUND: Levosimendan exerted favorable effects on the initial outcome in the treatment of ventricular fibrillation cardiac arrest. This study investigated the efficacy of levosimendan in the treatment of asphyxia-induced cardiac arrest in rats.
METHODS: Animals underwent asphyxial cardiac arrest/cardiopulmonary resuscitation, randomized to three treatment groups: epinephrine (10 μg/kg) supplemented with levosimendan (bolus 12 μg/kg and infusion for 1 h, EL group); epinephrine only (10 μg/kg, E group), or levosimendan only (bolus 12 μg/kg and infusion for 1 h, L group). The resuscitation success rate, wet-to-dry ratio of lung, and rate of alveolar and blood gas analysis were recorded.
RESULTS: 10 rats in the EL group, 8 in the E group, and 2 in the L group showed an initial return of spontaneous circulation ($P < 0.001$); among them, 10, 4, and 2 rats survived at the end of a 60-min observation period from each group, respectively ($P = 0.001$). The coronary perfusion pressure in the EL group was higher than that of either the E or L group ($P < 0.05$). The lung wet-to-dry weight ratio and rate of damaged alveoli were lower in the EL group than the E group ($P < 0.05$).
CONCLUSIONS: In the early stage of resuscitation for asphyxia-induced cardiac arrest in rats, levosimendan supplemented with epinephrine can significantly increase coronary perfusion pressure, reduce lung injury, and ultimately enhance the survival rate.
Free Article

5. **J Pharmacol Sci**. 2017 Oct 23. pii: S1347-8613(17)30173-1. doi: 10.1016/j.jphs.2017.10.004. [Epub ahead of print]
PD149163 induces hypothermia to protect against brain injury in acute cerebral ischemic rats.
Xue TF1, Ding X2, Ji J1, Yan H1, Huang JY1, Guo XD1, Yang J1, Sun XL3.
Abstract
Therapeutic hypothermia is a promising strategy for acute cerebral ischemia via physical or pharmacological methods. In this study, we pharmacologically induced hypothermia on Sprague Dawley rats by intraperitoneally injecting PD149163. We found that mild hypothermia was induced by PD149163 treatment without local cerebral blood flow (LCBF) alteration. To evaluate the neuroprotective effects of PD149163, TTC staining, HE staining and Nissl's staining were performed in our study. We found that PD149163 could prevent neuronal damage, and inhibit proliferation and activation of glial cells induced by ischemia. Simultaneously, we observed PD149163 ameliorated apoptosis characterized by down-regulated caspase-3 and Bax, but elevated Bcl-2. Moreover, PD149163 dramatically reduced JNK and AMPK/mTOR signaling pathway activation, and thereby inhibited autophagy by increased P62 expression, decreased the ratio of LC3-Ⅱ to LC3-Ⅰ and the expression of Beclin. Taken together, the present findings reveal the therapeutic effects of PD149163-induced hypothermia in brain ischemia, and provide a new strategy for stroke treatment.
Free Article

CASE REPORTS

1. **Acute Med Surg**. 2017 Apr 24;4(3):341-343. doi: 10.1002/ams2.277. eCollection 2017 Jul.
Two cases of life-threatening arrhythmia induced by risperidone: evaluation of risperidone and 9-hydroxy-risperidone concentrations.
Ito A1, Enokiya T2, Kawamoto E1, Iwashita Y 1, Takeda T1, Ikemura K2, Okuda M2, Imai H1.
Abstract
Cases: Case 1: A 20-year-old woman suffering a suspected overdose was transported to the hospital. She presented bradycardia with wide QRS waves and QT prolongation, followed by cardiac arrest. Extracorporeal cardiopulmonary resuscitation was implemented, improving circulation. Risperidone and 9OH-RIS levels were 9.6 ng/mL and 127.6 ng/mL, respectively. Case 2: A 54-year-old woman was hospitalized for femoral fracture and underwent surgery. Her electrocardiogram showed bradycardia and complete AV block. Risperidone and 9OH-RIS levels were 3.2 ng/mL and 61.4 ng/mL, respectively.
Outcome: In both cases, only serum concentration of 90H-RIS were elevated.
Conclusion: Arrhythmia related to risperidone has proven rare but sometimes fatal. Serum concentrations of risperidone and the metabolite 9-hydroxy-risperidone (9OH-RIS) during these events are seldom documented. As 9OH-RIS shows pharmacological activity equivalent to risperidone, it may induce life-threatening arrhythmia (regardless of the intake dosage). It is critical to evaluate the serum concentration of 9OH-RIS in suspected risperidone toxicity.

2. **J Intensive Care Soc**. 2017 Nov;18(4):342-347. doi: 10.1177/1751143717702155. Epub 2017 Apr 25.

The use of veno-venous extracorporeal membrane oxygenation following thrombolysis for massive pulmonary embolism.

Seaton A1, Hodgson LE1,2, Creagh-Brown B1,3, Pakavakis A4, Wyncoll D4, Doyle Jf JF1.

Abstract

A 59-year-old man was diagnosed with a massive pulmonary embolism. Despite thrombolysis there were two episodes of cardiac arrest and following recovery of spontaneous circulation profound cardiorespiratory failure ensued. An extracorporeal membrane oxygenation retrieval team initiated veno-venous extracorporeal membrane oxygenation on site to facilitate transfer to the extracorporeal membrane oxygenation centre. An excellent outcome is reported in the short term. This represents one of the few published cases of veno-venous extracorporeal membrane oxygenation for a massive pulmonary embolism following thrombolysis.

3**. Acute Med Surg**. 2017 Mar 29;4(3):334-337. doi: 10.1002/ams2.275. eCollection 2017 Jul.

Cardiac arrest caused by sibutramine obtained over the Internet: a case of a young woman without pre-existing cardiovascular disease successfully resuscitated using extracorporeal membrane oxygenation.

Bunya N1, Sawamoto K1, Uemura S1, Kyan R1, Inoue H1, Nishida J2, Kouzu H2, Kokubu N2, Miura T2, Narimatsu E1.

Abstract

Case: Sibutramine is a weight loss agent that was withdrawn from the market in the USA and European Union because it increases adverse events in patients with cardiovascular diseases. However, non-prescription weight loss pills containing sibutramine can be still easily purchased over the Internet.

A 21-year-old woman without history of cardiovascular diseases developed cardiac arrest. She was a user of a weight loss pills, containing sibutramine and hypokalemia-inducing agents, imported from Thailand over the Internet.

Outcome: She was successfully resuscitated without any neurological deficits by using extracorporeal membrane oxygenation for refractory ventricular fibrillation.

Conclusion: This case indicates that sibutramine can cause cardiac arrest even in subjects without pre-existing cardiovascular disease when combined with agents that promote QT prolongation.

4. **Am J Emerg Med.** 2017 Nov;35(11):1718-1723. doi: 10.1016/j.ajem.2017.05.011. Epub 2017 May 11.

