FEEDBACK

1. Resuscitation. 2016 Oct 14. pii: S0300-9572(16)30505-6. doi: 10.1016/j.resuscitation.2016.08.034. [Epub ahead of print]

The impact of post-resuscitation feedback for paramedics on the quality of cardiopulmonary resuscitation.

Bleijenberg E1, Koster RW2, de Vries H3, Beesems SG2.

Abstract

PURPOSE: The Guidelines place emphasis on high-quality cardiopulmonary resuscitation (CPR). This study aims to measure the impact of post-resuscitation feedback on the quality of CPR as performed by ambulance personnel.

MATERIALS AND METHODS: Two ambulances are dispatched for suspected cardiac arrest. The crew (driver and paramedic) of the first arriving ambulance is responsible for the quality of CPR. The crew of the second ambulance establishes an intravenous access and supports the first crew. All resuscitation attempts led by the ambulance crew of the study region were reviewed by two research paramedics and structured feedback was given based on defibrillator recording with impedance signal. A 12-months period before introduction of post-resuscitation feedback was compared with a 19-months period after introduction of feedback, excluding a six months run-in interval. Quality parameters were chest compression fraction (CCF), chest compression rate, longest peri-shock pause and longest non-shock pause.

RESULTS: In the pre-feedback period 55 cases were analyzed and 69 cases in the feedback period. Median CCF improved significantly in the feedback period (79% vs 86%, p<0.001). The mean chest compression rate was within the recommended range of 100-120/min in 87% of the cases in the pre-feedback period and in 90% of the cases in the feedback period (p=0.65). The duration of longest non-shock pause decreased significantly (40s-19s, p<0.001), the duration of the longest peri-shock pause did not change significantly (16s vs 13s, p=0.27).

CONCLUSION: Post-resuscitation feedback improves the quality of resuscitation, significantly increasing CCF and decreasing the duration of longest non-shock pauses.

REGISTRES, REVISIONS I EDITORIALS

1. Resuscitation. 2016 Nov;108:61-67. doi: 10.1016/j.resuscitation.2016.09.013. Epub 2016 Sep 21.

Age-specific differences in prognostic significance of rhythm conversion from initial non-shockable to shockable rhythm and subsequent shock delivery in out-of-hospital cardiac arrest.

Funada A1, Goto Y2, Tada H1, Teramoto R1, Shimojima M1, Hayashi K3, Yamagishi M3.

Abstract

BACKGROUND: Early rhythm conversion from an initial non-shockable to a shockable rhythm and subsequent shock delivery in patients with out-of-hospital cardiac arrest (OHCA) has been associated with favourable neurological outcome (Cerebral Performance Category score 1 or 2; CPC 1-2). We hypothesized that the prognostic significance of rhythm conversion and subsequent shock delivery differs by age and time from initiation of cardiopulmonary resuscitation (CPR) by emergency medical service (EMS) providers to first defibrillation (shock delivery time).

METHODS: We analysed 430,443 OHCA patients with an initial non-shockable rhythm using a prospective Japanese Utstein-style database from 2011 to 2014. The primary endpoint was 1-month CPC 1-2.

RESULTS: Multivariate logistic regression revealed that rhythm conversion and subsequent shock delivery is positively associated with 1-month CPC 1-2: the adjusted odds ratio was 6.09 (95% confidence interval: 3.65-9.75) for shock delivery time <10min and 3.34 (2.58-4.27) for 10-19min in patients aged 18-64 years, and 3.16 (1.45-6.09) for <10min and 2.17 (1.51-3.03) for 10-19min in patients aged 65-74 years. However, it is negatively associated with 1-month CPC 1-2 for shock delivery time of 20-59min in patients aged 75-84 years (0.55; 0.27-0.98) and ≥85 years (0.17; 0.03-0.53).

CONCLUSIONS: Early rhythm conversion from an initial non-shockable to a shockable rhythm and subsequent shock delivery is associated with increased odds of 1-month CPC 1-2 in OHCA patients aged 18-74 years but not in those aged ≥75 years.

2. Resuscitation. 2016 Sep 19;109:1-8. doi: 10.1016/j.resuscitation.2016.09.012. [Epub ahead of print]

Recognition of out-of-hospital cardiac arrest by medical dispatchers in emergency medical dispatch centres in two countries.

Møller TP1, Andréll C2, Viereck S3, Todorova L4, Friberg H2, Lippert FK3.

Abstract

INTRODUCTION: Survival after out-of-hospital cardiac arrest (OHCA) remains low. Early recognition by emergency medical dispatchers is essential for an effective chain of actions, leading to early cardiopulmonary resuscitation, use of an automated external defibrillator and rapid dispatching of the emergency medical services.

AIM: To analyse and compare the accuracy of OHCA recognition by medical dispatchers in two countries.

METHOD: An observational register-based study collecting data from national cardiac arrest registers in Denmark and Sweden during a six-month period in 2013. Data were analysed in two steps; registry data were merged with electronically registered emergency call data from the emergency medical dispatch centres in the two regions. Cases with missing or non-OHCA dispatch codes were analysed further by auditing emergency call recordings using a uniform data collection template.

RESULTS: The sensitivity for recognition of OHCA was 40.9% (95% CI: 37.1-44.7%) in the Capital Region of Denmark and 78.4% (95% CI: 73.2-83.0%) in the Skåne Region in Sweden (p<0.001). With additional data from the emergency call recordings, the sensitivity was 80.7% (95% CI: 77.7-84.3%) and 86.0% (95% CI: 81.3-89.8%) for the two regions (p=0.06). The majority of the non-recognised OHCA were dispatched with the highest priority.

CONCLUSION: The accuracy of OHCA recognition was high and comparable. We identified large differences in data registration practices despite the use of similar dispatch tools. This raises a discussion of definitions and transparency in general in scientific reporting of OHCA recognition, which is essential if used as quality indicator in emergency medical services.

3. Resuscitation. 2016 Oct 18. pii: S0300-9572(16)30498-1. doi: 10.1016/j.resuscitation.2016.09.027. [Epub ahead of print]

Factors impacting upon timely and adequate allocation of prehospital medical assistance and resources to cardiac arrest patients.

Hardeland C1, Sunde K2, Ramsdal H3, Hebbert SR4, Soilammi L5, Westmark F6, Nordum F7, Hansen AE8, Steen-Hansen JE9, Olasveengen TM10.

Abstract

AIM: Explore, understand and address issues that impact upon timely and adequate allocation of prehospital medical assistance and resources to out-of-hospital cardiac arrest (OHCA) patients.

METHODS: Mixed-methods: design obtaining data for one year in three emergency medical communication centres (EMCC); Oslo-Akershus (OA), Vestfold-Telemark (VT) and Østfold (Ø). Data collection included quantitative data from analysis of dispatch logs, ambulance records and audio files. Qualitative data were collected through in-depth interviews and non-participant observations.

RESULTS: OA-, VT- and Ø-EMCC responded to 1095 OHCAs and 579 of these calls were included for further analysis (333, 143 and 103, respectively). There were significant site differences in their recognition of OHCA (89, 94 and 78%, respectively, p<0.001), provision of CPR instructions (83, 83 and 61%, respectively, p<0.001), time from call answered to initial CPR instructions (1.4min (1.2, 1.6), 1.1min (0,9, 1.2) and 1.3 (1.2, 1.7) respectively, p=0.002). The most frequent reason for delayed or failed recognition of OHCA was misinterpretation of agonal breathing. Interviews and observations revealed individual differences in protocol use, interrogation strategy and assessment of breathing. Use of protocol was only part of decision making,

dispatchers trusted their own clinical experience and intuition, and used assumptions about the patient and the situation as part of decision making.
CONCLUSION: Agonal breathing continues to be the main barrier to recognition of cardiac arrest. Individual differences among dispatchers' strategies can directly impact on performance, mainly due to the wide definition of cardiac arrest and lack of uniform tools for assessment of breathing.

4. Circulation. 2016 Oct 19. pii: CIRCULATIONAHA.116.023309. [Epub ahead of print]
The Association Between Duration of Resuscitation and Favorable Outcome After Out-of-Hospital Cardiac Arrest: Implications for Prolonging or Terminating Resuscitation.
Reynolds JC1, Grunau BE2, Rittenberger JC3, Sawyer KN4, Kurz MC5, Callaway CW3.

Abstract
BACKGROUND: -Little evidence guides the appropriate duration of resuscitation in out-of-hospital cardiac arrest (OHCA), and case features justifying longer or shorter durations are ill-defined. We estimated the impact of resuscitation duration on the probability of favorable functional outcome in OHCA using a large, multi-center cohort.
METHODS: -Secondary analysis of a North American, single blind, multi-center, cluster-randomized clinical trial (ROC-PRIMED) of consecutive adults with non-traumatic, EMS-treated, OHCA. Primary exposure was duration of resuscitation in minutes (onset of professional resuscitation to return of spontaneous circulation [ROSC] or termination of resuscitation). Primary outcome was survival to hospital discharge with favorable outcome (modified Rankin scale [mRS] 0-3). Subjects were additionally classified as survival with unfavorable outcome (mRS 4-5), ROSC without survival (mRS 6), or without ROSC. Subject accrual was plotted as a function of resuscitation duration, and the dynamic probability of favorable outcome at discharge was estimated for the whole cohort and subgroups. Adjusted logistic regression models tested the association between resuscitation duration and survival with favorable outcome.
RESULTS: -The primary cohort included 11,368 subjects (median age 69 years [IQR: 56-81 years]; 7,121 men [62.6%]). Of these, 4,023 (35.4%) achieved ROSC, 1,232 (10.8%) survived to hospital discharge, and 905 (8.0%) had mRS 0-3 at discharge. Distribution of CPR duration differed by outcome ($p<0.00001$). For CPR duration up to 37.0 minutes (95%CI 34.9-40.9 minutes), 99% with eventual mRS 0-3 at discharge achieved ROSC. Dynamic probability of mRS 0-3 at discharge declined over elapsed resuscitation duration, but subjects with initial shockable cardiac rhythm, witnessed cardiac arrest, and bystander CPR were more likely to survive with favorable outcome after prolonged efforts (30-40 minutes). Adjusting for prehospital (OR 0.93; 95%CI 0.92-0.95) and inpatient (OR 0.97; 95%CI 0.95-0.99) covariates, resuscitation duration was associated with survival to discharge with mRS 0-3.
CONCLUSIONS: -Shorter resuscitation duration was associated with likelihood of favorable outcome at hospital discharge. Subjects with favorable case features were more likely to survive prolonged resuscitation up to 47 minutes

5. Circ Cardiovasc Qual Outcomes. 2016 Oct 18. pii: CIRCOUTCOMES.116.002916. [Epub ahead of print]
Identifying Important Gaps in Randomized Controlled Trials of Adult Cardiac Arrest Treatments: A Systematic Review of the Published Literature.
Sinha SS1, Sukul D2, Lazarus JJ2, Polavarapu V2, Chan PS2, Neumar RW2, Nallamothu BK2.

Abstract
BACKGROUND: Cardiac arrest is a major public health concern worldwide. The extent and types of randomized controlled trials (RCT)-our most reliable source of clinical evidence-conducted in these high-risk patients over recent years are largely unknown.
METHODS AND RESULTS: We performed a systematic review, identifying all RCTs published in PubMed, EMBASE, Scopus, Web of Science, and the Cochrane Library from 1995 to 2014 that focused on the acute treatment of nontraumatic cardiac arrest in adults. We then extracted data on the setting of study populations, types and timing of interventions studied, risk of bias, outcomes reported, and how these factors have changed over time. Over this 20-year period, 92 RCTs were published containing 64 309 patients (median, 225.5 per trial). Of these, 81 RCTs (88.0%) involved out-of-hospital cardiac arrest, whereas 4 (4.3%) involved in-hospital cardiac arrest and 7 (7.6%) included both. Eighteen RCTs (19.6%) were performed in the United States,

68 (73.9%) were performed outside the United States, and 6 (6.5%) were performed in both settings. Thirty-eight RCTs (41.3%) evaluated drug therapy, 39 (42.4%) evaluated device therapy, and 15 (16.3%) evaluated protocol improvements. Seventy-four RCTs (80.4%) examined interventions during the cardiac arrest, 15 (16.3%) examined post cardiac arrest treatment, and 3 (3.3%) studied both. Overall, reporting of the risk of bias was limited. The most common outcome reported was return of spontaneous circulation: 86 (93.5%) with only 22 (23.9%) reporting survival beyond 6 months. Fifty-three RCTs (57.6%) reported global ordinal outcomes, whereas 15 (16.3%) reported quality-of-life. RCTs in the past 5 years were more likely to be focused on protocol improvements and postcardiac arrest care.
CONCLUSIONS: Important gaps in RCTs of cardiac arrest treatments exist, especially those examining in-hospital cardiac arrest, protocol improvement, postcardiac arrest care, and long-term or quality-of-life outcomes.

6. Scand J Trauma Resusc Emerg Med. 2016 Oct 19;24(1):127.
The ReCaPTa study - a prospective out of hospital cardiac arrest registry including multiple sources of surveillance for the study of sudden cardiac death in the Mediterranean area.
Azeli Y1,2, Barbería E3,4, Jiménez-Herrera M5, Bonet G4,6,7, Valero-Mora E8, Lopez-Gomariz A8, Lucas-Guarque I8, Guillen-Lopez A8,9, Alonso-Villaverde C10, Landín I3,4, Torralba P3, Jammoul A4,11, Bladé-Creixenti J12, Axelsson C13, Bardají A4,6,7.

Abstract
BACKGROUND: Cardiovascular diseases are one of the leading causes of death in the industrialized world. Sudden cardiac death is very often the first manifestation of the disease and it occurs in the prehospital setting. The determination of the sudden cardiac death phenotype is challenging. It requires prospective studies in the community including multiple sources of case ascertainment that help to identify the cause and circumstances of death. The aim of the Clinical and Pathological Registry of Tarragona (ReCaPTa) is to study incidence and etiology of Sudden Cardiac Death in the Tarragona region (Catalonia, Spain).
METHODS: ReCaPTa is a population-based registry of OHCA using multiple sources of surveillance. The population base is 511,662. This registry is compiled chronologically in a relational database and it prospectively contains data on all the OHCA attended by the EMS from April 2014 to April 2017. ReCaPTa collects data after each emergency medical assistance using an online application including variables of the onset of symptoms. A quality control is performed and it permits monitoring the percentage of cases included by the emergency crew. Simultaneously, data from the medico-legal autopsies is taken from the Pathology Center of the area. All the examination findings following a specific protocol for the sudden death study are entered into the ReCaPTa database by one trained person. Survivors admitted to hospital are followed up and their clinical variables are collected in each hospital. The primary care researchers analyze the digital clinical records in order to obtain medical background. All the available data will be reviewed after an adjudication process with the aim of identifying all cases of sudden cardiac death.
DISCUSSION: There is a lack of population-based registries including multiple source of surveillance in the Mediterranean area. The ReCaPTa study could provide valuable information to prevent sudden cardiac death and develop new strategies to improve its survival.

8. Resuscitation. 2016 Nov;108:54-60. doi: 10.1016/j.resuscitation.2016.09.004. Epub 2016 Sep 15.
Patients without ST elevation after return of spontaneous circulation may benefit from emergent percutaneous intervention: A systematic review and meta-analysis.
Millin MG1, Comer AC2, Nable JV3, Johnston PV4, Lawner BJ5, Woltman N6, Levy MJ7, Seaman KG8, Hirshon JM9.

Abstract
INTRODUCTION: The American Heart Association recommends that post-arrest patients with evidence of ST elevation myocardial infarction (STEMI) on electrocardiogram (ECG) be emergently taken to the catheterization lab for percutaneous coronary intervention (PCI). However, recommendations regarding the utility of emergent PCI for patients without ST elevation are less specific. This review examined the literature on the utility of PCI in post-arrest patients without ST elevation compared to patients with STEMI.

METHODS: A systematic review of the English language literature was performed for all years to March 1, 2015 to examine the hypothesis that a percentage of post-cardiac arrest patients without ST elevation will benefit from emergent PCI as defined by evidence of an acute culprit coronary lesion.
RESULTS: Out of 1067 articles reviewed, 11 articles were identified that allowed for analysis of data to examine our study hypothesis. These studies show that patients presenting post cardiac arrest with STEMI are thirteen times more likely to be emergently taken to the catheterization lab than patients without STEMI; OR 13.8 (95% CI 4.9-39.0). Most importantly, the cumulative data show that when taken to the catheterization lab as much as 32.2% of patients without ST elevation had an acute culprit lesion requiring intervention, compared to 71.9% of patients with STEMI; OR 0.15 (95% CI 0.06-0.34).
CONCLUSION: The results of this systematic review demonstrate that nearly one third of patients who have been successfully resuscitated from cardiopulmonary arrest without ST elevation on ECG have an acute lesion that would benefit from emergent percutaneous coronary intervention.

ECOGRAFIA

1. Resuscitation. 2016 Sep 28;109:33-39. doi: 10.1016/j.resuscitation.2016.09.018. [Epub ahead of print]
Emergency department point-of-care ultrasound in out-of-hospital and in-ED cardiac arrest.
Gaspari R1, Weekes A2, Adhikari S3, Noble VE4, Nomura JT5, Theodoro D6, Woo M7, Atkinson P8, Blehar D9, Brown SM10, Caffery T11, Douglass E4, Fraser J8, Haines C12, Lam S13, Lanspa M10, Lewis M2, Liebmann O14, Limkakeng A15, Lopez F15, Platz E16, Mendoza M9, Minnigan H17, Moore C18, Novik J19, Rang L20, Scruggs W21, Raio C12.

Abstract
BACKGROUND: Point-of-care ultrasound has been suggested to improve outcomes from advanced cardiac life support (ACLS), but no large studies have explored how it should be incorporated into ACLS. Our aim was to determine whether cardiac activity on ultrasound during ACLS is associated with improved survival.
METHODS: We conducted a non-randomized, prospective, protocol-driven observational study at 20 hospitals across United States and Canada. Patients presenting with out-of-hospital arrest or in-ED arrest with pulseless electrical activity or asystole were included. An ultrasound was performed at the beginning and end of ACLS. The primary outcome was survival to hospital admission. Secondary outcomes included survival to hospital discharge and return of spontaneous circulation.
FINDINGS: 793 patients were enrolled, 208 (26.2%) survived the initial resuscitation, 114 (14.4%) survived to hospital admission, and 13 (1.6%) survived to hospital discharge. Cardiac activity on US was the variable most associated with survival at all time points. On multivariate regression modeling, cardiac activity was associated with increased survival to hospital admission (OR 3.6, 2.2-5.9) and hospital discharge (OR 5.7, 1.5-21.9). No cardiac activity on US was associated with non-survival, but 0.6% (95% CI 0.3-2.3) survived to discharge. Ultrasound identified findings that responded to non-ACLS interventions. Patients with pericardial effusion and pericardiocentesis demonstrated higher survival rates (15.4%) compared to all others (1.3%).
CONCLUSION: Cardiac activity on ultrasound was the variable most associated with survival following cardiac arrest. Ultrasound during cardiac arrest identifies interventions outside of the standard ACLS algorithm.

ECMO

1. Resuscitation. 2016 Nov;108:87-94. doi: 10.1016/j.resuscitation.2016.07.003. Epub 2016 Jul 20.
Extracorporeal membrane oxygenation (ECMO) assisted cardiopulmonary resuscitation or uncontrolled donation after the circulatory determination of death following out-of-hospital refractory cardiac arrest-An ethical analysis of an unresolved clinical dilemma.
Dalle Ave AL1, Shaw DM2, Gardiner D 3.

Abstract
BACKGROUND: The availability of extracorporeal membrane oxygenation (ECMO) assisted cardiopulmonary resuscitation (E-CPR), for use in refractory out-of hospital cardiac arrest (OHCA), is increasing. In parallel, some countries have developed uncontrolled donation after circulatory determination of death (uDCDD) programs using ECMO to preserve organs for transplantation purposes.
AIM: When facing a refractory OHCA, how does the medical team choose between initiating ECMO as part of an E-CPR protocol or ECMO as part of a uDCDD protocol?
METHODS: To answer these questions we conducted a literature review on E-CPR compared to uDCDD protocols using ECMO and analyzed the raised ethical issues.
RESULTS: Our analysis reveals that the inclusion criteria in E-CPR and uDCDD protocols are similar. There may be a non-negligible risk of including patients in a uDCDD protocol, when the patient might have been saved by the use of E-CPR.
CONCLUSION: In order to avoid the fatal error of letting a saveable patient die, safeguards are necessary. We recommend: (1) the development of internationally accepted termination of resuscitation guidelines that would have to be satisfied prior to inclusion of patients in any uDCDD protocol, (2) the choice regarding modalities of ongoing resuscitation during transfer should be focused on the primary priority of attempting to save the life of patients, (3) only centers of excellence in life-saving resuscitation should initiate or maintain uDCDD programs, (4) E-CPR should be clinically considered first before the initiation of any uDCDD protocol, and (5) there should be no discrimination in the availability of access to E-CPR.

