This week's PubMed 10th – 16th December 2023: articles of interest n = 39

CPR AND COVID-19

1. Vaccine X. 2023 Dec 1;15:100418. doi: 10.1016/j.jvacx.2023.100418. eCollection 2023 Dec.
Risk of cardiac arrhythmia and cardiac arrest after primary and booster COVID-19 vaccination in England: A self-controlled case series analysis.
Stowe J(1), Whitaker HJ(1), Andrews NJ(1), FMedSci EM(2).
ABSTRACT
BACKGROUND: Various cardiac arrhythmias have been reported after COVID-19 infection and vaccination. We assessed the risk after primary immunisation with the ChAdOx1 adenovirus vectored vaccine, and primary and booster immunisation with an mRNA vaccine in 40 million vaccinated adults with 121 million doses (33.9% ChAdOx1 and 66.1% mRNA) in England. METHODS: Hospital admissions for a cardiac arrhythmia and emergency care attendance for a cardiac arrest in individuals aged 18 years and older on the 31st March 2021 were linked to the national COVID-19 immunisation register. The incidence of events 1-14 and 15-28 days after vaccination relative to a post-vaccination control period was estimated using the self-controlled case series method modified for fatal events. Outcomes were stratified by arrhythmia type, vaccine type, age group and dose number (up to five). Elevated relative incidence (RI) estimates with $p < 0.001$ were considered strong evidence of an association. FINDINGS: There was an increased risk of admission for arrhythmia events that were largely palpitations without myocarditis within 14 days of a second priming dose of an mRNA vaccine in 18-49 year olds with an RI of 1.66 (95 % confidence interval 1.47,1.86) for BNT162b2 and 3.75 (2.52,5.57) for mRNA-1273 ($p < 0.001$) and also after a first booster dose, 1.34 (1.17,1.53) and 1.75 (1.43,2.15) respectively ($p < 0.001$). No other cardiac arrhythmia, including cardiac arrest, showed an elevated incidence within 28 days of vaccination for any dose, age group or vaccine type. In contrast the risk of a cardiac arrhythmia of all types, including a cardiac arrest, was consistently elevated in those testing positive for SARS-CoV-2 infection. INTERPRETATION: Our study provides reassuring evidence of the safety of the ChAdOx1 and mRNA COVID-19 vaccines with respect to serious cardiac arrhythmias and of the favourable risk benefit of mRNA booster vaccination.

2. Emerg Med Int. 2023 Nov 30;2023:9697442. doi: 10.1155/2023/9697442. eCollection 2023.
Impact of Personal Protective Equipment on Cardiopulmonary Resuscitation and Rescuer Safety.
Cheng CH(1)(2), Cheng YY(3), Yuan MK(4)(5), Juang YJ(6), Zeng XY(6), Chen CY(6)(7), Foo NP(8).
ABSTRACT
BACKGROUND: High-quality cardiopulmonary resuscitation (CPR) is a key element in the rescue of cardiac arrest patients but is difficult to achieve in circumstances involving aerosol transmission, such as the COVID-19 pandemic. METHODS: This prospective randomized crossover trial included 30 experienced health care providers to evaluate the impact of personal protective equipment (PPE) on CPR quality and rescuer safety. Participants were asked to perform continuous CPR for 5 minutes on a manikin with three types of PPE: level D-PPE, level C-PPE, and PAPR. The primary outcome was effective chest compression per minute. Secondary outcomes were the fit factor by PortaCount, vital signs and fatigue scores before and after CPR, and perceptions related to wearing PPE. Repeated-measures ANOVA was used, and a two-tailed test value of 0.05 was considered statistically significant. RESULTS: The rates of effective chest compressions for 5 minutes with level D-PPE, level C-PPE, and PAPRs were 82.0 ± 0.2%, 78.4 ± 0.2%, and 78.0 ± 0.2%, respectively ($p = 0.584$). The fit-factor test values of level C-PPE and PAPRs were 182.9 ± 39.9 vs. 198.9 ± 9.2 ($p < 0.001$). The differences in vital signs before and after CPR were not significantly different among the groups. In

addition, the fatigue and total perception scores of wearing PPE were significantly higher for level C-PPE than PAPRs: 3.8 ± 1.6 vs. 3.0 ± 1.6 ($p < 0.001$) and 27.9 ± 5.4 vs. 26.0 ± 5.3 ($p < 0.001$), respectively. CONCLUSION: PAPRs are recommended when performing CPR in situations where aerosol transmission is suspected. When PAPRs are in short supply, individual fit-tested N95 masks are an alternative.

CPR/MECHANICAL CHEST COMPRESSION

No articles identified.

REGISTRIES, REVIEWS AND EDITORIALS

No articles identified.

IN-HOSPITAL CARDIAC ARREST

1. Resusc Plus. 2023 Dec 8;17:100525. doi: 10.1016/j.resplu.2023.100525. eCollection 2024 Mar.
Ten years of incident reports on in-hospital cardiac arrest - Are they useful for improvements?
Djärv T(1)(2).

ABSTRACT
OBJECTIVES: Staff in hospitals are encouraged to write up incident reports whenever they notice an incident. There are few published compilations of these reports from an in-hospital cardiac arrest (IHCA) perspective. AIM: To describe content of incident reports over ten years in a two-sited university hospital in order to share knowledge and thereby being able to improve resuscitation systems in hospitals. MATERIAL AND METHODS: All incident reports between 2010-June 2023 written at Karolinska University Hospital contain the words "CPR", "cardiac arrest", "resuscitation", Do-Not-attend-CPR" (DNACPR), "life-sustaining treatment" were included for analysis. Reports were grouped into larger themes. RESULTS: In all 588 reports was identified automatically by the hospitals system based on the totally selected keywords. The largest category was "Life-sustaining treatment" with 178 (30%) reports and thereafter "Preventing care" (117, 20%) and "Material" (80, 14%). CONCLUSION: Our hospital has clearly valued incident reports as a mean to track on-going issues and serious events over time as well as a source to trigger educational interventions. To improve patient safety, a standardized approach for compilation of reports and actions would be helpful when sharing knowledge between hospitals and with the resuscitation community.

