

1. **Prehosp Emerg Care.** 2018 Jan 18:1-7. doi: 10.1080/10903127.2017.1394405. [Epub ahead of print]

**No Benefit in Neurologic Outcomes of Survivors of Out-of-Hospital Cardiac Arrest with Mechanical Compression Device.**

Newberry R, Redman T, Ross E, Ely R, Saidler C, Arana A, Wampler D, Miramontes D. Abstract

**INTRODUCTION:** Out-of-hospital cardiac arrest (OHCA) is a major cause of death and morbidity in the United States. Quality cardiopulmonary resuscitation (CPR) has proven to be a key factor in improving survival. The aim of our study was to investigate the outcomes of OHCA when mechanical CPR (LUCAS 2 Chest Compression System™) was utilized compared to conventional CPR. Although controlled trials have not demonstrated a survival benefit to the routine use of mechanical CPR devices, there continues to be an interest for their use in OHCA. **METHODS:** We conducted a retrospective observational study of OHCA comparing the outcomes of mechanical and manual chest compressions in a fire department based EMS system serving a population of 1.4 million residents. Mechanical CPR devices were geographically distributed on 11 of 33 paramedic ambulances. Data were collected over a 36-month period and outcomes were dichotomized based on utilization of mechanical CPR. The primary outcome measure was survival to hospital discharge with a cerebral performance category (CPC) score of 1 or 2. **RESULTS:** This series had 3,469 OHCA reports, of which 2,999 had outcome data and met the inclusion criteria. Of these 2,236 received only manual CPR and 763 utilized a mechanical CPR device during the resuscitation. Return of spontaneous circulation (ROSC) was attained in 44% (334/763) of the mechanical CPR resuscitations and in 46% (1,020/2,236) of the standard manual CPR resuscitations ( $p = 0.32$ ). Survival to hospital discharge was observed in 7% (52/763) of the mechanical CPR resuscitations and 9% (191/2,236) of the manual CPR group ( $p = 0.13$ ). Discharge with a CPC score of 1 or 2 was observed in 4% (29/763) of the mechanical CPR resuscitation group and 6% (129/2,236) of the manual CPR group ( $p = 0.036$ ). **CONCLUSIONS:** In our study, use of the mechanical CPR device was associated with a poor neurologic outcome at hospital discharge. However, this difference was no longer evident after logistic regression adjusting for confounding variables. Resuscitation management following institution of mechanical CPR, specifically medication and airway management, may account for the poor outcome reported. Further investigation of resuscitation management when a mechanical CPR device is utilized is necessary to optimize survival benefit.

**REGISTRES,**

**REVISIONS**

**I**

**EDITORIALS**

1. **Minerva Anesthesiol.** 2018 Jan 16. doi: 10.23736/S0375-9393.18.12164-X. [Epub ahead of print]

**Effect of therapeutic hypothermia on survival and neurological outcome in adults suffering cardiac arrest: a systematic review and meta-analysis.**

Hakim SM1, Ammar MA2, Reyad MS3. Abstract

**INTRODUCTION:** The aim of this review is to determine current evidence for the effect of therapeutic hypothermia (TH) on survival and neurological outcome in adults suffering cardiac arrest (CA).

**EVIDENCE AQUISITION:** We searched the Cochrane Controlled Trials Register, MEDLINE, EMBASE and NLM databases from 2000 to 2017 using the following terms: hypothermia, cooling, therapeutic, cardiac arrest, resuscitation, cardiopulmonary, CPR. Studies were eligible if they compared TH versus normothermic management in adult humans sustaining CA. Randomized controlled trials (RCT), pilot studies and observational trials were included. **EVIDENCE SYNTHESIS:** Ten studies involving 3,259 patients were included in meta-analysis. Pooling all eligible studies showed a favorable effect for TH on survival and neurological recovery. However, sensitivity analysis for RCTs showed no benefit on either outcome, while observational

trials showed benefit for neurological recovery with just marginally significant benefit regarding survival. Studies including patients with shockable rhythms demonstrated benefit for both outcome measures, while those including patients with any rhythms demonstrated benefit for neurological recovery but not for survival. TH did not benefit patients with non-shockable rhythms. Trials using external cooling favored TH regarding survival and neurological outcome but those using systemic cooling with or without external cooling did not show such benefit. When the overall incidence of complications was pooled, there was a statistically significant shift in odds ratio favoring normothermic management over TH. CONCLUSIONS: Evidence from RCTs suggests TH does not improve survival or neurological outcome, while observational trials favor TH over NT. TH may be attended with higher risk for complications.

2. **Curr Opin Anaesthesiol.** 2018 Jan 12. doi: 10.1097/ACO.0000000000000559. [Epub ahead of print]

**Oxygen in the critically ill: friend or foe?**  
Damiani E1, Donati A1, Girardis M2.  
Abstract

**PURPOSE OF REVIEW:** To examine the potential harmful effects of hyperoxia and summarize the results of most recent clinical studies evaluating oxygen therapy in critically ill patients.  
**RECENT FINDINGS:** Excessive oxygen supplementation may have detrimental pulmonary and systemic effects because of enhanced oxidative stress and inflammation. Hyperoxia-induced lung injury includes altered surfactant protein composition, reduced mucociliary clearance and histological damage, resulting in atelectasis, reduced lung compliance and increased risk of infections. Hyperoxemia causes vasoconstriction, reduction in coronary blood flow and cardiac output and may alter microvascular perfusion. Observational studies showed a close relationship between hyperoxemia and increased mortality in several subsets of critically ill patients. In absence of hypoxemia, the routine use of oxygen therapy in patients with myocardial infarction, stroke, traumatic brain injury, cardiac arrest and sepsis, showed no benefit but rather it seems to be harmful. In patients admitted to intensive care unit, a conservative oxygen therapy aimed to maintain arterial oxygenation within physiological range has been proved to be well tolerated and may improve outcome.  
**SUMMARY:** Liberal O<sub>2</sub> use and unnecessary hyperoxia may be detrimental in critically ill patients. The current evidence supports the use of a conservative strategy in O<sub>2</sub> therapy to avoid patient exposure to unnecessary hyperoxemia.

3. **Folia Med Cracov.** 2017;57(4):107-116.

**The efficacy of cardiopulmonary resuscitation, in a large city, based on Krakow's Emergency Medical Service.**

Rebes K, Cebula G1, Mydlowska A, Andres J.  
Abstract

**INTRODUCTION:** For many years, one of the biggest challenges of public healthcare system, in the European Union are cardiovascular diseases.  
**PURPOSE:** The purpose of this study was to analyze the variables influencing the specific aspects of the chain of survival in a large city.  
**METHODS:** Patients included in this study had to fulfill all of the following criteria: (1) patient had to experience an out-of-hospital cardiac arrest (OHCA), (2) emergency medical team had to initiate cardio-pulmonary resuscitation (CPR) at the site of the event. Data were collected from the 1st of January to the 31st of December 2004.  
**RESULT:** In a time period from the 1st of January to the 31st of December 2004 emergency medical teams initiated 381 resuscitations. The incidence of OHCA in which CRP was initiated was 50 events / 100 000 habitants. Spontaneous circulation was achieved in 163 patients (42.8%). Thirty-day after the resuscitation 62 patients (16.3%) were alive, and 52 patients (13.6%) were discharged alive from the hospital.

CONCLUSIONS: Analysis of collected data shows that return of spontaneous circulation (ROSC) was achieved in 42.8% of patients, 16.3% survived at least 30 days following the event, and 13.6% of patients were discharged alive from the hospital. These results are similar to findings from different studies conducted in Poland. Free Article

4. **Resuscitation.** 2018 Jan 11. pii: S0300-9572(18)30020-0. doi: 10.1016/j.resuscitation.2018.01.020. [Epub ahead of print]  
**Palliative Care Utilization Following Out-of-Hospital Cardiac Arrest in the United States.**  
Albaeni A1, Chandra-Strobos N2, Eid SM2.  
Abstract

AIMS: Palliative care (PC) has become an integral component of comprehensive care provided to critically ill patients. Little is known about the utilization of palliative care following Out-of-Hospital Cardiac Arrest (OHCA) in the United States.