Pediatric out-of-hospital cardiac arrest caused by left coronary-artery agenesis with primary shockable rhythm.

Weigeldt M1, Lahmann S2, Krieger K3, Buttenberg S4 , Stephan V5, Stiller B6, Stengel D7.

Abstract

BACKGROUND: To illustrate a rare cause of out-of-hospital cardiac arrest in children, its differential diagnoses, emergency and subsequent treatment at various steps in the rescue chain, and potential outcomes.

CASE PRESENTATION: A 4-year-old boy with unknown agenesis of the left coronary ostium sustained out-of-hospital cardiac arrest. Bystander cardio-pulmonary resuscitation was initiated and defibrillation was performed via an automated external defibrillator (AED) shortly after paramedics arrived at the scene, restoring sinus rhythm and spontaneous circulation. After admission to the intensive care unit the child was intubated for airway and seizure control. Further diagnostic work-up by angiography revealed agenesis of the left coronary artery. After initial seizures, the boy's neurological recovery was complete. He subsequently underwent successful internal mammary artery in-situ bypass surgery to the trunk of the left coronary artery. One year after cardiac arrest, the patient had completely recovered with no physical or intellectual sequelae. A catheter examination proved excellent growth of the bypass and good cardiac function.

CONCLUSIONS: This case illustrates the long term outcome after agenesis of the LCA while reiterating that prompt access to pediatric defibrillation may be lifesaving-albeit in a minority of pediatric OHCA.

RCP i CT MECÀNICS

1. **Acta Anaesthesiol Scand**. 2017 Nov 15. doi: 10.1111/aas.13027. [Epub ahead of print]

Skills among young and elderly laypersons during simulated dispatcher assisted CPR and after CPR training.

Nebsbjerg MA1,2, Rasmussen SE1,3, Bomholt KB1, Krogh LQ1,4, Krogh K5,6, Povlsen JA7,8, Riddervold IS9, Grøfte T9,10, Kirkegaard H1,9, Løfgren B1,7,11.

Abstract

BACKGROUND: Dispatcher assisted cardiopulmonary resuscitation (DA-CPR) increase the rate of bystander CPR. The aim of the study was to compare the performance of DA-CPR and attainable skills following CPR training between young and elderly laypersons.

METHODS: Volunteer laypersons (young: 18-40 years; elderly: > 65 years) participated. Single rescuer CPR was performed in a simulated DA-CPR cardiac arrest scenario and after CPR training. Data were obtained from a manikin and from video recordings. The primary endpoint was chest compression depth.

RESULTS: Overall, 56 young (median age: 26, years since last CPR training: 6) and 58 elderly (median age: 72, years since last CPR training: 26.5) participated. Young laypersons performed deeper (mean (SD): 56 (14) mm vs. 39 (19) mm, P < 0.001) and faster (median (25th-75th percentile): 107 (97-112) per min vs. 84 (74-107) per min, P < 0.001) chest compressions compared to elderly. Young laypersons had shorter time to first compression (mean (SD): 71 (11) seconds vs. 104 (38) seconds, P < 0.001) and less hands-off time (median (25th-75th percentile): 0 (0-1) seconds vs. 5 (2-10) seconds, P < 0.001) than elderly. After CPR training chest compressions were performed with a depth (mean (SD): 64 (8) mm vs. 50 (14) mm, P < 0.001) and rate (mean (SD): 111 (11) per min vs. 93 (18) per min, P < 0.001) for young and elderly laypersons respectively.

CONCLUSION: Despite long CPR retention time for both groups, elderly laypersons had longer retention time, and performed inadequate DA-CPR compared to young laypersons. Following CPR training the attainable CPR level was of acceptable quality for both young and elderly laypersons.

REGISTRES I REVISIONS

1**. Crit Care Med**. 2017 Nov 10. doi: 10.1097/CCM.0000000000002846. [Epub ahead of print]

Determinants of Long-Term Neurological Recovery Patterns Relative to Hospital Discharge Among Cardiac Arrest Survivors.

Agarwal S1, Presciutti A, Roth W, Matthews E, Rodriguez A, Roh DJ, Park S, Claassen J, Lazar RM.

Abstract

OBJECTIVE: To explore factors associated with neurological recovery at 1 year relative to hospital discharge after cardiac arrest.

DESIGN: Observational, retrospective review of a prospectively collected cohort.

SETTING: Medical or surgical ICUs in a single tertiary care center.

PATIENTS: Older than 18 years, resuscitated following either in-hospital or out-of-hospital cardiac arrest and considered for targeted temperature management between 2007 and 2013.

INTERVENTIONS: None.

MEASUREMENTS AND MAIN RESULTS: Logistic regressions to determine factors associated with a poor recovery pattern after 1 year, defined as persistent Cerebral Performance Category Score 3-4 or any worsening of Cerebral Performance Category Score relative to discharge status. In total, 30% (117/385) of patients survived to hospital discharge; among those discharged with Cerebral Performance Category Score 1, 2, 3, and 4, good recovery pattern was seen in 54.5%, 48.4%, 39.5%, and 0%, respectively. Significant variables showing trends in associations with a poor recovery pattern (62.5%) in a multivariate model were age more than 70 years (odds ratio, 4; 95% CIs, 1.1-15; p = 0.04), Hispanic ethnicity (odds ratio, 4; CI, 1.2-13; p = 0.02), and discharge disposition (home needing out-patient services (odds ratio, 1), home requiring no additional services (odds ratio, 0.15; CI, 0.03-0.8; p = 0.02), acute rehabilitation (odds ratio, 0.23; CI, 0.06-0.9; p = 0.04).

CONCLUSIONS: Patients discharged with mild or moderate cerebral dysfunction sustained their risk of neurological worsening within 1 year of cardiac arrest. Old age, Hispanic ethnicity, and discharge disposition of home with out-patient services may be associated with a poor 1 year neurological recovery pattern after hospital discharge from cardiac arrest.

2**. Am J Cardiol.** 2017 Oct 19. pii: S0002-9149(17)31612-0. doi: 10.1016/j.amjcard.2017.10.005. [Epub ahead of print]

Effect of Serum Albumin Concentration on Neurological Outcome After Out-of-Hospital Cardiac Arrest (from the CRITICAL [Comprehensive Registry of Intensive Cares for OHCA Survival] Study in Osaka, Japan).

Matsuyama T1, Iwami T2, Yamada T3, Hayakawa K4, Yoshiya K5, Irisawa T5, Abe Y6, Nishimura T7, Uejima T8, Ohishi Y9, Kiguchi T10, Kishi M11, Kishimoto M12, Nakao S13, Hayashi Y14, Sogabe T15, Morooka T16, Izawa J2, Shimamoto T2, Hatakeyama T2, Fujii T2, Sado J17, Shimazu T5, Kawamura T2, Kitamura T18.