2. J Cardiol. 2016 Nov;68(5):439-446. doi: 10.1016/j.jjcc.2015.10.014. Epub 2015 Nov 21.
Prognostic effect of estimated glomerular filtration rate in patients with cardiogenic shock or cardiac arrest undergoing percutaneous veno-arterial extracorporeal membrane oxygenation.
Kuroki N1, Abe D2, Iwama T1, Sugiyama K3, Akashi A3, Hamabe Y3, Aonuma K4, Sato A4.

Abstract
BACKGROUND: Veno-arterial extracorporeal membrane oxygenation (VA-ECMO) can improve survival in patients with cardiogenic shock or cardiac arrest. We investigated the association between initial renal function and clinical outcome in patients undergoing VA-ECMO for cardiogenic shock and cardiac arrest.
METHODS: This was a single-center, retrospective cohort study of 287 patients who underwent ECMO at our hospital from January 2005 to December 2014. We excluded 70 patients with non-cardiogenic events. The remaining 217 patients were divided into 2 groups according to initial estimated glomerular filtration rate (eGFR): Initial high eGFR (non-renal failure: non-RF) group: eGFR≥60ml/min/1.73m2 (n=73) and initial low eGFR (RF) group: eGFR<60ml/min/1.73m2 (n=144). Clinical outcome was defined as all-cause death at 30 days after extracorporeal life support.
RESULTS: VA-ECMO was begun in 87% of patients for cardiac arrest. The non-RF group was significantly younger (51.6 vs. 62.6 years), had lower body mass index (22.8 vs. 24.7kg/m2), lower blood urea nitrogen (14.4 vs. 23.9mg/dl), and lower K (4.0 vs. 4.5mEq/l, all p<0.05) than the RF group. Incidence of all-cause death at 30 days was significantly lower in the non-RF than RF group (49% vs. 76%, p<0.0001). Initial low eGFR was an independent predictor of mortality after adjustment for multiple cofounders (OR: 4.08, 95% CI: 1.77-9.42, p<0.001). Kaplan-Meier curve showed better outcome in the non-RF versus RF group (p=0.0009).
CONCLUSION: An initial low eGFR may predict worse clinical outcome in patients undergoing VA-ECMO for cardiogenic shock and cardiac arrest.

POST ROSC

1. Resuscitation. 2016 Sep 17;109:21-24. doi: 10.1016/j.resuscitation.2016.09.006. [Epub ahead of print]
Inter-rater reliability of post-arrest cerebral performance category (CPC) scores.
Grossestreuer AV1, Abella BS2, Sheak KR2, Cinousis MJ2, Perman SM3, Leary M4, Wiebe DJ5, Gaieski DF6.

Abstract

PURPOSE: Cerebral Performance Category (CPC) scores are often an outcome measure for post-arrest neurologic function, collected worldwide to compare performance, evaluate therapies, and formulate recommendations. At most institutions, no formal training is offered in their determination, potentially leading to misclassification.
MATERIALS AND METHODS: We identified 171 patients at 2 hospitals between 5/10/2005 and 8/31/2012 with two CPC scores at hospital discharge recorded independently - in an in-house quality improvement database and as part of a national registry. Scores were abstracted retrospectively from the same electronic medical record by two separate non-clinical researchers. These scores were compared to assess inter-rater reliability and stratified based on whether the score was concordant or discordant among reviewers to determine factors related to discordance.
RESULTS: Thirty-nine CPC scores (22.8%) were discordant (kappa: 0.66), indicating substantial agreement. When dichotomized into "favorable" neurologic outcome (CPC 1-2)/"unfavorable" neurologic outcome (CPC 3-5), 20 (11.7%) scores were discordant (kappa: 0.70), also indicating substantial agreement. Patients discharged home (as opposed to nursing/other care facility) and patients with suspected cardiac etiology of arrest were statistically more likely to have concordant scores. For the quality improvement database, patients with discordant scores had a statistically higher median CPC score than those with concordant scores. The registry had statistically lower median CPC score (CPC 1) than the quality improvement database (CPC 2); $p<0.01$ for statistical significance.
CONCLUSIONS: CPC scores have substantial inter-rater reliability, which is reduced in patients who have worse outcomes, have a non-cardiac etiology of arrest, and are discharged to a location other than home.

ACR INTRAHOSPITALÀRIA

1. Resuscitation. 2016 Nov;108:34-39. doi: 10.1016/j.resuscitation.2016.08.025. Epub 2016 Aug 31.
A multicentre observational study of inter-hospital transfer for post-resuscitation care after out-of-hospital cardiac arrest.
Park JH1, Ahn KO2, Shin SD3, Song KJ3, Ro YS4, Kim JY5, Lee EJ3, Lee YJ6.

Abstract
AIM: To provide therapeutic hypothermia (TH) to survivors after out-of-hospital cardiac arrest (OHCA), inter-hospital transfers (IHT) are frequently required. The safety of IHT remains controversial. The aim of this study was to investigate whether the effect of TH on brain recovery after OHCA differs between IHT and direct arrival groups.
METHODS: We identified patients with OHCA of presumed cardiac aetiology who were resuscitated by emergency medical services and experienced return-of-spontaneous circulation in 27 hospitals between January and December 2014. The main exposure variables were TH and IHT. The primary endpoint was discharge with good neurological recovery. We compared outcomes between the TH and non-TH groups using multivariable logistic regression with an interaction term between TH and IHT, after adjusting for potential confounders.
RESULTS: Among 1616 patients, 576 patients were included in the final analyses. Neurologic recovery was better in the TH group (46.2%) than in the non-TH group (20.1%) (adjusted odds ratio [aOR] 2.03 [95% confidence interval (CI) 1.24-3.33]). In the interaction model for the outcome of good neurological recovery, the aOR for TH was 2.82 (95% CI 1.59-5.01) in the direct transfer group vs. 0.76 (95% CI 0.29-2.01) in the IHT group. The measure of interaction on the multiplicative scale in this model was also statistically significant (OR 0.27 [95% CI 0.07-0.83]; $p=0.02$).
CONCLUSION: IHT modified the effect of TH on neurological recovery for survivors of OHCA. TH is significantly less beneficial for good neurological recovery in patients who arrive via IHT than for those who arrive directly.

2. Biomed Res Int. 2016;2016:4626027. Epub 2016 Sep 27.
The Prognosis of Cardiac Origin and Noncardiac Origin in-Hospital Cardiac Arrest Occurring during Night Shifts.
Syue YJ1, Huang JB2, Cheng FJ2, Kung CT2, Li CJ2.

Abstract
Background. The survival rates of in-hospital cardiac arrests (IHCAs) are reportedly low at night, but the difference between the survival rates of cardiac origin and noncardiac origin IHCAs occurring at night remains unclear. Methods. Outcomes of IHCAs during different shifts (night, day, and evening) were compared and stratified according to the etiology (cardiac and noncardiac origin). Result. The rate of return of spontaneous circulation (ROSC) was 24.7% lower for cardiac origin IHCA and 19.4% lower for noncardiac origin IHCA in the night shift than in the other shifts. The survival rate was 8.4% lower for cardiac origin IHCA occurring during the night shift, but there was no difference for noncardiac origin IHCA. After adjusting the potential confounders, chances of ROSC (aOR: 0.3, CI: 0.15-0.63) and survival to discharge (aOR: 0.1; CI: 0.01-0.90) related to cardiac origin IHCA were lower during night shifts. Regarding noncardiac origin IHCA, chances of ROSC (aOR: 0.5, CI: 0.30-0.78) were lower in the night shift, but chances of survival to discharge (aOR: 1.3, CI: 0.43-3.69) were similar in these two groups. Conclusion. IHCA occurring at night increases mortality, and this is more apparent for cardiac origin IHCAs than for noncardiac origin IHCA.

DESFIBRIL·LACIÓ

1. Resuscitation. 2016 Nov;108:68-74. doi: 10.1016/j.resuscitation.2016.09.010. Epub 2016 Sep 23.

Optimization of automated external defibrillator deployment outdoors: An evidence-based approach.

Dahan B1, Jabre P2, Karam N3, Misslin R4, Bories MC5, Tafflet M5, Bougouin W6, Jost D7, Beganton F5, Beal G5, Pelloux P8, Marijon E9, Jouven X9.

Abstract
BACKGROUND: The benefits of available automatic external defibrillators (AEDs) for out-of-hospital cardiac arrests (OHCAs) are well known, but strategies for their deployment outdoors remain somewhat arbitrary. Our study sought to assess different strategies for AED deployment.
METHODS: All OHCAs in Paris between 2000 and 2010 were prospectively recorded and geocoded. A guidelines-based strategy of placing an AED in locations where more than one OHCA had occurred within the past five years was compared to two novel strategies: a grid-based strategy with a regular distance between AEDs and a landmark-based strategy. The expected number of AEDs necessary and their median (IQR) distance to the nearest OHCA were assessed for each strategy.
RESULTS: Of 4176 OHCAs, 1372 (33%) occurred in public settings. The first strategy would result in the placement of 170 AEDs, with a distance to OHCA of 416 (180-614) m and a continuous increase in the number of AEDS. In the second strategy, the number of AEDs and their distance to the closest OHCA would change with the grid size, with a number of AEDs between 200 and 400 seeming optimal. In the third strategy, median distances between OHCAs and AEDs would be 324m if placed at post offices (n=195), 239 at subway stations (n=302), 137 at bike-sharing stations (n=957), and 142 at pharmacies (n=1466).
CONCLUSION: This study presents an original evidence-based approach to strategies of AED deployment to optimize their number and location. This rational approach can estimate the optimal number of AEDs for any city.

2. Resuscitation. 2016 Oct 1;109:9-15. doi: 10.1016/j.resuscitation.2016.09.021. [Epub ahead of print]

Characteristics of automated external defibrillator coverage in Philadelphia, PA, based on land use and estimated risk.

Chrisinger BW1, Grossestreuer AV2, Laguna MC3, Griffis HM4, Branas CC5, Wiebe DJ5, Merchant RM4.

Abstract
AIM: Approximately 424,000 out-of-hospital cardiac arrests (OHCA) occur in the US annually. As automated external defibrillators (AED) are an important part of the community response to OHCA, we investigated how well the spatial demand (likelihood of OHCA) was met by the spatial supply (AEDs) in a dense urban environment.

METHODS: Using geographic information system (GIS) software, we applied kernel density and optimized hot spot procedures with two differently-sized radii to model OHCA incidence rates from existing studies, providing an estimate of OHCA likelihood at a given location. We compared these density maps to existing AED coverage in the study area. Descriptive statistics summarized coverage by land use.
RESULTS: With a 420-ft buffer, we found that 56.0% (79.9%, 840-ft buffer) of the land area in the city center was covered by existing AEDs at, though 70.1 (91.5)% of the OHCA risk was covered using kernel density and 79.8% (98.1) was covered using hot spot analysis.
CONCLUSIONS: The difference in coverage by area and risk seems to indicate efficient placement of existing AEDs. Our findings also highlight the possible benefits to expanding the influence of AEDs by lowering search times, and identify opportunities to improve AED coverage in the study area. This article offers one method by which local officials can use spatial data to prioritize attention for AED placement and coverage.

ENSENYAMENT

1. Clin Exp Emerg Med. 2016 Sep 30;3(3):158-164. eCollection 2016.
Comparison between an instructor-led course and training using a voice advisory manikin in initial cardiopulmonary resuscitation skill acquisition.
Min MK1, Yeom SR2, Ryu JH1, Kim YI1, Park MR1, Han SK2, Lee SH2, Park SW2, Park SC2.

Abstract
OBJECTIVE: We compared training using a voice advisory manikin (VAM) with an instructor-led (IL) course in terms of acquisition of initial cardiopulmonary resuscitation (CPR) skills, as defined by the 2010 resuscitation guidelines.
METHODS: This study was a randomized, controlled, blinded, parallel-group trial. We recruited 82 first-year emergency medical technician students and distributed them randomly into two groups: the IL group (n=41) and the VAM group (n=37). In the IL-group, participants were trained in "single-rescuer, adult CPR" according to the American Heart Association's Basic Life Support course for healthcare providers. In the VAM group, all subjects received a 20-minute lesson about CPR. After the lesson, each student trained individually with the VAM for 1 hour, receiving real-time feedback. After the training, all subjects were evaluated as they performed basic CPR (30 compressions, 2 ventilations) for 4 minutes.
RESULTS: The proportion of participants with a mean compression depth ≥50 mm was 34.1% in the IL group and 27.0% in the VAM group, and the proportion with a mean compression depth ≥40 mm had increased significantly in both groups compared with ≥50 mm (IL group, 82.9%; VAM group, 86.5%). However, no significant differences were detected between the groups in this regard. The proportion of ventilations of the appropriate volume was relatively low in both groups (IL group, 26.4%; VAM group, 12.5%; P=0.396).
CONCLUSION: Both methods, the IL training using a practice-while-watching video and the VAM training, facilitated initial CPR skill acquisition, especially in terms of correct chest compression

2. Eur J Emerg Med. 2016 Dec;23(6):418-424.
Interactive videoconferencing versus audio telephone calls for dispatcher-assisted cardiopulmonary resuscitation using the ALERT algorithm: a randomized trial.
Stipulante S1, Delfosse AS, Donneau AF, Hartsein G, Haus S, D'Orio V, Ghuysen A.

Abstract
OBJECTIVES: The ALERT algorithm, a telephone cardiopulmonary resuscitation (CPR) protocol, has been shown to help bystanders initiate CPR. Mobile phone communications may play a role in emergency calls and improve dispatchers' understanding of the rescuer's situation. However, there is currently no validated protocol for videoconference-assisted CPR (v-CPR). We initiated this study to validate an original protocol of v-CPR and to evaluate the potential benefit in comparison with classical telephone-CPR (t-CPR).
MATERIALS AND METHODS: We developed an algorithm for v-CPR, adapted from the ALERT t-CPR protocol. A total of 180 students were recruited from secondary school and assigned randomly either to t-CPR or to v-CPR. A manikin was used to evaluate CPR performance.
RESULTS: The mean chest compression rate was higher in the v-CPR group (v-CPR: 110±16 vs. t-CPR: 86±28; P<0.0001), whereas depth was comparable between both groups (v-CPR: 48±13 vs.

t-CPR: 47±16 mm; P=0.64). Hand positioning was correct in 91.7% with v-CPR, but only 68% with t-CPR (P=0.001). There was almost no 'hands-off' period in the v-CPR group [v-CPR: 0 (0-0.4) vs. t-CPR: 7 (0-25.5) s; P<0.0001], but the median no-flow time was increased in the v-CPR group [v-CPR: 146 (128-173.5) vs. t-CPR: 122 (105-143.5) s, P<0.0001]. The overall score of CPR performance was improved in the v-CPR group (P<0.001).
CONCLUSION: The v-CPR protocol allows bystanders to reach compression rates and depths close to guidelines and to reduce 'hands-off' events during CPR.

3. Eur J Emerg Med. 2016 Dec;23(6):413-417.
The Stop-Only-While-Shocking algorithm reduces hands-off time by 17% during cardiopulmonary resuscitation - a simulation study.
Koch Hansen L1, Mohammed A, Pedersen M, Folkestad L, Brodersen J, Hey T, Lyhne Christensen N, Carter-Storch R, Bendix K, Hansen MR, Brabrand M.

Abstract
INTRODUCTION: Reducing hands-off time during cardiopulmonary resuscitation (CPR) is believed to increase survival after cardiac arrests because of the sustaining of organ perfusion. The aim of our study was to investigate whether charging the defibrillator before rhythm analyses and shock delivery significantly reduced hands-off time compared with the European Resuscitation Council (ERC) 2010 CPR guideline algorithm in full-scale cardiac arrest scenarios.
METHODS: The study was designed as a full-scale cardiac arrest simulation study including administration of drugs. Participants were randomized into using the Stop-Only-While-Shocking (SOWS) algorithm or the ERC2010 algorithm. In SOWS, chest compressions were only interrupted for a post-charging rhythm analysis and immediate shock delivery. A Resusci Anne HLR-D manikin and a LIFEPACK 20 defibrillator were used. The manikin recorded time and chest compressions.
RESULTS: Sample size was calculated with an α of 0.05 and 80% power showed that we should test four scenarios with each algorithm. Twenty-nine physicians participated in 11 scenarios. Hands-off time was significantly reduced 17% using the SOWS algorithm compared with ERC2010 [22.1% (SD 2.3) hands-off time vs. 26.6% (SD 4.8); P<0.05].
CONCLUSION: In full-scale cardiac arrest simulations, a minor change consisting of charging the defibrillator before rhythm check reduces hands-off time by 17% compared with ERC2010 guidelines.

4. Resuscitation. 2016 Nov;108:1-7. doi: 10.1016/j.resuscitation.2016.08.020. Epub 2016 Aug 27.
Teaching school children basic life support improves teaching and basic life support skills of medical students: A randomised, controlled trial.
Beck S1, Meier-Klages V2, Michaelis M2, Sehner S3, Harendza S4, Zöllner C2, Kubitz JC2.

Abstract
BACKGROUND: The "kids save lives" joint-statement highlights the effectiveness of training all school children worldwide in cardiopulmonary resuscitation (CPR) to improve survival after cardiac arrest. The personnel requirement to implement this statement is high. Until now, no randomised controlled trial investigated if medical students benefit from their engagement in the BLS-education of school children regarding their later roles as physicians. The objective of the present study is to evaluate if medical students improve their teaching behaviour and CPR-skills by teaching school children in basic life support.
METHODS: The study is a randomised, single blind, controlled trial carried out with medical students during their final year. In total, 80 participants were allocated alternately to either the intervention or the control group. The intervention group participated in a CPR-instructor-course consisting of a 4h-preparatory seminar and a teaching-session in BLS for school children. The primary endpoints were effectiveness of teaching in an objective teaching examination and pass-rates in a simulated BLS-scenario.
RESULTS: The 28 students who completed the CPR-instructor-course had significantly higher scores for effective teaching in five of eight dimensions and passed the BLS-assessment significantly more often than the 25 students of the control group (Odds Ratio (OR): 10.0; 95%-CI: 1.9-54.0; p=0.007).

CONCLUSIONS: Active teaching of BLS improves teaching behaviour and resuscitation skills of students. Teaching school children in BLS may prepare medical students for their future role as a clinical teacher and support the implementation of the "kids save lives" statement on training all school children worldwide in BLS at the same time.

TRAUMA

1. J Trauma Acute Care Surg. 2016 Nov;81(5 Suppl 2 Proceedings of the 2015 Military Health System Research Symposium):S128-S132.

Identifying potential utility of resuscitative endovascular balloon occlusion of the aorta: An autopsy study.

Joseph B1, Ibraheem K, Haider AA, Kulvatunyou N, Tang A, O'Keeffe T, Bauman ZM, Green DJ, Latifi R, Rhee P.

Abstract

BACKGROUND: Resuscitative thoracotomy (RT) has been the standard therapy in patients with acute arrest due to hemorrhagic shock. However, with the development of resuscitative endovascular balloon occlusion of the aorta (REBOA), its role as a potential adjunct to a highly morbid intervention such as RT is being discussed. The aim of this study was to identify patients who most likely would have potentially benefited from REBOA use based on autopsy findings.

METHODS: We performed a 4-year retrospective review of all RTs performed at our Level I trauma center. Patients with in-hospital mortality and who underwent subsequent autopsies were included. Patients were divided into blunt and penetrating trauma with and without thoracic injuries. Autopsy reports were reviewed to identify vascular and solid organ injuries. Outcome measure was potential benefit with REBOA. Potential benefit with REBOA was defined based on the ability to safely deploy REBOA. In patients without cardiac, aortic, and major pulmonary vasculature injuries, REBOA was considered potentially beneficial. In all other patients, it was considered as nonbeneficial.

RESULTS: A total of 98 patients underwent an RT, of whom 87 had subsequent autopsies and were reviewed. The mean age was 35.25 (SD, 17.85) years, mean admission systolic blood pressure was 51.38 (SD, 70.11) mm Hg, median Injury Severity Score was 29 (interquartile range [IQR], 25-42), and 44 had penetrating injury. Resuscitative endovascular balloon occlusion of the aorta would have been potentially beneficial in 51.2% of patients (22 of 43 patients) with blunt mechanism of trauma, whereas REBOA would have been potentially beneficial in 38.6% of patients (17 of 44 patients) with penetrating mechanism of trauma. A subgroup analysis showed that REBOA use would have been potentially beneficial in 50.0% of blunt thoracic and 33.3% of penetrating thoracic trauma patients.

