This week's PubMed 3rd – 9th September 2023: articles of interest n = 44

CPR AND COVID-19

1. Resuscitation. 2023 Sep 1:109957. doi: 10.1016/j.resuscitation.2023.109957. Online ahead of print.

Effect of COVID-19 on out-of-hospital cardiac arrest survival: no light at the end of the tunnel yet.

Guerini Giusteri V(1), Luce Caputo M(2), Baldi E(3), Auricchio A(4), Savastano S(3).

NO ABSTRACT AVAILABLE

2. Resusc Plus. 2023 Aug 23;15:100452. doi: 10.1016/j.resplu.2023.100452. eCollection 2023 Sep.

Code status orders in hospitalized patients with COVID-19.

Comer AR(1)(2)(3), Fettig L(2), Bartlett S(1), Sinha S(2), D'Cruz L(1), Odgers A(1), Waite C(1), Slaven JE(2), White R(2), Schmidt A(2), Petras L(2), Torke AM(2).

ABSTRACT
BACKGROUND: The COVID-19 pandemic created complex challenges regarding the timing and appropriateness of do-not-attempt cardiopulmonary resuscitation (DNACPR) and/or Do Not Intubate (DNI) code status orders. This paper sought to determine differences in utilization of DNACPR and/or DNI orders during different time periods of the COVID-19 pandemic, including prevalence, predictors, timing, and outcomes associated with having a documented DNACPR and/or DNI order in hospitalized patients with COVID-19. METHODS: A cohort study of hospitalized patients with COVID 19 at two hospitals located in the Midwest. DNACPR code status orders including, DNI orders, demographics, labs, COVID-19 treatments, clinical interventions during hospitalization, and outcome measures including mortality, discharge disposition, and hospice utilization were collected. Patients were divided into two time periods (early and late) by timing of hospitalization during the first wave of the pandemic (March-October 2020). RESULTS: Among 1375 hospitalized patients with COVID-19, 19% (n = 258) of all patients had a documented DNACPR and/or DNI order. In multivariable analysis, age (older) p =< 0.01, OR 1.12 and hospitalization early in the pandemic p = 0.01, OR 2.08, were associated with having a DNACPR order. Median day from DNACPR order to death varied between cohorts p => 0.01 (early cohort 5 days versus late cohort 2 days). In-hospital mortality did not differ between cohorts among patients with DNACPR orders, p = 0.80. CONCLUSIONS: There was a higher prevalence of DNACPR and/or DNI orders and these orders were written earlier in the hospital course for patients hospitalized early in the pandemic versus later despite similarities in clinical characteristics and medical interventions. Changes in clinical care between cohorts may be due to fear of resource shortages and changes in knowledge about COVID-19.

CPR/MECHANICAL CHEST COMPRESSION

No articles identified.

REGISTRIES, REVIEWS AND EDITORIALS

1. Resuscitation. 2023 Sep 6:109962. doi: 10.1016/j.resuscitation.2023.109962. Online ahead of print.

A two-point strategy to clarify prognosis in >80 year olds experiencing out of hospital cardiac arrest.

Paratz ED(1), Nehme E(2), Heriot N(2), Bissland K(3), Rowe S(4), Fahy L(5), Anderson D(6), Stub D(6), La Gerche A(4), Nehme Z(7).

ABSTRACT

BACKGROUND: The global population is aging, with the number of ≥80-year-olds projected to triple over the next 30 years. Rates of out-of-hospital cardiac arrest (OHCA) are also increasing within this age group. METHODS: The Victorian Ambulance Cardiac Arrest Registry was utilised to identify OHCAs in patients aged ≥80 years between 2002-2021. Predictors of survival to discharge were defined and a prognostic score derived from this cohort. RESULTS: 77,628 patients experienced OHCA of whom 25,269 (32.6%) were ≥80 years (80-90 years=18,956; 90-100 years=6,148; >100 years=209). The number of patients ≥80 years increased over time both absolutely (p=0.002) and proportionally (p=0.028). 619 (2.4%) patients survived to discharge without change over time. Older ages had no difference in witnessed OHCA status but were less likely to have shockable rhythm (OR 0.50 (95% CI 0.44-0.57) for 90-100-year-olds, OR 0.28 (95% CI 0.12-0.63) for 90-100-year-olds). If OHCA was witnessed and there was a shockable rhythm then survival was 14%; if one factor was present survival was 5-6% and if neither factor was present, survival was 0.09%. These survival rates enabled derivation of a simplified prognostic assessment score - the '15/5/0' score - highly comparable to a previously-published American cohort. CONCLUSIONS: Elderly OHCA rates have increased to one-third of caseload. The most important factors predicting survival were whether the OHCA was witnessed and there was a shockable rhythm. We present a simple two-point '15/5/0' prognostic score defining which patients will gain most from advanced resuscitative measures.

Agency Factors Associated with First Response Systems that Improve Out-of-Hospital Cardiac Arrest Outcomes.

Huebinger R(1), Spring M(2), McNally B(3), Humphries A(4), Persse D(5), Diggs D(6), Boerwinkle E(7), Bobrow B(8); CARES Surveillance Group.

ABSTRACT

BACKGROUND: Data are conflicting regarding the association between first responder (FR) intervention and improved outcomes after out-of-hospital cardiac arrest (OHCA). We evaluated characteristics of agencies that have positive associations between FR interventions and outcomes. METHODS: We analyzed the 2016-2021 national Cardiac Arrest Registry to Enhance Survival (CARES). We defined the exposures as FR CPR and AED. The outcome was survival with favorable neurologic status. We used logistic regression models to evaluate the association between FR interventions with OHCA outcome for each agency, stratifying agencies into positive association (95% confidence interval above 1) and no/inverse association (95% confidence below or including 1). We compared characteristics between cohorts. RESULTS: For the association between FR CPR and outcomes, 21 agencies caring for 42,856 OHCAs had a positive association; 371 agencies caring for 449,824 OHCAs had no association. For FR AED, 47 agencies caring for 103,120 OHCAs had a positive association; 262 agencies caring for 327,761 OHCAs had no association. Comparing agency characteristics for FR CPR, agencies with a positive association had more annual OHCAs (+300), lower FR CPR rate (-11.3%), and lower FR AED rate (-10.8%). Comparing FR AED, agencies with a positive association had more OHCAs per year (+150.5), lower FR CPR rate (-6.8%), lower FR AED rate (-13.3%), lower response time (-0.6 minutes), and more OHCAs from high-income neighborhoods (+3.7%). CONCLUSION: FR AED more commonly had a positive association with outcomes than FR CPR. Agencies with better outcomes from FR interventions treated more OHCAs and had lower rates of FR intervention.

Sudden cardiac arrest in adult congenital heart disease: a challenge to be tackled.
Waldmann V(1)(2), Narayanan K(2)(3), Marijon E(1)(2).
NO ABSTRACT AVAILABLE

Sudden Cardiac Death: A Systematic Review.
Jaramillo AP(1), Yasir M(2)(3), Iyer N(4), Hussein S(5), Sn VP(6).
ABSTRACT
Sudden cardiac death (SCD) is a condition that accounts for a high percentage of cardiovascular fatalities, with ventricular tachyarrhythmias being the most common cause. There are signs and symptoms of SCD that occur spontaneously without any warning and are deadly. Despite preventative efforts focusing on the use of subcutaneous implanted cardioverter defibrillators (S-ICD) in the highest-risk population categories, a high number of SCDs occur in the normal population and in people who do not have a documented cardiac condition. Therefore, primary prevention for SCD should be a more viable strategy for the general population, considering measures in the form of preventive medicine such as knowing more about any genetic predisposition, family history of any fatal arrhythmia, continuous surveillance after any syncope with unknown causes, etc. However, little data about SCD risk factors are known in comparison with other well-known diseases like ischemic heart disease and stroke. In search of medical databases for relevant medical literature, we looked at PubMed/Medline, the Cochrane Library, and Google Scholar. Thirteen publications were discovered after the papers were located, assessed, and qualifying criteria were applied. The finished articles were done to give an overview of SCD. Some others have shown that the major predisposition for SCD is related to the male gender, which increases the incidence if they have a family history of SCD. We described the importance of obstructive sleep apnea (OSA) as a comorbid condition. Patients with S-ICD and young athletes with a history of ventricular arrhythmia showed us that the predisposition for SCD can be higher than in the normal population. Based on the above, we concluded that more study is required to establish the most important approach for each of the risk factors mentioned in this systematic review in order to apply them in daily practice and have more knowledge about how to apply preventive and therapeutic medicine to the population at risk and the ones that already develop the disease.

Vasoespastic angina, plaque erosion, ischemia and cardiac arrest: four of a kind or straight?
Martín PV(1), Cueva Recalde JF(2), Pérez Guerrero A(2), Revilla Martí P(2), Ruiz Arroyo JR(2).
NO ABSTRACT AVAILABLE

IN-HOSPITAL CARDIAC ARREST

Survival With Favorable Neurologic Outcome and Quality of Cardiopulmonary Resuscitation Following In-Hospital Cardiac Arrest in Children With Cardiac Disease Compared With Noncardiac Disease.
Federman M(1), Sutton RM(2), Reeder RW(3), Ahmed T(4), Bell MJ(5), Berg RA(2), Bishop R(6)(7), Bochkoris M(8), Burns C(9), Carcillo JA(8), Carpenter TC(6)(7), Dean JM(3), Diddle JW(5), Fernandez R(10), Fink EL(8), Franzon D(11), Frazier AH(12)(13), Friess SH(14), Graham K(2), Hall M(10), Hehir DA(2), Horvat CM(8), Huard LL(1), Kirkpatrick T(1), Maa T(10), Maitoza LA(1), Manga A(14), McQuillen PS(11), Meert KL(4), Morgan RW(2), Mourani PM(14), Nadkarni VM(2), Notterman D(15),

Palmer CA(3), Pollack MM(5), Sapru A(1), Schneiter C(6)(7), Sharron MP(5), Srivastava N(1), Tilford B(4), Viteri S(16), Wessel D(5), Wolfe HA(2), Yates AR(10), Zuppa AF(2), Naim MY(2).