2. Pediatr Qual Saf. 2023 Dec 12;8(6):e706. doi: 10.1097/pq9.0000000000000706. eCollection 2023 Nov-Dec.
Establishing a Quality Improvement Program for Pediatric In-hospital Cardiac Arrest.
Freedman AJ(1), Madsen EC(1), Lowrie L(1).

ABSTRACT
BACKGROUND: Pediatric In-hospital Cardiac Arrest (IHCA) is a rare event with a 50-55% mortality rate. Techniques of Cardiopulmonary Resuscitation (CPR), medication and electrical therapy timing, team dynamics, simulation and debriefing programs are associated with improved outcomes. This study aimed to improve outcomes after IHCA by describing and implementing quality improvement processes that cross and coordinate among traditional siloed pediatric resuscitation team structures. METHODS: We chose three outcome measures: (1) return of spontaneous circulation (ROSC), (2) 24-hour survival after IHCA, and (3) survival to hospital discharge. Process outcomes include (1) hot debriefs performed with a standardized form, (2) code documentation using a revised form, and (3) formal code team review presented to a central Emergency Management Committee, using a

standardized form. RESULTS: One hundred and thirty-two patients experienced 176 events during the 36-month study period. Survival to hospital discharge increased from 33% during year 1 to 60% during year 2 ($P < 0.05$) but decreased to 45% in year 3. Both hot debrief performance and code documentation process methods did not demonstrate widespread adoption, but formal code team review was documented in 80% of events quite rapidly. CONCLUSIONS: There are common traits inherent to effective CPR team response. Ensuring optimal performance of these common tasks and techniques in every pediatric IHCA event in our hospital is being addressed by committee reorganization, task simplification, new technology acquisition and enhanced feedback loops. Early outcome analysis shows initial improvement in survival to hospital discharge after pediatric IHCA.

INJURIES AND CPR

1. Unfallchirurgie (Heidelb). 2023 Dec 15. doi: 10.1007/s00113-023-01386-x. Online ahead of print.
[Treatment strategy for an unstable chest wall after cardiopulmonary resuscitation].
[Article in German; Abstract available in German from the publisher]
Dobroniak CC(1), Lehmann W(2), Cagirici R(2), Lesche V(2), Olgemoeller U(3), Spering C(2).

ABSTRACT

Every year ca. 60,000 people in Germany undergo cardiopulmonary resuscitation (CPR). The two most frequent underlying causes are of cardiopulmonary and traumatic origin. According to the current CPR guidelines chest compressions should be performed in the middle of the sternum with a pressure frequency of 100-120/min and to a depth of 5-6 cm. In contrast to trauma patients where different injury patterns can arise depending on the accident mechanism, both the type of trauma and the injury pattern are similar in patients after CPR due to repetitive thorax compression. It is known that an early reconstruction of the thoracic wall and the restoration of the physiological breathing mechanics in trauma patients with unstable thoracic injuries reduce the rates of pneumonia and weaning failure and shorten the length of stay in the intensive care unit. As a result, it is increasingly being propagated that an unstable thoracic injury as a result of CPR should also be subjected to surgical treatment as soon as possible. In the hospital of the authors an algorithm was formulated based on clinical experience and the underlying evidence in a traumatological context and a surgical treatment strategy was designed, which is presented and discussed taking the available evidence into account.

CAUSE OF THE ARREST

1. Resusc Plus. 2023 Nov 23;17:100513. doi: 10.1016/j.resplu.2023.100513. eCollection 2024 Mar.
Association between obesity and neurological outcomes among out-of-hospital cardiac arrest patients: The SOS-KANTO 2017 study.
Aoki M(1), Aso S(2), Suzuki M(3), Tagami T(4), Sawada Y(5), Yasunaga H(6), Kitamura N(7), Oshima K(5); behalf of the SOS-KANTO 2017 Study Group.

ABSTRACT

AIM: To assess the association between body mass index (BMI) and neurological outcomes among patients with out-of-hospital cardiac arrest (OHCA). METHODS: This prospective, multicenter, observational study conducted between 2019 and 2021 included adults with OHCA who were hospitalized after return of spontaneous circulation. Based on the BMI, the patients were categorized as underweight (BMI < 18.5 kg/m2), normal weight (BMI 18.5-24.9 kg/m2), overweight (BMI 25.0-29.9 kg/m2), or obese (BMI ≥ 30 kg/m2). The normal weight group served as the reference. Favorable neurological outcomes were defined as a Cerebral Performance Category score of ≤2 at 30 days. Multivariate logistic regression analyses were performed to adjust for patient

characteristics, OHCA circumstances, and time variables. RESULTS: Of the 9,909 patients with OHCA who presented during the study period, 637 were eligible, of whom 10.8% (69/637), 48.9% (312/637), 27.6% (176/637), and 12.5% (80/637) were underweight, normal weight, overweight, and obese, respectively. These groups had favorable neurological outcome in 23.2%, 29.2%, 20.5%, and 16.2% of patients, respectively. Obese and overweight patients had a significantly lower rate of favorable neurologic outcomes (adjusted odds ratio [OR] = 0.35; 95% confidence interval [CI] = 0.16-0.77; adjusted OR = 0.53; 95% CI = 0.31-0.90, respectively) than those with a normal weight. CONCLUSIONS: Obese and overweight patients with OHCA have reduced rates of favorable neurological outcomes, suggesting that clinicians should pay attention to the BMI of patients.