METHODS: We used the 2002 to 2013 National Inpatient Sample database to identify adults  $\geq 18$  years old with an ICD-9-CM principal diagnosis code of cardio-respiratory arrest or ventricular fibrillation (VF). Patients were categorized into two groups based on the presence of PC, then compared using Pearson  $\chi^2$  test for categorical variables and linear regression for continuous variables. Multiple linear and logistic regression models were conducted to identify factors associated with PC, and temporal trends in PC utilization.

RESULTS: Of the 154,177 patients hospitalized with OHCA in the U.S, 11,260 (7.3%) had PC consultations during hospitalization. PC Utilization increased from 1.5% in 2002 to 16.7% in 2013 (P-trend  $<0.001$ ). patients="" who="" received="" palliative="" care="" were="" older="" (mean="" age=""  $70.7 \pm 0.3$ ="" vs=""  $65.9 \pm 0.1$ ),="" more="" likely="" to="" be="" female="" (45.8%="" vs="" 40.5%),="" and="" had="" higher="" charlson="" comorbidity="" index=""  $\geq 2$ ="" (55.8%="" vs="" 46.8%).="" in="" adjusted="" analyses,="" older="" age,="" female="" gender,="" caucasian="" race,="" higher="" charlson="" comorbidity="" index,="" multiorgan="" failure,="" metastatic="" cancer,="" non-shockable="" rhythm,="" admission="" to="" larger,="" urban="" and="" teaching="" hospitals="" were="" all="" associated="" with="" higher="" pc="" utilization.="">

CONCLUSION: We observed significant increase in the utilization of palliative care consultations following OHCA over the study period. This was influenced by multiple patient and hospital factors. Further investigations are needed to identify the appropriate cost-effective use of palliative care following cardiac arrest.

## CAUSES

D'ACR

1. **Prehosp Emerg Care.** 2018 Jan 18:1-8. doi: 10.1080/10903127.2017.1381790. [Epub ahead of print]

**Association between Weather-Related Factors and Cardiac Arrest of Presumed Cardiac Etiology: A Prospective Observational Study Based on Out-of-Hospital Care Data.**  
Hensel M, Geppert D, Kersten JF, Stuhr M, Lorenz J, Wirtz S, Kerner T.  
Abstract

OBJECTIVE: The objective of this study was to determine the association between weather-related factors and out-of-hospital cardiac arrest (OHCA) of presumed cardiac etiology.

METHODS: This was a prospective observational study performed in a prehospital setting. Data from the Emergency Medical Service in Hamburg (Germany) and data from the local weather station were evaluated over a 5-year period. Weather data (temperature, humidity, air pressure, wind speed) were obtained every minute and matched with the associated rescue mission data. Lowess-Regression analysis was performed to assess the relationship between the above-mentioned weather-related factors and OHCA of presumed cardiac etiology. Additionally, varying measuring-ranges were defined for each weather-related factor in order to compare them with each other with regard to the probability of occurrence of OHCA.

**RESULTS:** During the observation period 1,558 OHCA with presumed cardiac etiology were registered (age:  $67 \pm 19$  yrs; 62% male; hospital admission: 37%; survival to hospital discharge: 6.7%). Compared to moderate temperatures (5 - 25°C), probability of OHCA-occurrence increased significantly at temperatures above 25°C ( $p = 0.028$ ) and below 5°C ( $p = 0.011$ ). Regarding air humidity, probability of OHCA-occurrence increased below a threshold-value of 75% compared to values above this cut-off ( $p = 0.006$ ). Decreased probability was seen at moderate atmospheric pressure (1000 hPa - 1020 hPa), whereas increased probability was seen above 1020 hPa ( $p = 0.023$ ) and below 1000 hPa ( $p = 0.035$ ). Probability of OHCA-occurrence increased continuously with increasing wind speed ( $p < 0.001$ ).="">  
**CONCLUSIONS:** There are associations between several weather-related factors such as temperature, humidity, air pressure, and wind speed, and occurrence of OHCA of presumed cardiac etiology. Particularly dangerous seem to be cold weather, dry air and strong wind.

## ECOGRAFIA

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RESSUSCITACIÓ

1. **Resuscitation.** 2018 Jan 11;124:90-95. doi: 10.1016/j.resuscitation.2018.01.019. [Epub ahead of print]

**Echocardiographic patterns of postresuscitation myocardial dysfunction.**

Cha KC1, Kim HI1, Kim OH1, Cha YS1, Kim H1, Lee KH1, Hwang SO2.

Abstract

**BACKGROUND:** Postresuscitation myocardial dysfunction (PRMD) can develop after successful resuscitation from cardiac arrest. However, echocardiographic patterns of PRMD remain unknown. This study aimed to investigate PRMD manifestations with serial echocardiography during the post-cardiac arrest period.

**METHODS:** We enrolled non-traumatic out-of-hospital cardiac arrest patients older than 19 years who underwent successful cardiopulmonary resuscitation (CPR). We excluded patients with myocardial infarction or pre-existing cardiac disease, including heart failure or myocardial disease. Transthoracic echocardiography (TTE) was performed within 24 h, between 24 and 48 h, and between 72 and 96 h after restoration of spontaneous circulation (ROSC).

**RESULTS:** Of 280 patients, 138 (93 men) were analysed. PRMD was observed in 45 patients (33%), including global dysfunction in 28 patients (20%), regional wall motion abnormalities (RWMA) in 10 (7%), and Takotsubo pattern in 7 (5%). There were no differences in clinical characteristics, laboratory findings, or hospital mortality according to PRMD pattern. Global left ventricular (LV) systolic function gradually improved with time and had recovered to normal by Day 3 in all patients except one with the Takotsubo pattern, which remained on follow-up echocardiography two weeks after ROSC.

**CONCLUSIONS:** PRMD occurs in about one-third of patients resuscitated from cardiac arrest. Echocardiographic patterns of post-cardiac arrest LV dysfunction include global hypokinesia, regional wall motion abnormalities, and Takotsubo pattern.

## ORGANITZACIÓ I ENTRENAMENT

1. **Int J Qual Health Care.** 2018 Jan 11. doi: 10.1093/intqhc/mzx189. [Epub ahead of print] **A better understanding of ambulance personnel's attitude towards real-time resuscitation feedback.**

Brinkrolf P1, Lukas R2, Harding U3, Thies S2, Gerss J4, Van Aken H2, Lemke H5, Schniedermeier U6, Bohn A7.

Abstract

**Objective:** High-quality chest compressions during cardiopulmonary resuscitation (CPR) play a significant role in surviving cardiac arrest. Chest-compression quality can be measured and corrected by real-time CPR feedback devices, which are not yet commonly used. This article looks at the acceptance of such systems in comparison of equipped and unequipped personnel. **Design:** Two groups of emergency medical services' (EMS) personnel were interviewed using

standardized questionnaires.  
 Setting: The survey was conducted in the German cities Dortmund and Münster.  
 Participants: Overall, 205 persons participated in the survey: 103 paramedics and emergency physicians from the Dortmund fire service and 102 personnel from the Münster service.  
 Intervention: The staff of the Dortmund service were not equipped with real-time feedback systems. The test group of equipped personnel of the ambulance service of Münster Fire brigade uses real-time feedback systems since 2007.  
 Main outcome measure: What is the acceptance level of real-time feedback systems? Are there differences between equipped and unequipped personnel?  
 Results: The total sample is receptive towards real-time feedback systems. More than 80% deem the system useful. However, this study revealed concerns and prejudices by unequipped personnel. Negative ratings are significantly lower at the Münster site that is experienced with the use of the real-time feedback system in contrast to the Dortmund site where no such experience exists-the system's use in daily routine results in better evaluation than the expectations of unequipped personnel.  
 Conclusions: Real-time feedback systems receive overall positive ratings. Prejudices and concerns seem to decrease with continued use of the system.