ABSTRACT

OBJECTIVES: To assess associations between outcome and cardiopulmonary resuscitation (CPR) quality for in-hospital cardiac arrest (IHCA) in children with medical cardiac, surgical cardiac, or noncardiac disease. DESIGN: Secondary analysis of a multicenter cluster randomized trial, the ICU-RESUScitation Project (NCT02837497, 2016-2021). SETTING: Eighteen PICUs. PATIENTS: Children less than or equal to 18 years old and greater than or equal to 37 weeks postconceptual age receiving chest compressions (CC) of any duration during the study. INTERVENTIONS: None. MEASUREMENTS AND MAIN RESULTS: Of 1,100 children with IHCA, there were 273 medical cardiac (25%), 383 surgical cardiac (35%), and 444 noncardiac (40%) cases. Favorable neurologic outcome was defined as no more than moderate disability or no worsening from baseline Pediatric Cerebral Performance Category at discharge. The medical cardiac group had lower odds of survival with favorable neurologic outcomes compared with the noncardiac group (48% vs 55%; adjusted odds ratio [aOR] [95% CI], aOR 0.59 [95% CI, 0.39-0.87], p = 0.008) and surgical cardiac group (48% vs 58%; aOR 0.64 [95% CI, 0.45-0.9], p = 0.01). We failed to identify a difference in favorable outcomes between surgical cardiac and noncardiac groups. We also failed to identify differences in CC rate, CC fraction, ventilation rate, intra-arrest average target diastolic or systolic blood pressure between medical cardiac versus noncardiac, and surgical cardiac versus noncardiac groups. The surgical cardiac group had lower odds of achieving target CC depth compared to the noncardiac group (OR 0.15 [95% CI, 0.02-0.52], p = 0.001). We failed to identify a difference in the percentage of patients achieving target CC depth when comparing medical cardiac versus noncardiac groups. CONCLUSIONS: In pediatric IHCA, medical cardiac patients had lower odds of survival with favorable neurologic outcomes compared with noncardiac and surgical cardiac patients. We failed to find differences in CPR quality between medical cardiac and noncardiac patients, but there were lower odds of achieving target CC depth in surgical cardiac compared to noncardiac patients.

Disrupted Lives: Caregivers' Experiences of In-Hospital Cardiac Arrest Survivors' Recovery 5 Years Later.

Harrod M(1), Hauschildt K(1)(2)(3)(4), Kamphuis LA(1), Korpela PR(1), Rouse M(1), Nallamothu BK(1)(5)(6), Iwashyna TJ(1)(3)(4)(6)(7).

ABSTRACT

Background Survivors of in-hospital cardiac arrest (IHCA) experience ongoing physical and cognitive impairments, often requiring support from a caregiver at home afterwards. Caregivers are important in the survivor's recovery, yet there is little research specifically focused on their experiences once the survivor is discharged home. In this study, we highlight how caregivers for veteran IHCA survivors described and experienced their caregiver role, the strategies they used to fulfill their role, and the additional needs they still have years after the IHCA event. Methods and Results Between March and July 2019, semistructured telephone interviews were conducted with 12 caregivers for veteran IHCA survivors. Interviews were transcribed, and content analysis was performed. Patterns within the data were further analyzed and grouped into themes. A predominant theme of "disruption" was identified across 3 different domains including the following: (1) disruption in caregiver's life, (2) disruption in caregiver-patient relationship, and (3) disruption in caregiver's well-being. Disruption was associated with both positive and negative caregiver experiences. Strategies caregivers used and resources they felt would have helped them adjust to their caregiver role were also identified. Conclusions Caregivers for veteran IHCA survivors experienced a disruption in many facets of their lives. Caregivers felt the veterans' IHCA impacted various aspects of their lives, and they continued to need additional support in order to care for the IHCA survivor and themselves. Although some were able to procure coping strategies, such as counseling and engaging in stress-relieving activities, most indicated additional help and resources were still needed.

Recognizing the Struggles of Caregivers of In-Hospital Cardiac Arrest Survivors and Paving the Way for Solutions.
Dsouza E.
NO ABSTRACT AVAILABLE

Efficacy of in-bed chest compressions depending on provider position during in-hospital cardiac arrest: a controlled manikin study.
Strototte LM(1), May TW(2), Laker S(3), Latka E(3), Thaemel D(3), Thies KC(4), Rehberg SW(4), Jansen G(3)(5)(6).
ABSTRACT
BACKGROUND: In contrast to the pre-hospital environment, patients with in-hospital cardiac arrest are usually lying in a hospital bed. Interestingly, there are no current recommendations for optimal provider positioning. The present study evaluates in bed chest compression quality in different provider positions during in-hospital-cardiac-arrest. METHODS: Paramedics conducted four resuscitation scenarios: manikin lying on the floor with provider position kneeling next to the manikin (control group), manikin lying in a hospital bed with the provider kneeling astride, kneeling beside or standing next to the manikin. A resuscitation board was not used according to the current guideline recommendations. Quality of resuscitation, compression depth, compression rate and percentage of compressions with complete chest rebound were recorded. Afterwards, the paramedics were asked about subjective efficiency and fatigue. Data were analyzed using Generalized-Linear-Mixed-Models and, in addition, by non-parametric Friedman test. RESULTS: A total of 60 participants were recruited. The total quality of chest compressions was significantly higher in floor-based control position compared to the standing (P<.001) and both kneeling positions (P<.05). Also, the compression depth was significantly more guideline compliant in the control (P<.001) and the kneeling position (P<.05) compared to the standing position. The compression frequency as well as the complete chest wall recoil did not differ significantly. The standing position was rated as more fatiguing than the other positions (p≤0.001), kneeling beside as subjectively more efficient than the standing position (P<0.001). CONCLUSIONS: In case of an in-bed resuscitation high quality chest compressions are possible. Kneeling astride or beside the patient should be preferred because these positions demonstrated a good chest compression quality and were more efficient and less exhaustive.

Prospective, multicenter validation of the deep learning-based cardiac arrest risk management system for predicting in-hospital cardiac arrest or unplanned intensive care unit transfer in patients admitted to general wards.
Cho KJ(#)(1), Kim JS(#)(2), Lee DH(3), Lee SM(4)(5), Song MJ(6), Lim SY(6), Cho YJ(6), Jo YH(7), Shin Y(1), Lee YJ(8).
ABSTRACT
BACKGROUND: Retrospective studies have demonstrated that the deep learning-based cardiac arrest risk management system (DeepCARS™) is superior to the conventional methods in predicting in-hospital cardiac arrest (IHCA). This prospective study aimed to investigate the predictive accuracy of the DeepCARS™ for IHCA or unplanned intensive care unit transfer (UIT) among general ward patients, compared with that of conventional methods in real-world practice. METHODS: This prospective, multicenter cohort study was conducted at four teaching hospitals in South Korea. All adult patients admitted to general wards during the 3-month study period were included. The primary outcome was predictive accuracy for the occurrence of IHCA or UIT within 24 h of the alarm

being triggered. Area under the receiver operating characteristic curve (AUROC) values were used to compare the DeepCARS™ with the modified early warning score (MEWS), national early warning Score (NEWS), and single-parameter track-and-trigger systems. RESULTS: Among 55,083 patients, the incidence rates of IHCA and UIT were 0.90 and 6.44 per 1,000 admissions, respectively. In terms of the composite outcome, the AUROC for the DeepCARS™ was superior to those for the MEWS and NEWS (0.869 vs. 0.756/0.767). At the same sensitivity level of the cutoff values, the mean alarm counts per day per 1,000 beds were significantly reduced for the DeepCARS™, and the rate of appropriate alarms was higher when using the DeepCARS™ than when using conventional systems. CONCLUSION: The DeepCARS™ predicts IHCA and UIT more accurately and efficiently than conventional methods. Thus, the DeepCARS™ may be an effective screening tool for detecting clinical deterioration in real-world clinical practice.

INJURIES AND CPR

No articles identified.

CAUSE OF THE ARREST

1. Biomed J. 2023 Sep 1:100656. doi: 10.1016/j.bj.2023.100656. Online ahead of print.
Risk factors for peri-intubation cardiac arrest: a systematic review and meta-analysis.
Yang TH(1), Shao SC(2), Lee YC(1), Hsiao CH(3), Yen CC(4).
ABSTRACT
BACKGROUND: Peri-intubation cardiac arrest (PICA) is an uncommon yet serious complication of intubation. Although some associated risk factors have been identified, the results have been inconsistent. The aim of this study was to systematically review the relevant research and examine the associated risk factors of PICA through meta-analysis. METHODS: Studies examining the risk factors for PICA before 1 Nov. 2022 were identified through searches in MEDLINE (OvidSP) and EMBASE. The reported adjusted or unadjusted odds ratios (ORs) and risk ratios (RRs) were recorded. We calculated pooled ORs and created forest plots using a random-effects model to identify the statistically significant risk factors. We assessed the certainty of evidence for each risk factor. RESULTS: Eight studies were included in the meta-analysis. Pre-intubation hypotension, with a pooled OR of 4.96 (95% confidence interval [C.I.]: 3.75-6.57), pre-intubation hypoxemia, with a pooled OR of 4.43 (95% C.I.: 1.24-15.81), and two or more intubation attempts, with a pooled OR of 1.88 (95% C.I.: 1.09-3.23) were associated with a significantly higher risk of PICA. The pooled incidence of PICA was 2.1% (95% C.I.: 1.5%-3.0%). CONCLUSIONS: Pre-intubation hypotension, hypoxemia, and more intubation attempts are significant risk factors for PICA. The findings could help physicians identify patients at risk under the acute setting.