2. Resusc Plus. 2023 Nov 24;17:100514. doi: 10.1016/j.resplu.2023.100514. eCollection 2024 Mar.
The incidence, predictors, and causes of cardiac arrest in United States emergency departments.
Hsu SH(1)(2), Sung CW(3), Lu TC(1)(2), Wang CH(1)(2), Chou EH(4), Ko CH(1), Huang CH(1)(2), Tsai CL(1)(2).

ABSTRACT

BACKGROUND: Emergency department cardiac arrest (EDCA) is a global public health challenge associated with high mortality rates and poor neurological outcomes. This study aimed to describe the incidence, risk factors, and causes of EDCA during emergency department (ED) visits in the U.S. METHODS: This retrospective cohort study used data from the 2019 Nationwide Emergency Department Sample (NEDS). Adult ED visits with EDCA were identified using the cardiopulmonary resuscitation code. We used descriptive statistics and multivariable logistic regression, considering NEDS's complex survey design. The primary outcome measure was EDCA incidence. RESULTS: In 2019, there were approximately 232,000 ED visits with cardiac arrest in the U.S. The incidence rate of EDCA was approximately 0.2%. Older age, being male, black race, low median household income, weekend ED visits, having Medicare insurance, and ED visits in non-summer seasons were associated with a higher risk of EDCA. Hispanic race was associated with a lower risk of EDCA. Certain comorbidities (e.g., diabetes and cancer), trauma centers, hospitals with a metropolitan and/or teaching program, and hospitals in the South were associated with a higher risk of EDCA. Depression, dementia, and hypothyroidism were associated with a lower risk of EDCA. Septicemia, acute myocardial infarction, and respiratory failure, followed by drug overdose, were the predominant causes of EDCA. CONCLUSIONS: Some patients were disproportionately affected by EDCA. Strategies should be developed to target these modifiable risk factors, specifically factors within ED's control, to reduce the subsequent disease burden.

END-TIDAL CO_2

1. Am J Emerg Med. 2023 Nov 25;76:211-216. doi: 10.1016/j.ajem.2023.11.027. Online ahead of print.
End-tidal carbon dioxide after sodium bicarbonate infusion during mechanical ventilation or ongoing cardiopulmonary resuscitation.
Roh YI(1), Kim HI(2), Kim SJ(3), Cha KC(1), Jung WJ(1), Park YJ(4), Hwang SO(5).

ABSTRACT

PURPOSE: End-tidal CO2 is used to monitor the ventilation status or hemodynamic efficacy during mechanical ventilation or cardiopulmonary resuscitation (CPR), and it may be affected by various factors including sodium bicarbonate administration. This study investigated changes in end-tidal CO2 after sodium bicarbonate administration. MATERIALS AND METHODS: This single-center, prospective observational study included adult patients who received sodium bicarbonate during mechanical ventilation or CPR. End-tidal CO2 elevation was defined as an increase of ≥20% from the

baseline end-tidal CO2 value. The time to initial increase (lag time, Tlag), time to peak (Tpeak), and duration of the end-tidal CO2 rise (Tduration) were compared between the patients with spontaneous circulation (SC group) and those with ongoing resuscitation (CPR group). RESULTS: Thirty-three patients, (SC group, n = 25; CPR group, n = 8), were included. Compared with the baseline value, the median values of peak end-tidal CO2 after sodium bicarbonate injection increased by 100% (from 21 to 41 mmHg) in all patients, 89.5% (from 21 to 39 mmHg) in the SC group, and 160.2% (from 15 to 41 mmHg) in the CPR group. The median Tlag was 17 s (IQR: 12-21) and the median Tpeak was 35 s (IQR: 27-52). The median Tduration was 420 s (IQR: 90-639). The median Tlag, Tpeak, and Tduration were not significantly different between the groups. Tduration was associated with the amount of sodium bicarbonate for SC group (correlation coefficient: 0.531, p = 0.006). CONCLUSION: The administration of sodium bicarbonate may lead to a substantial increase in end-tidal CO2 for several minutes in patients with spontaneous circulation and in patients with ongoing CPR. After intravenous administration of sodium bicarbonate, the use of end-tidal CO2 pressure as a physiological indicator may be limited.

ORGAN DONATION

No articles identified.

FEEDBACK

No articles identified.

DRUGS

No articles identified.

TRAUMA

1. Eur J Emerg Med. 2023 Dec 13. doi: 10.1097/MEJ.0000000000001108. Online ahead of print.
Prehospital interventions and outcomes in traumatic cardiac arrest: a population-based cohort study using the Danish Helicopter Emergency Medical Services data.
Wolthers SA(1)(2), Breindahl N(1)(2)(3), Jensen TW(1)(4), Holgersen MG(2)(5), Møller TP(1)(6), Blomberg SNF(1), Andersen LB(1), Mikkelsen S(7), Steinmetz J(8)(9)(10), Christensen HC(1)(2).
ABSTRACT
BACKGROUND AND IMPORTANCE: Traumatic cardiac arrest is associated with poor prognosis, and timely evidence-based treatment is paramount for increasing survival rates. Physician-staffed helicopter emergency medical service use in major trauma has demonstrated improved outcomes. However, the sparsity of data highlights the necessity for a comprehensive understanding of the epidemiology of traumatic cardiac arrest. OBJECTIVES: The primary objective of the present study was to evaluate survival and return of spontaneous circulation (ROSC) and to investigate the characteristics of patients with traumatic cardiac arrest assessed by the Danish HEMS. DESIGN: This was a population-based cohort study based on data from the Danish helicopter emergency medical service database. SETTINGS AND PARTICIPANTS: The study included all patients assessed by the Danish helicopter emergency medical services between 2016 and 2021. OUTCOME MEASURES AND ANALYSIS: Data were analysed using descriptive statistics, non-parametric testing and logistic