2. **Resuscitation.** 2018 Jan 13. pii: S0300-9572(18)30021-2. doi: 10.1016/j.resuscitation.2018.01.021. [Epub ahead of print]

**Validation of an ICD code for accurately identifying emergency department patients who suffer an out-of-hospital cardiac arrest.**

Shelton SK1, Chukwulebe SB2, Gaieski DF3, Abella BS4, Carr BG3, Perman SM5.  
 Abstract

AIM: International classification of disease (ICD-9) code 427.5 (cardiac arrest) is utilized to identify cohorts of patients who suffer out-of-hospital cardiac arrest (OHCA), though the use of ICD codes for this purpose has never been formally validated. We sought to validate the utility of ICD-9 code 427.5 by identifying patients admitted from the emergency department (ED) after OHCA.

METHODS: Adult visits to a single ED between January 2007 and July 2012 were retrospectively examined and a keyword search of the electronic medical record (EMR) was used to identify patients. Cardiac arrest was confirmed; and ICD-9 information and location of return of spontaneous circulation (ROSC) were collected. Separately, the EMR was searched for patients who received ICD-9 code 427.5. The kappa coefficient ( $\kappa$ ) was calculated, as was the sensitivity and specificity of the code for identifying OHCA.

RESULTS: The keyword search identified 1717 patients, of which 385 suffered OHCA and 333 were assigned the code 427.5. The agreement between ICD-9 code and cardiac arrest was excellent ( $\kappa = 0.895$ ). The ICD-9 code 427.5 was both specific (99.4%) and sensitive (86.5%). Of the 52 cardiac arrests that were not identified by ICD-9 code, 33% had ROSC before arrival to the ED. When searching independently on ICD-9 code, 347 patients with ICD-9 code 427.5 were found, of which 320 were "true" arrests. This yielded a positive predictive value of 92% for ICD-9 code 427.5 in predicting OHCA.

CONCLUSIONS: ICD-9 code 427.5 is sensitive and specific for identifying ED patients who suffer OHCA with a positive predictive value of 92%.

**CURES**

**POST**

**ACR**

1. **Acta Cardiol.** 2018 Jan 16:1-8. doi: 10.1080/00015385.2017.1415403. [Epub ahead of print]  
**Early prognosis and predictor analysis for positive coronary angiography after out-of-hospital cardiac arrest (OHCA).**

Higny J1, Guédès A1, Jamart J2, Hanet C1, Gabriel L1, Dangoisse V1, de Meester de Ravenstein C3, Schroeder E1.

Abstract

**BACKGROUND:** Key predictors of survival after OHCA have been described in the literature. Current guidelines recommend emergency angiography in patients without an obvious extra-cardiac cause of arrest. However, the value of this strategy is debated. Moreover, diagnosis of acute coronary ischaemia after OHCA remains challenging, especially in patients without ST-segment elevation.

**OBJECTIVES:** The primary objective was to identify qualitative variables associated with an increased chance of 30-d survival after OHCA. The secondary objective was to identify predictors of 30-d survival among patients with ischaemic cardiomyopathy and patients without ST-segment elevation. Afterwards, we sought to identify parameters associated with acute coronary ischaemia and positive coronary angiography in patients without ST-segment elevation.

**METHODS:** Retrospective single-centre study including 123 patients resuscitated from OHCA. Baseline characteristics, resuscitation settings and angiographic findings were analysed.

**RESULTS:** The predictors of 30-d survival after OHCA included witnessed cardiac arrest, haemodynamic instability and coronary angiography. Convertible cardiac rhythm, history of coronary disease and presence of at least two cardiovascular risk factors were associated with acute coronary ischaemia. Predictors for a positive angiography in patients without ST-segment elevation included history of coronary disease, gender, diabetes, dyslipidaemia and presence of at least two cardiovascular risk factors (all  $p < .05$ ).

**CONCLUSIONS:** We identified qualitative predictors of 30-day survival after OHCA. Our findings suggest that the recognition of acute coronary ischaemia after OHCA might be improved. The identification of risk criteria may help to select the best candidates for emergency angiography.

## **ELECTROFISIOLOGIA I DESFIBRIL·LACIÓ**

1. **J Intern Med.** 2018 Jan 13. doi: 10.1111/joim.12730. [Epub ahead of print] **The challenges and possibilities of public access defibrillation.** Ringh M1, Hollenberg J1, Palsgaard-Moeller T2, Svensson L1, Rosenqvist M3, Lippert FK2, Wissenberg M4, Malta Hansen C4, Claesson A1, Viereck S2, Zijlstra JA5, Koster RW5, Herlitz J6, Blom MT5, Kramer-Johansen J7, Tan HL5, Beesems S5, Hulleman M5, Olasveengen TM7, Folke F2,4; COSTA study group (research collaboration between Copenhagen-Oslo-Stockholm--Amsterdam).

### **Abstract**

Out-of-Hospital Cardiac Arrest (OHCA) is a major health problem that affects approximately four hundred thousand patients annually in the United States alone. It is a major challenge for the emergency medical system since decreased survival rates are directly proportional to the time delay from collapse to defibrillation. Historically, defibrillation has only been performed by physicians and in-hospital. With the development of automated external defibrillators (AEDs), rapid defibrillation by non-medical professionals and subsequently by trained or untrained lay bystanders has become possible. Much hope has been put to the concept of Public Access Defibrillation with a massive dissemination of public available AEDs throughout most western countries. Accordingly, current guidelines recommend that AEDs should be deployed in places with a high likelihood of OHCA. Despite these efforts, AED use is in most settings anecdotal with little effect on overall OHCA survival. The major reasons for low use of public AEDs are that most OHCA take place outside high incidence sites of cardiac arrest and that most OHCA take place in residential settings, currently defined as not suitable for Public Access Defibrillation. However, the use of new technology for identification and recruitment of lay bystanders and nearby AEDs to the scene of the cardiac arrest as well as new methods for strategic AED placement redefines and challenges the current concept and definitions of Public Access Defibrillation. Existing evidence of Public Access Defibrillation and knowledge gaps and future directions to improve outcomes for OHCA are discussed. In addition, a new definition of the different levels of Public Access Defibrillation is offered as well as new strategies for increasing AED use in the society.

1. **Resuscitation.** 2018 Jan 11. pii: S0300-9572(18)30001-7. doi: 10.1016/j.resuscitation.2018.01.001. [Epub ahead of print]  
**Organ Support Therapy in the Intensive Care Unit and Return to Work in Out-of-Hospital Cardiac Arrest Survivors-a Nationwide Cohort Study.**  
Riddersholm S1, Kragholm K2, Mortensen RN3, Hansen SM3, Wissenberg M4, Lippert FK5, Torp-Pedersen C6, Christiansen CF7, Rasmussen BS8 .  
Abstract

**AIM:** With increased survival after out-of-hospital cardiac arrest (OHCA), impact of the post-resuscitation course has become important. Among 30-day OHCA survivors, we investigated associations between organ support therapy in the Intensive Care Unit (ICU) and return to work. **METHODS:** This Danish nationwide cohort-study included 30-day-OHCA-survivors who were employed prior to arrest. We linked OHCA data to information on in-hospital care and return to work. For patients admitted to an ICU and based on renal replacement therapy (RRT), cardiovascular support and mechanical ventilation, we assessed the prognostic value of organ support therapies in multivariable Cox regression models. **RESULTS:** Of 1,087 30-day survivors, 212 (19.5%) were treated in an ICU with 0-1 types of organ support, 494 (45.4%) with support of two organs, 26 (2.4%) with support of three organs and 355 (32.7%) were not admitted to an ICU. Return to work increased with decreasing number of organs supported, from 53.8% (95% CI: 49.5-70.1%) in patients treated with both RRT, cardiovascular support and mechanical ventilation to 88.5% (95% CI: 85.1-91.8%) in non-ICU-patients. In 732 ICU-patients, ICU-patients with support of 3 organs had significantly lower adjusted hazard ratios (HR) of returning to work (0.50 [95% CI: 0.30-0.85] compared to ICU-patients with support of 0-1 organ. The corresponding HR was 0.48 [95% CI: 0.30-0.78] for RRT alone. **CONCLUSIONS:** In 30-day survivors of OHCA, number of organ support therapies and in particular need of RRT were associated with reduced rate of return to work, although more than half of these latter patients still returned to work.