CONCLUSIONS: There are a great enthusiasm and premature efforts to introduce REBOA as an alternative to RT. While there exists a great potential for benefit with REBOA use in the management of noncompressible torso hemorrhage, the current indications for REBOA need to be defined better. Patients with penetrating chest trauma in extremis should be considered an absolute contraindication for REBOA use. The majority of patients with blunt trauma in extremis may potentially benefit from REBOA. However, better criteria will help increase these patients who may potentially benefit from REBOA placement.

2. J Trauma Acute Care Surg. 2016 Nov;81(5 Suppl 2 Proceedings of the 2015 Military Health System Research Symposium):S104-S110.

Combat MEDEVAC: A comparison of care by provider type for en route trauma care in theater and 30-day patient outcomes.

Maddry JK1, Mora AG, Savell S, Reeves LK, Perez CA, Bebarta VS.

Abstract

BACKGROUND: Medical evacuation (MEDEVAC) is the movement and en route care of injured and medically compromised patients by medical care providers via helicopter. Military MEDEVAC platforms provide lifesaving interventions that improve survival in combat. There is limited evidence to support decision making related to en route care and allocation of resources. The association between provider type and en route care is not well understood. Our objective was to describe MEDEVAC providers and identify associations between provider type, procedures performed, and outcomes.

METHODS: We conducted an institutional review board-approved, retrospective record review of patients traumatically injured in combat, evacuated by MEDEVAC from the point of injury, between 2011 and 2014. Data abstracted included injury description, provider type, procedures performed, medications administered, survival, and 30-day outcomes. Subjects were grouped according to provider type: medics, paramedics, and ADVs (advanced-level providers to include nurses, physician assistants, and physicians). Groups were compared. Analyses were performed using χ tests for categorical variables and analysis of variance tests (Kruskal-Wallis tests) for continuous variables; $p < 0.05$ was considered significant.
RESULTS: The MEDEVAC records were reviewed, and data were abstracted from 1,237 subjects. The providers were composed of medics, 76%; paramedics, 21%; and ADVs, 4%. Patient and injury demographics were similar among groups. The ADVs were most likely to perform intubation, chest needle decompressions ($p < 0.0001$), and hypothermia prevention ($p = 0.01$). Paramedics were most likely to administer blood en route ($p < 0.0001$). All other procedures were similar between groups. Paramedics were most likely to administer ketamine ($p < 0.0001$), any analgesic ($p < 0.0001$), or any medication en route ($p < 0.0001$). Incidence rates of en route events (pain, hypoxia, abnormal hemodynamics, vital signs) were similar between provider types. In-theater and 30-day survival rates were similar between provider types.
CONCLUSION: Providers with higher-level training were more likely to perform more advanced procedures during en route care. Our study found no significant association between provider type and in-theater or 30-day mortality rates. Upon subgroup analysis, no difference was found in patients with an injury severity score greater than 16. More evidence is needed to determine the appropriate level of MEDEVAC personnel training and skill maintenance necessary to minimize combat mortality.

3. J Trauma Acute Care Surg. 2016 Nov;81(5):905-912.
Epidemiology of accidental hypothermia in polytrauma patients: An analysis of 15,230 patients of the TraumaRegister DGU.
Weuster M1, Brück A, Lippross S, Menzdorf L, Fitschen-Oestern S, Behrendt P, Iden T, Höcker J, Lefering R, Seekamp A, Klüter T; TraumaRegister DGU.

Abstract
BACKGROUND: Accidental hypothermia (AH) endangers the patient after polytrauma. Past studies have emphasized this entity as a major risk factor. The aim of this study was to describe the epidemiology of AH in major trauma considering the preclinical and clinical course. Predictors should be elucidated.
METHODS: This is a retrospective investigation from the TraumaRegister DGU. Patients were documented in the period between 2002 and 2012. The study compared multiple-injured patients with or without hypothermic temperatures. Different groups of body core temperature were analyzed. Preclinical and clinical parameters were documented.
RESULTS: Fifteen thousand two hundred thirty patients could be included. In 5,078 patients, temperature was below 36.0°C. Blunt trauma mechanisms surpassed penetrating injuries. The majority of patients sustained car accidents, accidents involving pedestrians, and falls from heights of greater than 3 m. Preclinical rescue procedures were extensively long in patients with low body temperature. Female gender, Glasgow Coma Scale score of 8 or less, nighttime, winter, motorcycle/bicycle accidents, Injury Severity Score 9 or greater, shock on site and in the emergency room, preclinical volume therapy, and time until admission to emergency room are significant risk factors to develop AH of 33°C. Volume management ranged between 1,453 ± 1,051 mL (33°C) and 1,058 ± 768 mL (36°C). Treatment in emergency room was extensively long. In further clinical course, severe AH advanced the clinical development of sepsis and multiple organ failure. The overall mortality inclined with decreasing body temperatures.
CONCLUSIONS: Accidental hypothermia regularly occurred in polytrauma patients. Certain predictors exist, that is, female gender, which facilitate a body core temperature of 33°C. Preclinical and clinical courses match with other polytrauma studies. High incidence rates of sepsis, multiple organ failure, and mortality in hypothermic patients (33°C) demonstrate the severity of injury. Unfortunately, documentation of body core temperature remains challenging as the number of recorded hypothermic patients appears to be too small. We favor a strict focus on body core temperature on arrival in the emergency room

DONACIÓ D'ÒRGANS

1. Intensive Care Med (2016) 42:1661–1671 DOI 10.1007/s00134-016-4549-3

The rate of brain death and organ donation in patients resuscitated from cardiac arrest: a systematic review and meta−analysis.

Claudio Sandroni, Sonia D'Arrigo, Clifton W. Callaway, Alain Cariou, Irina Dragancea, Fabio Silvio Taccone and Massimo Antonelli.

Abstract

Background: The occurrence of brain death in patients with hypoxic-ischaemic brain injury after resuscitation from cardiac arrest creates opportunities for organ donation. However, its prevalence is currently unknown.

Methods: Systematic review. MEDLINE via PubMed, ISI Web of Science and the Cochrane Database of Systematic Reviews were searched for eligible studies (2002–2016). The prevalence of brain death in adult patients resuscitated

from cardiac arrest and the rate of organ donation among brain dead patients were summarised using a random effect model with double-arcsine transformation. The quality of evidence (QOE) was evaluated accor ding to the GRADE guidelines.

Results: 26 studies [16 on conventional cardiopulmonary resuscitation (c-CPR), 10 on extracorporeal CPR (e-CPR)] included a total of 23,388 patients, 1830 of whom developed brain death at a mean time of 3.2 ± 0.4 days after recovery of circulation. The overall prevalence of brain death among patients who died before hospital discharge was 12.6 [10.2–15.2] %. Prevalence was significantly higher in e-CPR vs. c-CPR patients (27.9 [19.7–36.6] vs. 8.3 [6.5–10.4] %; $p < 0.0001$). The overall rate of organ donation among brain dead patients was 41.8 [20.2–51.0] % (9/26 studies, 1264 patients; range 0–100 %). The QOE was very low for both outcomes.

Conclusions: In patients with hypoxic-ischaemic brain injury following CPR, more than 10 % of deaths were due to brain death. More than 40 % of brain-dead patients could donate organs. Patients who are unconscious after resuscitation from cardiac arrest, especially when resuscitated using e-CPR, should be carefully screened for signs of brain death.

PEDIATRIA

1. Resuscitation. 2016 Nov;108:20-26. doi: 10.1016/j.resuscitation.2016.08.026. Epub 2016 Aug 31.

Effects of Dispatcher-assisted Cardiopulmonary Resuscitation on Survival Outcomes in Infants, Children, and Adolescents with Out-of-hospital Cardiac Arrests.

Ro YS1, Shin SD2, Song KJ3, Hong KJ4, Ahn KO5, Kim DK6, Kwak YH7.

Abstract

OBJECTIVE: We studied the effect of a dispatcher-assisted cardiopulmonary resuscitation (CPR) program on paediatric out-of-hospital cardiac arrest (OHCA) outcomes by age groups.

METHODS: All emergency medical services (EMS)-treated paediatric OHCAs in Korea were enrolled between 2012 and 2014, excluding cases witnessed by EMS providers and those with unknown outcomes. The cases were divided into three groups: bystander CPR with dispatcher assistance, bystander CPR without dispatcher assistance, and no-bystander CPR. The endpoint was survival until discharge from hospital. Multivariable logistic regression analysis was performed. The final model with an interaction term was evaluated to compare the effects across age groups.

RESULTS: A total of 1529 patients (32.8% bystander CPR with dispatcher assistance, 17.3% without dispatcher assistance, and 54.6% no-bystander CPR) were included. Both bystander CPR groups were more likely to have higher rate of survival to discharge (8.8% and 12.1%) compared to no-bystander CPR (3.9%). The adjusted OR (95% CI) for survival to discharge were 1.77 (1.04-3.00) in bystander CPR with dispatcher assistance and 2.86 (1.61-5.08) in without dispatcher assistance compared with no-bystander CPR. By age groups, the adjusted OR (95% CI) in bystander CPR with and without dispatcher assistance were 2.18 (1.07-4.42) and 2.27 (1.01-5.14) for the group aged 9-18 years; 2.32 (0.64-8.44) and 6.21 (1.83-21.01) for the group aged 1-8 years; 1.06 (0.41-2.77) and 2.00 (0.64-6.18) for the group aged 0-12 months, respectively.

CONCLUSIONS: Bystander CPR, regardless of dispatcher assistance, was associated with improved survival outcomes after OHCA in the paediatric population. However, the associations between dispatcher-assisted bystander CPR and survival outcomes varied by age.

2. Resuscitation. 2016 Oct 11. pii: S0300-9572(16)30486-5. doi: 10.1016/j.resuscitation.2016.09.026. [Epub ahead of print]

Exploring the safety and efficacy of targeted temperature management amongst infants with out-of-hospital cardiac arrest due to apparent life threatening events.

Meert K1, Telford R2, Holubkov R2, Slomine BS3, Christensen JR3, Dean JM2, Moler FW4; Therapeutic Hypothermia after Paediatric Cardiac Arrest (THAPCA) Trial Investigators.

Abstract

OBJECTIVE: To explore the safety and efficacy of targeted temperature management amongst infants with out-of-hospital cardiac arrest due to an apparent life threatening event (ALTE) recruited to the Therapeutic Hypothermia after Paediatric Cardiac Arrest Out-of-Hospital trial.

METHODS: Fifty-four infants (48h to <1year of age) with ALTE who received chest compressions for ≥2min, were comatose, and required mechanical ventilation after return of circulation were included. Infants were randomised to therapeutic hypothermia (33°C) (n=26) or therapeutic normothermia (36.8°C) (n=28) within six hours of return of circulation. Outcomes included 12-month survival with Vineland Adaptive Behaviour Scales, Second Edition (VABS-II) score ≥70, 12-month survival, change in VABS-II score from pre-arrest to 12 months post-arrest, and select safety measures.

RESULTS: Amongst infants with pre-arrest VABS-II ≥70 (n=52), there was no difference in 12-month survival with VABS-II ≥70 between therapeutic hypothermia and therapeutic normothermia groups (2/25 (8.0%) vs. 1/27 (3.7%); relative risk 2.16; 95% confidence interval 0.21-22.38, p=0.60). Amongst all evaluable infants (n=53), the change in VABS-II score from pre-arrest to 12 months post-arrest did not differ (p=0.078) between therapeutic hypothermia and therapeutic normothermia groups, nor did 12-month survival (5/26 (19.2%) vs. 1/27 (3.7%); relative risk 5.19; 95% confidence interval 0.65-41.50, p=0.10).

CONCLUSIONS: Mortality was high amongst infants that were comatose after out-of-hospital cardiac arrest due to ALTE in both therapeutic hypothermia and therapeutic normothermia treated groups. Functional status was markedly reduced among survivors. (ClinicalTrials.gov, NCT00878644).

3. Pediatr Emerg Care. 2016 Oct;32(10):669-674.

Factors Associated With Poor Outcome in Childhood Swimming Pool Submersions.

Shenoi RP1, Koerner CE, Cruz AT, Frost MH, Jones JL, Camp EA, Alam S, Fraser JJ Jr.

Abstract

OBJECTIVES: The aims of the study were to determine factors associated with poor outcome in childhood swimming pool submersions and to study the association of bystander resuscitation with clinical outcome.

METHODS: This was a retrospective study of swimming pool submersion victims younger than 18 years in a metropolitan area from 2003 to 2007. Submersion, prehospital, and victim data were obtained from hospital, Emergency Medical Services, and fatality records. Outcome based on survival at hospital discharge was favorable (baseline/mild impairment) or poor (death/severe impairment). Logistic regression determined factors associated with poor outcome.

RESULTS: There were 260 submersions. Outcomes were available for 211 (81%). The median age was 4 years; 68% were males. Most incidents occurred at single residential pools (48%) and multiresidential pools (35%). Mortality was 23%; 75% had favorable outcomes. Favorable outcomes occurred in 8.6% (3/35) of victims with absent pulse at the scene. Descriptive analyses revealed significant differences in submersions that occurred on weekdays, during the summer, submersions lasting 5 minutes or more, with on-scene apnea or cardiac arrest needing cardiopulmonary resuscitation, rescuer type, and transfer to tertiary care. Logistic regression revealed that poor outcome was significantly associated with prolonged submersions and those that occurred on a weekday. Furthermore, hospitalization reduced the odds of a poor outcome by 81% when compared with victims who were not hospitalized. Bystander resuscitation was not significantly associated with outcome.

CONCLUSIONS: Childhood swimming pool submersions, which occur on weekdays and with prolonged submersion times, are associated with poor outcome. Bystander resuscitation is not significantly associated with outcome.

4. Adv Neonatal Care. 2016 Oct 18. [Epub ahead of print]

Survey of Neonatal Intensive Care Unit Nurse Attitudes Toward Therapeutic Hypothermia Treatment.

Craig A1, James C, Bainter J, Lucas FL, Evans S, Glazer J, Dowling D.

Abstract

BACKGROUND: The traumatic experiences of parents of babies treated with therapeutic hypothermia (TH) have been described. No research has assessed neonatal intensive care unit (NICU) nurse experience in providing care to hypothermic babies and emotional support to their parents.

PURPOSE: To assess NICU nurse attitudes to the provision of TH with respect to perceptions about baby pain/sedation, need for nurse and parent education, decision making about initiation of TH, and barriers to best care.

METHODS: A survey was electronically sent to 219 nurses at 2 affiliated academic level III NICUs: 1 rural and 1 urban location. There were 17 questions where responses were selected from a preset list and 7 opportunities for nurses to provide free text responses.

FINDINGS: The response rate was 38% (N = 83). Overwhelming similarities between the urban and rural institutions were found with NICU nurses expressing understanding of the indications for initiating TH, agreement that TH improves long-term outcomes and that the benefits of TH outweigh the risks. Nurses at the urban institution more frequently expressed concerns surrounding inadequate treatment of baby pain/sedation, and nurses at both institutions strongly emphasized the need for more nurse and parent education about TH and improved timeliness of decision making for initiation of TH.

IMPLICATIONS FOR PRACTICE: NICU nurses specifically want to learn more about outcomes of babies after treatment with TH and feel that parents need more education about TH.

IMPLICATIONS FOR RESEARCH: Research is urgently needed to better understand the implications of TH treatment for parent-baby bonding.

TARGET TEMEPERATUR MANAGEMENT

1. Resuscitation. 2016 Nov;108:102-110. doi: 10.1016/j.resuscitation.2016.07.238. Epub 2016 Aug 10.

Therapeutic hypothermia after cardiac arrest: A systematic review/meta-analysis exploring the impact of expanded criteria and targeted temperature.

Schenone AL1, Cohen A2, Patarroyo G3, Harper L2, Wang X4, Shishehbor MH5, Menon V5, Duggal A6.

Abstract

AIMS OF THE STUDY: We aimed to determine the benefit of an expanded use of TH. We also described the impact of a targeted temperature management on outcomes at discharge.

DATA SOURCES: We identified studies by searching MEDLINE, EMBASE and Cochrane Library databases. We included RCTs and observational studies restricted to those reporting achieved temperature during TH after OHCA. No other patient, cardiac arrest or hypothermia protocol restrictions were applied. Outcomes of interest were hospital mortality and neurological outcome at discharge. Appropriate risk of bias assessment for meta-analyzed studies was conducted. Studies contrasting hypothermia and normothermia outcomes were meta-analyzed using a random-effect model. Outcomes of cooling arms, obtained from enrolled studies, were pooled and compared across achieved temperatures.

RESULTS: Search strategy yielded 32,275 citations of which 24 articles met inclusion criteria. Eleven studies were meta-analyzed. The use of TH after OHCA, even within an expanded use, decreased the mortality (OR 0.51, 95%CI [0.41-0.64]) and improved the odds of good neurological outcome (OR 2.48, 95%CI [1.91-3.22]). No statistical heterogeneity was found for either mortality (I2=4.0%) or neurological outcome (I2=0.0%). No differences in hospital

mortality (p=0.86) or neurological outcomes at discharge (p=0.32) were found when pooled outcomes of 34 hypothermia arms grouped by cooling temperature were compared.
CONCLUSION: The use of TH after OHCA is associated with a survival and neuroprotective benefit, even when including patients with non-shockable rhythms, more lenient downtimes, unwitnessed arrest and/or persistent shock. We found no evidence to support one specific temperature over another during hypothermia

2. Resuscitation. 2016 Oct 12. pii: S0300-9572(16)30470-1. doi: 10.1016/j.resuscitation.2016.09.011. [Epub ahead of print]
Influence of body mass index on the prognosis of patients successfully resuscitated from out-of-hospital cardiac arrest treated by therapeutic hypothermia.
Geri G1, Savary G2, Legriel S2, Dumas F3, Merceron S2, Varenne O4, Livarek B5, Richard O6, Mira JP7, Bedos JP2, Empana JP8, Cariou A1, Grimaldi D9.

Abstract
BACKGROUND: Obesity prevalence has dramatically increased over recent years and is associated with cardiovascular diseases, but data are lacking on its prognostic impact in out-of-hospital cardiac arrest (OHCA) patients.
METHODS: Data of all consecutive OHCA patients admitted in two cardiac arrest centers from Paris and suburbs between 2005 and 2012 were prospectively collected. Patients treated by therapeutic hypothermia (TH) were included in the analysis. Logistic and Cox regression analyses were used to quantify the association between body mass index (BMI) at hospital admission and day-30 and 1-year mortality respectively.
RESULTS: 818 patients were included in the study (median age 60.9 [50.8-72.7] year, 70.2% male). Obese patients (BMI>30kgm-2) were older, more frequently male and evidenced more frequently cardiovascular risk factors than normally (18.5<BMI<25kgm-2) or overweight patients (25<BMI<30kgm-2). Post-resuscitation shock and therapeutic hypothermia failure were more frequent in obese patients. Overall mortality at day-30 and one-year was 63.8 and 67.2%, respectively. After multivariate adjustment, BMI>30kgm-2 was independently associated with day-30 mortality (Odds ratio [OR] in comparison with normally weight patients 2.45; 95% confidence interval [95%CI: 1.32-4.56; p<0.01]). Obesity was not associated with one-year mortality (Hazard ratio [HR] 0.99, 95%CI 0.21,4.67; p=0.99) while underweight was associated with one-year mortality in this subgroup of patients (Hazard ratio [HR] 3.94, 95%CI 1.11,14.01; p=0.03).
CONCLUSION: In the present study, obesity was independently associated with day-30 mortality in successfully resuscitated ICU TH OHCA patients. Further studies are needed to understand the mechanisms that underpin this finding

RECERCA EXPERIMENTALE

1. Crit Care Med. 2016 Nov;44(11):e1111-e1117.
Blood Pressure- and Coronary Perfusion Pressure-Targeted Cardiopulmonary Resuscitation Improves 24-Hour Survival From Ventricular Fibrillation Cardiac Arrest.
Naim MY1, Sutton RM, Friess SH, Bratinov G, Bhalala U, Kilbaugh TJ, Lampe JW, Nadkarni VM, Becker LB, Berg RA.