regression analyses. Descriptive analysis of prehospital interventions included cardiopulmonary resuscitation, defibrillation, airway management, administration of blood products, and thoracic decompression. The primary outcome was 30-day survival, and the key secondary outcome was prehospital ROSC. MAIN RESULTS: A total of 223 patients with TCA were included. The median age was 54 years (IQR 34-68), and the majority were males. Overall, 23% of patients achieved prehospital ROSC, and the 30-day survival rate was 4%. Factors associated with an increased likelihood of ROSC were an initial shockable cardiac rhythm, odds ratio (OR) of 3.78 (95% CI 1.33-11.00) and endotracheal intubation, OR 7.10 (95% CI 2.55-22.85). CONCLUSION: This study highlights the low survival rates observed among patients with traumatic cardiac arrest assessed by helicopter emergency medical services. The findings support the positive impact of an initial shockable cardiac rhythm and endotracheal intubation in improving the likelihood of ROSC. The study contributes to the limited literature on traumatic cardiac arrests assessed by physician-staffed helicopter emergency services. Finally, the findings emphasise the need for further research to understand and improve outcomes in this subgroup of cardiac arrest.

2. Eur J Trauma Emerg Surg. 2023 Dec 12. doi: 10.1007/s00068-023-02398-3. Online ahead of print.
Witnessed prehospital traumatic arrest: predictors of survival to hospital discharge.
Schellenberg M(1), Owattanapanich N(2), Ugarte C(2), Grigorian A(3), Nahmias J(3), Lam L(2), Martin MJ(2), Inaba K(2).

ABSTRACT
PURPOSE: Trauma patients are rapidly transported to the hospital for definitive care. Nonetheless, some are alive upon Emergency Medical Services (EMS) arrival but arrest on-scene or during transport. The study objective was to examine EMS-witnessed traumatic arrests to define patients who survived hospital discharge. METHODS: Patients sustaining EMS-witnessed traumatic arrest and entered into the National Trauma Data Bank were included (2007-2018). Mortality defined groups: survival to hospital discharge vs. in-hospital death vs. death in ED/declared dead on arrival (DOA). ANOVA/Chi-square compared cohorts. Multivariable analysis established factors associated with survival out of ED and to hospital discharge. RESULTS: After exclusions, 14,177 patients met the criteria: 10% survived, 22% died in hospital, and 68% died in ED/DOA. Survivors tended to be female (33% vs. 23% vs. 23%, $p < 0.001$), blunt traumas (71% vs. 56% vs. 60%, $p < 0.001$), have higher scene GCS (15 [7-15] vs. 3 [3-11] vs. 3 [3-7], $p < 0.001$), and lower injury severity (ISS 13 [7-26] vs. 27 [18-41] vs. 25 [10-30], $p < 0.001$), particularly of the head (AIS 0 [0-2] vs. 0 [0-4] vs. 1 [0-4], $p < 0.001$). Survival to hospital discharge was independently associated with higher field GCS (OR 1.252, $p < 0.001$) and SBP (OR 1.006, $p < 0.001$), and Head AIS scores (OR 1.073, $p < 0.001$). Increasing age (OR 0.984, $p < 0.001$), higher ISS (OR 0.975, $p < 0.001$), male sex (OR 0.695, $p < 0.001$), and penetrating mechanism of injury (OR 0.537, $p < 0.001$) were associated with reduced survival to discharge. CONCLUSION: After EMS-witnessed traumatic cardiac arrest, survivors were more likely to be young, female, injured by blunt trauma, and less hypotensive/comatose on-scene. These findings may have implications for ED resuscitation or declaration of care futility and should be further investigated with a prospective multicenter study.

VENTILATION

1. Resusc Plus. 2023 Nov 30;17:100512. doi: 10.1016/j.resplu.2023.100512. eCollection 2024 Mar.
Design and implementation of the hospital airway resuscitation trial.
Moskowitz A(1)(2), Andrea L(1)(2), Shiloh AL(1), Cardasis J(3), Carty C(3), Kim M(4), Xie X(4), McAllen S(5), Esses D(6), Lutz C(6), Takematsu M(6), Romero J(6), Schimmrich K(6), Fein DG(1)(2)(7), Dodi

AE(1), Rednor S(1), Bangar M(1), Mohamed A(1)(2), Eisen LA(1), Wang HE(8), Donnino MW(9), Gong MN(1)(2).

ABSTRACT

Guidelines for the management of in-hospital cardiac arrest resuscitation are often drawn from evidence generated in out-of-hospital cardiac arrest populations and applied to the in-hospital setting. Approach to airway management during resuscitation is one example of this phenomenon, with the recommendation to place either a supraglottic airway or endotracheal tube when performing advanced airway management during in-hospital cardiac arrest based mainly in clinical trials conducted in the out-of-hospital setting. The Hospital Airway Resuscitation Trial (HART) is a pragmatic cluster-randomized superiority trial comparing a strategy of first choice supraglottic airway to a strategy of first choice endotracheal intubation during resuscitation from in-hospital cardiac arrest. The design includes a number of innovative elements such as a highly pragmatic design drawing from electronic health records and a novel primary outcome measure for cardiac arrest trials-alive-and-ventilator free days. Many of the topics explored in the design of HART have wide relevance to other trials in in-hospital cardiac arrest populations.

CERERBRAL MONITORING

1. Heliyon. 2023 Nov 19;9(12):e22582. doi: 10.1016/j.heliyon.2023.e22582. eCollection 2023 Dec.

Serum spectrin breakdown product and neurofilament heavy in predicting outcome after cardiac arrest: A diagnostic accuracy study.