## **PEDIATRIA**

1. **Scand J Trauma Resusc Emerg Med.** 2018 Jan 18;26(1):9. doi: 10.1186/s13049-018-0474-5.  
**What should be included in the assessment of laypersons' paediatric basic life support skills? Results from a Delphi consensus study.**  
Hasselager AB1,2, Lauritsen T3, Kristensen T4,5, Bohnstedt C6, Sønderskov C7, Østergaard D4,8, Tolsgaard MG4,8,9.

Abstract

**BACKGROUND:** Assessment of laypersons' Paediatric Basic Life Support (PBLs) skills is important to ensure acquisition of effective PBLs competencies. However limited evidence exists on which PBLs skills are essential for laypersons. The same challenges exist with respect to the assessment of foreign body airway obstruction management (FBAOM) skills. We aimed to establish international consensus on how to assess laypersons' PBLs and FBAOM skills. **METHODS:** A Delphi consensus survey was conducted. Out of a total of 84 invited experts, 28 agreed to participate. During the first Delphi round experts suggested items to assess laypersons' PBLs and FBAOM skills. In the second round, the suggested items received comments from and were rated by 26 experts (93%) on a 5-point scale (1 = not relevant to 5 = essential). Revised items were anonymously presented in a third round for comments and 23 (82%) experts completed a re-rating. Items with a score above 3 by more than 80% of the experts in the third round were included in an assessment instrument. **RESULTS:** In the first round, 19 and 15 items were identified to assess PBLs and FBAOM skills, respectively. The ratings and comments from the last two rounds resulted in nine and eight essential assessment items for PBLs and FBAOM skills, respectively. The PBLs items included: "Responsiveness", "Call for help", "Open airway", "Check breathing", "Rescue breaths", "Compressions", "Ventilations", "Time factor" and "Use of AED". The FBAOM items included:

"Identify different stages of foreign body airway obstruction", "Identify consciousness", "Call for help", "Back blows", "Chest thrusts/abdominal thrusts according to age", "Identify loss of consciousness and change to CPR", "Assessment of breathing" and "Ventilation".  
DISCUSSION: For assessment of laypersons some PBLS and FBAOM skills described in guidelines are more important than others. Four out of nine of PBLS skills focus on airway and breathing skills, supporting the major importance of these skills for laypersons' resuscitation attempts.  
CONCLUSIONS: International consensus on how to assess laypersons' paediatric basic life support and foreign body airway obstruction management skills was established. The assessment of these skills may help to determine when laypersons have acquired competencies.  
TRIAL REGISTRATION: Not relevant.

## RECERCA

## EXPERIMENTAL

1. **JACC Cardiovasc Interv.** 2018 Jan 22;11(2):195-205. doi: 10.1016/j.jcin.2017.08.056. Dose-Dependent Cardioprotection of Moderate (32°C) Versus Mild (35°C) Therapeutic Hypothermia in Porcine Acute Myocardial Infarction. Dash R1, Mitsutake Y2, Pyun WB3, Dawoud F4, Lyons J2, Tachibana A2, Yahagi K5, Matsuura Y2, Kolodgie FD5, Virmani R5, McConnell MV6, Illindala U4, Ikeno F7, Yeung A7. Abstract

OBJECTIVES: The study investigated whether a dose response exists between myocardial salvage and the depth of the therapeutic hypothermia.

BACKGROUND: Cardiac protection from mild hypothermia during acute myocardial infarction (AMI) has yielded equivocal clinical trial results. Rapid, deeper hypothermia may improve myocardial salvage.

METHODS: Swine (n = 24) undergoing AMI were assigned to 3 reperfusion groups: normothermia (38°C) and mild (35°C) and moderate (32°C) hypothermia. One-hour anterior myocardial ischemia was followed by rapid endovascular cooling to target reperfusion temperature. Cooling began 30 min before reperfusion. Target temperature was reached before reperfusion and was maintained for 60 min. Infarct size (IS) was assessed on day 6 using cardiac magnetic resonance, triphenyl tetrazolium chloride, and histopathology.

RESULTS: Triphenyl tetrazolium chloride area at risk (AAR) was equivalent in all groups (p = 0.2), but 32°C exhibited 77% and 91% reductions in IS size per AAR compared with 35°C and 38°C, respectively (AAR: 38°C, 45 ± 12%; 35°C, 17 ± 10%; 32°C, 4 ± 4%; p < 0.001) and comparable reductions per lv mass (lv mass: 38°C, 14 ± 5%; 35°C, 5 ± 3%; 32°C, 1 ± 1%; p < 0.001). Importantly, 32°C showed a lower is-aar (p = 0.013) and increased immunohistochemical granulation tissue versus 35°C, indicating higher tissue salvage. Delayed-enhancement cardiac magnetic resonance is lv also showed marked reduction at 32°C (38°C: 10 ± 4%, p > 0.001; 35°C: 8 ± 3%; 32°C: 3 ± 2%, p > 0.001). Cardiac output on day 6 was only preserved at 32°C (reduction in cardiac output: 38°C, -29 ± 19%, p = 0.041; 35°C: -17 ± 33%; 32°C: -1 ± 28%, p = 0.041.) using linear regression, the predicted is reduction was 6.7% (aar) and 2.1% (lv) per every 1°C reperfusion temperature decrease.

CONCLUSIONS: Moderate (32°C) therapeutic hypothermia demonstrated superior and near-complete cardioprotection compared with 35°C and control, warranting further investigation into clinical applications.

2. **Eur J Cardiothorac Surg.** 2018 Jan 15. doi: 10.1093/ejcts/ezx467. [Epub ahead of print] **Cerebral mitochondrial dysfunction associated with deep hypothermic circulatory arrest in neonatal swine.** Mavroudis CD1, Karlsson M2, Ko T3, Hefti M4, Gentile JI1, Morgan RW2, Plyler R2, Mensah-

Brown KG3, Boorady TW3, Melchior RW5, Rosenthal TM5, Shade BC5, Schiavo KL5, Nicolson SC2, Spray TL1, Sutton RM2, Berg RA2, Licht DJ3, Gaynor JW1, Kilbaugh TJ2.

#### Abstract

**OBJECTIVES:** Controversy remains regarding the use of deep hypothermic circulatory arrest (DHCA) in neonatal cardiac surgery. Alterations in cerebral mitochondrial bioenergetics are thought to contribute to ischaemia-reperfusion injury in DHCA. The purpose of this study was to compare cerebral mitochondrial bioenergetics for DHCA with deep hypothermic continuous perfusion using a neonatal swine model.

**METHODS:** Twenty-four piglets (mean weight 3.8 kg) were placed on cardiopulmonary bypass (CPB): 10 underwent 40-min DHCA, following cooling to 18°C, 10 underwent 40 min DHCA and 10 remained at deep hypothermia for 40 min; animals were subsequently rewarmed to normothermia. 4 remained on normothermic CPB throughout. Fresh brain tissue was harvested while on CPB and assessed for mitochondrial respiration and reactive oxygen species generation. Cerebral microdialysis samples were collected throughout the analysis.