Abstract

The aim of this study was to assess whether serum albumin concentration upon hospital arrival had prognostic indications on out-of-hospital cardiac arrest (OHCA). This prospective, multicenter observational study conducted in Osaka, Japan (the CRITICAL [Comprehensive Registry of Intensive Cares for OHCA Survival] study), enrolled all patients with consecutive OHCA transported to 14 participating institutions. We included adult patients aged ≥18 years with nontraumatic OHCA who achieved return of spontaneous circulation and whose serum albumin concentration was available from July 2012 to December 2014. Based on the serum albumin concentration upon hospital arrival, patients were divided into quartiles (Q1 to Q4), namely, Q1 (<2.7 g/dl), Q2 (2.7 to 3.1 g/dl), Q3 (3.1 to 3.6 g/dl), and Q4 (≥3.6 g/dl). The primary outcome was 1-month survival with favorable neurological outcome (cerebral performance category scale 1 or 2). During the study period, a total of 1,269 patients with OHCA were eligible for our analyses. The highest proportion of favorable neurological outcome was 33.5% (109 of 325) in the Q4 group, followed by 13.2% (48 of 365), 5.0% (13 of 261), and 3.5% (11 of 318) in the Q3, Q2, and Q1 groups, respectively. In the multivariable logistic regression analysis, the proportion of favorable neurological outcome in the Q4 group was significantly higher, compared with that in the Q1 group (adjusted odds ratio 8.61; 95% confidence interval 4.28 to 17.33). The adjusted proportion of favorable neurological outcome increased in a stepwise manner across increasing quartiles (p for trend <0.001). Higher serum albumin concentration was significantly and independently associated with favorable neurological outcome in a dose-dependent manner.

3**. PLoS One**. 2017 Nov 16;12(11):e0188180. doi: 10.1371/journal.pone.0188180. eCollection 2017.

Out-of-hospital cardiac arrests in Switzerland: Predictors for emergency department mortality in patients with ROSC or on-going CPR on admission to the emergency department.

Sauter TC1, Iten N1, Schwab PR1,2, Hautz WE1, Ricklin ME1, Exadaktylos AK1.

Abstract

BACKGROUND: One of the leading causes of death is out-of-hospital cardiac arrest (OHCA) with an in-hospital mortality of about 70%. To identify predictors for the high mortality of OHCA patients and especially for women, that are considered at high risk for in-hospital mortality, we evaluated one specific setting of in-hospital treatment after OHCA: the emergency department (ED).

METHODS: Retrospective analysis of consecutive ED admissions with OHCA at the Inselspital Bern, Switzerland from 1st June 2012 to 31th Mai 2015. Demographic, preclinical and ED medical data were compared for patient groups with return of circulation (ROSC) and on-going resuscitation (CPR) on admission, as well as for subgroups with and without ED mortality. Predictors for ED mortality were investigated using univariate analysis with logistic regression.

RESULTS: In 354 patients (228 (64.4%) with ROSC; 126 (35.6%) with on-going CPR) we found an overall ED mortality of 28.5% (5.7% ROSC group; 69.8% on-going CPR group). Female gender (OR 7.053 (CI 95% 2.085; 24.853), p = 0.002) and greater age (OR 1.052 (95% CI 1.006-1.101), p = 0.029) were associated with ED mortality in the ROSC but not in the on-going CPR group. Ventricular fibrillation as initially monitored rhythm (OR 0.126 (95% CI 0.027-0.582), p = 0.008) and shorter CPR duration (OR 1.055 (95% CI 1.024;1.088), p = 0.001) were associated with ED survival in patients with ROSC but not in patients with on-going CPR on admission. In ROSC patients a higher lactate and lower pH were associated with mortality (pH: OR 0.009 (CI95% 0.000;0.420), p = 0.016; lactate: OR 1.183 (95% CI 1.037; 1.349), p = 0.013); similar in on-going CPR patients (pH 0.061 (95% CI 0.007, 0.558), p = 0.013, lactate: 1.146 (95% CI 1.041;1.261), p = 0.005).

CONCLUSION: Patients with ROSC who died during ED care were predominantly women and older patients, as well as patients with non-shockable initial heart rhythm and long CPR durations. In patients with on-going CPR on admission, no clinical or demographic predictors for ED mortality were found. Higher lactate and lower pH were predictors in both OHCA groups.

4**. N Engl J Med**. 2017 Nov 16;377(20):1943-1953. doi: 10.1056/NEJMoa1615710.

Sudden Cardiac Arrest during Participation in Competitive Sports.

Landry CH1, Allan KS1, Connelly KA1, Cunningham K1, Morrison LJ1, Dorian P1; Rescu Investigators.

Abstract

BACKGROUND: The incidence of sudden cardiac arrest during participation in sports activities remains unknown. Preparticipation screening programs aimed at preventing sudden cardiac arrest during sports activities are thought to be able to identify at-risk athletes; however, the efficacy of these programs remains controversial. We sought to identify all sudden cardiac arrests that occurred during participation in sports activities within a specific region of Canada and to determine their causes.

METHODS: In this retrospective study, we used the Rescu Epistry cardiac arrest database (which contains records of every cardiac arrest attended by paramedics in the network region) to identify all out-of-hospital cardiac arrests that occurred from 2009 through 2014 in persons 12 to 45 years of age during participation in a sport. Cases were adjudicated as sudden cardiac arrest (i.e., having a cardiac cause) or as an event resulting from a noncardiac cause, on the basis of records from multiple sources, including ambulance call reports, autopsy reports, in-hospital data, and records of direct interviews with patients or family members.
RESULTS: Over the course of 18.5 million person-years of observation, 74 sudden cardiac arrests occurred during participation in a sport; of these, 16 occurred during competitive sports and 58 occurred during noncompetitive sports. The incidence of sudden cardiac arrest during competitive sports was 0.76 cases per 100,000 athlete-years, with 43.8% of the athletes surviving until they were discharged from the hospital. Among the competitive athletes, two deaths were attributed to hypertrophic cardiomyopathy and none to arrhythmogenic right ventricular cardiomyopathy. Three cases of sudden cardiac arrest that occurred during participation in competitive sports were determined to have been potentially identifiable if the athletes had undergone preparticipation screening.
CONCLUSIONS: In our study involving persons who had out-of-hospital cardiac arrest, the incidence of sudden cardiac arrest during participation in competitive sports was 0.76 cases per 100,000 athlete-years. The occurrence of sudden cardiac arrest due to structural heart disease was uncommon during participation in competitive sports.