Kim K(1), Oh JS(1), Kim HJ(2), Song H(2), Oh SH(2), Youn CS(2), Choi KH(1), Park KN(2).

ABSTRACT

OBJECTIVES: Spectrin breakdown products 145 kDa (SBDP145) and neurofilament heavy chain (Nf-H) have been identified as potential biomarkers of neuronal injury. However, their ability to predict hypoxic-ischemic brain injury following cardiac arrest in humans is not well understood. This study aimed to investigate whether SBDP145 and Nf-H could be used as biomarkers to predict neurological outcomes after cardiac arrest. METHODS: This prospective study was conducted at two academic hospitals and included adults who survived after cardiac arrest. Blood samples were collected at 0, 24, and 48 h after the return of spontaneous circulation, and biomarker analyses were performed to measure SBDP145 and Nf-H. Poor neurological outcome was defined as a modified Rankin Score of 4-6, and diagnostic performance was determined by receiver-operating characteristics analysis. RESULTS: A total of 56 patients were included in this study. There were no significant differences in levels of SBDP145 or Nf-H between the poor and good outcome groups at any time point. Areas under the receiver-operating characteristics curve of SBDP145 and Nf-H were small, ranging from 0.51 to 0.7. At 0, 24, and 48 h, SBDP145 showed very low sensitivity (18.61 %, 13.89 %, and 13.79 %, respectively) and accuracy (33.93 %, 36.74 %, and 39.02 %, respectively) at a cut-off value for 100 % specificity. Nf-H also showed very low sensitivity (9.30 %, 16.67 %, and 0 %, respectively) and accuracy (29.09 %, 36.74 %, and 30.95 %, respectively). CONCLUSIONS: SBDP145 and Nf-H were found to be poor predictors of poor neurological outcomes six months after cardiac arrest.

ULTRASOUND AND CPR

1. POCUS J. 2023 Nov 27;8(2):217-222. doi: 10.24908/pocus.v8i2.16690. eCollection 2023.

Prevalence of Phantom Scanning in Cardiac Arrest and Trauma Resuscitations: The Scary Truth.

Boivin Z(1), Xu C(1), Doko D(1), Herbst MK(2), She T(3).

ABSTRACT

Background: The prevalence of phantom scanning, or point of care ultrasound (POCUS) performed without saving images, has not been well studied. Phantom scanning can negatively affect patient care, reduce billed revenue, and can increase medicolegal liability. We sought to quantify and compare the prevalence of phantom scanning among emergency department (ED) cardiac arrests and trauma resuscitations. Methods: This was a single center, retrospective cohort study from July 1, 2019, to July 1, 2021, of all occurrences of POCUS examination documented on the resuscitation run sheet during cardiac arrest and trauma resuscitations. Two investigators reviewed the run sheets to screen for POCUS documentation. Instances where documentation was present were matched with saved images in the picture archiving and communication system. Instances where documentation was present but no images could be located were considered phantom scans. A two-tailed student's t test was utilized to compare the phantom scanning rate between cardiac arrest and trauma resuscitations. Results: A total of 1,862 patients were included in the study period, with 329 cardiac arrests and 401 trauma resuscitations having run sheet documentation of POCUS performance. The phantom scanning rate in cardiac arrests and trauma resuscitations was 70.5% (232/329) and 86.5% (347/401), respectively ($p < 0.001$). Conclusion: Phantom scanning is common in both cardiac arrests and trauma resuscitations in the ED at our institution, but is significantly higher in trauma resuscitations. Further research is needed to assess causes and develop potential solutions to reduce the high prevalence of phantom scanning.

2. Am J Emerg Med. 2023 Nov 29;76:164-172. doi: 10.1016/j.ajem.2023.11.041. Online ahead of print.

Resuscitative transesophageal echocardiography in emergency departments in the United States and Canada: A cross-sectional survey.

Teran F(1), West FM(2), Jelic T(3), Taylor L(4), Jafry ZM(5), Burns KM(6), Owyang CG(7), Emt CC(8), Abella BS(8), Andrus P(9); On behalf ACEP Emergency Ultrasound Section and the Resuscitative TEE Collaborative Registry (rTEECoRe)

ABSTRACT

INTRODUCTION: Over the past two decades, transesophageal echocardiography (TEE) has been used with increasing frequency to evaluate critically ill patients outside of traditional settings. Thepurpose of this study was to characterize the number of programs, users, practice characteristics, training and competency requirements and barriers for the current use of resuscitative transesophageal echocardiography (TEE) in Emergency Departments (EDs) in the United States and Canada. METHODS: A closed internet-based, cross-sectional, point-prevalence survey was administered via email to 120 program directors of emergency ultrasound fellowships (EUSF) and 43 physicians from EDs without EUSF from the United States and Canada. RESULTS: Ninety-eight percent of surveyed participants responded. Twenty percent of respondents reported having active resuscitative TEE programs. The majority of participating hospitals (70%) were academic centers with residency programs. A total of 33 programs reported using resuscitative TEE in their ED and of those, 82% were programs with EUSF. Most programs performing TEE (79%) had less than five attending physicians performing TEE. Evaluation of patients during resuscitation from cardiac arrest (100%) and post-arrest care (76%) are the two most frequent indications for TEE in the ED. The most common core elements of resuscitative TEE protocols used are: assessment of left ventricular (LV) systolic function (97%), assessment of right ventricular (RV) function (88%), evaluation of pericardial effusion / tamponade (52%). All programs reported using formal didactics in their training programs, 94% reported using high-fidelity simulation, and 79% live scanning of patients. Financial concerns were the most common barrier use of TEE in the ED (58%), followed by maintenance of equipment (30%), and credentialing/privileges (30%). CONCLUSIONS: This study provides a snapshot of the practice of

resuscitative TEE in EDs in the United States and Canada revealing the existence of 33 programs using this emerging modality in the care of critically ill patients.