**RESULTS:** DHCA animals had significantly decreased mitochondrial complex I respiration, maximal oxidative phosphorylation, respiratory control ratio and significantly increased mitochondrial reactive oxygen species ( $P < 0.05$  for all). DHCA animals also had significantly increased cerebral microdialysis indicators of cerebral ischaemia (lactate/pyruvate ratio) and neuronal death (glycerol) during and after rewarming.

**CONCLUSIONS:** DHCA is associated with disruption of mitochondrial bioenergetics compared with deep hypothermic continuous perfusion. Preserving mitochondrial health may mitigate brain injury in cardiac surgical patients. Further studies are needed to better understand the mechanisms of neurological injury in neonatal cardiac surgery and correlate mitochondrial dysfunction with neurological outcomes.

3. **Am J Perinatol.** 2018 Jan 16. doi: 10.1055/s-0037-1620270. [Epub ahead of print] **Can Neonatal Brain MRI be Performed during Active Cooling?** Pacella MJ1, Rajderkar DA2, Copenhaver N1, Boykin K1, Weiss MD1,3. Abstract

**OBJECTIVE:** Due to logistical constraints, physicians traditionally delay diagnostic imaging for neonatal hypoxic-ischemic encephalopathy (HIE) until the neonate has completed all 72 hours of therapeutic hypothermia and rewarming. In some cases, neonates may require neuroimaging before 72 hours has passed.

**STUDY DESIGN:** We present a case in which an MRI was acquired during active hypothermia.

**RESULTS:** Upon return to the NICU, Baby X's temperature probe read 33.6 degrees, indicating that hypothermia was likely maintained at the target temperature.

**CONCLUSION:** Active hypothermia is possible during MRI.

#### CASE

#### REPORTS

1. **Case Rep Cardiol.** 2017;2017:1017686. doi: 10.1155/2017/1017686. Epub 2017 Nov 23. **Ventricular Fibrillation following Varicella Zoster Myocarditis.** Ioannou A1, Tsappa I2, Metaxa S3, Missouriis CG2,3. Abstract

Varicella-zoster virus (VZV) infection can rarely lead to serious cardiac complications and life-threatening arrhythmias. We present a case of a 46-year-old male patient who developed VZV myocarditis and presented with recurrent syncopal episodes followed by a cardiac arrest. He had a further collapse eight years later, and cardiac magnetic resonance imaging (MRI) demonstrated mild mid-wall basal and inferolateral wall fibrosis. He was treated with an implantable cardioverter defibrillator (ICD) and represented two years later with ICD shocks, and interrogation of the device revealed ventricular fibrillation episodes. This case demonstrates the life-threatening long-term sequelae of VZV myocarditis in adults. We suggest that VZV

myocarditis should be considered in all patients who present with a syncopal event after VZV infection. In these patients, ICD implantation is a potentially life-saving procedure.  
FREE ARTICLE

## RCP | COMPRESSORS TORÀCICS MECÀNICS

1. **BMJ Open.** 2018 Feb 1;8(2):e019009. doi: 10.1136/bmjopen-2017-019009.

### **Training approaches for the deployment of a mechanical chest compression device: a randomised controlled manikin study.**

Couper K1,2, Velho RM1,2, Quinn T3, Devrell A4, Lall R1, Orriss B4, Yeung J1,2, Perkins GD1,2.

Abstract

**OBJECTIVES:** To evaluate the effect of training strategy on team deployment of a mechanical chest compression device.

**DESIGN:** Randomised controlled manikin trial.

**SETTING:** Large teaching hospital in the UK.

**PARTICIPANTS:** Twenty teams, each comprising three clinicians. Participating individuals were health professionals with intermediate or advanced resuscitation training.

**INTERVENTIONS:** Teams were randomised in a 1:1 ratio to receive either standard mechanical chest compression device training or pit-crew device training. Training interventions lasted up to 1 h. Performance was measured immediately after training in a standardised simulated cardiac arrest scenario in which teams were required to deploy a mechanical chest compression device.

**PRIMARY AND SECONDARY OUTCOME MEASURES:** Primary outcome was chest compression flow fraction in the minute preceding the first mechanical chest compression. Secondary outcomes included cardiopulmonary resuscitation quality and mechanical device deployment metrics, and non-technical skill performance. Outcomes were assessed using video recordings of the test scenario.

**RESULTS:** In relation to the primary outcome of chest compression flow fraction in the minute preceding the first mechanical chest compression, we found that pit-crew training was not superior to standard training (0.76 (95% CI 0.73 to 0.79) vs 0.77 (95% CI 0.73 to 0.82), mean difference -0.01 (95% CI -0.06 to 0.03), P=0.572). There was also no difference between groups in performance in relation to any secondary outcome.

**CONCLUSIONS:** Pit-crew training, compared with standard training, did not improve team deployment of a mechanical chest device in a simulated cardiac arrest scenario.

**TRIAL REGISTRATION NUMBER:** ISRCTN43049287;

## REGISTRES, REVISIONS I EDITORIALS

1. **J Am Coll Cardiol.** 2018 Jan 30;71(4):402-411. doi: 10.1016/j.jacc.2017.11.043.

### **Trends in Survival After In-Hospital Cardiac Arrest During Nights and Weekends.**

Ofoma UR1, Basnet S2, Berger A3, Kirchner HL3, Girotra S4; American Heart Association Get With the Guidelines – Resuscitation Investigators.

Collaborators: (15)

Abella B, Anderson ML, Bradley SM, Chan PS, Edelson DP, Churpek MM, Geocadin R, Goldberger ZD, Howard PK, Kurz MC, Mosesso VN Jr., Nassar B, Ornato JP, Peberdy MA, Perman SM.

Abstract

**BACKGROUND:** Survival after in-hospital cardiac arrest (IHCA) is lower during nights and weekends (off-hours) compared with daytime during weekdays (on-hours). As overall IHCA survival has improved over time, it remains unknown whether survival differences between on-hours and off-hours have changed.

**OBJECTIVES:** This study sought to examine temporal trends in survival differences between on-hours and off-hours IHCA.

**METHODS:** We identified 151,071 adults at 470 U.S. hospitals in the Get with the Guidelines-Resuscitation registry during 2000 to 2014. Using multivariable logistic regression with generalized estimating equations, we examined whether survival trends in IHCA differed during on-hours (Monday to Friday 7:00 am to 10:59 pm) versus off-hours (Monday to Friday 11:00 pm to 6:59 am, and Saturday to Sunday, all day).

RESULTS: Among 151,071 participants, 79,091 (52.4%) had an IHCA during off-hours. Risk-adjusted survival improved over time in both groups (on-hours: 16.0% in 2000, 25.2% in 2014; off-hours: 11.9% in 2000, 21.9% in 2014; p for trend <0.001 for both). However, there was no significant change in the survival difference over time between on-hours and off-hours, either on an absolute (p = 0.75) or a relative scale (p = 0.059). Acute resuscitation survival improved significantly in both groups (on-hours: 56.1% in 2000, 71% in 2014; off-hours: 46.9% in 2000, 68.2% in 2014; p for trend <0.001 for both) and the difference between on-hours and off-hours narrowed over time (p = 0.02 absolute scale, p < 0.001 relative scale). In contrast, although post-resuscitation survival also improved over time in both groups (p for trend < 0.001 for both), the absolute and relative difference persisted.

CONCLUSIONS: Despite an overall improvement in survival, lower survival in IHCA during off-hours compared with on-hours persists.