ACR INTRAHOSPITALÀRIA

1. Kardiol Pol. 2017 Nov 13. doi: 10.5603/KP.a2017.0209. [Epub ahead of print]
In-hospital sudden cardiac arrest protocol analysis.
Jagosz A, Bursy D, Sobon A, Kiczmer P, Copik M, Bialka S, Smereka J, Misiolek H, Szarpak Ł1.
Abstract
BACKGROUND: In-hospital sudden cardiac arrest (SCA) is an event that is linked to high mortality. Data analysis of SCA and the course of in-hospital cardiopulmonary resuscitation (CPR) allows for its better understanding and improvement.
AIM: Analysis of cases of SCA and the procedures taken by the medical staff of University Hospital.
METHODS: A retrospective analysis of 104 protocols of SCA, from May 2014 to December 2015. Actions taken by medical staff before the arrival of the resuscitation team (RT) and RT proceedings. Data are presented as median and mean ± SD. For statistical analysis was used Statistica 12, significant results were accepted at $p < 0.05$.
RESULTS: Analysis of data revealed that 52.88% of cases were women, mean age was 70.82 ± 13.32 years. Resuscitation activities (BLS - 48.08%, ALS - 42.31%) were performed before the RT arrival, and no action was taken in 5.77% of cases. Significantly, the SCA occurred in the afternoons, and the Emergency Room in 41.35% of cases was the place of CPR. The waiting time for RT was an average of 4.47 ± 5.85 minutes. Non-defibrillation rhythms occurred in 79.80% and the efficacy of resuscitation was 40%.
CONCLUSIONS: Resuscitation protocols should be registered not only as an important part of medical records, but also as a source of information during the CPR training of staff. The lack of rescue activities before the arrival of the RT indicates the urgent need to identify the cause of the problem and try to eliminate these negative behaviors.
Free Article

CAUSES DE L'ACR

1. **Gynecol Obstet Fertil Senol**. 2017 Nov 10. pii: S2468-7189(17)30251-9. doi: 10.1016/j.gofs.2017.10.020. [Epub ahead of print]
[Maternal deaths due to sudden death. Results from the French confidential enquiry into maternal deaths, 2010-2012].
[Article in French]
Morau E1, Beaumont E2, Verspyck E3.
Abstract
Sudden death is defined as unexpected cardiac arrest occurring less than one hour after the onset of the first symptoms. Between 2010 and 2012, 23 maternal deaths were considered as unexplained sudden deaths and three of them were not evaluated due to a lack of clinical data. In addition, 13 maternal deaths with an identified cause occurred in a clinical context of sudden death (7 cases of pulmonary embolism, 2

cases of epilepsy, and 2 cases of cardiomyopathy). The first maneuvers of resuscitation in the presence of bystanders were attempted in 8 of 22 cases (36%). This emphasizes the importance of teaching the non-medical resuscitation modalities of cardiac arrest in pregnant women. Pregnant women must receive accurate resuscitation as the whole population. An autopsy was performed in 10 of 33 cases (30%) and was considered incomplete in 3 patients. This result emphasizes the necessity to perform a systematic and specialized autopsy in the context of sudden maternal death, which is mostly unexplained.

ETCO2

1. **Resuscitation**. 2017 Nov 13. pii: S0300-9572(17)30731-1. doi: 10.1016/j.resuscitation.2017.11.040. [Epub ahead of print]
Predicting ROSC in out-of-hospital cardiac arrest using expiratory carbon dioxide concentration: Is trend-detection instead of absolute threshold values the key?
Brinkrolf P1, Borowski M2, Metelmann C1, Lukas RP3, Pidde-Küllenberg L3, Bohn A4.
Abstract
AIM: Guidelines recommend detecting return of spontaneous circulation (ROSC) by a rising concentration of carbon dioxide in the exhalation air. As CO2 is influenced by numerous factors, no absolute cut-off values of CO2 to detect ROSC are agreed on so far. As trends in CO2 might be less affected by influencing factors, we investigated an approach which is based on detecting CO2-trends in real-time.
METHODS: We conducted a retrospective case-control study on 169 CO2 time series from out of hospital cardiac arrests resuscitated by Muenster City Ambulance-Service, Germany. A recently developed statistical method for real-time trend-detection (SCARM) was applied to each time series. For each series, the percentage of time points with detected positive and negative trends was determined.
RESULTS: ROSC time series had larger percentages of positive trends than No-ROSC time series (p=0.003). The median percentage of positive trends was 15% in the ROSC time series (IQR: 5% to 23%) and 7% in the No-ROSC time series (IQR: 3% to 14%). A receiver operating characteristic (ROC) analysis yielded an optimal threshold of 13% to differentiate between ROSC and No-ROSC cases with a specificity of 58.4% and sensitivity of 73.9%; the area under the curve was 63.5%.
CONCLUSION: Patients with ROSC differed from patients without ROSC as to the percentage of detected CO2 trends, indicating the potential of our real-time trend-detection approach. Since the study was designed as a proof of principle and its calculated specificity and sensitivity are low, more research is required to implement CO2-trend-detection into clinical use.

2. **Pediatr Crit Care Med**. 2017 Nov 14. doi: 10.1097/PCC.0000000000001372. [Epub ahead of print]
End-Tidal Carbon Dioxide Use for Tracheal Intubation: Analysis From the National Emergency Airway Registry for Children (NEAR4KIDS) Registry.
Langhan ML1, Emerson BL, Nett S, Pinto M, Harwayne-Gidansky I, Rehder KJ, Krawiec C, Meyer K, Giuliano JS Jr, Owen EB, Tarquinio KM, Sanders RC Jr, Shepherd M, Bysani GK, Shenoi AN, Napolitano N, Gangadharan S, Parsons SJ, Simon DW, Nadkarni VM, Nishisaki A; for Pediatric Acute Lung Injury and Sepsis Investigators (PALISI) and National Emergency Airway Registry for Children (NEAR4KIDS) Investigators.
Abstract
OBJECTIVE: Waveform capnography use has been incorporated into guidelines for the confirmation of tracheal intubation. We aim to describe the trend in waveform capnography use in emergency departments and PICUs and assess the association between waveform capnography use and adverse tracheal intubation-associated events.
DESIGN: A multicenter retrospective cohort study.
SETTING: Thirty-four hospitals (34 ICUs and nine emergency departments) in the National Emergency Airway Registry for Children quality improvement initiative.
PATIENTS: Primary tracheal intubation in children younger than 18 years.
INTERVENTIONS: None.
MEASUREMENTS AND MAIN RESULTS: Patient, provider, and practice data for tracheal intubation procedure including a type of end-tidal carbon dioxide measurement, as well as the procedural safety outcomes, were prospectively collected. The use of waveform capnography versus colorimetry was evaluated in association with esophageal intubation with delayed recognition, cardiac arrest, and oxygen desaturation less than 80%. During January 2011 and December 2015, 9,639 tracheal intubations were reported. Waveform capnography use increased over time (39% in 2010 to 53% in 2015; $p < 0.001$), whereas colorimetry use decreased (< 0.001). There was significant variability in waveform capnography

use across institutions (median 49%; interquartile range, 25-85%; p < 0.001). Capnography was used more often in emergency departments as compared with ICUs (66% vs. 49%; p < 0.001). The rate of esophageal intubation with delayed recognition was similar with waveform capnography versus colorimetry (0.39% vs. 0.46%; p = 0.62). The rate of cardiac arrest was also similar (p = 0.49). Oxygen desaturation occurred less frequently when capnography was used (17% vs. 19%; p = 0.03); however, this was not significant after adjusting for patient and provider characteristics.
CONCLUSIONS: Significant variations existed in capnography use across institutions, with the use increasing over time in both emergency departments and ICUs. The use of capnography during intubation was not associated with esophageal intubation with delayed recognition or the occurrence of cardiac arrest.