END-TIDAL CO$_2$

No articles identified.

ORGAN DONATION

No articles identified.

DRUGS

1. Resusc Plus. 2023 Aug 31;16:100459. doi: 10.1016/j.resplu.2023.100459. eCollection 2023 Dec.
Vasopressin versus epinephrine during cardiopulmonary resuscitation of asphyxiated newborns: A study protocol for a prospective, cluster, open label, single-center, randomized controlled phase 2 trial - The VERSE-Trial.
Ramsie M(1)(2), Cheung PY(1)(2), Law B(1)(2), Schmölzer GM(1)(2).
ABSTRACT
INTRODUCTION: Current neonatal resuscitation guidelines recommend the use of epinephrine during neonatal cardiopulmonary resuscitation (CPR). However, newborns receiving epinephrine continue to have high rates of mortality and neurodevelopmental disability. The infrequent need for neonatal CPR, coupled with an inability to consistently anticipate which newborn infants are at risk of requiring CPR, explains the lack of high-quality evidence (i.e., large randomized clinical trials) to better guide healthcare providers in their resuscitative effort. Therefore, we need neonatal data to determine the optimal vasopressor therapy during neonatal CPR. The current pilot trial will examine the efficacy of vasopressin versus epinephrine during CPR of asphyxiated newborn infants.
METHODS AND ANALYSIS: The trial will be a prospective, cluster, open label, single-center, randomized controlled trial on two alternative cardiovascular supportive medications. This study will assess the primary outcome of time to return of spontaneous circulation (ROSC) in newborns requiring CPR in the delivery room who were treated with either vasopressin (intervention) or epinephrine (control). Secondary outcomes such as infant mortality and other clinical outcome measures will also be collected. An estimated 20 newborns will be recruited, and comparisons will be made between asphyxiated infants treated with either drugs. ETHICS AND DISSEMINATION: This study has been approved by the Research Ethics Board at the University of Alberta (June 16, 2023). Study findings will be published in peer-reviewed journals, presented at conferences, and communicated to relevant participants and stakeholders.

2. Resuscitation. 2023 Sep 1:109958. doi: 10.1016/j.resuscitation.2023.109958. Online ahead of print.
Bicarbonate, Calcium, and Magnesium for In-Hospital Cardiac Arrest - An Instrumental Variable Analysis.
Holmberg MJ(1), Granfeldt A(2), Andersen LW(3).
ABSTRACT
INTRODUCTION: Bicarbonate, calcium, and magnesium are commonly used during in-hospital cardiac arrest. Whether these drugs are associated with survival in cardiac arrest patients is uncertain. METHODS: This was an observational study using data from the Get With The Guidelines registry. Adult patients with an in-hospital cardiac arrest between January 2008 and December 2021 were included. An instrumental variable approach was used based on hospital preferences for bicarbonate, calcium, and magnesium, respectively. The primary outcome was survival to hospital discharge. RESULTS: A total of 319,230 patients were included. The median age was 66 years, 59% patients were male, and 85% patients presented with a non-shockable rhythm. Bicarbonate was administered in 58% patients, calcium in 33% patients, and magnesium in 10% patients. When considering drug use in the previous cardiac arrest patient at a given hospital as an instrument, the absolute difference in survival to hospital discharge was estimated at -14.2% (95% CI, -19.9 to -8.6)

for bicarbonate, -3.0% (95% CI, -8.6 to 2.6) for calcium, and 10.7% (95% CI, -0.8 to 22.2) for magnesium as compared to no drug. When considering the proportion of drug use within the past year at a given hospital as an instrument, the confidence intervals were very wide, making the results difficult to interpret. CONCLUSIONS: In this analysis, the results for bicarbonate, calcium, and magnesium were inconclusive due to wide confidence intervals and inconsistencies in estimates across instrumental variables. Randomized trials are needed to investigate the effect of these drugs on patient outcomes.

TRAUMA

No articles identified.

VENTILATION

A randomized crossover comparison of the bébé VieScope and direct laryngoscope for pediatric airway management by nurses in medical simulation settings.
Wieczorek P(1)(2), Pruc M(2), Krajsman MJ(2)(3), Wieczorek W(2)(4), Cander B(5), Szarpak L(6)(7)(8), Navolokina A(9), Matuszewski M(10), Zyla M(2), Bragazzi NL(11)(12), Smereka J(2)(13).
ABSTRACT
BACKGROUND: Airway management in life-threatening emergencies is essential for children, and endotracheal intubation is the gold standard. It protects against regurgitation and enables mechanical ventilation. New types of airway management equipment are being developed and implemented to meet the needs of medical personnel. RESEARCH DESIGN AND METHODS: This prospective, randomized, cross-over simulation trial evaluated the success of endotracheal intubation in three scenarios: normal airway (scenario-A), tongue edema (scenario-B), and continuous chest compression (scenario-C), using the bébé Vie Scope™ laryngoscope (VieScope) and the Macintosh blade larynoscope (MAC) as a comparative tool performed by nurses with limited tracheal intubation experience. RESULTS: The results of the study showed that in scenario-A, there were no significant differences in the first attempt success rate or endotracheal intubation time between VieScope and MAC. However, VieScope was associated with better visualization of the glottis. In scenarios B and C, VieScope was significantly more effective than MAC in terms of first-pass success rate, time to intubate, Cormack-Lehane grade, POGO score, and ease of endotracheal intubation. CONCLUSIONS: Bébé VieScope may be useful for endotracheal intubation in pediatric patients, particularly in cases of tongue edema and ongoing chest compression, providing a higher first-pass success rate than conventional laryngoscopes.

CERERBRAL MONITORING

Confounders for prognostic accuracy of neuron-specific enolase after cardiac arrest: A retrospective cohort study.
Czimmeck C(1), Kenda M(2), Aalberts N(1), Endisch C(1), Ploner CJ(1), Storm C(3), Nee J(4), Streitberger KJ(1), Leithner C(1).
ABSTRACT

AIM: To evaluate neuron-specific enolase (NSE) thresholds for prediction of neurological outcome after cardiac arrest and to analyze the influence of hemolysis and confounders. METHODS: Retrospective analysis from a cardiac arrest registry. Determination of NSE serum concentration and hemolysis-index (h-index) 48-96 hours after cardiac arrest. Evaluation of neurological outcome using the Cerebral Performance Category score (CPC) at hospital discharge. Separate analyses considering CPC 1-3 and CPC 1-2 as good neurological outcome. Analysis of specificity and sensitivity for poor and good neurological outcome prediction with and without exclusion of hemolytic samples (h-index larger than 50). RESULTS: Among 356 survivors three days after cardiac arrest, hemolysis was detected in 28 samples (7.9%). At a threshold of 60 µg/L, NSE predicted poor neurological outcome (CPC 4-5) in all samples with a specificity of 92% (86%-95%) and sensitivity of 73% (66%-79%). In non-hemolytic samples, specificity was 94% (89%-97%) and sensitivity 70% (62%- 76%). At a threshold of 100 µg/L, specificity was 98% (95%-100%, all samples) and 99% (95%-100%, non-hemolytic samples), and sensitivity 58% (51%-65%) and 55% (47%-63%), respectively. Possible confounders for elevated NSE in patients with good neurological outcome were ECMO, malignancies, blood transfusions and acute brain diseases. Nine patients with NSE below 17 µg/L had CPC 5, all had plausible death causes other than hypoxic-ischemic encephalopathy. CONCLUSIONS: NSE concentrations higher than 100 µg/L predicted poor neurological outcome with high specificity. An NSE less than 17 µg/L indicated absence of severe hypoxic-ischemic encephalopathy. Hemolysis and other confounders need to be considered.

Cerebral hemodynamics after cardiac arrest: implications for clinical management.
Schoenthal T(1), Hoiland R(2)(3)(4)(5), Griesdale DE(1)(2)(6), Sekhon MS(7)(5)(8).
ABSTRACT
Following resuscitation from cardiac arrest, hypoxic ischemic brain injury (HIBI) ensues, which is the primary determinant of adverse outcome. The pathophysiology of HIBI can be compartmentalized into primary and secondary injury, resulting from cerebral ischemia during cardiac arrest and reperfusion following successful resuscitation, respectively. During the secondary injury phase, increased attention has been directed towards the optimization of cerebral oxygen delivery to prevent additive injury to the brain. During this phase, cerebral hemodynamics are characterized by early hyperemia following resuscitation and then a protracted phase of cerebral hypoperfusion termed "no-reflow" during which additional hypoxic-ischemic injury can occur. As such, identification of therapeutic strategies to optimize cerebral delivery of oxygen is at the forefront of HIBI research. Unfortunately, randomized control trials investigating the manipulation of arterial carbon dioxide tension and mean arterial pressure augmentation as methods to potentially improve cerebral oxygen delivery have shown no impact on clinical outcomes. Emerging literature suggests differential patient-specific phenotypes may exist in patients with HIBI. The potential to personalize therapeutic strategies in the critical care setting based upon patient-specific pathophysiology presents an attractive strategy to improve HIBI outcomes. Herein, we review the cerebral hemodynamic pathophysiology of HIBI, discuss patient phenotypes as it pertains to personalizing care, as well as suggest future directions.