## CAUSES DE L'ACR

1. *Circ J*. 2018 Jan 26. doi: 10.1253/circj.CJ-17-1003. [Epub ahead of print]

### **Three-Year Follow-up After the Great East Japan Earthquake in the Incidence of Out-of-Hospital Cardiac Arrest With Cardiac Origin.**

Sado J1, Kiyohara K2, Iwami T3, Kitamura Y1, Ando E1, Ohira T4, Sobue T1, Kitamura T1.

Abstract

BACKGROUND: We assessed whether the occurrence of out-of-hospital cardiac arrest (OHCA) with cardiac origin increased in the disaster areas during the 3-year period after the Great East Japan Earthquake (GEJE). Methods and Results: From the OHCA registry in Japan, yearly changes in occurrence after the GEJE were assessed by applying Poisson regression models. The risk ratio of the first year after the earthquake was significantly greater in both men and women, but the difference disappeared in the second and third years.

CONCLUSIONS: The GEJE significantly increased the occurrence of OHCA with cardiac origin in the first year after the earthquake.

Free Article

## VENTILACIÓ

1. *Acad Emerg Med*. 2017 Dec;24(12):1464-1473. doi: 10.1111/acem.13309. Epub 2017 Nov 8.

### **Prehospital Supraglottic Airway Was Associated With Good Neurologic Outcome in Cardiac Arrest Victims Especially Those Who Received Prolonged Cardiopulmonary Resuscitation.**

Park MJ1, Kwon WY2,3, Kim K1, Suh GJ2,3, Shin J4, Jo YH1, Kim KS2,3, Lee HJ4, Kim J1, Lee SJ4, Kim JY3, Cho JH5.

Abstract

OBJECTIVES: We performed this study to investigate the association of prehospital supraglottic airway (SGA) on neurologic outcome in cardiac arrest victims with adjustment of postresuscitation variables as well as prehospital and resuscitation variables.

METHODS: This study was a retrospective study based on a multicenter prospective cohort registry from December 2013 to April 2016. According to the 28-day cerebral performance categories (CPCs) scale, patients were divided into the good-outcome group (CPC 1-2) and the poor-outcome group (CPC 3-5). We compared the two groups with respect to demographic variables, prehospital and in-hospital resuscitation variables, and postresuscitation variables.

RESULTS: A total of 869 cardiac arrest victims who received in-progress cardiopulmonary resuscitation (CPR) were delivered to the emergency department of three hospitals, and 310 patients were admitted to the intensive care unit. The use of a prehospital SGA was independently associated with 28-day good neurologic outcome (odds ratio [OR] = 7.88; 95% confidence interval [CI] = 1.33-46.53; p = 0.023] when postresuscitation variables were adjusted, although there were no significant association with the acquisition of sustained return of spontaneous circulation (OR = 0.992; 95% CI = 0.591-1.666; p = 0.976). Furthermore, a prehospital SGA was significantly associated with good neurologic outcome, especially in patients who received prolonged CPR (low flow time > 15 minutes; OR = 3.41; 95% CI = 1.23-9.45; p = 0.018) rather than in patients with nonprolonged CPR (OR = 4.50; 95% CI = 0.75-27.13; p = 0.101).

CONCLUSIONS: When postresuscitation variables were adjusted, the prehospital SGA was independently associated with 28-day good neurologic outcome in cardiac arrest victims.

2. **BMJ Case Rep.** 2018 Jan 26;2018. pii: bcr-2017-222283. doi: 10.1136/bcr-2017-222283.

**Emergency percutaneous transtracheal jet ventilation in a hypoxic cardiopulmonary resuscitation setting: a life-saving rescue technique.**

Dong PV1, Ter Horst L1, Krage R2.

Abstract

(Un)anticipated difficult airway remains a challenge in anaesthesia. Percutaneous transtracheal jet ventilation has been shown to be an adequate technique for temporary oxygenation and ventilation and has been described as an acknowledged method in emergency settings of an unanticipated difficult airway. These emergency settings can be considered as low incidence high-risk situations. Both technical and non-technical skills should be trained regularly as education and simulation continues to play an important factor in patient safety. Furthermore, postoperative laryngeal oedema due to altered lymphatic drainage patterns must be considered as a possible mechanism of an upper airway obstruction in combination with a history of neck dissection and radiotherapy.

## FORMACIÓ I ORGANITZACIÓ

1. **J Int Soc Prev Community Dent.** 2017 Nov-Dec;7(6):364-369. doi: 10.4103/jispcd.JISPCD\_414\_17. Epub 2017 Dec 29.

**Knowledge, Attitude, and Perceived Confidence in the Management of Medical Emergencies in the Dental Office: A Survey among the Dental Students and Interns.**

Albelaihi HF1, Alweneen A1, Ettish A1, Alshahrani FA2.

Abstract

**Aims and Objectives:** Many situations in the dental office can provoke medical emergencies. Lack of training and inability to overcome the medical emergencies can lead to serious consequences and legal actions. The aim of the study is to investigate and assess the knowledge, attitude, and perceived confidence of dental students and interns in the management of medical emergency.

**Materials and Methods:** A self-administered structured questionnaire was distributed to 153 of the undergraduate dental students and interns in Qassim province. Questionnaire consisted of nineteen questions pertaining to knowledge and awareness regarding syncope, cardiopulmonary resuscitation (CPR), intravenous drugs, measuring vital signs, and handling situation of aspiration of a foreign body, bleeding, and choking. Data were analyzed by Statistical Package for Social Sciences (SPSS) version 21.0.

**Results:** Fifty-seven percent was the response rate received from the questionnaire. Eighty-nine percent and 30% of the participants inquired about the medical history and vital signs before dental treatment, respectively. Only 37% of participants were confident to handle any medical emergency in the dental office. Seventy percent knew the correct location of chest compression and 67% were familiar about the right compression ventilation ratio showing significant difference between academic years and interns ( $P = 0.003$ ). Females were significantly more aware about the management of bleeding after extraction than the males (65%, and 47%, respectively;  $P = 0.035$ ). Thirty-five percent and 53% chose the correct management to relieve choking in responsive and unresponsive adult or child, respectively. A total of 28% of the participants reported syncope as the most common emergency situation.

**Conclusion:** Participants were lacking confidence in handling medical emergencies even though the majority of them inquired the medical history. Most of them have a good knowledge regarding CPR, but regarding airway obstruction, the knowledge was not at an acceptable level. Annual basic life support and emergency courses should be mandatory in dental teaching curriculum.

2. **Adv Med Educ Pract.** 2018 Jan 10;9:31-37. doi: 10.2147/AMEP.S141436. eCollection 2018.

**Medical students' experiences of resuscitation and discussions surrounding resuscitation status.**

Aggarwal AR1, Khan I1.

Abstract

**Objectives:** In the UK, cardiopulmonary resuscitation (CPR) should be undertaken in the event of cardiac arrest unless a patient has a "Do Not Attempt CPR" document. Doctors have a legal duty to discuss CPR with patients or inform them that CPR would be futile. In this study, final-year medical students were interviewed about their experiences of resuscitation on the wards and of observing conversations about resuscitation status to explore whether they would be equipped to have an informed discussion about resuscitation in the future.

Methods: Twenty final-year medical students from two medical schools were interviewed about their experiences on the wards. Interviews were transcribed verbatim, and thematic analysis was undertaken. Results: Students who had witnessed CPR on the wards found that aspects of it were distressing. A significant minority had never seen resuscitation status being discussed with a patient. No students reported seeing a difficult conversation. Half of the students interviewed reported being turned away from difficult conversations by clinicians. Only two of the twenty students would feel comfortable raising the issue of resuscitation with a patient.

Conclusion: It is vital that doctors are comfortable talking to patients about resuscitation. Given the increasing importance of this aspect of communication, it should be considered for inclusion in the formal communication skills teaching during medical school.