Abstract
OBJECTIVES: Treatment algorithms for cardiac arrest are rescuer centric and vary little from patient to patient. The objective of this study was to determine if cardiopulmonary resuscitation-targeted to arterial blood pressure and coronary perfusion pressure rather than optimal guideline care would improve 24-hour survival in a porcine model of ventricular fibrillation cardiac arrest.
DATA SOURCES: Preclinical animal laboratory using female 3-month-old swine.
STUDY SELECTION: A randomized interventional study.
DATA EXTRACTION: After induction of anesthesia and 7 minutes of untreated ventricular fibrillation, 16 female 3-month-old swine were randomized to 1) blood pressure care: titration of chest compression depth to a systolic blood pressure of 100 mm Hg and vasopressor dosing to maintain coronary perfusion pressure of greater than 20 mm Hg or 2) guideline care: chest compression depth targeted to 51 mm and standard guideline vasopressor dosing. Animals

received manual cardiopulmonary resuscitation for 10 minutes before the first defibrillation attempt and standardized postresuscitation care for 24 hours.
DATA SYNTHESIS: Twenty-four-hour survival was more likely with blood pressure care versus guideline care (0/8 vs 5/8; $p < 0.03$), and all survivors had normal neurologic examinations. Mean coronary perfusion pressure prior to defibrillation was significantly higher with blood pressure care (28 ± 3 vs 10 ± 6 mm Hg; $p < 0.01$). Chest compression depth was lower with blood pressure care (48 ± 0.4 vs 44 ± 0.5 mm Hg; $p < 0.05$), and the number of vasopressor doses was higher with blood pressure care (median, 3 [range, 1-7] vs 2 [range, 2-2]; $p < 0.01$).
CONCLUSIONS: Individualized goal-directed hemodynamic resuscitation targeting systolic blood pressure of 100 mm Hg and coronary perfusion pressure of greater than 20 mm Hg improved 24-hour survival compared with guideline care in this model of ventricular fibrillation cardiac arrest.

2. Life Sci. 2016 Nov 15;165:21-25. doi: 10.1016/j.lfs.2016.09.007. Epub 2016 Sep 15.
EEG power as a biomarker to predict the outcome after cardiac arrest and cardiopulmonary resuscitation induced global ischemia.
Weitzel LR1, Sampath D2, Shimizu K1, White AM2, Herson PS3, Raol YH4.

Abstract
AIMS: Cardiac arrest (CA) is a major cause of mortality and survivors often develop neurologic deficits. The objective of this study was to determine the effect of CA and cardiopulmonary resuscitation (CPR) in mice on the EEG and neurologic outcomes, and identify biomarkers that can prognosticate poor outcomes.
MAIN METHODS: Video-EEG records were obtained at various periods following CA-CPR and examined manually to determine the presence of spikes and sharp-waves, and seizures. EEG power was calculated using a fast Fourier transform (FFT) algorithm.
KEY FINDINGS: Fifty percent mice died within 72h following CA and successful CPR. Universal suppression of the background EEG was observed in all mice following CA-CPR, however, a more severe and sustained reduction in EEG power occurred in the mice that did not survive beyond 72h than those that survived until sacrificed. Spikes and sharp wave activity appeared in the cortex and hippocampus of all mice, but only one out of eight mice developed a purely electrographic seizure in the acute period after CA-CPR. Interestingly, none of the mice that died experienced any acute seizures. At 10days after the CA-CPR, 25% of the mice developed spontaneous convulsive and nonconvulsive seizures that remained restricted to the hippocampus. The frequency of nonconvulsive seizures was higher than that of convulsive seizures.
SIGNIFICANCE: A strong association between changes in EEG power and mortality following CA-CPR were observed in our study. Therefore, we suggest that the EEG power can be used to prognosticate mortality following CA-CPR induced global ischemia.

RCP

1. CJEM. 2016 Nov;18(6):461-468. Epub 2016 Sep 21.
Bystander fatigue and CPR quality by older bystanders: a randomized crossover trial comparing continuous chest compressions and 30:2 compressions to ventilations.
Liu S1, Vaillancourt C1, Kasaboski A1, Taljaard M 1.
Abstract
OBJECTIVES: This study sought to measure bystander fatigue and cardiopulmonary resuscitation (CPR) quality after five minutes of CPR using the continuous chest compression (CCC) versus the 30:2 chest compression to ventilation method in older lay persons, a population most likely to perform CPR on cardiac arrest victims.
METHODS: This randomized crossover trial took place at three tertiary care hospitals and a seniors' center. Participants were aged ≥55 years without significant physical limitations (frailty score ≤3/7). They completed two 5-minute CPR sessions (using 30:2 and CCC) on manikins; sessions were separated by a rest period. We used concealed block randomization to determine CPR method order. Metronome feedback maintained a compression rate of 100/minute. We measured heart rate (HR), mean arterial pressure (MAP), and Borg Exertion Scale. CPR quality

measures included total number of compressions and number of adequate compressions (depth ≥5 cm).
RESULTS: Sixty-three participants were enrolled: mean age 70.8 years, female 66.7%, past CPR training 60.3%. Bystander fatigue was similar between CPR methods: mean difference in HR -0.59 (95% CI -3.51-2.33), MAP 1.64 (95% CI -0.23-3.50), and Borg 0.46 (95% CI 0.07-0.84). Compared to 30:2, participants using CCC performed more chest compressions (480.0 v. 376.3, mean difference 107.7; p<0.0001) and more adequate chest compressions (381.5 v. 324.9, mean difference. 62.0; p=0.0001), although good compressions/minute declined significantly faster with the CCC method (p=0.0002).
CONCLUSIONS: CPR quality decreased significantly faster when performing CCC compared to 30:2. However, performing CCC produced more adequate compressions overall with a similar level of fatigue compared to the 30:2 method.

REGISTRES, REVISIONS I EDITORIALS

1. Int J Cardiol. 2016 Dec 1;224:178-182. doi: 10.1016/j.ijcard.2016.09.047. Epub 2016 Sep 16.
High-rise buildings and neurologically favorable outcome after out-of-hospital cardiac arrest.
Kobayashi D1, Kitamura T2, Kiyohara K3, Nishiyama C4, Hayashida S5, Fujii T1, Izawa J1, Shimamoto T1, Matsuyama T6, Hatakeyama T1, Katayama Y7, Kiguchi T8, Kawamura T1, Iwami T1.
Abstract
BACKGROUND: The number of people living in high-rise buildings has recently been increasing in Japan, and delayed transport time by emergency-medical-service (EMS) personnel from higher floors could lead to lower survival after out-of-hospital cardiac arrest (OHCA). However, there are no clinical studies assessing the association between the floor where patients reside and neurologically favorable outcome after OHCA.
METHODS: This was a prospective, population-based study conducted in Osaka City, Japan that enrolled adults aged >=18years suffering an OHCA of cardiac origin before EMS arrival between 2013 and 2014. The primary outcome measure was one-month survival with neurologically favorable outcome. We divided OHCA patients into the following groups: those residing on >=3 floors (the high floor group) and <3 floors (the low floor group). Multiple logistic regression analysis was used to assess factors associated with neurologically favorable outcome.
RESULTS: A total of 2979 patients were eligible for analysis. Of them, 1885 (62.3%) occurred below the third floor and 1094 (37.4%) occurred at or above the third floor. The proportion of neurologically favorable outcome after OHCA was significantly lower in the high floor group than in the low floor group (2.7% [30/1094] versus 4.8% [91/1885], P=0.005). In a multivariate analysis, neurologically favorable outcome after OHCA was significantly lower in the high floor group than in the low floor group (adjusted odds ratio, 0.59 [95% confidence interval, 0.37-0.96]).
CONCLUSIONS: In this population, one-month survival with neurologically favorable outcome from OHCA was lower in the high floor group than in the low floor group.

2. Circulation. 2016 Oct 28. pii: CIRCULATIONAHA.116.022954. [Epub ahead of print]
Identifying Patients at Risk for Pre-Hospital Sudden Cardiac Arrest at the Early Phase of Myocardial Infarction: The e-MUST Study.
Karam N1, Bataille S2, Marijon E3, Giovanetti O4 , Tafflet M5, Savary D6, Benamer H7, Caussin C8, Garot P9, Juliard JM10, Pires V11, Boche T12, Dupas F13, Lebail G14, Lamhaut L15, Laborne FX15, Lefort H16, Mapouata MB17, Lapostolle F16, Spaulding C3, Empana JP18, Jouven X3, Lambert Y19; e-MUST study Investigators.
Abstract
BACKGROUND: -In-hospital mortality of ST-Segment Elevation Myocardial Infarction (STEMI) has decreased drastically. In contrast pre-hospital mortality by Sudden Cardiac Arrest (SCA) remains high and difficult to reduce. Identification of the STEMI patients at higher risk for pre-hospital SCA could facilitate rapid triage and intervention in the field.
METHODS: - Using a prospective population-based study evaluating all STEMI patients managed by Emergency Medical Services (EMS) in the Greater Paris Area (11.7 million inhabitants) between 2006 and 2010, we identified characteristics associated with an increased risk of pre-

hospital SCA and used these variables to build a SCA prediction score which we validated internally and externally.
RESULTS: - In the overall STEMI population, (n=8112; median age 60years, 78% males), SCA occurred in 452 patients (5.6%). By multivariate analysis, younger age, absence of obesity, absence of diabetes, shortness of breath, and a short delay between pain onset and call to EMS were the main predictors of SCA. A score built from these variables predicted SCA, with the risk increasing 2-fold in patients with a score between 10 and 19, 4-fold with a score between 20 and 29, and more than 18-fold with a score ≥ 30, compared to those with scores <10. The SCA rate was 28.9% in patients with a score ≥30 compared to 1.6% in patients with a score ≤ 9 (P for trend<0.001). The Area Under the Curve values were 0.7033 in the internal validation sample, and 0.6031 in the external validation sample. Sensitivity and specificity varied between 96.9% and 10.5% for scores 10 and above, and 18.0% and 97.6% for scores 30 and above, with scores between 20 and 29 achieving the best sensitivity and specificity (65.4% and 62.6%, respectively).
CONCLUSIONS: - At the early phase of STEMI, the risk of pre-hospital SCA can be determined through a simple score of five routinely assessed predictors. This score might help optimizing EMS dispatching and management of STEMI patients.

3. Resuscitation. 2016 Oct 19;109:64-70. doi: 10.1016/j.resuscitation.2016.10.004. [Epub ahead of print]

The effect of atmosphere temperature on out-of-hospital cardiac arrest outcomes.

Cho EJ1, Shin SD2, Jeong S3, Kwak YH4, Suh GJ5.

Abstract

BACKGROUND: It is unclear whether the atmosphere temperature is associated with outcomes after out-of-hospital cardiac arrest (OHCA).
METHODS: This is a nationwide observational study using the national OHCA registry merged with a geographical and weather database. Adult patients with a cardiac etiology that occurred from 2006 to 2013 were included, excluding patients with unknown outcome or unknown weather information. The main exposure was the hourly measured temperature matched to the OHCA event time. The covariates were age, gender, metropolis, place, and weather factors (wind speed and humidity). The primary outcome was good cerebral performance scale (CPC) 1 or 2. Patients were classified with three temperature groups by quartile range: Cold (<4°C), Intermediate (4-21°C), and Hot (≥22°C). We tested the associations between the atmosphere temperature (by 1°C and by temperature group) and outcomes using multivariable logistic regression analysis.
RESULTS: Of 17,3051 OHCAs, a total of 115,578 cases were matched to weather database. A total of 78,717 OHCAs were analyzed. The proportion of good CPC 1 or 2 was 1.7% in the Cold group, 1.8% in the Intermediate group, and 2.3% in the Hot group. As the temperature at the event of OHCA increased by 1°C, AORs (95% CIs) were 1.006 (1.002-1.009) for good CPC. The AORs (95% CIs) for good CPC in Cold and Hot group comparing with Intermediate group for good CPC were 0.964 (0.845-1.100) and 1.246 (1.096-1.416), respectively.
CONCLUSION: The temperature at the time of the OHCA event was associated with outcomes after OHCA in a nationwide observational study in Korea.

4. Resuscitation. 2016 Oct 18;109:56-63. doi: 10.1016/j.resuscitation.2016.09.027. [Epub ahead of print]

Factors impacting upon timely and adequate allocation of prehospital medical assistance and resources to cardiac arrest patients.

Hardeland C1, Sunde K2, Ramsdal H3, Hebbert SR4, Soilammi L5, Westmark F6, Nordum F7, Hansen AE5, Steen-Hansen JE4, Olasveengen TM8.

Abstract

AIM: Explore, understand and address issues that impact upon timely and adequate allocation of prehospital medical assistance and resources to out-of-hospital cardiac arrest (OHCA) patients.
METHODS: Mixed-methods: design obtaining data for one year in three emergency medical communication centres (EMCC); Oslo-Akershus (OA), Vestfold-Telemark (VT) and Østfold (Ø). Data collection included quantitative data from analysis of dispatch logs, ambulance records and audio files. Qualitative data were collected through in-depth interviews and non-participant observations.

RESULTS: OA-, VT- and Ø-EMCC responded to 1095 OHCAs and 579 of these calls were included for further analysis (333, 143 and 103, respectively). There were significant site differences in their recognition of OHCA (89, 94 and 78%, respectively, p<0.001), provision of CPR instructions (83, 83 and 61%, respectively, p<0.001), time from call answered to initial CPR instructions (1.4min (1.2, 1.6), 1.1min (0,9, 1.2) and 1.3 (1.2, 1.7) respectively, p=0.002). The most frequent reason for delayed or failed recognition of OHCA was misinterpretation of agonal breathing. Interviews and observations revealed individual differences in protocol use, interrogation strategy and assessment of breathing. Use of protocol was only part of decision making, dispatchers trusted their own clinical experience and intuition, and used assumptions about the patient and the situation as part of decision making.
CONCLUSION: Agonal breathing continues to be the main barrier to recognition of cardiac arrest. Individual differences among dispatchers' strategies can directly impact on performance, mainly due to the wide definition of cardiac arrest and lack of uniform tools for assessment of breathing.phil

5. Int J Cardiol. 2016 Oct 25;226:110-117. doi: 10.1016/j.ijcard.2016.10.053. [Epub ahead of print]

The impact of short-term exposure to air pollutants on the onset of out-of-hospital cardiac arrest: A systematic review and meta-analysis.

Zhao R1, Chen S1, Wang W1, Huang J1 , Wang K1, Liu L1, Wei S2.

Abstract

BACKGROUND: Acute exposure to outdoor air pollution was considered to be associated with the incidence of out-of-hospital cardiac arrest (OHCA). But the relation between specific air pollutants and OHCA remains controversial. We conducted a systematic review and meta-analysis to quantitatively assess the acute effects of air pollutants, including particulate matter (PM10 and PM2.5), sulfur dioxide (SO2), nitrogen dioxide (NO2), carbon monoxide (CO) and ozone (O3) on OHCA onset.
METHODS: Six databases were searched to identify studies analyzing the association between OHCA and the main air pollutants. We summarized the pooled estimates using random-effect models. Heterogeneity within studies was assessed using Cochran's Q and I2 statistics. Funnel plots, Egger's regression test and Begg's rank correlation method were constructed to evaluate publication bias. Subgroup analyses and sensitivity analyses were also conducted to evaluate the potential sources of heterogeneity.
RESULTS: A total of 15 studies met the inclusion criteria. PM10, PM2.5, NO2 and O3 were found to be significantly associated with increase in OHCA risk (PM10 1.021, 95%CI: 1.006-1.037; PM2.5 1.041, 95%CI: 1.012-1.071; NO2 1.015, 95%CI: 1.001-1.030 and O3 1.016, 95%CI: 1.008-1.024). The acute exposure to SO2 and CO was not associated with the incidence of OHCA. Additional analyses verified the findings in the overall analyses except SO2 and NO2. Population attributable fractions for PM10, PM2.5, and O3 were 2.1%, 3.9% and 1.6%, respectively.
CONCLUSION: The current evidence confirmed the associations between short-term exposure to PM2.5, PM10 and O3 and a high risk of OHCA, with the strongest association being observed for PM2.5.

OFEGAMENTS

1. Resuscitation. 2016 Oct 24. pii: S0300-9572(16)30508-1. doi: 10.1016/j.resuscitation.2016.10.005. [Epub ahead of print]

Observed Long-term Mortality after 18,000 Person-Years among Survivors in a Large Regional Drowning Registry.

Reynolds JC1, Michiels EA2, Nasiri M3, Reeves MJ4, Quan L5.

Abstract

AIM: Long-term outcomes beyond one year after non-fatal drowning are uncharacterized. We estimated long-term mortality and identified prognostic factors in a large, population-based cohort.
METHODS: Population-based prospective cohort study (1974-1996) of Western Washington Drowning Registry (WWDR) subjects surviving the index drowning through hospital discharge. Primary outcome was all-cause mortality through 2012. We tabulated Utstein-style exposure variables, estimated Kaplan-Meier curves, and identified prognostic factors with Cox

proportional hazard modeling. We also compared 5-, 10-, and 15-year mortality estimates of the primary cohort to age-specific mortality estimates from United States Life Tables.
RESULTS: Of 2,824 WWDR cases, 776 subjects (5[IQR 2-17] years, 68% male) were included. Only 63 (8%) non-fatal drowning subjects died during 18,331 person-years of follow-up. Long-term mortality differed by Utstein variables (age, precipitating alcohol use, submersion interval, GCS, CPR, intubation, defibrillation, initial vital signs, neurologic status at hospital discharge) and inpatient markers of illness severity (mechanical ventilation, vasopressor use, seizure, pneumothorax). Survival differed by age (HR 1.04;95%CI 1.03-1.05), drowning-related cardiac arrest (HR 3.47;95%CI 1.97-6.13), and neurologic impairment at hospital discharge (HR 5.10;95% CI 2.70-9.62). In adjusted analysis, age (HR 1.05;95%CI 1.03-1.06) and severe neurologic impairment at discharge (HR 2.31;95%CI 1.01-5.28) were associated with long-term mortality. Subjects aged 5-15 years had higher mortality risks than those calculated from Life Tables.
CONCLUSION: Most drownings were fatal, but survivors of non-fatal drowning had low risk of subsequent long-term mortality similar to the general population that was independently associated with age and neurologic status at hospital discharge.

2. Br J Sports Med. 2016 Nov;50(22):1360-1366. doi: 10.1136/bjsports-2015-094722. Epub 2016 Mar 3.
Hypothesised mechanisms of swimming-related death: a systematic review.
Asplund CA1, Creswell LL2.
Abstract
BACKGROUND: Recent reports from triathlon and competitive open-water swimming indicate that these events have higher rates of death compared with other forms of endurance sport. The potential causal mechanism for swimming-related death is unclear.
OBJECTIVE: To examine available studies on the hypothesised mechanisms of swimming-related death to determine the most likely aetiologies.
MATERIAL AND METHODS: MEDLINE, EMBASE and the Cochrane Database of Systematic Reviews (1950 to present) were searched, yielding 1950 potential results, which after title and citation reviews were reduced to 83 possible reports. Studies included discussed mechanisms of death during swimming in humans, and were Level 4 evidence or higher.
RESULTS: A total of 17 studies (366 total swimmers) were included for further analysis: 5 investigating hyperthermia/hypothermia, 7 examining cardiac mechanisms and responses, and 5 determining the presence of pulmonary edema. The studies provide inconsistent and limited-quality or disease-oriented evidence that make definitive conclusions difficult.
CONCLUSIONS: The available evidence is limited but may suggest that cardiac arrhythmias are the most likely aetiology of swimming-related death. While symptoms of pulmonary edema may occur during swimming, current evidence does not support swimming-induced pulmonary edema as a frequent cause of swimming-related death, nor is there evidence to link hypothermia or hyperthermia as a causal mechanism. Further higher level studies are needed.

POST ROSC

1. Heart Lung Circ. 2016 Dec;25(12):1210-1217. doi: 10.1016/j.hlc.2016.04.008. Epub 2016 May 20.
Intra-Aortic Balloon Pump Counterpulsation in the Post-Resuscitation Period is Associated with Improved Functional Outcomes in Patients Surviving an Out-of-Hospital Cardiac Arrest: Insights from a Dedicated Heart Attack Centre.
Iqbal MB1, Al-Hussaini A2, Rosser G2, Rajakulasingam R2, Patel J2, Elliott K2, Mohan P2, Phylactou M2, Green R2, Whitbread M3, Mason M4, Grocott-Mason R4, Smith R2, Ilsley C2.
Abstract
BACKGROUND: Despite advances in cardiopulmonary resuscitation, functional survival remains low after out-of-hospital cardiac arrest (OOHCA). Intra-aortic balloon pump (IABP) therapy has recently been shown to augment cerebral blood flow. Whether IABP therapy in the post-resuscitation period improves functional outcomes is unknown.
METHODS:
We analysed 174 consecutive patients who were successfully resuscitated from an OOHCA between 2011-2013 at Harefield Hospital, London. We analysed functional status at discharge and mortality up to one year.