DONACIÓ D'ÒRGANS

1. **Am J Transplant**. 2017 Nov 15. doi: 10.1111/ajt.14591. [Epub ahead of print]
Comments on "Impact of spontaneous donor hypothermia on graft outcomes after kidney transplantation".
Niemann C1, Broglio K2, Malinoski D3.
Abstract
Using a retrospective cohort that was part of a donor intervention trial published in 2009 1 , Schnuelle et al report in this issue that spontaneous hypothermia in deceased organ donors resulted in decreased recipient renal delayed graft function2 . Allograft survival was not statistically significantly different during long-term follow up. While spontaneous hypothermia is likely a distinct physiologic process compared to targeted mild hypothermia, as in our previously reported randomized controlled trial3 , the findings of the current retrospective study further confirm our impression that therapeutic mild hypothermia and deceased organ donor intervention research, in general, hold tremendous potential for addressing the ongoing shortage of organs available for transplantation.

TRAUMA

1. **Emerg Med Clin North Am**. 2018 Feb;36(1):161-179. doi: 10.1016/j.emc.2017.08.011.
Acute Management of the Traumatically Injured Pelvis.
Skitch S1, Engels PT2.
Abstract
Severe pelvic trauma is a challenging condition. The pelvis can create multifocal hemorrhage that is not easily compressible nor managed by traditional surgical methods such as tying off a blood vessel or removing an organ. Its treatment often requires reapproximation of bony structures, damage control resuscitation, assessment for associated injuries, and triage of investigations, as well as multimodality hemorrhage control (external fixation, preperitoneal packing, angioembolization, REBOA [resuscitative endovascular balloon occlusion of the aorta]) by multidisciplinary trauma specialists (general surgeons, orthopedic surgeons, endovascular surgeons/interventional radiologists). This article explores this complex clinical problem and provides a practical approach to its management.

2**. Emerg Med Clin North Am**. 2018 Feb;36(1):149-160. doi: 10.1016/j.emc.2017.08.012.
Major Abdominal Trauma: Critical Decisions and New Frontiers in Management.
Brenner M1, Hicks C2.
Abstract
A standardized approach should be used with a patient with abdominal trauma, including primary and secondary surveys, followed by additional diagnostic testing as indicated. Specific factors can make the diagnosis of serious abdominal trauma challenging, particularly in the face of multiple and severe injuries, unknown mechanism of injury, altered mental status, and impending or complete cardiac arrest. Advances in technology in diagnosis and/or treatment with ultrasound, helical computed tomography, and resuscitative endovascular balloon occlusion of the aorta (REBOA) have significantly advanced trauma care, and are still the focus of current and ongoing investigations.

ECOGRAFIA

1. **J Emerg Med**. 2017 Nov;53(5):722-725. doi: 10.1016/j.jemermed.2017.08.011.

Bedside Identification of Massive Pulmonary Embolism with Point-of-Care Transesophageal Echocardiography.
Jelic T1, Baimel M2, Chenkin J2.
Abstract
BACKGROUND: Pulmonary embolism can be difficult to diagnose, particularly in those who are hemodynamically unstable and cannot be imaged to confirm the diagnosis. Echocardiography can allow for rapid assessment of patients in shock, but requires adequate transthoracic windows to obtain clinically useful information. Emergency physician-performed transesophageal echocardiography (TEE) may be a useful tool when transthoracic echocardiography fails.
CASE REPORT: An 86-year-old woman presented to the emergency department after a fall at home. She rapidly decompensated in the emergency department and sustained a pulseless electrical activity cardiac arrest. Attempts made during the resuscitation to obtain transthoracic echocardiographic views to elicit the cause of the patient's cardiac arrest were unsuccessful. An emergency physician, with previous focused training in TEE, performed emergent TEE. The TEE examination rapidly revealed a dilated right ventricle and an empty, hyperdynamic left ventricle, suggestive of an unsuspected massive acute pulmonary embolism. WHY SHOULD AN EMERGENCY PHYSICIAN BE AWARE OF THIS?: With continued growth and utility of point-of-care ultrasound in emergency medicine, TEE provides an attractive means to assess critically ill patients that may not otherwise be assessable.

ORGANITZACIÓ I FORMACIÓ

1**. J Emerg Med.** 2017 Nov;53(5):688-696.e1. doi: 10.1016/j.jemermed.2017.08.076.
Association of the Emergency Medical Services-Related Time Interval with Survival Outcomes of Out-of-Hospital Cardiac Arrest Cases in Four Asian Metropolitan Cities Using the Scoop-and-Run Emergency Medical Services Model.
Kim TH1, Lee K2, Shin SD1, Ro YS3, Tanaka H4, Yap S5, Wong KD6, Ng YY7, Piyasuwankul T8, Leong B9.
Abstract
BACKGROUND: Response time interval (RTI) and scene time interval (STI) are key time variables in the out-of-hospital cardiac arrest (OHCA) cases treated and transported via emergency medical services (EMS).
OBJECTIVE: We evaluated distribution and interactive association of RTI and STI with survival outcomes of OHCA in four Asian metropolitan cities.
METHODS: An OHCA cohort from Pan-Asian Resuscitation Outcome Study (PAROS) conducted between January 2009 and December 2011 was analyzed. Adult EMS-treated cardiac arrests with presumed cardiac origin were included. A multivariable logistic regression model with an interaction term was used to evaluate the effect of STI according to different RTI categories on survival outcomes. Risk-adjusted predicted rates of survival outcomes were calculated and compared with observed rate.
RESULTS: A total of 16,974 OHCA cases were analyzed after serial exclusion. Median RTI was 6.0 min (interquartile range [IQR] 5.0-8.0 min) and median STI was 12.0 min (IQR 8.0-16.1). The prolonged STI in the longest RTI group was associated with a lower rate of survival to discharge or of survival 30 days after arrest (adjusted odds ratio [aOR] 0.59; 95% confidence interval [CI] 0.42-0.81), as well as a poorer neurologic outcome (aOR 0.63; 95% CI 0.41-0.97) without an increasing chance of prehospital return of spontaneous circulation (aOR 1.12; 95% CI 0.88-1.45).
CONCLUSIONS: Prolonged STI in OHCA with a delayed response time had a negative association with survival outcomes in four Asian metropolitan cities using the scoop-and-run EMS model. Establishing an optimal STI based on the response time could be considered.