ULTRASOUND AND CPR

No articles identified.

ORGANISATION AND TRAINING

Cardiac Rhythm Changes During Transfer from the Emergency Medical Service to the Emergency Department: A Retrospective Tertiary Single-Center Analysis on Prevalence and Outcomes.
Mandigers L(1), Rietdijk WJR(2), den Uil CA(3), de Graaf EY(4), Strnisa S(4), Verdonschot RJCG(5).
ABSTRACT
BACKGROUND: Out-of-hospital cardiac arrest (OHCA) is a leading cause of death worldwide. Cardiac rhythms of OHCA patients can change during transportation and transfer from emergency medical services (EMS) to the emergency department (ED). OBJECTIVE: Our objective was to study the prevalence of cardiac rhythm changes during transfer from the EMS to the ED in OHCA patients and the possible association with clinical outcomes. METHODS: We retrospectively studied adult OHCA patients admitted to the ED between January 2017 and December 2019. The primary outcome was the incidence of cardiac rhythm changes during transfer from EMS to the ED. Secondary outcomes were: ED survival, intensive care unit survival, hospital survival, and maximum Glasgow Coma Scale score during admission. RESULTS: We included 625 patients, of whom there were 49 (7.8%) in the rhythm change group and 576 in the no rhythm change group. ED survival was significantly lower in the rhythm change group (26.5%) vs. the no rhythm change group (78.5%, p < 0.01). CONCLUSION: Cardiac rhythm changes can occur in OHCA patients during transfer from EMS to the ED. Our results showed some evidence that these changes are associated with a lower ED survival.

Rural versus urban out-of-hospital cardiac arrest response, treatment and outcomes in the North East of England from 2018 to 2019.
Finney O(1), Stagg H(2).
ABSTRACT
INTRODUCTION: Out-of-hospital cardiac arrest (OHCA) is a time-sensitive medical emergency. There is international evidence to suggest that rural regions experience worse OHCA outcomes, such as reduced survival rates. The aim of this study was to quantitatively review and compare the OHCA response, treatment and pre-hospital outcomes in a single-centre ambulance service over a 1-year period in urban and rural areas. METHODS: This study used retrospective OHCA audit data from the North East Ambulance Service NHS Foundation Trust, from April 2018 to April 2019, comparing OHCA response, treatment and return of spontaneous circulation (ROSC) data in relation to urban or rural classification status, using the UK government urban-rural classification tool. RESULTS: A total of 1295 urban cases and 319 rural cases were compared. Bystander public-access defibrillator (PAD) use was higher in rural areas in comparison to urban areas (20/319 (6.3%) vs 47/1295 (3.6%); p = 0.03). The mean ambulance response time was slower in rural areas (10:43 minutes (n = 319) (SD ± 8.2) vs 07:35 minutes (n = 1295) (SD ± 7.1); p = < 0.01). Despite this, overall ROSC rates at hospital were similar between the groups, with no statistically significant difference (rural: 87/319 (27.3%) vs urban: 409/1295 (31.6%); p = 0.14). A further sub-group analysis of initially shockable OHCA cases showed slower ambulance response times in rural areas (10:45 minutes (n = 68) (SD ± 12.3) vs 07:55 minutes (n = 245) (SD ± 5.5); p = < 0.01) and that rural cases experienced lower ROSC at hospital rates (31/68 (45.6%) vs 151/245 (61.6%); p = 0.02). CONCLUSION: This report showed differences in OHCA response and outcomes between rural and urban settings. In the shockable OHCA sub-group analysis, rural areas had slower ambulance response times and lower ROSC rates. The longer ambulance response times in the rural shockable OHCA group could be a factor in the reduced ROSC rates. Linking hospital survival data should be used in future research to explore this area further.

Police as first reponders improve out-of-hospital cardiac arrest survival.

Jean Louis C(1)(2)(3), Cildoz M(4), Echarri A(5)(6), Beaumont C(7), Mallor F(4), Greif R(8)(9)(10), Baigorri M(4), Reyero D(5).

ABSTRACT

BACKGROUND: Police forces are abundant circulating and might arrive before the emergency services to Out-of-Hospital-Cardiac-Arrest victims. If properly trained, they can provide basic life support and early defibrillation within minutes, probably increasing the survival of the victims. We evaluated the impact of local police as first responders on the survival rates of out-of-hospital cardiac arrest victims in Navarra, Spain, over 7 years. METHODS: A retrospective analysis of an ongoing Out-of-Hospital Cardiac registry to compare the characteristics and survival of Out-of-Hospital-Cardiac-Arrest victims attended to in first place by local police, other first responders, and emergency ambulance services between 2014 and 2020. RESULTS: Of 628 cases, 73.7% were men (aged 68.9 ± 15.8), and 26.3% were women (aged 65,0 ± 14,7 years, p < 0.01). Overall survival of patients attended to by police in the first place was 17.8%, other first responders 17.4% and emergency services 13.5% with no significant differences (p > 0.1). Time to initiating cardio-pulmonary resuscitation is significant for survival. When police arrived first and started CPR before the emergency services, they arrived at a mean of 5.4 ± 3 min earlier (SD = 3.10). This early police intervention showed an increase in the probability of survival by 10.1%. CONCLUSIONS: The privileged location and the sole amount of personnel of local police forces trained in life support and their fast delivery of defibrillators as first responders can improve the survival of out-of-hospital cardiac arrest victims.

Cardiac Arrest Survival at Emergency Medical Service Agencies in Catchment Areas With Primarily Black and Hispanic Populations.

Uzendu AI(1)(2), Spertus JA(1)(2), Nallamothu BK(3), Girotra S(4), Jones PG(1), McNally BF(5), Del Rios M(6), Sasson C(7)(8)(9), Breathett K(10), Sperling J(11)(12), Dukes KC(6)(13)(14), Chan PS(1)(2).

ABSTRACT

IMPORTANCE: Black and Hispanic patients are less likely to survive an out-of-hospital cardiac arrest (OHCA) than White patients. Given the central importance of emergency medical service (EMS) agencies in prehospital care, a better understanding of OHCA survival at EMS agencies that work in Black and Hispanic communities and White communities is needed to address OHCA disparities. OBJECTIVE: To examine whether EMS agencies serving catchment areas with primarily Black and Hispanic populations (Black and Hispanic catchment areas) have different rates of OHCA survival than agencies serving catchment areas with primarily White populations (White catchment areas). DESIGN, SETTING, AND PARTICIPANTS: A cohort study including adults with nontraumatic OHCA from January 1, 2015, to December 31, 2019, in the Cardiac Arrest Registry to Enhance Survival was conducted. Data analysis was conducted from August 17, 2022, to July 7, 2023. EXPOSURE: Emergency medical service agencies, categorized as working in catchment areas where the combination of Black and Hispanic residents made up more than 50% of the population or where White residents made up more than 50% of the population. MAIN OUTCOMES AND MEASURES: The unit of analysis was the EMS agency. The primary outcome was agency-level risk-standardized survival rates (RSSRs) to hospital admission for OHCA at each EMS agency, which were calculated using hierarchical logistic regression and compared between agencies serving Black and Hispanic and White catchment areas. Whether differences in OHCA survival were explained by EMS and first responder measures was evaluated with additional adjustment for these factors. RESULTS: Among 764 EMS agencies representing 258 342 OHCAs, 82 EMS agencies (10.7%) had a Black and Hispanic

catchment area. Overall median age of the patients was 63.0 (IQR, 52.0-75.0) years, 36.1% were women, and 63.9% were men. Overall, the mean (SD) RSSR was 27.5% (3.6%), with lower survival at EMS agencies with Black and Hispanic catchment areas (25.8% [3.6%]) compared with agencies with White catchment areas (27.7% [3.5%]; P < .001). Among the 82 EMS agencies with Black and Hispanic catchment areas, a disproportionately higher number (32 [39.0%]) was in the lowest survival quartile, whereas a lower number (12 [14.6%]) was in the highest survival quartile. Additional adjustment for EMS response times, EMS termination of resuscitation rates, and first responder rates of initiating cardiopulmonary resuscitation or applying an automated external defibrillator before EMS arrival did not meaningfully attenuate differences in RSSRs between agencies with Black and Hispanic compared with White catchment areas (mean [SD] RSSRs after adjustment, 25.9% [3.3%] vs 27.7% [3.1%]; P < .001). CONCLUSIONS AND RELEVANCE: Risk-standardized survival rates for OHCA were 1.9% lower at EMS agencies working in Black and Hispanic catchment areas than in White catchment areas. This difference was not explained by EMS response times, rates of EMS termination of resuscitation, or first responder rates of initiating cardiopulmonary resuscitation or applying an automated external defibrillator. These findings suggest there is a need for further assessment of these discrepancies.