ORGANISATION AND TRAINING

1. Resuscitation. 2023 Dec 13:110088. doi: 10.1016/j.resuscitation.2023.110088. Online ahead of print.

Empowering the Next Generation: An innovative "Kids Save Lives" blended learning programme for schoolchildren training.

Semeraro F(1), Imbriaco G(2), Del Giudice D(3), Antognoli M(1), Celin D(3), Cuttitta M(1), Lo Guasto V(1), Giulini G(1), Gnudi T(1), Monesi A(1), Nava E(3), Tucci R(1), Carenzio A(4), Lo Jacono S(5), Gordini G(1), Gamberini L(1), Carlo Coniglio(1), Baldazzi M(1), Landini C(6), Guarnera M(7), Masina J(3), Ghedini G(3), Potri L(8), Tortolani D(7); collaborators:.

ABSTRACT

INTRODUCTION: Guidelines recommend teaching resuscitation from school age; however, little is known about the best methods to provide it. We devised a blended learning program for primary and secondary students (Kids Save Lives - KSL) consisting of brief lectures, practical training with mannequins, and virtual reality. We aimed to evaluate its impact on students' attitudes towards intervening during cardiac arrest and their knowledge about basic life support. METHODS: This observational, prospective, before-and-after study assessed attitudes and basic life support knowledge in primary and secondary school children exposed to the KSL program. 20 events were conducted in the metropolitan area of Bologna, Italy. A multiple-choice test (before and after the course) explored attitude, knowledge and perceptions of realism, engagement, and agreement with the virtual reality method. RESULTS: A total of 1,179 students (response rate 81.4%) were included in the final analysis, with 12.89% from primary schools, 5.94% from middle schools, and 81.17% from high schools. Students' willingness to intervene during a cardiac arrest rose from 56.9% to 93.1% ($p<0.001$) post-course. The course's realism, engagement, and future prospects received positive feedback, with median scores notably higher in primary schools compared to secondary schools. CONCLUSION: The blended learning method improved students' understanding of basic life support techniques and their attitude to act during cardiac arrest situations. The positive reception of the virtual reality component underscores technology's potential to bolster engagement and should be further explored for basic life support teaching in schoolchildren.

2. Resuscitation. 2023 Dec 12:110087. doi: 10.1016/j.resuscitation.2023.110087. Online ahead of print.

Reporting Standard for describing First Responder Systems, Smartphone Alerting Systems, and AED Networks.

Müller MP(1), Metelmann C(2), Thies KC(3), Greif R(4), Scquizzato T(5), Deakin CD(6), Auricchio A(7), Barry T(8), Berglund E(9), Böttiger BW(10), Burkart R(11), Busch HJ(12), Caputo ML(7), Cheskes S(13), Cresta R(14), Damjanovic D(15), Degraeuwe E(16), Ekkel MM(17), Elschenbroich D(18), Fredman D(19), Ganter J(20), Gregers MCT(21), Gronewald J(15), Hänsel M(22), Henriksen FL(23), Herzberg L(24), Jonsson M(9), Joos J(25), Kooy TA(26), Krammel M(27), Marks T(28), Monsieurs K(29), Ng WM(30), Osche S(31), Salcido DD(32), Scapigliati A(33), Schwietring J(34), Semeraro F(35), Snobelen P(36), Sowa J(15), Stieglis R(17), Tan HL(37), Trummer G(38), Unterrainer J(39), Vercammen S(40), Wetsch WA(41), Metelmann B(2).

ABSTRACT

Standardized reporting of data is crucial for out-of-hospital cardiac arrest (OHCA) research. While the implementation of first responder systems dispatching volunteers to OHCA is encouraged, there

is currently no uniform reporting standard for describing these systems. A steering committee established a literature search to identify experts in smartphone alerting systems. These international experts were invited to a conference held in Hinterzarten, Germany, with 40 researchers from 13 countries in attendance. Prior to the conference, participants submitted proposals for parameters to be included in the reporting standard. The conference comprised five workshops covering different aspects of smartphone alerting systems. Proposed parameters were discussed, clarified, and consensus was achieved using the Nominal Group Technique. Participants voted in a modified Delphi approach on including each category as a core or supplementary element in the reporting standard. Results were presented, and a writing group developed definitions for all categories and items, which were sent to participants for revision and final voting using LimeSurvey web-based software. The resulting reporting standard consists of 68 core items and 21 supplementary items grouped into five topics (first responder system, first responder network, technology/ algorithm/ strategies, reporting data, and automated external defibrillators (AED)). This proposed reporting standard generated by an expert opinion group fills the gap in describing first responder systems. Its adoption in future research will facilitate comparison of systems and research outcomes, enhancing the transfer of scientific findings to clinical practice.

3. Resuscitation. 2023 Dec 11:110076. doi: 10.1016/j.resuscitation.2023.110076. Online ahead of print.

Exploring cardiac arrest in 'at-home' settings: concepts derived from a qualitative interview study with layperson bystanders.

Beck S(1), Phillipps M(2), Degel A(3), Mochmann HC(4), Breckwoldt J(5).