RESULTS: A total of 55 patients (32.1%) received IABP therapy. Comparing those receiving IABP with those not receiving IABP, there was no difference in favourable functional status at discharge (49.1% vs. 57.1%, p=0.321); and mortality at one year (45.5% vs. 35.5%, p=0.164). Multivariable analyses identified IABP therapy as a strong independent predictor for favourable functional status at discharge (OR=7.51, 95% CI: 2.15-26.14, p=0.002) and this association was maintained in propensity-score adjusted analyses (OR=9.90, 95% CI: 2.11-46.33, p=0.004) and inverse probability treatment weighted analyses (OR=10.84, 95% CI: 2.75-42.69, p<0.001). However, IABP therapy was not an independent predictor for mortality at one year (HR=0.93, 95% CI: 0.52-1.65, p=0.810) and this was confirmed in both propensity-score adjusted and inverse probability treatment weighted analyses.
CONCLUSIONS: In this observational analysis of patients surviving an OOHCA, the use of IABP therapy in the post-resuscitation period was associated with improved functional outcomes. This warrants further evaluation in larger prospective studies.

2. J Thromb Haemost. 2016 Oct;14(10):2036-2044. doi: 10.1111/jth.13421. Epub 2016 Aug 26.
Usefulness of mean platelet volume as a marker for clinical outcomes after out-of-hospital cardiac arrest: a retrospective cohort study.
Chung SP1, Yune HY1, Park YS1, You JS2, Hong JH3, Kong T1, Park JW4, Chung HS1, Park I1.
Abstract
Essentials It is unknown whether mean platelet volume (MPV) estimates outcomes after cardiac arrest (CA). We investigated whether MPV was associated with 30-day neurologic outcome and mortality after CA. Elevated MPV at admission was associated with poor neurological outcomes and mortality at 30 days. Identifying levels of MPV is helpful for estimating disease severity among resuscitated patients.
SUMMARY: Background Whole-body ischemia followed by reperfusion during cardiac arrest and after return of spontaneous circulation (ROSC) triggers systemic sterile inflammatory responses, inducing a sepsis-like state during post-cardiac arrest syndrome. Activated platelets are enlarged, and contain vasoactive and prothrombic factors that aggravate systemic inflammation and endothelial dysfunction. Objectives To investigate whether mean platelet volume (MPV) is useful as a marker for early mortality and neurologic outcomes in patients who achieve ROSC after out-of-hospital cardiac arrest (OHCA). Methods OHCA records from the Emergency Department Cardiac Arrest Registry were retrospectively analyzed. Patients who survived for > 24 h after ROSC were included. We evaluated mortality and cerebral performance category scores after 30 days. Results We analyzed records from 184 patients with OHCA. Increased 30-day mortality among patients who achieved ROSC after OHCA was associated with MPV at admission (hazard ratio [HR] 1.36; 95% confidence interval [CI] 1.06-1.75). An elevated MPV at admission was also associated with poor neurologic outcomes (HR 1.28; 95% CI 1.06-1.55). Conclusions An elevated MPV was independently associated with increased 30-day mortality, with the highest discriminative value being obtained upon admission after OHCA. An elevated MPV on admission was associated with poor neurologic outcomes. High MPVs are helpful for estimating 30-day mortality and neurologic outcomes among patients who achieve ROSC after OHCA.

3. J Crit Care. 2016 Dec;36:218-222. doi: 10.1016/j.jcrc.2016.07.012. Epub 2016 Jul 17.
The association between hemoglobin concentration and neurologic outcome after cardiac arrest.
Johnson NJ1, Rosselot B2, Perman SM3, Dodampahala K4, Goyal M5, Gaieski DF6, Grossestreuer AV7.
Abstract
PURPOSE: The purpose of the study is to determine the association between hemoglobin concentration (Hgb) and neurologic outcome in postarrest patients.
METHODS: We conducted a retrospective cohort study using the Penn Alliance for Therapeutic Hypothermia (PATH) cardiac arrest registry. Inclusion criteria were resuscitated cardiac arrest (inhospital or out of hospital) and an Hgb value recorded within 24 hours of return of spontaneous circulation. The primary outcome was favorable neurologic status at hospital discharge. Survival to hospital discharge was a secondary outcome.
RESULTS: There were 598 eligible patients from 21 hospitals. Patients with favorable neurologic outcome had significantly higher median Hgb in the first 2 hours (12.7 vs 10.5 g/dL; P<.001) and 6 hours (12.6 vs 10.6 g/dL; P<.001) postarrest. Controlling for age, pulseless rhythm, etiology,

location of arrest, receipt of targeted temperature management, hematologic or metastatic malignancy, or preexisting renal insufficiency, there was a significant relationship between Hgb and neurologic outcome within the first 6 hours after arrest (odds ratio, 1.23; 95% confidence interval, 1.09-1.38) and survival to hospital discharge (odds ratio, 1.20; 95% confidence interval, 1.08-1.34).
CONCLUSION: Higher Hgb after cardiac arrest is associated with favorable neurologic outcome, particularly within the first 6 hours. It is unclear if this effect is due to impaired oxygen delivery or if Hgb is a marker for more severe illness.

ATURADA CARDIACA INTRAHOSPITALÀRIA

1. J Am Heart Assoc. 2016 Sep 29;5(10). pii: e003638.
Location of In-Hospital Cardiac Arrest in the United States-Variability in Event Rate and Outcomes.
Perman SM1, Stanton E2, Soar J3, Berg RA4, Donnino MW5, Mikkelsen ME2, Edelson DP6, Churpek MM6, Yang L7, Merchant RM8; American Heart Association's Get With the Guidelines®—Resuscitation (formerly the National Registry of Cardiopulmonary Resuscitation) Investigators.
Collaborators: (16)
Nichol G, Nadkarni VM, Peberdy MA, Chan PS, Mader T, Kern KB, Warren S, Allen E, Eigel B, Hunt EA, Ornato JP, Braithwaite S, Geocadin RG, Mancini ME, Potts J, Truitt TL.
Abstract
BACKGROUND: In-hospital cardiac arrest (IHCA) is a major public health problem with significant mortality. A better understanding of where IHCA occurs in hospitals (intensive care unit [ICU] versus monitored ward [telemetry] versus unmonitored ward) could inform strategies for reducing preventable deaths.
METHODS AND RESULTS: This is a retrospective study of adult IHCA events in the Get with the Guidelines-Resuscitation database from January 2003 to September 2010. Unadjusted analyses were used to characterize patient, arrest, and hospital-level characteristics by hospital location of arrest (ICU versus inpatient ward). IHCA event rates and outcomes were plotted over time by arrest location. Among 85 201 IHCA events at 445 hospitals, 59% (50 514) occurred in the ICU compared to 41% (34 687) on the inpatient wards. Compared to ward patients, ICU patients were younger (64±16 years versus 69±14; P<0.001) and more likely to have a presenting rhythm of ventricular tachycardia/ventricular fibrillation (21% versus 17%; P<0.001). In the ICU, mean event rate/1000 bed-days was 0.337 (±0.215) compared with 0.109 (±0.079) for telemetry wards and 0.134 (±0.098) for unmonitored wards. Of patients with an arrest in the ICU, the adjusted mean survival to discharge was 0.140 (0.037) compared with the unmonitored wards 0.106 (0.037) and telemetry wards 0.193 (0.074). More IHCA events occurred in the ICU compared to the inpatient wards and there was a slight increase in events/1000 patient bed-days in both locations.
CONCLUSIONS: Survival rates vary based on location of IHCA. Optimizing patient assignment to unmonitored wards versus telemetry wards may contribute to improved survival after IHCA.

DESFIBRIL·LACIÓ I ELECTROFISIOLOGIA

1. Resuscitation. 2016 Oct 23. pii: S0300-9572(16)30510-X. doi: 10.1016/j.resuscitation.2016.10.007. [Epub ahead of print]
Ventricular fibrillation waveform measures and the etiology of cardiac arrest.
Hidano D1, Coult J2, Blackwood J3, Fahrenbruch C3, Kwok H1, Kudenchuk P4, Rea T5.
Abstract
BACKGROUND: Early determination of the acute etiology of cardiac arrest could help guide resuscitation or post-resuscitation care. In experimental studies, quantitative measures of the ventricular fibrillation waveform distinguish ischemic from non-ischemic etiology.
METHODS: We investigated whether waveform measures distinguished arrest etiology among adults treated by EMS for out-of-hospital ventricular fibrillation between January 1, 2006-December 31, 2014. Etiology was classified using hospital information into three exclusive groups: acute coronary syndrome (ACS) with ST elevation myocardial infarction (STEMI), ACS without ST elevation (non-STEMI), or non-ischemic arrest. Waveform measures included

amplitude spectrum area (AMSA), centroid frequency (CF), mean frequency (MF), and median slope (MS) assessed during CPR-free epochs immediately prior to the initial and second shock. Waveform measures prior to the initial shock and the changes between first and second shock were compared by etiology group. We a priori chose a significance level of 0.01 due to multiple comparisons.
RESULTS: Of the 430 patients, 35% (n=150) were classified as STEMI, 29% (n=123) as non-STEMI, and 37% (n=157) with non-ischemic arrest. We did not observe differences by etiology in any of the waveform measures prior to shock 1 (Kruskal-Wallis Test) (p=0.28 for AMSA, p=0.07 for CF, p=0.63 for MF, and p=0.39 for MS). We also did not observe differences for change in waveform between shock 1 and 2, or when the two acute ischemia groups (STEMI and non-STEMI) were combined and compared to the non-ischemic group.
CONCLUSION: This clinical investigation suggests that waveform measures may not be useful in distinguishing cardiac arrest etiology.

2. Circ J. 2016 Oct 25;80(11):2310-2316. Epub 2016 Oct 6.
Ventricular Fibrillation in a General Population - A National Database Study.
Tseng WC1, Wu MH, Chen HC, Kao FY, Huang SK .
Abstract
BACKGROUND: Ventricular fibrillation (VF) is a life-threatening disease that can be remedied by prompt defibrillation. However, data regarding such risk in a general population remain limited. This general population study was to explore the epidemiological profile of VF.Methods and Results:We investigated patients with VF younger than 60 years (average population, 19,725,031) using a national database spanning the period 2000-2010. We identified 3,971 (68.4% male) patients with VF (crude incidence rate: 1.83/100,000). Incidence rates were low in patients younger than 10 years and increased steadily after adolescence. Comorbidities were noted in 2,766 (69.7%) patients, with 2,431 (61%) having cardiac diseases. Over half of the adolescent and young adult patients did not have comorbidities. Among the 838 deaths (mortality rate 21.1%), approximately half (381/838, 45.5%) occurred after arrival at emergency services (ES). The proportion of deaths after arrival at ES relative to total deaths increased sharply to a peak in the 15-19-years age group and thereafter remained stationary.
CONCLUSIONS: VF patients, with a male dominance, increased after adolescence and were likely to die at presentation to ES. Approximately half of young adults, with high mortality, did not have comorbidities, suggesting underdiagnosis of underlying primary electrical diseases and the need for implementing automated external defibrillator programs.

3. N Engl J Med. 2016 Oct 27;375(17):1649-1659.
Public-Access Defibrillation and Out-of-Hospital Cardiac Arrest in Japan.
Kitamura T1, Kiyohara K1, Sakai T1, Matsuyama T1, Hatakeyama T1, Shimamoto T1, Izawa J1, Fujii T1, Nishiyama C1, Kawamura T1, Iwami T1.
Abstract
Background: Early defibrillation plays a key role in improving survival in patients with out-of-hospital cardiac arrests due to ventricular fibrillation (ventricular-fibrillation cardiac arrests), and the use of publicly accessible automated external defibrillators (AEDs) can help to reduce the time to defibrillation for such patients. However, the effect of dissemination of public-access AEDs for ventricular-fibrillation cardiac arrest at the population level has not been extensively investigated. Methods: From a nationwide, prospective, population-based registry of patients with out-of-hospital cardiac arrest in Japan, we identified patients from 2005 through 2013 with bystander-witnessed ventricular-fibrillation arrests of presumed cardiac origin in whom resuscitation was attempted. The primary outcome measure was survival at 1 month with a favorable neurologic outcome (Cerebral Performance Category of 1 or 2, on a scale from 1 [good cerebral performance] to 5 [death or brain death]). The number of patients in whom survival with a favorable neurologic outcome was attributable to public-access defibrillation was estimated.
Results: Of 43,762 patients with bystander-witnessed ventricular-fibrillation arrests of cardiac origin, 4499 (10.3%) received public-access defibrillation. The percentage of patients receiving public-access defibrillation increased from 1.1% in 2005 to 16.5% in 2013 (P<0.001 for trend). The percentage of patients who were alive at 1 month with a favorable neurologic outcome was significantly higher with public-access defibrillation than without public-access defibrillation (38.5% vs. 18.2%; adjusted odds ratio after propensity-score matching, 1.99; 95% confidence

interval, 1.80 to 2.19). The estimated number of survivors in whom survival with a favorable neurologic outcome was attributed to public-access defibrillation increased from 6 in 2005 to 201 in 2013 (P<0.001 for trend).
Conclusions: In Japan, increased use of public-access defibrillation by bystanders was associated with an increase in the number of survivors with a favorable neurologic outcome after out-of-hospital ventricular-fibrillation cardiac arrest.

3. Resuscitation. 2016 Oct 1;109:9-15. doi: 10.1016/j.resuscitation.2016.09.021. [Epub ahead of print]
Characteristics of automated external defibrillator coverage in Philadelphia, PA, based on land use and estimated risk.
Chrisinger BW1, Grossestreuer AV2, Laguna MC3, Griffis HM4, Branas CC5, Wiebe DJ5, Merchant RM4.
Abstract
AIM: Approximately 424,000 out-of-hospital cardiac arrests (OHCA) occur in the US annually. As automated external defibrillators (AED) are an important part of the community response to OHCA, we investigated how well the spatial demand (likelihood of OHCA) was met by the spatial supply (AEDs) in a dense urban environment.
METHODS: Using geographic information system (GIS) software, we applied kernel density and optimized hot spot procedures with two differently-sized radii to model OHCA incidence rates from existing studies, providing an estimate of OHCA likelihood at a given location. We compared these density maps to existing AED coverage in the study area. Descriptive statistics summarized coverage by land use.
RESULTS: With a 420-ft buffer, we found that 56.0% (79.9%, 840-ft buffer) of the land area in the city center was covered by existing AEDs at, though 70.1 (91.5)% of the OHCA risk was covered using kernel density and 79.8% (98.1) was covered using hot spot analysis.
CONCLUSIONS: The difference in coverage by area and risk seems to indicate efficient placement of existing AEDs. Our findings also highlight the possible benefits to expanding the influence of AEDs by lowering search times, and identify opportunities to improve AED coverage in the study area. This article offers one method by which local officials can use spatial data to prioritize attention for AED placement and coverage.

4. Am J Emerg Med. 2016 Oct 25. pii: S0735-6757(16)30738-0. doi: 10.1016/j.ajem.2016.10.042. [Epub ahead of print]
Conversion to shockable rhythms during resuscitation and survival for out-of hospital cardiac arrest.
Wah W1, Wai KL2, Pek PP3, Ho AF4, Alsakaf O5, Chia MY6, Noor JM7, Kajino K8, De Souza NN9, Ong ME10; PAROS Investigators.
Collaborators: (4)
Khruekarnchana P, Tham LP, Leong BS, Tiah L.
Abstract
BACKGROUND: In out of hospital cardiac arrest (OHCA), the prognostic influence of conversion to shockable rhythms during resuscitation for initially non-shockable rhythms remains unknown. This study aimed to assess the relationship between initial and subsequent shockable rhythm and post-arrest survival and neurological outcomes after OHCA.
METHODOLOGY: This was a retrospective analysis of all OHCA cases collected from the Pan-Asian Resuscitation Outcomes Study (PAROS) registry in 7 countries in Asia between 2009 and 2012. We included OHCA cases of presumed cardiac etiology, aged 18-years and above and resuscitation attempted by EMS. We performed multivariate logistic regression analyses to assess the relationship between initial and subsequent shockable rhythm and survival and neurological outcomes. 2-stage seemingly unrelated bivariate probit models were developed to jointly model the survival and neurological outcomes. We adjusted for the clustering effects of country variance in all models.
RESULTS: 40,160 OHCA cases met the inclusion criteria. There were 5356 OHCA cases (13.3%) with initial shockable rhythm and 33,974 (84.7%) with initial non-shockable rhythm. After adjustment of baseline and prehospital characteristics, OHCA with initial shockable rhythm (odds ratio/OR=6.10, 95% confidence interval/CI=5.06-7.34) and subsequent conversion to shockable rhythm (OR=2.00,95%CI=1.10-3.65) independently predicted better survival-to-hospital-discharge outcomes. Subsequent shockable rhythm conversion significantly improved

survival-to-admission, discharge and post-arrest overall and cerebral performance outcomes in the multivariate logistic regression and 2-stage analyses.
CONCLUSION: Initial shockable rhythm was the strongest predictor for survival. However, conversion to subsequent shockable rhythm significantly improved post-arrest survival and neurological outcomes. This study suggests the importance of early resuscitation efforts even for initially non-shockable rhythms which has prognostic implications and selection of subsequent post-resuscitation therapy.

OCLUSIÓ DE L'AORTA AMB UN BALÓ ENDOVASCULAR EN LA RESSUSCITACIÓ (REBOA)

1. Curr Opin Crit Care. 2016 Dec;22(6):563-571.
Resuscitative endovascular balloon occlusion of the aorta: promise, practice, and progress?
Perkins ZB1, Lendrum RA, Brohi K.
Abstract
PURPOSE OF REVIEW: Resuscitative endovascular balloon occlusion of the aorta (REBOA) is a minimally invasive damage control procedure for life-threatening abdominal or pelvic haemorrhage. The purpose of this review is to summarize the current understanding and experience with REBOA, outline potential future applications of this technology, and highlight priority areas for further research.
RECENT FINDINGS: REBOA is a feasible method of achieving temporary aortic occlusion and can be performed rapidly, with a high degree of success, in the emergency setting (including at the scene of injury) by appropriately trained clinicians. The procedure supports central perfusion, controls noncompressible haemorrhage, and may improve survival in certain profoundly shocked patient groups; but is also associated with significant risks, including ischaemic tissue damage and procedural complications. Evolutions of this strategy are being explored, with promising proof-of-concept studies in the fields of partial aortic occlusion and the combination of REBOA with extracorporeal support.
SUMMARY: Noncompressible torso haemorrhage is the leading cause of preventable trauma deaths. The majority of these deaths occur soon after injury, often before any opportunity for definitive haemorrhage control. For a meaningful reduction in trauma mortality, novel methods of rapid haemorrhage control are required.

2. Am J Case Rep. 2016 Nov 1;17:810-813.
"REBOA" - Is it Really Safe? A Case with Massive Intracranial Hemorrhage Possibly due to Endovascular Balloon Occlusion of the Aorta (REBOA).
Uchino H1, Tamura N1, Echigoya R1, Ikegami T1, Fukuoka T1.
Abstract
BACKGROUND: Non-compressible torso hemorrhage continues to be the leading cause of preventable death in trauma patients. Recent case series report that resuscitative endovascular balloon occlusion of the aorta (REBOA) in the trauma population is a technically feasible method to manage the patients with exsanguinating hemorrhage. On the other hand, it seems that REBOA is being widely promoted prematurely. Complications due to REBOA haven't been reported much in the literature, and they could have been underestimated.
CASE REPORT: An 86-year-old female presented to our emergency department following a pedestrian-vehicle accident. On admission, she was hemodynamically unstable with systolic blood pressure (SBP) of 78 mm Hg. She responded to fluid administration, and computed tomography (CT) scan showed cerebral contusion, subarachnoid hemorrhage, pelvic fracture with contrast extravasation, and thoracic spine fracture. Her condition deteriorated after the CT scan, and she became hemodynamically unstable. REBOA was inserted and inflated. Her blood pressure recovered and even became as high as SBP of 180 mm Hg. Transarterial embolization for pelvic fracture was successfully performed. A subsequent head CT scan showed massive intracranial hemorrhage with penetration to the ventricle, which was fatal. She died on the same day due to cerebral herniation.
CONCLUSIONS: REBOA is now considered as an alternative to resuscitative thoracotomy or even widely indicated to control hemorrhage. We should be more cautious about using REBOA for polytrauma patients since it could make hemorrhage worse. Further research, assessing its potential complications and safety, will be required to elucidate clear indications for REBOA in trauma populations.