Predicting survival post-cardiac arrest: An observational cohort study.
Drennan IR(1)(2)(3), Thorpe KE(4), Scales D(5), Cheskes S(1)(3)(6), Mamdani M(7), Morrison LJ(2)(8)(9); Rescu Epistry Investigators.
ABSTRACT
INTRODUCTION: Over 400,000 out-of-hospital cardiac arrest (OHCA) occur each year in Canada and the United States with less than 10% survival to hospital discharge. Cardiac arrest is a heterogenous condition and patient outcomes are impacted by a multitude of factors. Prognostication is recommended at 72 hours after return of spontaneous circulation (ROSC), however there may be other factors that could predict patient outcome earlier in the post-arrest period. The objective of our study was to develop and internally validate a novel clinical prediction rule to risk stratify patients early in the post-cardiac arrest period. METHODS: We performed a retrospective cohort study of adult (≥18 years) post-cardiac arrest patients between 2010 and 2015 from the Epistry Cardiac Arrest database in Toronto. Our primary analysis used ordinal logistic regression to examine neurologic outcome at discharge using the modified Rankin Scale (mRS). Our secondary analysis used logistic regression for neurologic outcome and survival to hospital discharge. Models were internally validated using bootstrap validation. RESULTS: A total of 3432 patients met our inclusion criteria. Our clinical prediction model was able to predict neurologic outcome on an ordinal scale using our predefined variables with an AUC of 0.89 after internal validation. The predictive performance was maintained when examining neurologic outcome as a binary variable and survival to hospital discharge. CONCLUSION: We were able to develop a model to accurately risk stratify adult cardiac arrest patients early in the post-cardiac arrest period. Future steps are needed to externally validate this model in other healthcare settings.

Early and late withdrawal of life-sustaining treatment after out-of-hospital cardiac arrest in the United Kingdom: institutional variation and association with hospital mortality.
Vlachos S(1), Rubenfeld G(2), Menon D(3), Harrison D(4), Rowan K(5), Maharaj R(6).
ABSTRACT

AIM: Frequency and timing of Withdrawal of Life-Sustaining Treatment (WLST) after Out-of-Hospital Cardiac Arrest (OHCA) vary across Intensive Care Units (ICUs) in the United Kingdom (UK) and may be a marker of lower healthcare quality if instituted too frequently or too early. We aimed to describe WLST practice, quantify its variability across UK ICUs, and assess the effect of institutional deviation from average practice on patients' risk-adjusted hospital mortality. METHODS: We conducted a retrospective multi-centre cohort study including all adult patients admitted after OHCA to UK ICUs between 2010-2017. We identified patient and ICU characteristics associated with early (within 72h) and late (>72h) WLST and quantified the between-ICU variation. We used the ICU-level observed-to-expected (O/E) ratios of early and late-WLST frequency as separate metrics of institutional deviation from average practice and calculated their association with patients' hospital mortality. RESULTS: We included 28438 patients across 204 ICUs. 10775 (37.9%) had WLST and 6397 (59.4%) of them had early-WLST. Both WLST types were strongly associated with patient-level demographics and pre-existing conditions but weakly with ICU-level characteristics. After adjustment, we found unexplained between-ICU variation for both early-WLST (Median Odds Ratio 1.59, 95%CrI 1.49-1.71) and late-WLST (MOR 1.39, 95%CrI 1.31-1.50). Importantly, patients' hospital mortality was higher in ICUs with higher O/E ratio of early-WLST (OR 1.29, 95%CI 1.21-1.38, p<0.001) or late-WLST (OR 1.39, 95%CI 1.31-1.48, p<0.001). CONCLUSIONS: Significant variability exists between UK ICUs in WLST frequency and timing. This matters because unexplained higher-than-expected WLST frequency is associated with higher hospital mortality independently of timing, potentially signalling prognostic pessimism and lower healthcare quality.

Development and Validation of a Novel Score to Predict Brain Death After Out-of-Hospital Cardiac Arrest.
Kitlen E(1), Kim N(1), Rubenstein A(2), Keenan C(2), Garcia G(3), Khosla A(4), Johnson J(5), Elliot Miller P(6), Wira C(7), Greer D(2), Gilmore EJ(1), Beekman R(8).

ABSTRACT
BACKGROUND AND OBJECTIVES: Brain death (BD) occurs in 9-24% of successfully resuscitated out-of-hospital cardiac arrests (OHCA). To predict BD after OHCA, we developed a novel brain death risk (BDR) score. METHODS: We identified independent predictors of BD after OHCA in a retrospective, single academic center cohort between 2011-2021. The BDR score ranges from 0-7 points and includes: non-shockable rhythm (1 point), drug overdose as etiology of arrest (1 point), evidence of grey-white differentiation loss or sulcal effacement on head computed tomography (CT) radiology report within 24 hours of arrest (2 points), Full-Outline-Of-UnResponsiveness (FOUR) score of 0 (2 points), FOUR score 1-5 (1 point), and age < 45 years (1 point). We internally validated the BDR score using k-fold cross validation (k = 8) and externally validated the score at an independent academic center. The main outcome was BD. RESULTS: The development cohort included 362OHCA patients, of whom 18% (N=58) experienced BD. Internal validation provided an area under the receiving operator characteristic curve (AUC) (95% CI) of 0.931 (0.905 - 0.957). In the validation cohort, 19.8% (N=17) experienced BD. The AUC (95% CI) was 0.849 (0.765-0.933). In both cohorts, a BDR score > 4 was the optimal cut off (sensitivity 0.903 and 0.882, specificity 0.830 and 0.652, in the development and validation cohorts respectively). DISCUSSION: The BDR score identifies those at highest risk for BD after OHCA. Our data suggest that a BDR score > 4 is the optimal cut off.

Is insomnia associated with self-reported health and life satisfaction in cardiac arrest survivors? A cross-sectional survey.

Hellström P(1), Israelsson J(1)(2), Hellström A(1), Hjelm C(3), Broström A(4)(5)(6), Årestedt K(1)(7).

ABSTRACT
BACKGROUND: Insomnia symptoms seem to be common in cardiac arrest survivors but their associations with important outcomes such as self-reported health and life satisfaction have not previously been reported during the early post-event period. Therefore, the aim of the study was to investigate whether symptoms of insomnia are associated with self-reported health and life satisfaction in cardiac arrest survivors six months after the event. METHODS: This multicentre cross-sectional survey included cardiac arrest survivors ≥18 years. Participants were recruited six months after the event from five hospitals in southern Sweden, and completed a questionnaire including the Minimal Insomnia Symptom Scale, EQ-5D-5L, Health Index, Hospital Anxiety and Depression Scale, and Satisfaction With Life Scale. Data were analysed using the Mann-Whitney U test, linear regression, and ordinal logistic regression. The regression analyses were adjusted for demographic and medical factors. RESULTS: In total, 212 survivors, 76.4% males, with a mean age of 66.6 years (SD = 11.9) were included, and of those, 20% reported clinical insomnia. Insomnia was significantly associated with all aspects of self-reported health (p < 0.01) and life satisfaction (p < 0.001), except mobility (p = 0.093), self-care (p = 0.676), and usual activities (p = 0.073). CONCLUSION: Insomnia plays a potentially important role for both health and life satisfaction in cardiac arrest survivors. Screening for sleep problems should be part of post cardiac arrest care and follow-up to identify those in need of further medical examination and treatment.

Using Artificial Intelligence to Develop Educational Content for Teaching Children on Cardiopulmonary Resuscitation.
Birkun AA(1).
NO ABSTRACT AVAILABLE

Factors affecting knowledge and attitude of healthcare workers towards basic life support in Khyber Teaching Hospital, Peshawar, Pakistan: a cross-sectional analysis.
Hasnain S(1), Hussan J(2), Khan L(3), Muhammad S(3), Kamal K(3), Sawaira(3), Hayat U(3), Abbasi A(3), Akhlaq M(3), Ahmad A(3), Ahmad K(3).
ABSTRACT
OBJECTIVE: This study was conducted to assess the knowledge and attitude of healthcare workers towards basic life support (BLS) in Khyber Teaching Hospital, Peshawar, and to investigate the factors affecting them. DESIGN: Cross-sectional study. SETTING: This study was carried out in a tertiary care hospital in Peshawar, Pakistan. PARTICIPANTS: 201 healthcare professionals were recruited for this study through simple convenience sampling which included house officers (HOs), trained medical officers, postgraduate residents, professors, specialty registrars and nurses. Healthcare professionals who were reluctant to give consent were excluded from the study. RESULTS: Among the chosen participants, only 16.4% had good knowledge whereas 63% had a good attitude towards BLS. Knowledge of participants was found to be positively associated with less time elapsed between the training sessions (p=0.041). On the other hand, factors such as age(p=0.004), designation (p=0.05), number of BLS sessions attended (p=0.012) and the time elapsed since the last BLS session attended (p=0.015), were positively associated with the attitude of healthcare professionals. CONCLUSION: The level of knowledge and attitude towards BLS by healthcare professionals was suboptimal. Those individuals who had attended BLS training sessions frequently had better knowledge and attitude as compared with their counterparts.

POST-CARDIAC ARREST TREATMENTS

1. J Cardiovasc Electrophysiol. 2023 Sep 8. doi: 10.1111/jce.16058. Online ahead of print.
Myocardial scarring and recurrence of ventricular arrhythmia in patients surviving an out-of-hospital cardiac arrest.

Thomsen AF(1), Winkel BG(1), Golvano LCC(2), Porta-Sánchez A(3)(4), Jøns C(1), Ferro E(2), Bertelsen L(1), Vazquez S(2), Bhardwaj P(1), Stampe NK(1), Ortiz-Perez JT(5), Andrea R(5), Engstrøm T(1), Køber L(1), Vejlstrup N(1), Mont L(2)(3)(4), Roca-Luque I(2)(3)(4), Jacobsen PK(1).