## CURES POST-RCE

1. **PLoS One.** 2017 Dec 29;12(12):e0189442. doi: 10.1371/journal.pone.0189442. eCollection 2017.

### **Coronary angiography is related to improved clinical outcome of out-of-hospital cardiac arrest with initial non-shockable rhythm.**

Ko E1, Shin JK1, Cha WC1, Park JH1, Lee TR1, Yoon H1, Lee G1, Hwang SY1, Shin TG1, Sim MS1, Jo JJ1, Rhee JE1, Song KJ1, Jeong YK1, Shin SD2, Choi JH1; Cardiac Arrest Pursuit Trial with Unique Registry; Epidemiologic Surveillance investigators.

#### Abstract

**OBJECTIVE:** Coronary angiography (CAG) for survivors of out-of-hospital cardiac arrest (OHCA) enables early identification of coronary artery disease and revascularization, which might improve clinical outcome. However, little is known for the role of CAG in patients with initial non-shockable cardiac rhythm.

**METHODS:** We investigated clinical outcomes of successfully resuscitated 670 adult OHCA patients who were transferred to 27 hospitals in Cardiac Arrest Pursuit Trial with Unique Registration and Epidemiologic Surveillance (CAPTURES), a Korean nationwide multicenter registry. The primary outcome was 30-day survival with good neurological outcome. Propensity score matching and inverse probability of treatment weighting analyses were performed to account for indication bias.

**RESULTS:** A total of 401 (60%) patients showed initial non-shockable rhythm. CAG was performed only in 13% of patients with non-shockable rhythm (53 out of 401 patients), whereas more than half of patients with shockable rhythm (149 out of 269 patients, 55%). Clinical outcome of patients who underwent CAG was superior to patients without CAG in both non-shockable (hazard ratio (HR) = 3.6, 95% confidence interval (CI) = 2.5-5.2) and shockable rhythm (HR = 3.7, 95% CI = 2.5-5.4,  $p < 0.001$ , all). Further analysis after propensity score matching or inverse probability of treatment weighting showed consistent findings (HR ranged from 2.0 to 3.2,  $p < 0.001$ , all).

**CONCLUSIONS:** Performing CAG was related to better survival with good neurological outcome of OHCA patients with initial non-shockable rhythms as well as shockable rhythms.

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## TARGET TEMPERATURE MANAGEMENT

1. **Ther Hypothermia Temp Manag.** 2018 Feb 2. doi: 10.1089/ther.2017.0051. [Epub ahead of print] **Left Ventricle Function During Therapeutic Hypothermia with Beta1-Adrenergic Receptor Blockade.**

Bergan HA1,2, Halvorsen PS3, Espinoza A1, Kerans V1, 3, Skulstad H2,4, Fosse E2,3, Bugge JF1,2.

#### Abstract

Therapeutic hypothermia is an established treatment in patients resuscitated from cardiac arrest. It is usually well-tolerated circulatory, but hypothermia negatively effects myocardial contraction and relaxation velocities and increases diastolic filling restrictions. A significant proportion of resuscitated patients are treated with long-acting beta-receptor blocking agents' prearrest, but the combined effects of hypothermia and beta-blockade on left ventricle (LV) function are not previously investigated. We hypothesized that beta1-adrenergic receptor blockade (esmolol infusion) exacerbates the negative effects of hypothermia on active myocardial motions, affecting both systolic and diastolic LV function. A pig ( $n = 10$ ) study was performed to evaluate the myocardial effects of esmolol during hypothermia ( $33^{\circ}\text{C}$ ) and during normothermia, at spontaneous and pacing-increased heart rates (HRs). LV function was assessed by a LV pressure transducer, an epicardial ultrasonic transducer (wall thickness, wall thickening/thinning velocity) and an aortic ultrasonic flow-probe (stroke volume, cardiac output). The

data were compared using a paired two-tailed Students t-test, and also analyzed using a linear mixed model to handle dependencies introduced by repeated measurements within each subject. The significance level was  $p \leq 0.05$ . The effects of hypothermia and beta blockade were distinct and additive. Hypothermia reduced myocardial motion velocities and increased diastolic filling restrictions, but end-systolic wall thickness increased, and stroke volume and  $dP/dt_{max}$  (pumping function) were maintained. In contrast, esmolol predominantly affected systolic pumping function, by a negative inotropic effect. In combination, hypothermia and esmolol reduced myocardial velocities in systole and diastole by  $\sim 40\%$ , compared with normothermia without esmolol, inducing in combination both systolic and diastolic LV function impairment. The cardiac dysfunction deteriorated at increased HRs during hypothermia. Beta1-adrenergic receptor blockade (esmolol) exacerbates the negative effects of hypothermia on active myocardial contraction and relaxation. The combination of hypothermia with beta-blockade induces both systolic and diastolic LV function impairment.

## ELECTROFISIOLOGIA I DESFIBRIL·LACIÓ

1. **Chaos**. 2018 Jan;28(1):013106. doi: 10.1063/1.5019367.

### **The role of conductivity discontinuities in design of cardiac defibrillation.**

Lim H1, Cun W1, Wang Y1, Gray RA2, Glimm J1.

#### Abstract

Fibrillation is an erratic electrical state of the heart, of rapid twitching rather than organized contractions. Ventricular fibrillation is fatal if not treated promptly. The standard treatment, defibrillation, is a strong electrical shock to reinitialize the electrical dynamics and allow a normal heart beat. Both the normal and the fibrillatory electrical dynamics of the heart are organized into moving wave fronts of changing electrical signals, especially in the transmembrane voltage, which is the potential difference between the cardiac cellular interior and the intracellular region of the heart. In a normal heart beat, the wave front motion is from bottom to top and is accompanied by the release of Ca ions to induce contractions and pump the blood. In a fibrillatory state, these wave fronts are organized into rotating scroll waves, with a centerline known as a filament. Treatment requires altering the electrical state of the heart through an externally applied electrical shock, in a manner that precludes the existence of the filaments and scroll waves. Detailed mechanisms for the success of this treatment are partially understood, and involve local shock-induced changes in the transmembrane potential, known as virtual electrode alterations. These transmembrane alterations are located at boundaries of the cardiac tissue, including blood vessels and the heart chamber wall, where discontinuities in electrical conductivity occur. The primary focus of this paper is the defibrillation shock and the subsequent electrical phenomena it induces. Six partially overlapping causal factors for defibrillation success are identified from the literature. We present evidence in favor of five of these and against one of them. A major conclusion is that a dynamically growing wave front starting at the heart surface appears to play a primary role during defibrillation by critically reducing the volume available to sustain the dynamic motion of scroll waves; in contrast, virtual electrodes occurring at the boundaries of small, isolated blood vessels only cause minor effects. As a consequence, we suggest that the size of the heart (specifically, the surface to volume ratio) is an important defibrillation variable.

## PEDIATRIA

1. **Medicine** (Baltimore). 2018 Feb;97(5):e9386. doi: 10.1097/MD.0000000000009386.

### **Is there any alternative to standard chest compression techniques in infants? A randomized manikin trial of the new "2-thumb-fist" option.**

Ladny JR1, Smereka J2, Rodríguez-Núñez A3,4,5,6, Leung S7, Ruetzler K7, Szarpak L8.

#### Abstract

**BACKGROUND:** Pediatric cardiac arrest is a fatal emergent condition that is associated with high mortality, permanent neurological injury, and is a socioeconomic burden at both the individual and national levels. The aim of this study was to test in an infant manikin a new chest compression (CC) technique ("2 thumbs-fist" or nTTT) in comparison with standard 2-finger (TFT) and 2-thumb-encircling hands techniques (TTEHT).

**METHODS:** This was prospective, randomized, crossover manikin study. Sixty-three nurses who performed a randomized sequence of 2-minute continuous CC with the 3 techniques in random order. Simulated

systolic (SBP), diastolic (DBP), mean arterial pressure (MAP), and pulse pressures (PP, SBP-DBP) in mm Hg were measured.