TRAUMA

1. Med Klin Intensivmed Notfmed. 2016 Oct 27. [Epub ahead of print]
[Cardiopulmonary resuscitation in cardiac arrest following trauma].
[Article in German]
Leidel BA1,2, Kanz KG3.
Abstract
For decades, survival rates of cardiac arrest following trauma were reported between 0 and 2 %. Since 2005, survival rates have increased with a wide range up to 39 % and good neurological recovery in every second person injured for unknown reasons. Especially in children, high survival rates with good neurologic outcomes are published. Resuscitation following traumatic cardiac arrest differs significantly from nontraumatic causes. Paramount is treatment of reversible causes, which include massive bleeding, hypoxia, tension pneumothorax, and pericardial tamponade. Treatment of reversible causes should be simultaneous. Chest compression is inferior following traumatic cardiac arrest and should never delay treatment of reversible causes of the traumatic cardiac arrest. In massive bleeding, bleeding control has priority. Damage control resuscitation with permissive hypotension, aggressive coagulation therapy, and damage control surgery represent the pillars of initial treatment. Cardiac arrest due to hypoxia should be resolved by airway management and ventilation. Tension pneumothorax should be decompressed by finger thoracostomy, pericardial tamponade by resuscitative thoracotomy. In addition, resuscitative thoracotomy allows direct and indirect bleeding control. Untreated impact brain apnea may rapidly lead to cardiac arrest and requires quick opening of the airway and effective oxygenation. Established algorithms for treatment of cardiac arrest following trauma enable a safe, structured, and effective management.

2. Emerg Med J. 2016 Oct 26. pii: emermed-2014-204596. doi: 10.1136/emermed-2014-204596. [Epub ahead of print]
Long-term prognosis after out-of-hospital resuscitation of cardiac arrest in trauma patients: prehospital trauma-associated cardiac arrest.
Duchateau FX1, Hamada S2, Raux M3, Gay M1, Mantz J4, Paugam Burtz C4,5, Gauss T4; Traumabase Group.
Collaborators: (5)
Duranteau J, Riou B, Vigué B, Langeron O, Harrois A.
Abstract
BACKGROUND: Although prehospital cardiac arrest (CA) remains associated with poor long-term outcome, recent studies show an improvement in the survival rate after prehospital trauma associated CA (TCA). However, data on the long-term neurological outcome of TCA, particularly from physician-staffed Emergency Medical Service (EMS), are scarce, and results reported have been inconsistent. The objective of this pilot study was to evaluate the long-term outcome of patients admitted to several trauma centres after a TCA.
METHODS: This study is a retrospective database review of all patients from a multicentre prospective registry that experienced a TCA and had undergone successful cardiopulmonary resuscitation (CPR) prior their admission at the trauma centre. The primary end point was neurological outcome at 6 months among patients who survived to hospital discharge.
RESULTS: 88 victims of TCA underwent successful CPR and were admitted to the hospital, 90% of whom were victims of blunt trauma. Of these 88 patients, 10 patients (11%; CI 95% 6% to 19%) survived to discharge: on discharge, 9 patients displayed a GCS of 15 and Cerebral Performance Categories (CPC) 1-2 and one patient had a GCS 7 and CPC of 3. Hypoxia was the most frequent cause of CA among survivors. 6-month follow-up was achieved for 9 patients of the 10 surviving patients. The 9 patients with a good outcome on hospital discharge had a CPC of 1 or 2 6 months post discharge. All returned to their premorbid family and social settings.
CONCLUSIONS: Among patients admitted to hospital after successful CPR from TCA, hypoxia as the likely aetiology of arrest carried a more favourable prognosis. Most of the patients successfully resuscitated from TCA and surviving to hospital discharge had a good neurological outcome, suggesting that prehospital resuscitation may not be futile.

FÀRMACS

1. Crit Care. 2016 Apr 3;20:82. doi: 10.1186/s13054-016-1257-x.

Corticosteroid therapy in refractory shock following cardiac arrest: a randomized, double-blind, placebo-controlled, trial.

Donnino MW1,2, Andersen LW3,4,5, Berg KM6, Chase M 3, Sherwin R7, Smithline H8, Carney E3,9, Ngo L10, Patel PV3, Liu X3, Cutlip D11, Zimetbaum P11, Cocchi MN3,12; Collaborating Authors from the Beth Israel Deaconess Medical Center's Center for Resuscitation Science Research Group.
Collaborators: (9)
Giberson T, Giberson B, Salciccioli J, DeBrule A, Uber A, Rogan M, Jones-Bamman C, Moskowitz A, Balkema J.

Abstract

BACKGROUND: The purpose of this study was to determine whether the provision of corticosteroids improves time to shock reversal and outcomes in patients with post-cardiac arrest shock.

METHODS: We conducted a randomized, double-blind trial of post-cardiac arrest patients in shock, defined as vasopressor support for a minimum of 1 hour. Patients were randomized to intravenous hydrocortisone 100 mg or placebo every 8 hours for 7 days or until shock reversal. The primary endpoint was time to shock reversal.

RESULTS: Fifty patients were included with 25 in each group. There was no difference in time to shock reversal between groups (hazard ratio: 0.83 [95% CI: 0.40-1.75], p = 0.63). We found no difference in secondary outcomes including shock reversal (52% vs. 60%, p = 0.57), good neurological outcome (24% vs. 32%, p = 0.53) or survival to discharge (28% vs. 36%, p = 0.54) between the hydrocortisone and placebo groups. Of the patients with a baseline cortisol < 15 ug/dL, 100% (6/6) in the hydrocortisone group achieved shock reversal compared to 33% (1/3) in the placebo group (p = 0.08). All patients in the placebo group died (100%; 3/3) whereas 50% (3/6) died in the hydrocortisone group (p = 0.43).

CONCLUSIONS: In a population of cardiac arrest patients with vasopressor-dependent shock, treatment with hydrocortisone did not improve time to shock reversal, rate of shock reversal, or clinical outcomes when compared to placebo.

CLINICAL TRIAL REGISTRATION: Clinicaltrials.gov: NCT00676585, registration date: May 9, 2008.

PEDIATRIA

1. Resuscitation. 2016 Oct 11;109:40-48. doi: 10.1016/j.resuscitation.2016.09.026. [Epub ahead of print]

Exploring the safety and efficacy of targeted temperature management amongst infants with out-of-hospital cardiac arrest due to apparent life threatening events.

Meert K1, Telford R2, Holubkov R2, Slomine BS3, Christensen JR3, Dean JM2, Moler FW4; Therapeutic Hypothermia after Paediatric Cardiac Arrest (THAPCA) Trial Investigators.

Abstract

OBJECTIVE: To explore the safety and efficacy of targeted temperature management amongst infants with out-of-hospital cardiac arrest due to an apparent life threatening event (ALTE) recruited to the Therapeutic Hypothermia after Paediatric Cardiac Arrest Out-of-Hospital trial.

METHODS: Fifty-four infants (48h to <1year of age) with ALTE who received chest compressions for ≥2min, were comatose, and required mechanical ventilation after return of circulation were included. Infants were randomised to therapeutic hypothermia (33°C) (n=26) or therapeutic normothermia (36.8°C) (n=28) within six hours of return of circulation. Outcomes included 12-month survival with Vineland Adaptive Behaviour Scales, Second Edition (VABS-II) score ≥70, 12-month survival, change in VABS-II score from pre-arrest to 12 months post-arrest, and select safety measures.

RESULTS: Amongst infants with pre-arrest VABS-II ≥70 (n=52), there was no difference in 12-month survival with VABS-II ≥70 between therapeutic hypothermia and therapeutic normothermia groups (2/25 (8.0%) vs. 1/27 (3.7%); relative risk 2.16; 95% confidence interval 0.21-22.38, p=0.60). Amongst all evaluable infants (n=53), the change in VABS-II score from pre-arrest to 12 months post-arrest did not differ (p=0.078) between therapeutic hypothermia and therapeutic normothermia groups, nor did 12-month survival (5/26 (19.2%) vs. 1/27 (3.7%); relative risk 5.19; 95% confidence interval 0.65-41.50, p=0.10).

CONCLUSIONS: Mortality was high amongst infants that were comatose after out-of-hospital cardiac arrest due to ALTE in both therapeutic hypothermia and therapeutic normothermia

treated groups. Functional status was markedly reduced among survivors. (ClinicalTrials.gov, NCT00878644).

2. Front Pediatr. 2016 Oct 7;4:109. eCollection 2016.

ECLS in Pediatric Cardiac Patients.

Di Nardo M1, MacLaren G2, Marano M1, Cecchetti C1, Bernaschi P3, Amodeo A4.

Abstract

Extracorporeal life support (ECLS) is an important device in the management of children with severe refractory cardiac and or pulmonary failure. Actually, two forms of ECLS are available for neonates and children: extracorporeal membrane oxygenation (ECMO) and use of a ventricular assist device (VAD). Both these techniques have their own advantages and disadvantages. The intra-aortic balloon pump is another ECLS device that has been successfully used in larger children, adolescents, and adults, but has found limited applicability in smaller children. In this review, we will present the "state of art" of ECMO in neonate and children with heart failure. ECMO is commonly used in a variety of settings to provide support to critically ill patients with cardiac disease. However, a strict selection of patients and timing of intervention should be performed to avoid the increase in mortality and morbidity of these patients. Therefore, every attempt should be done to start ECLS "urgently" rather than "emergently," before the presence of dysfunction of end organs or circulatory collapse. Even though exciting progress is being made in the development of VADs for long-term mechanical support in children, ECMO remains the mainstay of mechanical circulatory support in children with complex anatomy, particularly those needing rapid resuscitation and those with a functionally univentricular circulation. With the increase in familiarity with ECMO, new indications have been added, such as extracorporeal cardiopulmonary resuscitation (ECPR). The literature supporting ECPR is increasing in children. Reasonable survival rates have been achieved after initiation of support during active compressions of the chest following in-hospital cardiac arrest. Contraindications to ECLS have reduced in the last 5 years and many centers support patients with functionally univentricular circulations. Improved results have been recently achieved in this complex subset of patients.

3. J Am Heart Assoc. 2016 Oct 17;5(10). pii: e003589.

Subsequent Shockable Rhythm During Out-of-Hospital Cardiac Arrest in Children With Initial Non-Shockable Rhythms: A Nationwide Population-Based Observational Study.

Goto Y1, Funada A2, Goto Y3.

Abstract

BACKGROUND: The effect of a subsequent treated shockable rhythm during cardiopulmonary resuscitation on the outcome of children who suffer out-of-hospital cardiac arrest with initial nonshockable rhythm is unclear. We hypothesized that subsequent treated shockable rhythm in children with out-of-hospital cardiac arrest would improve survival with favorable neurological outcomes (Cerebral Performance Category scale 1-2).

METHODS AND RESULTS: From the All-Japan Utstein Registry, we analyzed the records of 12 402 children (aged <18 years) with out-of-hospital cardiac arrest and initial nonshockable rhythms. Patients were divided into 2 cohorts: subsequent treated shockable rhythm (YES; n=239) and subsequent treated shockable rhythm (NO; n=12 163). The rate of 1-month cerebral performance category 1 to 2 in the subsequent treated shockable rhythm (YES) cohort was significantly higher when compared to the subsequent treated shockable rhythm (NO) cohort (4.6% [11 of 239] vs 1.3% [155 of 12 163]; adjusted odds ratio, 2.90; 95% CI, 1.42-5.36; all P<0.001). In the subsequent treated shockable rhythm (YES) cohort, the rate of 1-month cerebral performance category 1 to 2 decreased significantly as time to shock delivery increased (17.7% [3 of 17] for patients with shock-delivery time 0-9 minutes, 7.3% [8 of 109] for 10-19 minutes, and 0% [0 of 109] for 20-59 minutes; P<0.001 [for trend]). Age-stratified outcomes showed no significant differences between the 2 cohorts in the group aged <7 years old: 1.3% versus 1.4%, P=0.62.

CONCLUSIONS: In children with out-of-hospital cardiac arrest and initial nonshockable rhythms, subsequent treated shockable rhythm was associated with improved 1-month survival with favorable neurological outcomes. In the cohort of older children (7-17 years), these outcomes worsened as time to shock delivery increased.

4. Circulation. 2016 Oct 24. pii: CIRCULATIONAHA.116.023821. [Epub ahead of print]

Duration of Prehospital Cardiopulmonary Resuscitation and Favorable Neurological Outcomes for Pediatric Out-of-Hospital Cardiac Arrests: A Nationwide, Population-Based Cohort Study.

Goto Y1, Funada A2, Goto Y3.

Abstract

BACKGROUND: -The appropriate duration of cardiopulmonary resuscitation (CPR) for pediatric out-of-hospital cardiac arrests (OHCAs) remains unclear and may differ based on initial rhythm. We aimed to determine the relationship between the duration of prehospital CPR by emergency medical services (EMS) personnel and post-OHCA outcomes.

METHODS: -We analyzed the records of 12,877 pediatric patients who experienced OHCAs (aged <18 years). Data were recorded in a nationwide Japanese database between 2005 and 2012. Study endpoints were 30-day survival and 30-day survival with favorable neurological outcomes (Cerebral Performance Category [CPC] scale 1-2). Prehospital EMS-initiated CPR duration was defined as the time from CPR initiation by EMS personnel to prehospital return of spontaneous circulation (ROSC), or to hospital arrival when prehospital ROSC was not achieved during prehospital CPR efforts.

RESULTS: -The rates of 30-day survival and 30-day CPC 1-2 were 9.1% (n=1167) and 2.5% (n=325), respectively. Prehospital EMS-initiated CPR duration was significantly and inversely associated with 30-day outcomes (adjusted odds ratio for 1-minute increments [aOR]: 0.94, 95% confidence interval [CI]: 0.93-0.95 for survival; aOR: 0.90, 95% CI: 0.88-0.92 for CPC 1-2). The duration of prehospital EMS-initiated CPR beyond which the chance for favorable outcomes diminished to <1% was 42 minutes for each key outcome, 30-day survival and 30-day survival with CPC 1-2. When categorized by initial rhythm, the prehospital EMS-initiated CPR durations beyond which the chance for 30-day survival with CPC 1-2 diminished to <1% were 39 minutes for shockable rhythms, 42 minutes for pulseless electrical activity, and 46 minutes for asystole, respectively. In patients with bystander-initiated CPR, the prehospital CPR duration beyond which the chance for favorable outcome diminished to <1% was 46 minutes from call receipt.

CONCLUSIONS: Prehospital EMS-initiated CPR duration for pediatric OHCAs was independently and inversely associated with 30-day favorable outcomes. The duration of prehospital EMS-initiated CPR beyond which the chance for 30-day favorable outcomes diminished to <1% was 42 minutes. However, the CPR duration to achieve this proportion of outcomes differed based on initial rhythm. Further research is required to elucidate appropriate CPR duration for pediatric OHCAs including in-hospital CPR time.

5. Am J Physiol Heart Circ Physiol. 2016 Nov 1;311(5):H1202-H1213. doi: 10.1152/ajpheart.00227.2016. Epub 2016 Sep 2.

Selective head cooling during neonatal seizures prevents postictal cerebral vascular dysfunction without reducing epileptiform activity.

Harsono M1, Pourcyrous M1, Jolly EJ2, de Jongh Curry A2, Fedinec AL1, Liu J1, Basuroy S1, Zhuang D1, Leffler CW1, Parfenova H3.

Abstract

Epileptic seizures in neonates cause cerebrovascular injury and impairment of cerebral blood flow (CBF) regulation. In the bicuculline model of seizures in newborn pigs, we tested the hypothesis that selective head cooling prevents deleterious effects of seizures on cerebral vascular functions. Preventive or therapeutic ictal head cooling was achieved by placing two head ice packs during the preictal and/or ictal states, respectively, for the ~2-h period of seizures. Head cooling lowered the brain and core temperatures to 25.6 ± 0.3 and 33.5 ± 0.1°C, respectively. Head cooling had no anticonvulsant effects, as it did not affect the bicuculline-evoked electroencephalogram parameters, including amplitude, duration, spectral power, and spike frequency distribution. Acute and long-term cerebral vascular effects of seizures in the normothermic and head-cooled groups were tested during the immediate (2-4 h) and delayed (48 h) postictal periods. Seizure-induced cerebral vascular injury during the immediate postictal period was detected as terminal deoxynucleotidyl transferase-mediated dUTP nick-end labeling-positive staining of cerebral arterioles and a surge of brain-derived circulating endothelial cells in peripheral blood in the normothermic group, but not in the head-cooled groups. During the delayed postictal period, endothelium-dependent cerebral vasodilator responses were greatly reduced in the normothermic group, indicating impaired CBF regulation. Preventive or therapeutic ictal head cooling mitigated the endothelial injury and greatly reduced loss of postictal cerebral vasodilator functions. Overall, head cooling during seizures is a clinically

relevant approach to protecting the neonatal brain by preventing cerebrovascular injury and the loss of the endothelium-dependent control of CBF without reducing epileptiform activity.

6. Pediatr Emerg Care. 2016 Nov;32(11):779-784.
Fatal Cardiac Arrest in 2 Children: Possible Role of Ondansetron.
Brenner SM1, Boucher J.
Abstract
INTRODUCTION: Ondansetron is commonly used to treat vomiting in gastroenteritis, but has a United States Food and Drug Administration black box warning for risk of Q wave to T wave time interval (QT) prolongation. We report 2 pediatric cases of fatal refractory cardiac arrest after administration of ondansetron.
CASES: A 10-year-old previously healthy boy presented to the emergency room with gastroenteritis symptoms. After intravenous fluids, morphine, antibiotics, and 2 doses of ondansetron, the patient became unresponsive with agonal respirations and a wide complex tachycardia consistent with ventricular tachycardia. In a second case, an 86-day-old infant with previously unidentified congenital cardiomyopathy presented to our emergency department with gastroenteritis symptoms. The patient received ondansetron and subsequently experienced repeated bouts of supraventricular tachycardia which progressed to ventricular fibrillation. Resuscitation efforts failed in each case, and both patients expired.
DISCUSSION: Ondansetron can cause dose-dependent QT prolongation effects, which are more clinically relevant when other proarrhythmic elements are present. There is very limited published experience on use of ondansetron in children younger than 2 years. Our 2 cases join 2 previous case reports of death after ondansetron administration for gastroenteritis. The pharmacology of ondansetron's cardiac effects and drug-induced QT prolongation is discussed.
CONCLUSIONS: Patients may have hidden risk factors that, together with ondansetron, could result in a proarrhythmic state that could lead to adverse effects, such as arrhythmias. Administration of ondansetron should be individualized and used cautiously in patients with risk factors for arrhythmia.

TARGET TEMEPERATUR MANAGEMENT

1. Resuscitation. 2016 Oct 12;109:49-55. doi: 10.1016/j.resuscitation.2016.09.011. [Epub ahead of print]
Influence of body mass index on the prognosis of patients successfully resuscitated from out-of-hospital cardiac arrest treated by therapeutic hypothermia.
Geri G1, Savary G2, Legriel S2, Dumas F3, Merceron S2, Varenne O4, Livarek B5, Richard O6, Mira JP7, Bedos JP2, Empana JP8, Cariou A1, Grimaldi D9.
Abstract
BACKGROUND: Obesity prevalence has dramatically increased over recent years and is associated with cardiovascular diseases, but data are lacking on its prognostic impact in out-of-hospital cardiac arrest (OHCA) patients.
METHODS: Data of all consecutive OHCA patients admitted in two cardiac arrest centers from Paris and suburbs between 2005 and 2012 were prospectively collected. Patients treated by therapeutic hypothermia (TH) were included in the analysis. Logistic and Cox regression analyses were used to quantify the association between body mass index (BMI) at hospital admission and day-30 and 1-year mortality respectively.
RESULTS: 818 patients were included in the study (median age 60.9 [50.8-72.7] year, 70.2% male). Obese patients (BMI>30kgm-2) were older, more frequently male and evidenced more frequently cardiovascular risk factors than normally (18.5<BMI<25kgm-2) or overweight patients (25<BMI<30kgm-2). Post-resuscitation shock and therapeutic hypothermia failure were more frequent in obese patients. Overall mortality at day-30 and one-year was 63.8 and 67.2%, respectively. After multivariate adjustment, BMI>30kgm-2 was independently associated with day-30 mortality (Odds ratio [OR] in comparison with normally weight patients 2.45; 95% confidence interval [95%CI: 1.32-4.56; p<0.01]). Obesity was not associated with one-year mortality (Hazard ratio [HR] 0.99, 95%CI 0.21,4.67; p=0.99) while underweight was associated with one-year mortality in this subgroup of patients (Hazard ratio [HR] 3.94, 95%CI 1.11,14.01; p=0.03).