2. **Aust Health Rev**. 2017 Nov 16. doi: 10.1071/AH17105. [Epub ahead of print]
Outcomes following changing from a two-tiered to a three-tiered hospital rapid response system.
Cheung W.
Abstract
Objectives: The aim of the present study was to determine whether changing a hospital rapid response system (RRS) from a two-tiered to a three-tiered model can reduce disruption to normal hospital routines while maintaining the same overall patient outcomes.
Methods: Staff at an Australian teaching hospital attending medical emergency team and cardiac arrest (MET/CA) calls were interviewed after the RRS was changed from a two-tiered to three-tiered model, and the results were compared with a study using the same methods conducted before the change. The main outcome measures were changes in: (1) the incident rate resulting from staff leaving normal duties to

attend MET/CA calls; (2) the cardiac arrest rate, (3) unplanned intensive care unit (ICU) admission rates; and (4) hospital mortality.
Results: We completed 1337 structured interviews (overall response rate 65.2%). The rate of incidents occurring as a result of staff leaving normal duties to attend MET/CA calls fell from 213.7 to 161.3 incidents per 1000 MET/CA call participant attendances (P<0.001), but the rate of cardiac arrest and unplanned ICU admissions did not change significantly. Hospital mortality was confounded by the opening of a new palliative care ward.
Conclusion: A three-tiered RRS may reduce disruption to normal hospital routines while maintaining the same overall patient outcomes.
What is known about the topic?: RRS calls result in significant disruption to normal hospital routines because staff can be called away from normal duties to attend. The best staffing model for an RRS is currently unknown.
What does this paper add?: The present study demonstrates, for the first time, that changing a hospital RRS from a two-tiered to a three-tiered model can reduce the rate of incidents reported by staff caused by leaving normal duties to attend RRS calls while maintaining the same overall patient outcomes.
What are the implications for practitioners?: Hospitals could potentially reduce disruption to normal hospital routines, without compromising patient care, by changing to a three-tiered RRS.

CURES POST RCE

1. **Am J Emerg Med**. 2017 Oct 17. pii: S0735-6757(17)30840-9. doi: 10.1016/j.ajem.2017.10.036. [Epub ahead of print]
Association between percutaneous hemodynamic support device and survival from cardiac arrest in the state of Michigan.
Pressman A1, Sawyer KN2, Devlin W3, Swor R 4.
Abstract
INTRODUCTION: The role of circulatory support in the post-cardiac arrest period remains controversial. Our objective was to investigate the association between treatment with a percutaneous hemodynamic support device and outcome after admission for cardiac arrest.
METHODS: We performed a retrospective study of adult patients with admission diagnosis of cardiac arrest or ventricular fibrillation (VF) from the Michigan Inpatient Database, treated between July 1, 2010, and June 30, 2013. Patient demographics, clinical characteristics, treatments, and disposition were electronically abstracted based on ICD-9 codes at the hospital level. Mixed-effects logistic regression models were fit to test the effect of percutaneous hemodynamic support device defined as either percutaneous left ventricular assist device (pLVAD) or intra-aortic balloon pump (IABP) on survival. These models controlled for age, sex, VF, myocardial infarction (MI), and cardiogenic shock with hospital modeled as a random effect.
RESULTS: A total of 103 hospitals contributed 4393 patients for analysis, predominately male (58.8%) with a mean age of 64.1years (SD 15.5). On univariate analysis, younger age, male sex, VF as the initial rhythm, acute MI, percutaneous coronary intervention, percutaneous hemodynamic support device, and absence of cardiogenic shock were associated with survival to discharge (each p<0.001). Mixed-effects logistic regressions revealed use of percutaneous hemodynamic support device was significantly associated with survival among all patients (OR 1.8 (1.28-2.54)), and especially in those with acute MI (OR 1.95 (1.31-2.93)) or cardiogenic shock (OR 1.96 (1.29-2.98)).
CONCLUSION: Treatment with percutaneous hemodynamic support device in the post-arrest period may provide left ventricular support and improve outcome.

2. **Ther Hypothermia Temp Manag**. 2017 Nov 13. doi: 10.1089/ther.2017.0039. [Epub ahead of print]
Plasma Neutrophil Gelatinase-Associated Lipocalin Measured Immediately After Restoration of Spontaneous Circulation Predicts Acute Kidney Injury in Cardiac Arrest Survivors Who Underwent Therapeutic Hypothermia.
Lee DH1, Lee BK1, Cho YS1, Jung YH1, Lee SM1, Park JS2, Jeung KW1.
Abstract
Early diagnosis of acute kidney injury (AKI) after cardiac arrest (CA) is challenging. We aimed to identify the diagnostic and prognostic performance of neutrophil gelatinase-associated lipocalin (NGAL) for AKI and its clinical outcomes. A retrospective observational study, involving adult comatose CA survivors treated with therapeutic hypothermia between May 2013 and December 2016, was conducted. AKI was classified according to the guidelines of Kidney Disease Improving Global Outcomes. NGAL levels were

measured after return of spontaneous circulation (ROSC). The primary outcome was development of AKI within 7 days after CA, and the secondary outcome was inhospital mortality. The study included 279 patients, of which 111 (39.8%) developed AKI and 61 (21.9%) died. Thirty-seven (33.3%) of patients in the AKI group had stage 3 AKI, and 45 (40.5%) patients received renal replacement therapy. The area under the curve of NGAL levels for diagnosing AKI was 0.725 (95% confidence interval [CI] 0.668-0.776), and NGAL levels were independently associated with the development of AKI (odds ratio [OR] 1.004; 95% CI 1.002-1.006). Nonsurvivors had significantly higher NGAL levels (221.0 ng/mL [154.0-355.5] vs. 148.5 ng/mL [97.0-232.9]; $p < 0.001$). The development of AKI was independently associated with mortality (OR 4.926; 95% CI 2.353-10.311); however, NGAL level was not associated with mortality (OR 1.000; 95% CI 0.999-1.001). Plasma NGAL level measured after ROSC can be an early predictor for the development of AKI after CA. The presence of AKI was associated with increased inhospital mortality