**RESULTS:** The nTTT resulted in a higher median SBP value (69 [IQR, 63-74] mm Hg) than TTEHT (41.5 [IQR, 39-42] mm Hg), ( $P < .001$ ) and TFT (26.5 [IQR, 25.5-29] mm Hg), ( $P < .001$ ). The simulated median value of DBP was 20 (IQR, 19-20) mm Hg with nTTT, 18 (IQR, 17-19) mm Hg with TTEHT and 23.5 (IQR, 22-25.5) mm Hg with TFT. DBP was significantly higher with TFT than with TTEHT ( $P < .001$ ), as well as with TTEHT than nTTT ( $P < .001$ ). Median values of simulated MAP were 37 (IQR, 34.5-38) mm Hg with nTTT, 26 (IQR, 25-26) mm Hg with TTEHT and 24.5 (IQR, 23.5-26.5) mm Hg with TFT. A statistically significant difference was noticed between nTTT and TFT ( $P < .001$ ), nTTT and TTEHT ( $P < .001$ ), and between TTEHT and TFT ( $P < .001$ ). Sixty-one subjects (96.8%) preferred the nTTT over the 2 standard methods.

**CONCLUSIONS:** The new nTTT technique achieved higher SBP and MAP compared to the standard CC techniques in our infant manikin model. nTTT appears to be a suitable alternative or complementary to the TFT and TTEHT.

Free Article

## RECERCA EXPERIMENTAL

1. **MAbs.** 2018 Jan 30:0. doi: 10.1080/19420862.2018.1433977. [Epub ahead of print] Mild hypothermic culture conditions affect residual host cell protein composition post-Protein A chromatography.

Goey CH1, Bell D2, Kontoravdi C1.

Abstract

Host cell proteins (HCPs) are endogenous impurities, and their proteolytic and binding properties can compromise the integrity, and, hence, the stability and efficacy of recombinant therapeutic proteins such as monoclonal antibodies (mAbs). Nonetheless, purification of mAbs currently presents a challenge because they often co-elute with certain HCP species during the capture step of protein A affinity chromatography. A Quality-by-Design (QbD) strategy to overcome this challenge involves identifying residual HCPs and tracing their source to the harvested cell culture fluid (HCCF) and the corresponding cell culture operating parameters. Then, problematic HCPs in HCCF may be reduced by cell engineering or culture process optimization. Here, we present experimental results linking cell culture temperature and post-protein A residual HCP profile. We had previously reported that Chinese hamster ovary cell cultures conducted at standard physiological temperature and with a shift to mild hypothermia on day 5 produced HCCF of comparable product titer and HCP concentration, but with considerably different HCP composition. In this study, we show that differences in HCP variety at harvest cascaded to downstream purification where different residual HCPs were present in the two sets of samples post-protein A purification. To detect low-abundant residual HCPs, we designed a looping liquid chromatography-mass spectrometry experiment with continuous expansion of a preferred, exclude, and targeted peptide list. Mild hypothermic cultures produced 20% more residual HCP species, especially cell membrane proteins, distinct from the control. Critically, we identified that half of the potentially immunogenic residual HCP species were different between the two sets of samples.

2. **Biomed Res Int.** 2017;2017:5470406. doi: 10.1155/2017/5470406. Epub 2017 Dec 17.

**Corpuls CPR Generates Higher Mean Arterial Pressure Than LUCAS II in a Pig Model of Cardiac Arrest.**

Eichhorn S1, Mendoza A2, Prinzing A1, Stroh A1, Xinghai L1, Polski M1, Heller M3, Lahm H1, Wolf E4, Lange R1,5, Krane M1,5.

Abstract

According to the European Resuscitation Council guidelines, the use of mechanical chest compression devices is a reasonable alternative in situations where manual chest compression is impractical or compromises provider safety.

The aim of this study is to compare the performance of a recently developed chest compression device (Corpuls CPR) with an established system (LUCAS II) in a pig model. Methods. Pigs ( $n = 5$ /group) in provoked ventricular fibrillation were left untreated for 5 minutes, after which 15 min of cardiopulmonary resuscitation was performed with chest compressions. After 15 min, defibrillation was performed every 2 min if necessary, and up to 3 doses of adrenaline were given. If there was no return of spontaneous circulation after 25 min, the experiment was terminated. Coronary perfusion pressure, carotid blood flow, end-expiratory CO<sub>2</sub>, regional oxygen saturation by near infrared spectroscopy, blood gas, and local organ perfusion with fluorescent labelled microspheres were measured at baseline and during resuscitation.

Results. Animals treated with Corpuls CPR had significantly higher mean arterial pressures during resuscitation, along with a detectable trend of greater carotid blood flow and organ perfusion. Conclusion. Chest compressions with the Corpuls CPR device generated significantly higher mean arterial pressures than compressions performed with the LUCAS II device.

## CASE REPORTS

1. **Acta Med Acad.** 2017 May;46(1):50-54. doi: 10.5644/ama2006-124.186.

### **Targeted temperature management after out-of-hospital cardiac arrest in three young patients.**

Godinjak A1, Iglica A2, Kukuljac A3, Tančica I4, Jusufović S5, Ajanović A6, Rožajac Š7.

#### Abstract

**OBJECTIVE:** We present the use of targeted temperature management in a tertiary-level intensive care unit, in three patients who experienced an out-of-hospital cardiac arrest.

**CASE REPORT:** Three young patients experienced an out-of-hospital non-coronary cardiac arrest. The causes of the cardiac arrest were: Wolf-Parkinson-White syndrome, drug overdose and long-QT syndrome. All patients were resuscitated according to the advanced cardiac life support guidelines, and treated with targeted temperature management, with a target temperature of 33°C for 24 hours. After completion of targeted temperature management, all the patients regained full consciousness and were discharged from hospital without any neurological sequelae.

**CONCLUSION:** Targeted temperature management may improve survival and neurological outcome in patients after out-of-hospital cardiac arrest.

Free Article

2. **Medicine (Baltimore).** 2017 Nov;96(47):e8646. doi: 10.1097/MD.0000000000008646.

### **Case of a cardiac arrest patient who survived after extracorporeal cardiopulmonary resuscitation and 1.5 hours of resuscitation: A case report.**

Moon SH1, Kim JW1, Byun JH1, Kim SH1, Kim KN1, Choi JY2, Jang IS2, Lee CE2, Yang JH2, Kang DH2, Park HO1.

#### Abstract

**RATIONALE:** Per the American Heart Association guidelines, extracorporeal cardiopulmonary resuscitation should be considered for in-hospital patients with easily reversible cardiac arrest. However, there are currently no consensus recommendations regarding resuscitation for prolonged cardiac arrest cases.

#### **PATIENT CONCERNS AND DIAGNOSIS:**

We encountered a 48-year-old man who survived a cardiac arrest that lasted approximately 1.5 hours. He visited a local hospital's emergency department complaining of chest pain and dyspnea that had started 3 days earlier. Immediately after arriving in the emergency department, a cardiac arrest occurred; he was transferred to our hospital for extracorporeal membrane oxygenation (ECMO).

**INTERVENTIONS:** Resuscitation was performed with strict adherence to the American Heart Association/American College of Cardiology advanced cardiac life support guidelines until ECMO could be placed.

**OUTCOMES:** On hospital day 7, he had a full neurologic recovery. On hospital day 58, additional treatments, including orthotopic heart transplantation, were considered necessary; he was transferred to another hospital.

**LESSONS:** To our knowledge, this is the first case in South Korea of patient survival with good neurologic outcomes after resuscitation that lasted as long as 1.5 hours. Documenting cases of prolonged resuscitation may lead to updated guidelines and improvement of outcomes of similar cases in future.