ABSTRACT
INTRODUCTION: Prediction of recurrent ventricular arrhythmia (VA) in survivors of an out-of-hospital cardiac arrest (OHCA) is important, but currently difficult. Risk of recurrence may be related to presence of myocardial scarring assessed with late gadolinium enhancement cardiac magnetic resonance (LGE-CMR). Our study aims to characterize myocardial scarring as defined by LGE-CMR in survivors of a VA-OHCA and investigate its potential role in the risk of new VA events. METHODS: Between 2015 and 2022, a total of 230 VA-OHCA patients without ST-segment elevation myocardial infarction had CMR before implantable cardioverter-defibrillator implantation for secondary prevention at Copenhagen University Hospital, Rigshospitalet, and Hospital Clínic, University of Barcelona, of which n = 170 patients had a conventional (no LGE protocol) CMR and n = 60 patients had LGE-CMR (including LGE protocol). Scar tissue including core, border zone (BZ) and BZ channels were automatically detected by specialized investigational software in patients with LGE-CMR. The primary endpoint was recurrent VA. RESULTS: After exclusion, n = 52 VA-OHCA patients with LGE-CMR and a mean left ventricular ejection fraction of 49 ± 16% were included, of which 18 (32%) patients reached the primary endpoint of VA. Patients with recurrent VA in exhibited greater scar mass, core mass, BZ mass, and presence of BZ channels compared with patients without recurrent VA. The presence of BZ channels identified patients with recurrent VA with 67% sensitivity and 85% specificity (area under the ROC curve (AUC) 0.76; 95% CI: 0.63-0.89; p < .001) and was the strongest predictor of the primary endpoint. CONCLUSIONS: The presence of BZ channels was the strongest predictor of recurrent VA in patients with an out of-hospital cardiac arrest and LGE-CMR.

2. J Intensive Care. 2023 Sep 6;11(1):38. doi: 10.1186/s40560-023-00687-y.
Comparison of balanced and unbalanced crystalloids as resuscitation fluid in patients treated for cardiogenic shock.

Gmeiner J(1), Bulach B(1), Lüsebrink E(1)(2), Binzenhöfer L(1)(2), Kupka D(3), Stocker T(1)(2), Löw K(1), Weckbach L(1), Rudi WS(1), Petzold T(1)(2), Kääb S(1)(2), Hausleiter J(1)(2), Hagl C(2)(4), Massberg S(1)(2), Orban M(1)(2), Scherer C(5)(6).

ABSTRACT
BACKGROUND: The efficacy and safety of saline versus balanced crystalloid solutions in ICU-patients remains complicated by exceptionally heterogenous study population in past comparative studies. This study sought to compare saline and balanced crystalloids for fluid resuscitation in patients with cardiogenic shock with or without out-of-hospital cardiac arrest (OHCA). METHODS: We retrospectively analyzed 1032 propensity score matched patients with cardiogenic shock from the Munich University Hospital from 2010 to 2022. In 2018, default resuscitation fluid was changed from 0.9% saline to balanced crystalloids. The primary endpoint was defined as 30-day mortality rate. RESULTS: Patients in the saline group (n = 516) had a similar 30-day mortality rate as patients treated with balanced crystalloids (n = 516) (43.1% vs. 43.0%, p = 0.833), but a higher incidence of new onset renal replacement therapy (30.2% vs 22.7%, p = 0.007) and significantly higher doses of catecholamines. However, OHCA-patients with a lactate level higher than 7.4 mmol/L had a significantly lower 30-day mortality rate when treated with saline (58.6% vs. 79.3%, p = 0.013). In addition, use of balanced crystalloids was independently associated with a higher mortality in the multivariate cox regression analysis after OHCA (hazard ratio 1.43, confidence interval: 1.05-1.96, p = 0.024). CONCLUSIONS: In patients with cardiogenic shock, use of balanced crystalloids was

associated with a similar all-cause mortality at 30 days but a lower rate of new onset of renal replacement therapy. In the subgroup of patients after OHCA with severe shock, use of balanced crystalloids was associated with a higher mortality than saline.

Impact of pre-hospital handling and initial time to cranial computed tomography on outcome in aneurysmal subarachnoid hemorrhage patients with out-of-hospital sudden cardiac arrest-a retrospective bi-centric study.
Pantel T(#)(1), Neulen A(#)(2), Mader MM(1), Kurz E(2), Piffko A(1), Fassl V(2), Westphal M(1), Gempt J(1), Ringel F(2), Czorlich P(1).
ABSTRACT
BACKGROUND: Aneurysmal subarachnoid hemorrhage (SAH) presents occasionally with cardiac arrest (CA). The impact of pre-hospital and emergency room (ER) treatment on outcome remains unclear. Therefore, we investigated the impact of pre-hospital treatment, focusing on lay cardiopulmonary resuscitation (CPR), and ER handling on the outcome of SAH patients with out-of-hospital CA (OHCA). METHODS: In this bi-centric retrospective analysis, we reviewed SAH databases for OHCA and CPR from January 2011 to June 2021. Patients were analyzed for general clinical and epidemiological parameters. CPR data were obtained from ambulance reports and information on ER handling from the medical records. Data were correlated with patient survival at hospital discharge as a predefined outcome parameter. RESULTS: Of 1,120 patients with SAH, 45 (4.0%) were identified with OHCA and CPR, 38 of whom provided all required information and were included in this study. Time to resuscitation was significantly shorter with lay resuscitation (5.3 ± 5.2 min vs. 0.3 ± 1.2 min, p = 0.003). Nineteen patients were not initially scheduled for cranial computed tomography (CCT), resulting in a significantly longer time interval to first CCT (mean ± SD: 154 ± 217 min vs. 40 ± 23 min; p < 0.001). Overall survival to discharge was 31.6%. Pre-hospital lay CPR was not associated with higher survival (p = 0.632). However, we observed a shorter time to first CCT in surviving patients (p = 0.065). CONCLUSIONS: OHCA in SAH patients is not uncommon. Besides high-quality CPR, time to diagnosis of SAH appears to play an important role. We therefore recommend considering CCT diagnostics as part of the diagnostic algorithm in patients with OHCA.

[Prehospital postcardiac-arrest-sedation and -care in the Federal Republic of Germany-a web-based survey of emergency physicians].
[Article in German; Abstract available in German from the publisher]
Jansen G(1)(2)(3), Latka E(4), Deicke M(5), Fischer D(6), Gretenkort P(7), Hoyer A(8), Keller Y(9), Kobiella A(10), Ristau P(11), Seewald S(11)(12), Strickmann B(10), Thies KC(13), Johanning K(14), Tiesmeier J(15).
ABSTRACT
BACKGROUND: This study evaluates the implementation of postcardiac-arrest-sedation (PCAS) and -care (PRC) by prehospital emergency physicians in Germany. MATERIALS AND METHODS: Analysis of a web-based survey from October to November 2022. Questions were asked about implementation, medications used, complications, motivation for implementing or not implementing PCAS, and measures and target parameters of PRC. RESULTS: A total of 500 emergency physicians participated in the survey. In all, 73.4% stated that they regularly performed PCAS (hypnotics: 84.7%; analgesics: 71.1%; relaxants: 29.7%). Indications were pressing against the respirator (88.3%), analgesia (74.1%), synchronization to respirator (59.5%), and change of airway device (52.6%). Reasons for not performing PCAS (26.6%) included unconscious patients (73.7%); concern about hypotension (31.6%), re-arrest (26.3%), and worsening neurological assessment (22.5%). Complications of PCAS

were observed by 19.3% of participants (acute hypotension [74.6%]); (re-arrest [32.4%]). In addition to baseline monitoring, PRC included 12-lead-electrocardiogram (96.6%); capnography (91.6%); catecholamine therapy (77.6%); focused echocardiography (20.6%), lung ultrasound (12.0%) and abdominal ultrasound (5.6%); induction of hypothermia (13.6%) and blood gas analysis (7.4%). An etCO2 of 35-45 mm Hg was targeted by 40.6%, while 9.0% of participants targeted an SpO2 of 94-98% and 19.2% of participants targeted a systolic blood pressure of ≥ 100 mm Hg. CONCLUSIONS: Prehospital PRC in Germany is heterogeneous and deviations from its target parameters are frequent. PCAS is frequent and associated with relevant complications. The development of preclinical care algorithms for PCAS and PRC within preclinical care seems urgently needed.

TARGETED TEMPERATURE MANAGEMENT

1. Ther Hypothermia Temp Manag. 2023 Sep;13(3):102-111. doi: 10.1089/ther.2022.0041. Epub 2022 Nov 15.
A Commentary on the Effect of Targeted Temperature Management in Patients Resuscitated from Cardiac Arrest.
Holzer M(1), Poole JE(2), Lascarrou JB(3), Fujise K(4), Nichol G(5).
ABSTRACT
The members of the International Liaison Committee on Resuscitation (ILCOR) Advanced Life Support Task Force have written a comprehensive summary of trials of the effectiveness of induced hypothermia (IH) or targeted temperature management (TTM) in comatose patients after cardiac arrest (CA). However, in-depth analysis of these studies is incomplete, especially since there was no significant difference in primary outcome between hypothermia versus normothermia in the recently reported TTM2 trial. We critically appraise trials of IH/TTM versus normothermia to characterize reasons for the lack of treatment effect, based on a previously published framework for what to consider when the primary outcome fails. We found a strong biologic rationale and external clinical evidence that IH treatment is beneficial. Recent TTM trials mainly included unselected patients with a high rate of bystander cardiopulmonary resuscitation. The treatment was not applied as intended, which led to a large delay in achievement of target temperature. While receiving intensive care, sedative drugs were likely used that might have led to increased neurologic damage as were antiplatelet drugs that could be associated with increased acute stent thrombosis in hypothermic patients. It is reasonable to still use or evaluate IH treatment in patients who are comatose after CA as there are multiple plausible reasons why IH compared to normothermia did not significantly improve neurologic outcome in the TTM trials.