ABSTRACT

BACKGROUND: Two thirds of Out-of-Hospital Cardiac Arrests (OHCAs) occur at the patient's home ('at-home-CA'), where bystander CPR (B-CPR) rates are significantly lower than in public locations. Knowledge about the circumstances of this specific setting has mainly been limited to quantitative data. To develop a more conceptual understanding of the circumstances and dynamics of 'at-home CA', we conducted a qualitative interview study. METHODS: Twenty-one semi-structured in-depth interviews were performed with laypersons who had witnessed 'at-home CA'. The interviews were audio recorded, transcribed, and analysed by qualitative content analysis (QCA). A category system was developed to classify facilitating and impeding factors and to finally derive overarching concepts of 'at-home CA'. RESULTS: Qualitative Content Analysis yielded 1'347 relevant interview segments. Of these, 398 related to factors facilitating B-CPR, 328 to factors impeding, and 621 were classified neutral. Some of these factors were specific to 'at-home CA'. The privacy context was found to be a particularly supportive factor, as it enhanced the commitment to act and facilitated the detection of symptoms. Impeding factors, aggravated in 'at-home CA' settings, included limited support from other bystanders, acute stress response and impaired situational judgement, as well as physical challenges when positioning the patient. We derived six overarching concepts defining the 'at-home CA' situation: (a) unexpectedness of the event, (b) acute stress response, (c) situational judgement, (d) awareness of the necessity to perform B-CPR, (e) initial position of the patient, (f) automaticity of actions. CONCLUSION: Integrating these concepts into dispatch protocols and layperson training may improve dispatcher-bystander interaction and the outcomes of 'at-home CA'.

4. Neth Heart J. 2023 Dec 12. doi: 10.1007/s12471-023-01838-4. Online ahead of print.

Cognitive screening and rehabilitation after cardiac arrest: only a few hurdles to take.

van Til JA(1), Hemels MEW(2)(3), Hofmeijer J(4)(5).

ABSTRACT

Dutch and European guidelines recommend systematic screening for cognitive and emotional impairments in cardiac arrest survivors. We aimed to clarify opinions on cognitive screening and rehabilitation, identify barriers and facilitators for implementation in the Netherlands, and arrive at recommendations in this field. We conducted 22 semi-structured interviews with various stakeholders using the Tailored Implementation in Chronic Diseases checklist. There is broad-based acknowledgement of the relevance of cognitive impairment and a positive attitude regarding early cognitive screening among health professionals and patients. Barriers to implementation include a lack of practical recommendations on how, where and when to screen, insufficient knowledge of cognitive consequences of cardiac arrest, insufficient collaboration and knowledge sharing among different specialties within hospitals, insufficient resources, and insufficient evidence of the effectiveness of screening and therapy to justify financial compensation. Most of the identified barriers to implementation are solvable: national guidelines need practical recommendations and knowledge gaps among healthcare workers can be bridged by in-hospital collaboration. Fulfilling these requirements should be sufficient for the implementation of simple screening and tailored advice. More extensive cognitive rehabilitation therapy needs stronger evidence of efficacy in order to warrant stronger guideline recommendations and financial reimbursement.

5. Resuscitation. 2023 Dec 9:110077. doi: 10.1016/j.resuscitation.2023.110077. Online ahead of print.

Testing ChatGPT ability to answer laypeople questions about cardiac arrest and Cardiopulmonary resuscitation.

Scquizzato T(1), Semeraro F(2), Swindell P(3), Simpson R(4), Angelini M(1), Gazzato A(1), Sajjad U(4), Bignami EG(5), Landoni G(6), Keeble TR(7), Mion M(8).

ABSTRACT

INTRODUCTION: Cardiac arrest leaves witnesses, survivors, and their relatives with a multitude of questions. When a young or a public figure is affected, interest around cardiac arrest and cardiopulmonary resuscitation (CPR) increases. ChatGPT allows everyone to obtain human-like responses on any topic. Due to the risks of accessing incorrect information, we assessed ChatGPT accuracy in answering laypeople questions about cardiac arrest and CPR. METHODS: We co-produced a list of 40 questions with members of Sudden Cardiac Arrest UK covering all aspects of cardiac arrest and CPR. Answers provided by ChatGPT to each question were evaluated by professionals for their accuracy, by professionals and laypeople for their relevance, clarity, comprehensiveness, and overall value on a scale from 1 (poor) to 5 (excellent), and for readability. RESULTS: ChatGPT answers received an overall positive evaluation (4.3±0.7) by 14 professionals and 16 laypeople. Also, clarity (4.4±0.6), relevance (4.3±0.6), accuracy (4.0±0.6), and comprehensiveness (4.2±0.7) of answers was rated high. Professionals, however, rated overall value (4.0±0.5 vs 4.6±0.7; p=0.02) and comprehensiveness (3.9±0.6 vs 4.5±0.7; p=0.02) lower compared to laypeople. CPR-related answers consistently received a lower score across all parameters by professionals and laypeople. Readability was 'difficult' (median Flesch reading ease score of 34 [IQR 26-42]). CONCLUSIONS: ChatGPT provided largely accurate, relevant, and comprehensive answers to questions about cardiac arrest commonly asked by survivors, their relatives, and lay rescuers, except CPR-related answers that received the lowest scores. Large language model will play a significant role in the future and healthcare-related content generated should be monitored.

6. Resuscitation. 2023 Dec 9:110084. doi: 10.1016/j.resuscitation.2023.110084. Online ahead of print.

Impact of "basic life support & defibrillation" training on quality of telephone-assisted cardiopulmonary resuscitation.

D'Agostino F(1), Ferri C(2), Fusco P(3), Desideri G(2), Ristagno G(4).

ABSTRACT

While telephone-assisted cardiopulmonary resuscitation (T-CPR) is crucial for improving the chances of survival during cardiac arrest, there is limited information available on the effectiveness of T-CPR when administered by laypeople, especially those who are unfamiliar with these procedures. Therefore, we assessed the influence of basic life support and defibrillation (BLSD) training on the proficiency of T-CPR carried out by volunteer medical students participating in a BLSD course, using a simulated cardiac arrest scenario. The quality of T-CPR maneuvers was compared before and after the BLSD course. The results highlight the positive impact of BLSD training, significantly enhancing the quality of T-CPR and bringing it close to optimal levels.