ELECTROFISIOLOGIA I DESFIBRIL·LACIÓ

1**. PLoS Comput Biol**. 2017 Nov 16;13(11):e1005783. doi: 10.1371/journal.pcbi.1005783. eCollection 2017 Nov.
Estimating the probabilities of rare arrhythmic events in multiscale computational models of cardiac cells and tissue.
Walker MA1, Gurev V2, Rice JJ2, Greenstein JL 1, Winslow RL1.
Abstract
Ectopic heartbeats can trigger reentrant arrhythmias, leading to ventricular fibrillation and sudden cardiac death. Such events have been attributed to perturbed Ca2+ handling in cardiac myocytes leading to spontaneous Ca2+ release and delayed afterdepolarizations (DADs). However, the ways in which perturbation of specific molecular mechanisms alters the probability of ectopic beats is not understood. We present a multiscale model of cardiac tissue incorporating a biophysically detailed three-dimensional model of the ventricular myocyte. This model reproduces realistic Ca2+ waves and DADs driven by stochastic Ca2+ release channel (RyR) gating and is used to study mechanisms of DAD variability. In agreement with previous experimental and modeling studies, key factors influencing the distribution of DAD amplitude and timing include cytosolic and sarcoplasmic reticulum Ca2+ concentrations, inwardly rectifying potassium current (IK1) density, and gap junction conductance. The cardiac tissue model is used to investigate how random RyR gating gives rise to probabilistic triggered activity in a one-dimensional myocyte tissue model. A novel spatial-average filtering method for estimating the probability of extreme (i.e. rare, high-amplitude) stochastic events from a limited set of spontaneous Ca2+ release profiles is presented. These events occur when randomly organized clusters of cells exhibit synchronized, high amplitude Ca2+ release flux. It is shown how reduced IK1 density and gap junction coupling, as observed in heart failure, increase the probability of extreme DADs by multiple orders of magnitude. This method enables prediction of arrhythmia likelihood and its modulation by alterations of other cellular mechanisms.

ECMO

1. **Am J Emerg Med.** 2017 Nov 8. pii: S0735-6757(17)30924-5. doi: 10.1016/j.ajem.2017.11.016. [Epub ahead of print]
D-dimer predicts bleeding complication in out-of-hospital cardiac arrest resuscitated with extracorporeal membrane oxygenation.
Otani T1, Sawano H2, Natsukawa T2, Matsuoka R2, Nakashima T2, Takahagi M2, Hayashi Y2.
Abstract
PURPOSE: In out-of-hospital cardiac arrest (OHCA) patients resuscitated with veno-arterial extracorporeal membrane oxygenation (VA-ECMO), known as extracorporeal cardiopulmonary resuscitation (ECPR), bleeding is a common complication. The purpose of this study was to assess the risk factors for bleeding complications in ECPR patients.
METHODS: We retrospectively analyzed the data for OHCA patients admitted to our hospital and resuscitated with ECPR between October 2009 and December 2016. We compared patients with and without major bleeding (i.e. the Bleeding Academic Research Consortium class≥3 bleeding) within 24h of hospital admission. Patients, whose bleeding complication was not evaluated, were excluded.
RESULTS: During the study period, 133 OHCA patients were resuscitated with ECPR, of whom 102 (77%) were included. In total, 71 (70%) patients experienced major bleeding. There were significant differences in age (median 65 vs. 50years, P<0.001), prior antiplatelet therapy (25% vs. 3%, P=0.008), hemoglobin

(median 11.6 vs. 12.6g/dL, P=0.003), platelet count (median 125 vs. 155×103/μL, P=0.001), and D-dimer levels on admission (median 18.8 vs. 6.7μg/mL, P<0.001) among patients with and those without major bleeding. Multivariate analysis showed significant associations between major bleeding and D-dimer levels (odds ratio, 1.066; 95% confidence interval, 1.018-1.116). Area under receiver-operating characteristic curve, which describes the accuracy of D-dimer levels in predicting major bleeding, was 0.76 (95% confidence interval, 0.66-0.87).
CONCLUSION: D-dimer levels may predict major bleeding in ECPR patients, suggesting that hyperfibrinolysis may be related to bleeding.

2. **Resuscitation**. 2017 Nov 8;122:1-5. doi: 10.1016/j.resuscitation.2017.11.034. [Epub ahead of print]
A retrospective comparison of survivors and non-survivors of massive pulmonary embolism receiving veno-arterial extracorporeal membrane oxygenation support.
George B1, Parazino M2, Omar HR3, Davis G4, Guglin M4, Gurley J4, Smyth S4.
Abstract
INTRODUCTION: While the optimal care of patients with massive pulmonary embolism (PE) is unclear, the general goal of therapy is to rapidly correct the physiologic derangements propagated by obstructive clot. Extracorporeal membrane oxygenation (ECMO) in this setting is promising, however the paucity of data limits its routine use. Our institution expanded the role of ECMO as an advanced therapy option in the initial management of massive PE. The purpose of this project was to evaluate ECMO-treated patients with massive PE at an academic medical center and report shortterm mortality outcomes.
METHODS: Thirty-two patients placed on ECMO for confirmed, massive PE from January 2012 to December 2015 were retrospectively analyzed. All patients had PE confirmed by computerized tomography and/or invasive pulmonary angiography.
RESULTS: In our population of patients managed with ECMO, 21 (65.6%) patients survived to decannulation and 17 (53.1%) survived index hospitalization. Baseline characteristics and clinical variables showed no difference in age, gender, right ventricular-to-left ventricular ratios, or peak troponin-T between survivors and non-survivors. Non-survivors tended to have a previous history of malignancy. Cardiac arrest prior to ECMO cannulation was associated with worse outcomes. All 5 patients who received concomitant systemic thrombolysis died, while 11 of 15 patients who received catheter-directed thrombolysis survived. A lactic acid level ≤6mmol/L had an 82.4% sensitivity and 84.6% specificity for predicting survival to discharge.
CONCLUSION: The practical approach of utilizing ECMO for massive PE is to reserve it for those who would receive the greatest benefit. Patients with poor perfusion, for example from cardiac arrest, may gain less benefit from ECMO. Our findings indicate that a serum lactate >6mmol/L may be an indicator of worse prognosis. Finally, in our patient population, catheter-directed thrombolytics was effectively combined with ECMO.

PEDIATRIA

1. **Pediatr Crit Care Med**. 2017 Nov 10. doi: 10.1097/PCC.0000000000001370. [Epub ahead of print]
Failure of Invasive Airway Placement on the First Attempt Is Associated With Progression to Cardiac Arrest in Pediatric Acute Respiratory Compromise.
Stinson HR1, Srinivasan V, Topjian AA, Sutton RM, Nadkarni VM, Berg RA, Raymond TT; American Heart Association Get With the Guidelines-Resuscitation Investigators.
Abstract
OBJECTIVES: The aim of this study was to describe the proportion of acute respiratory compromise events in hospitalized pediatric patients progressing to cardiopulmonary arrest, and the clinical factors associated with progression of acute respiratory compromise to cardiopulmonary arrest. We hypothesized that failure of invasive airway placement on the first attempt (defined as multiple attempts at tracheal intubation, and/or laryngeal mask airway placement, and/or the creation of a new tracheostomy or cricothyrotomy) is independently associated with progression of acute respiratory compromise to cardiopulmonary arrest.
DESIGN: Multicenter, international registry of pediatric in-hospital acute respiratory compromise.
SETTING: American Heart Association's Get with the Guidelines-Resuscitation registry (2000-2014).
PATIENTS: Children younger than 18 years with an index (first) acute respiratory compromise event.
INTERVENTIONS: None.
MEASUREMENTS AND MAIN RESULTS: Of the 2,210 index acute respiratory compromise events, 64% required controlled ventilation, 26% had return of spontaneous ventilation, and 10% progressed to