2. Cureus. 2023 Aug 7;15(8):e43064. doi: 10.7759/cureus.43064. eCollection 2023 Aug.
Effectiveness of Induced Hypothermia on the Prognosis of Post-cardiac Arrest Patients: A Scoping Literature Review.
Rohit RK(1), Tibrewal C(2), Modi NS(2), Bajoria PS(3), Dave PA(4), Gandhi SK(5), Patel P(4).
ABSTRACT
Cardiac arrest (CA) is one of the leading causes of death worldwide. Therapeutic hypothermia (TH) is hypothesized to be a reliable practice for better prognosis in post-cardiac arrest (PCA) patients. Medical subject headings (MeSH) terminology was used to search PubMed Central, Medline, and PubMed databases for articles on the use of hypothermia in PCA patients. We selected various clinical trials, meta-analyses and review articles with complete texts in the English language. PCA syndrome occurs after a CA where the body experiences a state of global ischemia and multi-system dysfunction due to the release of reactive oxygen species (ROS) and inflammatory mediators. Hypothermia slows down enzymatic reactions, reduces free radical production, conserves energy,

and prevents the accumulation of metabolic waste products. Delaying the time to initiate targeted temperature management (TTM) increases the mortality of patients, the appropriate temperature for TTM has always been debatable. TTM also has various deleterious effects on various organ systems from shivering, and arrhythmias to life-threatening infections but the risks outweigh the benefits for the patients when hypothermia is introduced in PCA care. Our study compares the different modalities to initiate hypothermia from surface cooling devices to intravascular cooling devices, and the adverse effects of each method compared to another.

ELECTROPHYSIOLOGY AND DEFIBRILLATION

1. Heart Lung Circ. 2023 Aug;32(8):e51-e52. doi: 10.1016/j.hlc.2023.03.012.
Refining Automated External Defibrillator Signage to Improve Out-of-Hospital Cardiac Arrest Survival.
Kovoor JG(1), Bacchi S(2), Gupta AK(3), Stretton B(4), Page GJ(5), Kovoor P(6).
NO ABSTRACT AVAILABLE

2. Ann Noninvasive Electrocardiol. 2023 Sep;28(5):e13075. doi: 10.1111/anec.13075. Epub 2023 Jul 22.
Defibrillation strategies for refractory ventricular fibrillation out-of-hospital cardiac arrest: A systematic review and network meta-analysis.
Abuelazm MT(1), Ghanem A(2), Katamesh BE(1), Hassan AR(1), Abdalshafy H(3), Seri AR(4)(5), Awad AK(6), Abdelnabi M(7), Abdelazeem B(4)(5).
ABSTRACT
BACKGROUND AND OBJECTIVE: Double sequential external defibrillation (DSED) and vector-change defibrillation (VCD) have been suggested to enhance clinical outcomes for patients with ventricular fibrillation (VF) refractory of standard defibrillation (SD). Therefore, this network meta-analysis aims to evaluate the comparative efficacy of DSED, VCD, and SD for refractory VF. METHODS: A systematic review and network meta-analysis synthesizing randomized controlled trials (RCTs) and comparative observational studies retrieved from PubMed, EMBASE, WOS, SCOPUS, and Cochrane through November 15th, 2022. R software netmeta and netrank package (R version 4.2.0) and meta-insight software were used to pool dichotomous outcomes using odds ratio (OR) presented with the corresponding confidence interval (CI). Our protocol was prospectively published in PROSPERO with ID: CRD42022378533. RESULTS: We included seven studies with a total of 1632 participants. DSED was similar to SD in survival to hospital discharge (OR: 1.14 with 95% CI [0.55, 2.83]), favorable neurological outcome (modified Rankin scale ≤2 or cerebral performance category ≤2) (OR: 1.35 with 95% CI [0.46, 3.99]), and return of spontaneous circulation (ROSC) (OR: 0.81 with 95% CI [0.43; 1.5]). In addition, VCD was similar to SD in survival to hospital discharge (OR: 1.12 with 95% CI [0.27, 4.57]), favorable neurological outcome (OR: 1.01 with 95% CI [0.18, 5.75]), and ROSC (OR: 0.88 with 95% CI [0.24; 3.15]). CONCLUSION: Double sequential external defibrillation and VCD were not associated with enhanced outcomes in patients with refractory VF out-of-hospital cardiac arrest, compared to SD. However, the current evidence is still inconclusive, warranting further large-scale RCTs.

PEDIATRICS AND CHILDREN

1. Crit Care. 2023 Sep 7;27(1):349. doi: 10.1186/s13054-023-04630-3.

Out-of-hospital cardiac arrest in children: an epidemiological study based on the German Resuscitation Registry identifying modifiable factors for return of spontaneous circulation.

Katzenschlager S(1), Kelpanides IK(2)(3), Ristau P(4), Huck M(5), Seewald S(4)(6), Brenner S(7), Hoffmann F(8), Wnent J(4)(6)(9), Kramer-Johansen J(3)(4)(10), Tjelmeland IBM(3)(4)(10), Weigand MA(5), Gräsner JT(4)(6), Popp E(5).

ABSTRACT

AIM: This work provides an epidemiological overview of out-of-hospital cardiac arrest (OHCA) in children in Germany between 2007 and 2021. We wanted to identify modifiable factors associated with survival. METHODS: Data from the German Resuscitation Registry (GRR) were used, and we included patients registered between 1st January 2007 and 31st December 2021. We included children aged between > 7 days and 17 years, where cardiopulmonary resuscitation (CPR) was started, and treatment was continued by emergency medical services (EMS). Incidences and descriptive analyses are presented for the overall cohort and each age group. Multivariate binary logistic regression was performed on the whole cohort to determine the influence of (1) CPR with/without ventilation started by bystander, (2) OHCA witnessed status and (3) night-time on the outcome hospital admission with return of spontaneous circulation (ROSC). RESULTS: OHCA in children aged < 1 year had the highest incidence of the same age group, with 23.42 per 100 000. Overall, hypoxia was the leading presumed cause of OHCA, whereas trauma and drowning accounted for a high proportion in children aged > 1 year. Bystander-witnessed OHCA and bystander CPR rate were highest in children aged 1-4 years, with 43.9% and 62.3%, respectively. In reference to EMS-started CPR, bystander CPR with ventilation were associated with an increased odds ratio for ROSC at hospital admission after adjusting for age, sex, year of OHCA and location of OHCA. CONCLUSION: This study provides an epidemiological overview of OHCA in children in Germany and identifies bystander CPR with ventilation as one primary factor for survival.

Characterization of Circulating Cold Shock Proteins FGF21 and RBM3 in a Multi-Center Study of Pediatric Cardiac Arrest.

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ABSTRACT

Fibroblast Growth Factor 21 (FGF21) is a neuroprotective hormone induced by cold exposure that targets the β-klotho co-receptor. β-klotho is abundant in the newborn brain but decreases rapidly with age. RNA-Binding Motif 3 (RBM3) is a potent neuroprotectant upregulated by FGF21 in hypothermic conditions. We characterized serum FGF21 and RBM3 levels in patients enrolled in a prospective multi-center study of pediatric cardiac arrest (CA) via a secondary analysis of samples collected to evaluate brain injury biomarkers. Patients (n = 111) with remnant serum samples available from at least two of three available timepoints (0-24, 24-48 or 48-72 hours post-resuscitation) were included. Serum samples from 20 healthy controls were used for comparison. FGF21 was measured by Luminex and internally validated enzyme-linked immunoassay (ELISA). RBM3 was measured by internally validated ELISA. Of postarrest patients, 98 were managed with normothermia, while 13 were treated with therapeutic hypothermia (TH). FGF21 increased >20-fold in the first 24 hours postarrest versus controls (681 pg/mL [200-1864] vs. 29 pg/mL [15-51], n = 99 vs. 19, respectively, p < 0.0001, median [interquartile range]) with no difference in RBM3. FGF21 did not differ by sex, while RBM3 was increased in females versus males at 48-72 hours postarrest (1866 pg/mL [873-5176] vs. 1045 pg/mL [535-2728], n = 40 vs. 54, respectively, p < 0.05). Patients requiring extracorporeal membrane oxygenation (ECMO) postresuscitation had increased FGF21 versus those who did not at 48-72 hours (6550 pg/mL [1455-66,781] vs. 1213 pg/mL [480-3117],

n = 7 vs 74, respectively, p < 0.05). FGF21 and RBM3 did not correlate (Spearman's rho = 0.004, p = 0.97). We conclude that in a multi-center study of pediatric CA patients where normothermic targeted temperature management was largely used, FGF21 was markedly increased postarrest versus control and highest in patients requiring ECMO postresuscitation. RBM3 was sex-dependent. We provide a framework for future studies examining the effect of TH on FGF21 or use of FGF21 therapy after pediatric CA.