CONCLUSION: In the present study, obesity was independently associated with day-30 mortality in successfully resuscitated ICU TH OHCA patients. Further studies are needed to understand the mechanisms that underpin this finding.

2. Ther Hypothermia Temp Manag. 2016 Oct 26. [Epub ahead of print]
Clinical Effect of Rebound Hyperthermia After Cooling Postcardiac Arrest: A Retrospective Cohort Study.
Makker P1, Shimada YJ2, Misra D3, Kanei Y3.
Abstract
Therapeutic hypothermia is used in select patients after out-of-hospital cardiac arrest (OHCA) to improve neurologic outcome. Rebound hyperthermia (RH) is commonly observed post-treatment. Previous studies analyzing the association of RH with clinical outcome have reported conflicting results. The purpose of this study is to examine the impact of RH after completion of therapeutic hypothermia in patients postcardiac arrest. We analyzed a retrospective cohort from our institution. All adults who underwent therapeutic hypothermia post-OHCA were divided into two cohorts depending on the presence/absence of fever (T > 38°C) within 24 hours of completing hypothermia protocol. Clinical outcomes were analyzed at hospital discharge or death. Among 306 patients admitted with OHCA, 117 underwent hypothermia, 97 survived 24 hours postrewarming. Twenty-seven patients (50%) with RH died compared with 20 (47%) without RH (OR, 1.15; 95% CI, 0.52-2.57). Twenty-six patients (67%) with RH had a poor neurologic outcome compared with 27 (63%) without RH (OR 1.19, 95% CI, 0.51-2.74). RH is common after completion of therapeutic hypothermia in comatose patients due to cardiac arrest and is associated with poor neurologic outcomes. We found no significant clinical impact of rebound hypothermia on neurologic outcome or mortality, but our study was underpowered to reveal such impact if it exists.

CASE REPORTS

1. Prehosp Emerg Care. 2016 Oct 28:1-5. [Epub ahead of print]
CPR Induced Consciousness During Out-of-Hospital Cardiac Arrest: A Case Report on an Emerging Phenomenon.
Pound J, Verbeek PR, Cheskes S.
Abstract
BACKGROUND: High quality cardiopulmonary resuscitation (CPR) has produced a relatively new phenomenon of consciousness in patients with vital signs absent. Further research is necessary to produce a viable treatment strategy during and post resuscitation.
OBJECTIVE: To provide a case study done by paramedics in the field illustrating the need for sedation in a patient whose presentation was consistent with CPR induced consciousness. Resuscitative challenges are provided as well as potential future treatment options to minimize harm to both patients and prehospital providers.
CASE REPORT: A 52-year-old male presented as a witnessed out-of-hospital cardiac arrest (OHCA). During CPR the patient began to exhibit signs of life including severe agitation and thrashing of his limbs while CPR was ongoing for ventricular fibrillation prior to defibrillation. Resuscitation became considerably more complicated due to the violent and counterintuitive motions done by the patient during their own resuscitation. Despite the atypical presentation of cardiac arrest the patient was successfully resuscitated employing high quality CPR, standard advanced life support (ALS) care as well as two double sequential external defibrillation shocks. The patient underwent emergency percutaneous coronary intervention (PCI) for a 100% occlusion of his left anterior descending artery (LAD). The patient returned home 3 days later fully recovered with a Cerebral Performance Score of 1.
CONCLUSION: CPR induced consciousness is emerging as a new phenomenon challenging providers of high quality CPR during cardiac arrest resuscitation. Our case report describes the manifestations of CPR induced consciousness as well as the resuscitative challenges which occur during resuscitation. Further research is required to determine the true frequency of this condition as well as treatment algorithms that would allow for appropriate and safe management for both the patient and EMS providers.

2. CJEM. 2016 Nov;18(6):484-487. Epub 2016 May 16.
CPR-associated right ventricular rupture in the setting of pulmonary embolism.

Hickey TB1, Gill GG2, Seidman MA3, Webber DL1.

Abstract

Cardiopulmonary resuscitation (CPR) is an inherently traumatic procedure. Successful resuscitations are often complicated by iatrogenic injuries to structures of the neck, thorax, or abdomen. Rib and sternal fractures are the most frequently induced injuries. However, rare and life-threatening trauma to vital organs such as the heart may also occur during CPR. We describe a novel case of CPR-associated right ventricular rupture in a woman with acute-on-chronic pulmonary embolism and no known pre-existing cardiac disease. We propose that chest compressions in the setting of elevated right ventricular pressure resulted in cardiac rupture, in this case.

3. J Clin Monit Comput. 2016 Dec;30(6):933-937. Epub 2015 Oct 26.

Massive pulmonary embolism leading to cardiac arrest: one pathology, two different ECMO modes to assist patients.

Giraud R1,2,3, Banfi C4,5,6, Siegenthaler N7,5,6, Bendjelid K7, 5,6.

Abstract

Massive acute pulmonary embolism (MAPE) represents a significant risk for morbidity and mortality. The potential for sudden and fatal deterioration highlights the need for a prompt diagnosis and appropriate intervention. Using two cases reports, we describe two different modes of successful ECMO implantation (VA-ECMO vs. VV-ECMO) for MAPE leading to cardiac arrest. A 27-year-old patient with a severe trauma presented with a MAPE leading to cardiac arrest. In this case, which had absolute contraindications of thrombolysis, a VA-ECMO was successfully implanted. Additionally, a 56-year-old patient presented with a MAPE leading to cardiac arrest. Although intravenous thrombolysis allowed for hemodynamic stabilization, the patient remained severely hypoxemic with RV dilation. A VV-ECMO was successfully implemented, leading to a rapid improvement in both oxygenation and RV function. ECMO can provide lifesaving hemodynamic and respiratory support in critically ill patients with a MAPE who are too unstable to tolerate other interventions or have failed other therapies. An important determinant of success in the use of ECMO for MAPE is the return of adequate RV function, which allows physicians to appropriately identify which type of ECMO to implant.

BJA: Possible complication of bee stings and a review of the cardiac effects of bee stings.

4. BMJ Case Rep. 2016 Nov 1;2016. pii: bcr2015213974. doi: 10.1136/bcr-2015-213974.

Possible complication of bee stings and a review of the cardiac effects of bee stings.

Gupta PN1, Kumar BK1, Velappan P1, Sudheer MD1.

Abstract

We report the case of a patient who, ∼3 weeks after multiple bee stings, developed a prolonged heart block, syncope and cardiac arrest. This required a temporary pacemaker to be implanted, which was later replaced with a permanent pacemaker. An ECG taken following surgery for a fractured humerus 6 years earlier was reportedly normal. The patient had been a rubber tapper who walked ∼1.5 km/day, but after the bee attack he was no longer able to walk or get up from the bed without experiencing syncope. We presume that the bee venom caused these signs, as well as the resulting heart block, which persisted long after the bee sting had subsided. Since his coronary angiogram was normal we believe he had a Kounis type involvement of the cardiovascular system, namely profound coronary spasm that caused complete heart block that did not recover. Another probable reason for the complete heart block could have been that the bees had consumed the pollen of a rhododendron flower, causing 'grayanotoxin' poisoning and severe heart block. The other effects of bee sting are discussed briefly.

REGISTRES I REVISIONS

1. Resuscitation. 2016 Nov 5. pii: S0300-9572(16)30522-6. doi: 10.1016/j.resuscitation.2016.10.019. [Epub ahead of print]

Medical versus non medical etiology in out-of-hospital cardiac arrest-Changes in outcome in relation to the revised Utstein template.

Claesson A1, Djarv T2, Nordberg P2, Ringh M2, Hollenberg J2, Axelsson C3, Ravn-Fischer A4, Stromsoe A5.

Abstract
INTRODUCTION:
The Utstein-style recommendations for reporting etiology and outcome in out-of-hospital cardiac arrest (OHCA) from 2004 have recently been revised. Among other etiologies a medical category is now introduced, replacing the cardiac category from Utstein template 2004.
AIM: The aim of this study is to describe characteristics and temporal trends from reporting OHCA etiology according to the revised Utstein template 2014 in regards to patient characteristics and 30-day survival rates.
METHODS: This registry study is based on consecutive OHCA cases reported from the Emergency medical services (EMS) to the Swedish Registry of Cardiopulmonary Resuscitation (SRCR) 1992-2014. Characteristics, including a presumed cardiac etiology in Utstein template 2004, were transcribed to a medical etiology in Utstein template 2014.
RESULTS: Of a total of n=70,846 cases, 92% were categorized as having a medical etiology and 8% as having a non-medical cause. Using the new classifications, the 30-day survival rate has significantly increased over a 20-year period from 4.7% to 11.0% in the medical group and from 3% to 9.9% in the non-medical group (p≤0.001). Trauma was the most common cause in OHCA of a non-medical etiology (26%) with a 30-day survival rate of 3.4% whilst drowning and drug overdose had the highest survival rates (14% and 10% respectively).
CONCLUSION: Based on Utstein 2014 categories of etiology, overall survival after OHCA with a medical etiology has more than doubled in a 20-year period and tripled for non-medical cases. Patients with a medical etiology found in a shockable rhythm have the highest chance of survival. There is great variability in characteristics among non-medical cases.

2. Obstet Gynecol Clin North Am. 2016 Dec;43(4):809-819. doi: 10.1016/j.ogc.2016.07.011.
Cardiac Arrest and Resuscitation Unique to Pregnancy.
Bennett TA1, Katz VL2, Zelop CM3.
Abstract
Maternal cardiopulmonary arrest (MCPA) is a catastrophic event that can cause significant morbidity and mortality. A prepared, multidisciplinary team is necessary to perform basic and advanced cardiac life support specific to the anatomic and physiologic changes of pregnancy. MCPA is a challenging clinical scenario for any provider. Overall, it is an infrequent occurrence that involves 2 patients. However, key clinical intervention performed concurrently can save the life of both mother and baby.

3. BMJ Open. 2016 Nov 7;6(11):e012434. doi: 10.1136/bmjopen-2016-012434.
Are sociodemographic characteristics associated with spatial variation in the incidence of OHCA and bystander CPR rates? A population-based observational study in Victoria, Australia.
Straney LD1, Bray JE1,2,3, Beck B1, Bernard S1,3,4, Lijovic M1,4, Smith K1,4,5.
Abstract
BACKGROUND: Rates of out-of-hospital cardiac arrest (OHCA) and bystander cardiopulmonary resuscitation (CPR) have been shown to vary considerably in Victoria. We examined the extent to which this variation could be explained by the sociodemographic and population health characteristics of the region.
METHODS: Using the Victorian Ambulance Cardiac Arrest Registry, we extracted OHCA cases occurring between 2011 and 2013. We restricted the calculation of bystander CPR rates to those arrests that were witnessed by a bystander. To estimate the level of variation between Victorian local government areas (LGAs), we used a two-stage modelling approach using random-effects modelling.
RESULTS: Between 2011 and 2013, there were 15 830 adult OHCA in Victoria. Incidence rates varied across the state between 41.9 to 104.0 cases/100 000 population. The proportion of the population over 65, socioeconomic status, smoking prevalence and education level were significant predictors of incidence in the multivariable model, explaining 93.9% of the variation in incidence among LGAs. Estimates of bystander CPR rates for bystander witnessed arrests varied from 62.7% to 73.2%. Only population density was a significant predictor of rates in a multivariable model, explaining 73% of the variation in the odds of receiving bystander CPR among LGAs.
CONCLUSIONS: Our results show that the regional characteristics which underlie the variation seen in rates of bystander CPR may be region specific and may require study in smaller areas. However, characteristics associated with high incidence and low bystander CPR rates can be

identified and will help to target regions and inform local interventions to increase bystander CPR rates

4. Ann Cardiol Angeiol (Paris). 2016 Nov 4. pii: S0003-3928(16)30401-2. doi: 10.1016/j.ancard.2016.10.004. [Epub ahead of print]
[**Sudden cardiac death: Are women different?**]
[Article in French]
Karam N1, Marijon E2, Bougouin W3, Spaulding C 2, Jouven X2.
Abstract
Sudden cardiac death is a major public health problem with around 40,000 cases per year in France. Epidemiological, clinical and prognostic differences according to gender have been described in most cardiovascular diseases, including sudden cardiac death. In this article, we will review gender differences in sudden cardiac death incidence, circumstance of occurrence, management, and prognosis.

5. Resuscitation. 2016 Nov 2;110:42-47. doi: 10.1016/j.resuscitation.2016.10.018. [Epub ahead of print]
The influence of comorbidity on survival and long-term outcomes after out-of-hospital cardiac arrest.
Andrew E1, Nehme Z2, Bernard S3, Smith K4.
Abstract
INTRODUCTION: Comorbid conditions have been associated with morbidity, functional status and quality of life for patients with a wide range of diseases. Previous studies have attempted to elucidate the influence of pre-arrest comorbidities on survival and neurological recovery following out-of-hospital cardiac arrest (OHCA), however the findings are conflicting.
METHODS: Baseline comorbidities recorded within prehospital patient care records were linked with baseline and 12-month follow-up data from the Victorian Ambulance Cardiac Arrest Registry for adult (≥16 years) non-traumatic OHCA patients. Dates of death from the Victorian death registry were also obtained for patients surviving to hospital discharge. Multivariable logistic, linear and Cox proportional hazards regression models were used to assess the influence of the Charlson Comorbidity Index (CCI) on survival to hospital discharge, 12-month functional recovery and health-related quality of life (HR-QOL), and long-term mortality over an eight-year period.
RESULTS: A total of 15,953 patients were included. Increasing CCI was independently associated with reduced odds of survival to hospital discharge (CCI=1: OR=0.87 [95% CI 0.76-1.00]; CCI=2: OR=0.80 [95% CI 0.68-0.94]; CCI=3: OR=0.62 [95% CI 0.50-0.78]; CCI≥4: OR=0.53 [95% CI 0.41-0.68]). Additionally, increasing CCI was associated with reduced odds of 12-month functional recovery, a reduced chance of favourable 12-month HR-QOL, and an increased hazard of mortality after discharge from hospital.
CONCLUSION: Consideration of a patient's baseline comorbidity may assist prognostication decisions for cardiac arrest patients. Exploration of the effect of additional rehabilitation on HR-QOL and long-term survival outcomes for OHCA patients with a high baseline comorbidity burden may be warranted.

ECMO

1. CJEM. 2016 Nov 7:1-6. [Epub ahead of print]
Concealed resuscitation-related injuries as reversible cause of recurrent arrest following extracorporeal cardiopulmonary resuscitation.
Han KS1, Lee SW1, Park KH1, Park JS1, Jung JS2, Yu CW3, Kim SJ1.
Abstract
A life-threatening cardiopulmonary resuscitation (CPR)-related injury can cause recurrent arrest after return of circulation. Such injuries are difficult to identify during resuscitation, and their contribution to failed resuscitation can be missed given the limitations of conventional CPR. Extracorporeal cardiopulmonary resuscitation (ECPR), increasingly being considered for selected patients with potentially reversible etiology of arrest, may identify previously occult CPR-related injuries by restoring arterial pressure and flow. Herein, we describe two cases of severe CPR-related injuries contributing to recurrent arrest. Each case had ECPR implemented within 60 minutes of the start of CPR. After the presumed cardiac etiology had been addressed with

percutaneous coronary intervention, life-threatening cardiovascular injuries with recurrent arrest were noted, and resuscitative thoracotomy was performed under ECPR. One patient survived to hospital discharge. ECPR may provide an opportunity to identify and correct severe resuscitation-related injuries causing recurrent arrest. Chest compression depth >6 cm, especially in older women, may contribute to these injuries.

DESFIBRIL·LACIÓ I ELECTROFISIOLOGIA

1. West J Emerg Med. 2016 Nov;17(6):762-765. Epub 2016 Oct 20.
First Report of Survival in Refractory Ventricular Fibrillation After Dual-Axis Defibrillation and Esmolol Administration.
Boehm KM1, Keyes DC1, Mader LE2, Moccia JM2.
Abstract
There is a subset of patients who suffer a witnessed ventricular fibrillation (VF) arrest and despite receiving reasonable care with medications (epinephrine and amiodarone) and multiple defibrillations (3+ attempts at 200 joules of biphasic current) remain in refractory VF (RVF), also known as electrical storm. The mortality for these patients is as high as 97%. We present the case of a patient who, with a novel approach, survived RVF to outpatient follow up.

REBOA (Resuscitative endovascular balloon occlusion of the aorta)

1. Curr Opin Crit Care. 2016 Nov 4. [Epub ahead of print]
Resuscitative endovascular balloon occlusion of the aorta: promise, practice, and progress?
Perkins ZB1, Lendrum RA, Brohi K.
Abstract
PURPOSE OF REVIEW: Resuscitative endovascular balloon occlusion of the aorta (REBOA) is a minimally invasive damage control procedure for life-threatening abdominal or pelvic haemorrhage. The purpose of this review is to summarize the current understanding and experience with REBOA, outline potential future applications of this technology, and highlight priority areas for further research.
RECENT FINDINGS: REBOA is a feasible method of achieving temporary aortic occlusion and can be performed rapidly, with a high degree of success, in the emergency setting (including at the scene of injury) by appropriately trained clinicians. The procedure supports central perfusion, controls noncompressible haemorrhage, and may improve survival in certain profoundly shocked patient groups; but is also associated with significant risks, including ischaemic tissue damage and procedural complications. Evolutions of this strategy are being explored, with promising proof-of-concept studies in the fields of partial aortic occlusion and the combination of REBOA with extracorporeal support.
SUMMARY: Noncompressible torso haemorrhage is the leading cause of preventable trauma deaths. The majority of these deaths occur soon after injury, often before any opportunity for definitive haemorrhage control. For a meaningful reduction in trauma mortality, novel methods of rapid haemorrhage control are required.

2. Injury. 2016 Oct 20. pii: S0020-1383(16)30674-X. doi: 10.1016/j.injury.2016.10.024. [Epub ahead of print]
Resuscitative endovascular balloon occlusion of the aorta (REBOA): What have we learned?
Andres J1, Scott J2, Giannoudis PV3.

TRAUMA

1. Injury. 2016 Nov 5. pii: S0020-1383(16)30724-0. doi: 10.1016/j.injury.2016.11.003. [Epub ahead of print]
Bi-manual proximal external aortic compression after major abdominal-pelvic trauma and during ambulance transfer: A simulation study.
Douma MJ1, O'Dochartaigh D2, Brindley PG3.
Abstract
BACKGROUND: Applying manual pressure after hemorrhage is intuitive, cost-free, and logistically-simple. When direct abdominal-pelvic compression fails, clinicians can attempt indirect proximal-external-aortic-compression (PEAC), while expediting transfer and definitive

rescue. This study quantifies the sustainability of simulated bi-manual PEAC both immediately on scene and during subsequent ambulance transfer. The goal is to understand when bi-manual PEAC might be clinically-useful, and when to prioritize compression-devices or endovascular-occlusion.
METHODS: We developed a simulated central vessel compression model utilizing a digital scale and Malbrain intra-abdominal pressure monitor inside a cardiopulmonary resuscitation mannequin. Twenty prehospital health care professionals (HCPs) performed simulated bimanual PEAC i) while stationary and ii) inside an 80km/h ambulance on a closed driving-track. Participants compressed at "the maximal effort they could maintain for 20min". Results were measured in mmHg applied-pressure and kilograms compressive-weight. The Borg scale of perceived-exertion was used to assess sustainability, with <16 regarded as acceptable.
RESULTS: While stationary all participants could maintain 20min of compressive pressure/weight: within five-percent of their starting effort, and with a Borg-score <16. Participants applied 88-300mmHg compression pressure; (mean 180mmHg), 14-55kg compression-weight (mean 33kg), and 37-66% of their bodyweight (mean 43%). In contrast, participants could not apply consistent or sustained compression in a moving ambulance: Borg Score exceeded 16 in all cases.
CONCLUSIONS: Survival following major abdominal-pelvic hemorrhage requires expedited operative/interventional rescue. Firstly, however, we must temporize pre-hospital exsanguination both on scene and during transfer. Despite limitations, our work suggests PEAC is feasible while waiting for, but not during, ambulance-transfer. Accordingly, we propose a chain-of-survival that cautions against over-reliance on manual PEAC, while supporting pre-hospital devices, endovascular occlusion, and expeditious but safe hospital-transfer.