cardiopulmonary arrest. There were 762 acute respiratory compromise events (34%) that did not require an invasive airway, 1,185 acute respiratory compromise events (54%) with successful invasive airway placement on the first attempt, and 263 acute respiratory compromise events (12%) with failure of invasive airway placement on the first attempt. After adjusting for confounding variables, failure of invasive airway placement on the first attempt was independently associated with progression of acute respiratory compromise to cardiopulmonary arrest (adjusted odds ratio 1.8 [95% CIs, 1.2-2.6]).
CONCLUSIONS: More than 1 in 10 hospitalized pediatric patients who experienced an acute respiratory compromise event progressed to cardiopulmonary arrest. Failure of invasive airway placement on the first attempt is independently associated with progression of acute respiratory compromise to cardiopulmonary arrest.

CASE REPORTS

1. **Am J Emerg Med**. 2017 Nov 10. pii: S0735-6757(17)30929-4. doi: 10.1016/j.ajem.2017.11.021. [Epub ahead of print]
Fulminant adrenergic myocarditis complicated by pulmonary edema, cardiogenic shock and cardiac arrest.
Rostoff P1, Nessler B2, Pikul P3, Golinska-Grzybala K2, Miszalski-Jamka T3, Nessler J2.
Abstract
Adrenergic myocarditis is an uncommon presentation of pheochromocytoma and extremely rare cause of de novo acute heart failure (AHF). We present a case of a 31-year-old Caucasian woman with a history of hypertension and recurrent occipital headaches who was admitted to the emergency department due to severe de novo AHF presenting as pulmonary edema and cardiogenic shock. During the hospital admission the patient experienced asystolic cardiac arrest and was successfully resuscitated, intubated, and mechanically ventilated. Bedside transthoracic echocardiography revealed severe diffuse left ventricular hypokinesis with ejection fraction (LVEF) of 10%. Coronary angiography disclosed normal epicardial coronary arteries. The diagnosis of fulminant myocarditis was based on clinical, laboratory and imaging findings including cardiac magnetic resonance imaging (cMRI) Lake Louise criteria. STIR-cMRI sequences revealed myocardial edema in the lateral, inferior and posterior walls of the left ventricle, whereas T1-weighted early contrast-enhanced sequences showed myocardial hyperemia and capillary leak. An ultrasound and computed tomographic scan of the abdomen disclosed a solid, heterogeneous mass (3.6×3.2×2.8-cm) in the right suprarenal area. Urinary and plasma catecholamines and metanephrines were markedly elevated. A pheochromocytoma was suspected and laparoscopic resection of the tumor was performed after pharmacological preparation with phenoxybenzamine. The histopathological findings were consistent with pheochromocytoma. Follow-up cMRI showed complete reversal of myocardial edema and hyperemia. At 12-month follow-up, the patient has remained asymptomatic and normotensive with no recurrence of cardiovascular symptoms.

2. **BMC Cardiovasc Disord**. 2017 Nov 15;17(1):277. doi: 10.1186/s12872-017-0711-2.
Case report: electrical storm during induced hypothermia in a patient with early repolarization.
Badertscher P1,2, Kuehne M1,2, Schaer B1,2, Sticherling C 1,2, Osswald S1,2, Reichlin T3,4.
Abstract
BACKGROUND: Population based studies showed an association of early repolarization in the electrocardiogram (ECG) and a higher rate of sudden cardiac death presumably due to ventricular fibrillation. The triggers for ventricular fibrillation in patients with early repolarization are not fully understood.
CASE PRESENTATION: We describe the case of a young patient with a survived ventricular fibrillation arrest while asleep followed by multiple episodes of recurrent ventricular fibrillation. The admission ECG showed an early repolarization pattern with substantial J-point elevation in most of the ECG-leads. After initiation of a hypothermia protocol, the patient developed an electrical storm with multiple ventricular fibrillation episodes requiring multiple cardioversions. Intravenous isoproterenol infusion successfully suppressed the malignant arrhythmia.
CONCLUSION: Hypothermia appears proarrhythmic in patients with early repolarization and may trigger ventricular fibrillation. This knowledge is particularly important when initiating temperature management protocols in patients after a survived cardiac arrest. During the acute phase of an early repolarization associated electrical storm, isoproterenol is the most effective treatment suppressing the ventricular fibrillation-inducing premature ventricular complexes at higher heart rates.
Free Article

3**. J Med Case Rep**. 2017 Nov 11;11(1):318. doi: 10.1186/s13256-017-1485-y.

Chest compression-related fatal internal mammary artery injuries manifesting after venoarterial extracorporeal membrane oxygenation: a case series.

Yamagishi T1, Kashiura M2, Sugiyama K3, Nakamura K3, Ishida T3, Yukawa T3, Miyazaki K3, Tanabe T3, Hamabe Y3.

Abstract

BACKGROUND: Cardiopulmonary resuscitation-related bleeding, especially internal mammary artery injuries, can become life-threatening complications after initiating venoarterial extracorporeal membrane oxygenation owing to the frequent involvement of concomitant anticoagulant treatment, antiplatelet treatment, targeted temperature management, and bleeding coagulopathy. We report the cases of five patients who experienced this complication and discuss their management.

CASE PRESENTATION: We retrospectively evaluated five patients with cardiopulmonary resuscitation-related internal mammary artery injuries who were treated between February 2011 and February 2016 at our institution. All five patients were Asian men, aged 56 to 68-years old, who had received concomitant intravenously administered unfractionated heparin (3000 units) with antiplatelet therapy. Four patients received targeted temperature management. The injuries and hematomas were detected using contrast-enhanced computed tomography in all cases. Three patients were treated using transcatheter arterial embolization within 6 hours following cardiopulmonary arrest, and two were resuscitated and received appropriate treatment following early recognition of their injuries. Two patients died of hemorrhagic shock with delayed intervention. Four of the five patients had excessively prolonged activated partial thromboplastin times before their interventions.

CONCLUSIONS: Computed tomography should be performed as soon as possible after the return of spontaneous circulation to identify injuries and consider appropriate treatments for patients who have experienced cardiac arrest. Delayed bleeding may develop after treating hypovolemic shock and relieving arterial spasms; therefore, transcatheter arterial embolization should be performed aggressively to prevent delayed bleeding even in the absence of extravasation. This approach may be superior to thoracotomy because it is less invasive, causes less bleeding, and can selectively stop arterial bleeding sooner. A 3000-unit intravenous bolus of unfractionated heparin may be redundant; heparin-free extracorporeal cardiopulmonary resuscitation may be a more appropriate alternative. Unfractionated heparin treatment can commence after the bleeding has stopped.

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