EXTRACORPOREAL LIFE SUPPORT

Application of the TiPS65 score for out-of-hospital cardiac arrest patients with initial non-shockable rhythm treated with ECPR.
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ABSTRACT
BACKGROUND: The TiPS65 score is a validated scoring system used to predict neurological outcomes in out-of-hospital cardiac arrest (OHCA) patients with shockable rhythm treated with extracorporeal cardiopulmonary resuscitation (ECPR). This study aimed to assess the predictive performance of the TiPS65 score in OHCA patients with initial non-shockable rhythm treated with ECPR. METHODS: This was a secondary analysis using the JAAM-OHCA registry, a multicenter prospective cohort study. The study included adult OHCA patients with initial non-shockable rhythm who underwent ECPR. The TiPS65 score assigned one point to each of four variables: time to hospital ≤25 minutes, pH value ≥7.0 on initial blood gas assessment, shockable on hospital arrival, and age younger than 65 years. Based on the sum score, the predictive performance for 1-month survival and favorable neurological outcomes, defined as the Cerebral Performance Category 1 or 2, was evaluated. RESULTS: Among 57,754 patients in the registry, 370 were included in the analysis. The overall one-month survival and favorable neurological outcome were 11.1% (41/370) and 4.2% (15/370), respectively. The 1-month survival rates based on the TiPS65 score were as follows: 11.2% (12/107) for 0 points, 9.3% (14/150) for 1 point, 10.0% (9/90) for 2 points, and 26.1% (6/23) for ≥3 points. Similarly, the 1-month favorable neurological outcomes were: 5.6% (6/107) for 0 points, 2.7% (4/150) for 1 point, 4.4% (4/90) for 2 points, and 4.3% (1/23) for ≥3 points. The area under the curve was 0.535 (95% CI: 0.437-0.630) for 1-month survival and 0.530 (95% CI: 0.372-0.683) for 1-month neurological outcome. CONCLUSION: This study demonstrates that the TiPS65 score has limited prognostic performance among OHCA patients with initial non-shockable rhythm treated with ECPR. Further research is warranted to develop a predictive tool specifically focused on OHCA with initial non-shockable rhythm to aid in determining candidates for ECPR.

Impella and venoarterial extracorporeal membrane oxygenation in cardiogenic shock complicating acute myocardial infarction.
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ABSTRACT
AIMS: This research aimed to give contemporary insight into the use of Impella and venoarterial extracorporeal membrane oxygenation (VA-ECMO) in myocardial infarction-related cardiogenic shock (AMICS) and into associated outcomes, adverse events, and resource demands. METHODS AND RESULTS: This nationwide observational cohort study describes all AMICS patients treated with Impella(ABIOMED, Danvers, USA) and/or VA-ECMO in 2020-2021. Impella and/or VA-ECMO were used in 20% of all AMICS cases(n = 4088). Impella patients were older (34% vs 13% >75 years, p < 0.001) and less frequently presented after an out-of-hospital cardiac arrest (18% vs. 40%,

p < 0.001). In-hospital mortality was lower in the Impella versus VA-ECMO cohort (61% vs. 67%, p = 0.001). Adverse events occurred less frequently in Impella-supported patients: Acute haemorrhagic anaemia (36% vs. 68%, p < 0.001), cerebrovascular accidents (4% vs. 11%, p < 0.001), thromboembolisms of the extremities (5% vs. 8%, p < 0.001), systemic inflammatory response syndrome (21% vs. 25%, p = 0.004), acute kidney injury (44% vs. 53%, p < 0.001), and acute liver failure (7% vs. 12%, p < 0.001). Impella patients were discharged home directly more often (20% vs. 11%, p < 0.001) whereas VA-ECMO patients were more often discharged to another care facility (22% vs. 19%, p = 0.031). Impella patients had shorter hospital stays and lower hospital costs. CONCLUSION: This is the largest, most recent European cohort study describing outcomes, adverse events, and resource demands based on claims data in patients with Impella and/or VA-ECMO. Overall, adverse event rates and resource consumption were high. Given the current lack of beneficial evidence, our study reinforces the need for prospectively established, high-quality evidence to guide clinical decision making.

Rewarming Young Children After Drowning-Associated Hypothermia and Out-of-Hospital Cardiac Arrest: Analysis Using the CAse REport Guideline.
Andre MC(1), Vuille-Dit-Bille RN(2), Berset A(3), Hammer J(1).
ABSTRACT
OBJECTIVES: Extracorporeal membrane oxygenation (ECMO) is recommended in adults with drowning-associated hypothermia and out-of-hospital cardiac arrest (OHCA). Our experience of managing a drowned 2-year-old girl with hypothermia (23°C) and cardiac arrest (58 min) prompted this summary using the CAse REport (CARE) guideline to address the question of optimal rewarming procedure in such patients. DESIGN/PATIENTS: Following the CARE guideline, we identified 24 reports in the "PubMed database" describing children less than or equal to 6 years old with a temperature less than or equal to 28°C who had been rewarmed using conventional intensive care ± ECMO. Adding our patient, we were able to analyze a total of 57 cases. MAIN RESULTS: The two groups (ECMO vs non-ECMO) differed with respect to submersion time, pH and potassium but not age, temperature or duration of cardiac arrest. However, 44 of 44 in the ECMO group were pulseless on arrival versus eight of 13 in the non-ECMO group. Regarding survival, 12 of 13 children (92%) undergoing conventional rewarming survived compared with 18 of 44 children (41%) undergoing ECMO. Among survivors, 11 of 12 children (91%) in the conventional group and 14 of 18 (77%) in the ECMO group had favorable outcome. We failed to identify any correlation between "rewarming rate" and "outcome." CONCLUSIONS: In this summary analysis, we conclude that conventional therapy should be initiated for drowned children with OHCA. However, if this therapy does not result in return of spontaneous circulation, a discussion of withdrawal of intensive care might be prudent when core temperature has reached 34°C. We suggest further work is needed using an international registry.

Extracorporeal Blood Purification with CytoSorb in 359 Critically Ill Patients.
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ABSTRACT
INTRODUCTION: Critically ill patients with inflammatory dysregulation and organ disfunction may benefit from blood purification, although the use of this technique has not been described in large case series. We evaluated clinical outcomes and survival in high-risk intensive care unit (ICU) patients who underwent extracorporeal blood purification. METHODS: 359 consecutive ICU patients treated with CytoSorb were included. RESULTS: Main admission diagnoses were 120 (34%) refractory cardiac arrest under mechanical chest compression; 101 (28%) profound cardiogenic shock; 81 (23%)

post-cardiotomy cardiogenic shock; and 37 (10%) respiratory failure. Fifteen patients (4%) were positive for SARS-CoV-2 infection. We observed 49% 30-day mortality, 57% ICU mortality, and 62% hospital mortality, all lower than the 71% mortality predicted by SAPS II and 68% predicted by SOFA score. Parameters of shock and organ failure, above all vasoactive inotropic score, reduced during CytoSorb treatment. Multivariable analysis identified SAPS II, lactate dehydrogenase, ICU stay duration, vasoactive inotropic score, lactates, intra-aortic counterpulsation on top of VA-ECMO, and total bilirubin as predictors of mortality. No CytoSorb-related complications occurred. CONCLUSION: CytoSorb treatment was effective in reducing laboratory parameters of shock and vasoactive inotropic score with possible survival implications in a large population of critically ill patients.

EXPERIMENTAL RESEARCH

Chest compression rates of 60/min versus 90/min during neonatal cardiopulmonary resuscitation: a randomized controlled animal trial.
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ABSTRACT
BACKGROUND: To compare chest compression (CC) rates of 60/min with 90/min and their effect on the time to return of spontaneous circulation (ROSC), survival, hemodynamic, and respiratory parameters. We hypothesized that asphyxiated newborn piglets that received CC at 60/min vs. 90/min during cardiopulmonary resuscitation would have a shorter time to ROSC. METHODS: Newborn piglets (n = 7/group) were anesthetized, tracheotomized and intubated, instrumented and exposed to 45 min normocapnic hypoxia followed by asphyxia and cardiac arrest. Piglets were randomly allocated to a CC rate of 60/min or 90/min. CC was performed using an automated CC machine using CC superimposed with sustained inflation. Hemodynamic parameters, respiratory parameters, and applied compression force were continuously measured. RESULTS: The mean (IQR) time to ROSC was 97 (65-149) s and 136 (88-395) s for CC rates of 60/min and 90/min, respectively (p = 0.31). The number of piglets that achieved ROSC was 5 (71%) and 5 (71%) with 60/min and 90/min CC rates, respectively (p = 1.00). Hemodynamic parameters (i.e., diastolic and mean blood pressure, carotid blood flow, stroke volume, end-diastolic volume, left ventricular contractile function) and respiratory parameters (i.e., minute ventilation, peak inflation and peak expiration flow) were all similar with a CC rate of 60/min compared to 90/min. CONCLUSION: Time to ROSC, hemodynamic, and respiratory parameters were not significantly different between CC rates of 60/min vs. 90/min. Different CC rates during neonatal resuscitation warrant further investigation.

CASE REPORTS

Vagal Asystoles in a Boy With Prader-Willi Syndrome.
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ABSTRACT
Prader-Willi syndrome (PWS) is a genetic hormonal disorder of the hypothalamic-pituitary-axis resulting in mental retardation, muscle hypotonia, hypogonadism, and hyperphagia leading to significant obesity. Cardiovascular morbidity and mortality in adult patients with PWS is higher than in healthy controls and mainly secondary to massive obesity. In childhood, mortality may result from respiratory or gastrointestinal illnesses. We present a case of a 10-year-old boy with PWS who experienced recurrent and asymptomatic episodes of sinus pauses caused by the ingestion of large

gulps of apple juice, which could be provoked and reproduced. The asystoles could not be provoked by any other vagal maneuvers and an initial diagnostic workup revealed no indication for structural heart disease. Because of the asymptomatic character of the asystoles, no treatment was initially provided. When he re-presented 3 months later after a clinically relevant syncope at school, pacemaker therapy was initiated, and he has demonstrated no subsequent sinus pauses or syncopes. Regarding the rising awareness of subtle cardiac alterations including autonomic dysfunction and electrocardiogram changes in young patients with PWS and especially the occurrence of unexplained sudden deaths in childhood that may be precipitated by arrhythmia, we suggest that the utility of periodic screening for arrhythmia risk should be evaluated in children with PWS.