PEDIATRIA

1. JAMA Pediatr. 2016 Nov 12. doi: 10.1001/jamapediatrics.2016.3643. [Epub ahead of print]
Association of Bystander Cardiopulmonary Resuscitation With Overall and Neurologically Favorable Survival After Pediatric Out-of-Hospital Cardiac Arrest in the United States: A Report From the Cardiac Arrest Registry to Enhance Survival Surveillance Registry.
Naim MY1, Burke RV2, McNally BF3, Song L4, Griffis HM4, Berg RA5, Vellano K3, Markenson D6, Bradley RN7, Rossano JW8.
Abstract
Importance: There are few data on the prevalence or outcome of bystander cardiopulmonary resuscitation (BCPR) in children 18 years and younger.
Objective:
To characterize BCPR in pediatric out-of-hospital cardiac arrests (OHCAs).
Design, Setting, and Participants:
This analysis of the Cardiac Arrest Registry to Enhance Survival database investigated nontraumatic OHCAs in children 18 years and younger from January 2013 through December 2015.
Exposures: Bystander CPR, which included conventional CPR and compression-only CPR.
Main Outcomes and Measures:
Overall survival and neurologically favorable survival, defined as a Cerebral Performance Category score of 1 or 2, at the time of hospital discharge.
Results: Of the 3900 children younger than 18 years with OHCA, 2317 (59.4%) were infants, 2346 (60.2%) were female, and 3595 (92.2%) had nonshockable rhythms. Bystander CPR was performed on 1814 children (46.5%) and was more common for white children (687 of 1221 [56.3%]) compared with African American children (447 of 1134 [39.4%]) and Hispanic children (197 of 455 [43.3%]) ($P < .001$). Overall survival and neurologically favorable survival were 11.3% (440 of 3900) and 9.1% (354 of 3900), respectively. On multivariable analysis, BCPR was independently associated with improved overall survival (adjusted proportion, 13.2%; 95% CI, 11.81-14.58; adjusted odds ratio, 1.57; 95% CI, 1.25-1.96) and neurologically favorable survival (adjusted proportion, 10.3%; 95% CI, 9.10-11.54; adjusted odds ratio, 1.50; 95% CI, 1.21-1.98) compared with no BCPR (overall survival: adjusted proportion, 9.5%; 95% CI, 8.28-10.69; neurologically favorable survival: adjusted proportion, 7.59%; 95% CI, 6.50-8.68). For those with data on type of BCPR, 697 of 1411 (49.4%) received conventional CPR and 714 of 1411 (50.6%) received compression-only CPR. On multivariable analysis, only conventional CPR (adjusted proportion, 12.89%; 95% CI, 10.69-15.09; adjusted odds ratio, 2.06; 95% CI, 1.51-2.79) was

associated with improved neurologically favorable survival compared with no BCPR (adjusted proportion, 9.59%; 95% CI, 6.45-8.61). There was a significant interaction of BCPR with age. Among infants, conventional BCPR was associated with improved overall survival and neurologically favorable survival while compression-only CPR had similar outcomes to no BCPR. Conclusions and Relevance: Bystander CPR is associated with improved outcomes in pediatric OHCAs. Improving the provision of BCPR in minority communities and increasing the use of conventional BCPR may improve outcomes for children with OHCA.

2. JAMA Pediatr. 2016 Nov 7. doi: 10.1001/jamapediatrics.2016.2535. [Epub ahead of print]
Survival Rates Following Pediatric In-Hospital Cardiac Arrests During Nights and Weekends.
Bhanji F1, Topjian AA2, Nadkarni VM2, Praestgaard AH3, Hunt EA4, Cheng A5, Meaney PA2, Berg RA2; American Heart Association's Get With the Guidelines–Resuscitation Investigators.
Abstract
Importance: Nearly 6000 hospitalized children in the United States receive cardiopulmonary resuscitation (CPR) annually. Little is known about whether the survival of these children is influenced by the time of the event (eg, nighttime or weekends). Differences in survival could have important implications for hospital staffing, training, and resource allocation.
Objective: To determine whether outcomes after pediatric in-hospital cardiac arrests differ during nights and weekends compared with days/evenings and weekdays.
Design, Setting, and Participants: This study included a total of 354 hospitals participating in the American Heart Association's Get With the Guidelines-Resuscitation registry from January 1, 2000, to December 12, 2012. Index cases (12 404 children) from all children younger than 18 years of age receiving CPR for at least 2 minutes were included. Data analysis was performed in December 2014 and June 2016. We aggregated hourly blocks of time, using previously defined time intervals of day/evening and night, as well as weekend. Multivariable logistic regression models were used to examine the effect of independent variables on survival to hospital discharge. We used a combination of a priori variables based on previous literature (including age, first documented rhythm, location of event in hospital, extracorporeal CPR, and hypotension as the cause of arrest), as well as variables that were identified in bivariate generalized estimating equation models, and maintained significance of $P \leq .15$ in the final multivariable models.
Main Outcomes and Measures: The primary outcome measure was survival to hospital discharge, and secondary outcomes included return of circulation lasting more than 20 minutes and 24-hour survival.
Results: Of 12 404 children (56.0% were male), 8731 (70.4%) experienced a return of circulation lasting more than 20 minutes, 7248 (58.4%) survived for 24 hours, and 4488 (36.2%) survived to hospital discharge. After adjusting for potential confounders, we found that the rate of survival to hospital discharge was lower during nights than during days/evenings (adjusted odds ratio, 0.88 [95% CI, 0.80-0.97]; $P = .007$) but was not different between weekends and weekdays (adjusted odds ratio, 0.92 [95% CI, 0.84-1.01]; $P = .09$).
Conclusions and Relevance: The rate of survival to hospital discharge was lower for pediatric CPR events occurring at night than for CPR events occurring during daytime and evening hours, even after adjusting for many potentially confounding patient-, event-, and hospital-related factors.

3. AMA Pediatr. 2016 Nov 12. doi: 10.1001/jamapediatrics.2016.3694. [Epub ahead of print]
Pediatric Out-of-Hospital Cardiac Arrest: Pushing for Progress in Public Response.
Haskell SE1, Atkins DL1.
Author information:
- 1Department of Pediatrics, University of Iowa Children's Hospital, Iowa City2Department of Pediatrics, University of Iowa Carver College of Medicine, Iowa City.

4. BMJ Open. 2016 Nov 11;6(11):e012259. doi: 10.1136/bmjopen-2016-012259.
Patient safety events in out-of-hospital paediatric airway management: a medical record review by the CSI-EMS.
Hansen M1, Meckler G2, Lambert W3, Dickinson C4, Dickinson K4, Van Otterloo J4, Guise JM1,3,4,5.
Abstract

OBJECTIVE: To describe the frequency and characterise the nature of patient safety events in paediatric out-of-hospital airway management.
METHODS: We conducted a retrospective cross-sectional medical record review of all 'lights and sirens' emergency medicine services transports from 2008 to 2011 in patients <18 years of age in the Portland Oregon metropolitan area. A chart review tool (see online supplementary appendix) was adapted from landmark patient safety studies and revised after pilot testing. Expert panels of physicians and paramedics performed blinded reviews of each chart, identified safety events and described their nature. The primary outcomes were presence and severity of patient safety events related to airway management including oxygen administration, bag-valve-mask ventilation (BVM), airway adjuncts and endotracheal intubation (ETI).DC1SM110.1136/bmjopen-2016-012259.supp1supplementary appendix RESULTS: From the 11 328 paediatric transports during the study period, there were 497 'lights and sirens' (code 3) transports (4.4%). 7 transports were excluded due to missing data. Of the 490 transports included in the analysis, 329 had a total of 338 airway management procedures (some had more than 1 procedure): 61.6% were treated with oxygen, 15.3% with BVM, 8.6% with ETI and 2% with airway adjuncts. The frequency of errors was: 21% (71/338) related to oxygen use, 9.8% (33/338) related to BVM, 9.5% (32/338) related to intubation and 0.9% (3/338) related to airway adjunct use. 58% of intubations required 3 or more attempts or failed altogether. Cardiac arrest was associated with higher odds of a severe error.
CONCLUSIONS: Errors in paediatric out-of-hospital airway management are common, especially in the context of intubations and during cardiac arrest.

5. Pediatr Cardiol. 2016 Nov 8. [Epub ahead of print]
Risk Factors for Cardiac Arrest or Mechanical Circulatory Support in Children with Fulminant Myocarditis.
Casadonte JR1, Mazwi ML1,2, Gambetta KE1, Palac HL3, McBride ME1,2, Eltayeb OM4, Monge MC4, Backer CL4, Costello JM5,6.
Abstract
In children with fulminant myocarditis (FM), we sought to describe presenting characteristics and clinical outcomes, and identify risk factors for cardiac arrest and mechanical circulatory support (MCS). A retrospective review of patients with FM admitted at our institution between January 1, 2004, and June 31, 2015, was performed. We compared characteristics and outcomes of FM patients who received cardiopulmonary resuscitation (CPR) and/or were placed on MCS (CPR/MCS group) to those who did not develop these outcomes (Control group). There were 28 patients who met criteria for FM. Median age was 1.2 years (1 day-17 years). Recovery of myocardial function occurred in 13 patients (46%); 6 (21%) had chronic ventricular dysfunction, 6 (21%) underwent heart transplantation, and 3 (11%) died prior to hospital discharge (including one death following heart transplant). Of the 28 FM patients, 13 (46%) developed cardiac arrest (n = 11) and/or received MCS (n = 8). When compared to controls, patients in the CPR/MCS group had a higher peak b-type natriuretic peptide (BNP) levels (p = 0.03) and peak inotropic scores (p = 0.02). No significant differences were found between groups in demographics; chest radiograph, electrocardiogram, or echocardiogram findings; or initial laboratory values including BNP, troponin, C-reactive protein, lactate, and creatinine (p > 0.05 for all). Children with FM are at high risk of cardiovascular collapse leading to the use of CPR or MCS. Aside from peak BNP levels and inotropic scores, the most presenting characteristics were not helpful for predicting these outcomes. FM patients should ideally receive care in centers that provide emergent MCS.

6. J Pediatr Nurs. 2016 Nov 4. pii: S0882-5963(16)30355-4. doi: 10.1016/j.pedn.2016.10.005. [Epub ahead of print]
Validation of the Children's Hospital Early Warning System for Critical Deterioration Recognition.
McLellan MC1, Gauvreau K2, Connor JA3.
Abstract
OBJECTIVE: Early warning scores, such as the Children's Hospital Early Warning Score (CHEWS), are used by hospitals to identify patients at risk for critical deterioration and trigger clinicians to intervene and prevent further deterioration. This study's objectives were to validate the CHEWS and to compare the CHEWS to the previously validated Brighton Pediatric Early Warning Score

(PEWS) for early detection of critical deterioration in hospitalized, non-cardiac patients at a pediatric hospital.
DESIGN AND METHODS: A retrospective cohort study reviewed medical and surgical patients at a quaternary academic pediatric hospital. CHEWS scores and abstracted PEWS scores were obtained on cases (n=360) and a randomly selected comparison sample (n=776). Specificity, sensitivity, area under the receiver-operating characteristic curves (AUROC) and early warning times were calculated for both scoring tools.
RESULTS: The AUROC for CHEWS was 0.902 compared to 0.798 for PEWS (p<0.001). Sensitivity for scores ≥3 was 91.4% for CHEWS and 73.6% for PEWS with specificity of 67.8% for CHEWS and 88.5% for PEWS. Sensitivity for scores ≥5 was 75.6% for CHEWS and 38.9% for PEWS with specificity of 88.5% for CHEWS and 93.9% for PEWS. The early warning time from critical score (≥5) to critical deterioration was 3.8h for CHEWS versus 0.6h for PEWS (p<0.001).
CONCLUSION: The CHEWS system demonstrated higher discrimination, higher sensitivity and longer early warning time than the PEWS for identifying children at risk for critical deterioration.

7. Arch Dis Child. 2016 Oct 24. pii: archdischild-2016-310691. doi: 10.1136/archdischild-2016-310691. [Epub ahead of print]
Randomised crossover trial of rate feedback and force during chest compressions for paediatric cardiopulmonary resuscitation.
Gregson RK1,2, Cole TJ1, Skellett S2, Bagkeris E1, Welsby D2, Peters MJ1,2.
Abstract
OBJECTIVE: To determine the effect of visual feedback on rate of chest compressions, secondarily relating the forces used.
DESIGN: Randomised crossover trial.
SETTING: Tertiary teaching hospital.
SUBJECTS: Fifty trained hospital staff.
INTERVENTIONS: A thin sensor-mat placed over the manikin's chest measured rate and force. Rescuers applied compressions to the same paediatric manikin for two sessions. During one session they received visual feedback comparing their real-time rate with published guidelines.
OUTCOME MEASURES: Primary: compression rate. Secondary: compression and residual forces.
RESULTS: Rate of chest compressions (compressions per minute (compressions per minute; cpm)) varied widely (mean (SD) 111 (13), range 89-168), with a fourfold difference in variation during session 1 between those receiving and not receiving feedback (108 (5) vs 120 (20)). The interaction of session by feedback order was highly significant, indicating that this difference in mean rate between sessions was 14 cpm less (95% CI -22 to -5, p=0.002) in those given feedback first compared with those given it second. Compression force (N) varied widely (mean (SD) 306 (94); range 142-769). Those receiving feedback second (as opposed to first) used significantly lower force (adjusted mean difference -80 (95% CI -128 to -32), p=0.002). Mean residual force (18 N, SD 12, range 0-49) was unaffected by the intervention.
CONCLUSIONS: While visual feedback restricted excessive compression rates to within the prescribed range, applied force remained widely variable. The forces required may differ with growth, but such variation treating one manikin is alarming. Feedback technologies additionally measuring force (effort) could help to standardise and define effective treatments throughout childhood.

TTM

1. Am J Emerg Med. 2016 Oct 29. pii: S0735-6757(16)30782-3. doi: 10.1016/j.ajem.2016.10.070. [Epub ahead of print]
The association of body mass index with outcomes and targeted temperature management practice in cardiac arrest survivors.
Jung YH1, Lee BK2, Lee DH1, Lee SM1, Cho YS1, Jeung KW1.
Abstract
PURPOSE: Obesity is a well-known risk factor in various health conditions. We analyzed the association between obesity and clinical outcomes, and its effect on targeted temperature management (TTM) practice for cardiac arrest survivors by calculating and classifying their body mass indexes (BMIs).

METHODS: We conducted a retrospective data analysis of adult comatose cardiac arrest survivors treated with TTM from 2008 to 2015. BMI was calculated and the cohort was divided into four categories based on the cut-off values of 18.5, 23.0, and 27.5kgm-2. The primary outcome was six-month mortality and the secondary outcomes were neurologic outcome at hospital discharge, cooling rate, and rewarming rate.
RESULTS: The study included 468 patients. Poor neurologic outcome at discharge and six-month mortality were reported in 311 (66.5%) and 271 (57.9%) patients, respectively. A multivariate logistic analysis showed that an overweight compared to normal BMI was associated with lower probability of six-month mortality (odds ratio [OR], 0.481; 95% confidence interval [CI], 0.274-0.846; p=0.011) and poor neurologic outcome at discharge (OR, 0.482; 95% CI, 0.258-0.903; p=0.023). BMI correlated with cooling rate (B, -0.073; 95% CI, -0.108 to -0.039; p<0.001), but had no association with rewarming rate (B, 0.003; 95% CI, -0.001-0.008; p=0.058).
CONCLUSION: Overweight BMI compared to normal BMI classification was found to be associated with lower six-month mortality and poor neurologic outcome at discharge in cardiac arrest survivors treated with TTM. Higher BMI correlated with a slower induction rate.

2. PLoS One. 2016 Nov 7;11(11):e0166148. doi: 10.1371/journal.pone.0166148. eCollection 2016.
Outcomes of Adult In-Hospital Cardiac Arrest Treated with Targeted Temperature Management: A Retrospective Cohort Study.
Wang CH1,2, Huang CH1, Chang WT1, Tsai MS1, Yu PH3, Wu YW4,5,6, Chen WJ1,7.
Abstract
AIM: Targeted temperature management (TTM) for in-hospital cardiac arrest (IHCA) is given different recommendation levels within international resuscitation guidelines. We aimed to identify whether TTM would be associated with favourable outcomes following IHCA and to determine which factors would influence the decision to implement TTM.
METHODS: We conducted a retrospective observational study in a single medical centre. We included adult patients suffering IHCA between 2006 and 2014. We used multivariable logistic regression analysis to evaluate associations between independent variables and outcomes.
RESULTS: We included a total of 678 patients in our analysis; only 22 (3.2%) patients received TTM. Most (81.1%) patients met at least one exclusion criteria for TTM. In all, 144 (21.2%) patients survived to hospital discharge; among them, 60 (8.8%) patients displayed favourable neurological status at discharge. TTM use was significantly associated with favourable neurological outcome (OR: 3.74, 95% confidence interval [CI]: 1.19-11.00; p-value = 0.02), but it was not associated with survival (OR: 1.41, 95% CI: 0.54-3.66; p-value = 0.48). Arrest in the emergency department was positively associated with TTM use (OR: 22.48, 95% CI: 8.40-67.64; p value < 0.001) and having vasopressors in place at the time of arrest was inversely associated with TTM use (OR: 0.08, 95% CI: 0.004-0.42; p-value = 0.02).
CONCLUSION: TTM might be associated with favourable neurological outcome of IHCA patients, irrespective of arrest rhythms. The prevalence of proposed exclusion criteria for TTM was high among IHCA patients, but these factors did not influence the use of TTM in clinical practice or neurological outcomes after IHCA.

4. Stroke. 2016 Nov 10. pii: STROKEAHA.116.014200. [Epub ahead of print]
Results of the ICTuS 2 Trial (Intravascular Cooling in the Treatment of Stroke 2).

RECERCA EXPERIMENTAL

1. Artif Organs. 2016 Mar;40(3):270-7. doi: 10.1111/aor.12551. Epub 2015 Sep 2.
Retrograde Cerebral Perfusion Results in Better Perfusion to the Striatum Than the Cerebral Cortex During Deep Hypothermic Circulatory Arrest: A Microdialysis Study.
Liang MY1, Chen GX1, Tang ZX2, Rong J3, Yao JP1, Wu ZK1.
Abstract
It remains controversial whether contemporary cerebral perfusion techniques, utilized during deep hypothermic circulatory arrest (DHCA), establish adequate perfusion to deep structures in the brain. This study aimed to investigate whether selective antegrade cerebral perfusion (SACP) or retrograde cerebral perfusion (RCP) can provide perfusion equally to various anatomical positions in the brain using metabolic evidence obtained from microdialysis. Eighteen piglets

were randomly assigned to 40 min of circulatory arrest (CA) at 18°C without cerebral perfusion (DHCA group, n = 6) or with SACP (SACP group, n = 6) or RCP (RCP group, n = 6). Microdialysis parameters (glucose, lactate, pyruvate, and glutamate) were measured every 30 min in cortex and striatum. After 3 h of reperfusion, brain tissue was harvested for Western blot measurement of α-spectrin. After 40 min of CA, the DHCA group showed marked elevations of lactate and glycerol and a reduction in glucose in the microdialysis perfusate (all $P < 0.05$). The changes in glucose, lactate, and glycerol in the perfusate and α-spectrin expression in brain tissue were similar between cortex and striatum in the SACP group (all $P > 0.05$). In the RCP group, the cortex exhibited lower glucose, higher lactate, and higher glycerol in the perfusate and higher α-spectrin expression in brain tissue compared with the striatum (all $P < 0.05$). Glutamate showed no difference between cortex and striatum in all groups (all $P > 0.05$). In summary, SACP provided uniform and continuous cerebral perfusion to most anatomical sites in the brain, whereas RCP resulted in less sufficient perfusion to the cortex but better perfusion to the striatum

CASE REPORTS

1. Cardiovasc Pathol. 2016 Oct 20;26:7-11. doi: 10.1016/j.carpath.2016.10.002. [Epub ahead of print]

Woven coronary artery anomaly presenting as sudden cardiac death.

Val-Bernal JF1, Malaxetxebarria S2, González-Rodilla I2, Salas-García M3.

Abstract

Woven coronary artery is a rare anomaly characterized by thin channels arising from the coronary artery and reanastomosing at the distal arterial segment. To our knowledge, no data are available currently on the histologic structure of the woven segment. A 39-year-old man presented with sudden atypical chest pain while he was practicing cycling. During the transfer of the patient to the hospital, he suffered cardiac arrest. After 50 min of cardiopulmonary resuscitation, the patient could not return to sinus rhythm and died. At autopsy, the patient presented a woven right coronary artery associated with an old myocardial infarct of the posterior wall of the left ventricle. We describe for the first time a case of woven coronary artery associated with sudden death. This case allowed us to study the histopathology of the channels that make up the malformation. These showed well-conformed walls with absence of breaches. A complete review of the literature on the subject is included.