7. Resusc Plus. 2023 Nov 23;17:100510. doi: 10.1016/j.resplu.2023.100510. eCollection 2024 Mar.

Automatic measurement of departing times in smartphone alerting systems: A pilot study.

Ganter J(1)(2), Ruf A(3), Oppermann J(3), Feilhauer J(3), Brucklacher T(2), Busch HJ(2)(4), Müller MP(2)(5).

ABSTRACT

AIM: Smartphone alerting systems (SAS) alert volunteers in close vicinity of suspected out-of-hospital cardiac arrest. Some systems use sophisticated algorithms to select those who will probably arrive first. Precise estimation of departing times and travel times may help to further improve algorithms. We developed a global positioning system (GPS) based method for automatic measurements of departing times. The aim of this pilot study was to evaluate feasibility and precision of the method. METHODS: Region of Lifesavers alerting app (iOS/ Android, version 3.0, FirstAED ApS, Denmark) was used in this study. 27 experiments were performed with 9 students, who were instructed to stay in their flats during the study days. A geofence was set for each alarm in the alerting system with a radius of 10 m (8 cases), 15 m (10 cases), and 20 m (9 cases) around the GPS position at which the alarm was accepted in the app. The system logged responders as being departed when the smartphone position was registered outside the geofence. The students were instructed to manually start a stopwatch at the time of the alert and to stop the stopwatch once they had entered the street in front of their flat. RESULTS: The median difference between automatically and manually retrieved times were -16 seconds [interquartile range IQR 50 seconds] (geofence 10 m), 30 seconds [IQR 25 seconds] (15 m), and 20 seconds [IQR 13 seconds] (20 m), respectively. The 20 m geofence was associated with the smallest interquartile range. CONCLUSION: Departing times of volunteer responders in SAS can be retrieved automatically using GPS and a geofence.

8. Resusc Plus. 2023 Nov 29;17:100516. doi: 10.1016/j.resplu.2023.100516. eCollection 2024 Mar.

Epidemiology and outcomes of out of hospital cardiac arrest in Saudi Arabia: Findings from the Saudi Out of Hospital cardiac Arrest Registry (SOHAR).

Alabdali A(1)(2), Alghamdi A(1)(2), Binhotan M(1)(2), Alshibani A(1)(2), Alharbi M(1)(2), Alghaith A(1)(2), Altuwaijri M(3), Albaiz S(1)(4), Aldibasi O(2)(5), Alwarhi M(4), Alquraishi N(4), Aljerian N(1)(6).

ABSTRACT

AIM: The Saudi Out-of-Hospital Cardiac Arrest Registry (SOHAR) is the first out-of-hospital cardiac arrest (OHCA) registry in Saudi Arabia. This study aimed to describe the epidemiology and outcomes of OHCA in Saudi Arabia. METHODS: The SOHAR is a prospective data collection system. Data were collected monthly from defined regions, and registry measured variables were adopted from the Utstein recommendations. RESULTS: During the period from 01/01/2019 to 31/12/2022, 3671 patients were included in the registry. The mean age was 62 years, and 6.5% (240) of patients were

under the age of 18 years. The most common cause of OHCA was medical 3439 (93.6%). A total of 641 (17.4%) and 129 (3.9%) had presumed cardiac and respiratory causes. Additionally, most OHCA in Saudi Arabia (3034, 82.6%) occurred at home. Prehospital Return Of Spontaneous Circulation (ROSC) was achieved in 275 (7.4%) cases, and 491 (13.3%) patients were pronounced dead upon arrival at the hospital. Survival to hospital discharge was achieved in 107 (2.9%) of the cases, and good neurological outcomes, defined as a Cerebral Performance Category (CPC) of 1-3, occurred in < 0.5% of patients. CONCLUSION: The Saudi out-of-hospital ROSC was 7.4%. The survival to hospital discharge rate was 2.9%, and less than 1% of patients were discharged with good neurological outcomes. Further research and the continuation of registry data collection is highly recommended. Additionally, a national-level out-of-hospital cardiac arrest system is recommended to ensure the standardization of medical care provided to patients with OHCA.

9. Resusc Plus. 2023 Nov 30;17:100519. doi: 10.1016/j.resplu.2023.100519. eCollection 2024 Mar.
Wolf Creek XVII part 9: Wolf Creek Innovator in Cardiac Arrest and Resuscitation Science Award.
Gottula AL(1)(2)(3)(4), Maciel CB(5)(6)(7), Nishikimi M(8)(9), Kalra R(10), Sunshine J(11), Morgan RW(12)(13).

ABSTRACT

The Wolf Creek Conferences on Cardiac Arrest Resuscitation began in 1975, and have served as an important forum for thought leaders and scientists from industry and academia to come together with the common goal of advancing the field of cardiac arrest resuscitation. The Wolf Creek XVII Conference was hosted by the Max Harry Weil Institute of Critical Care Research and Innovation in Ann Arbor, Michigan on June 14-17, 2023. A new component of the conference was the Wolf Creek Innovator in Cardiac Arrest and Resuscitation Science Award competition. The competition was designed to recognize early career investigators from around the world who's science is challenging the current paradigms in the field. Finalists were selected by a panel of international experts and invited to present in-person at the conference. The winner was chosen by electronic vote of conference participants and awarded a $10,0000 cash prize. Finalists included Carolina Barbosa Maciel from the University of Florida, Adam Gottula from the University of Michigan, Rajat Kalra from the University of Minnesota, Ryan Morgan from the Children's Hospital of Philadelphia, Mitsuaki Nishikimi form Hiroshima University, and Jacob Sunshine from the University of Washington. Ryan Morgan from the Children's Hospital of Philadelphia was selected as the 2023 Wolf Creek Innovator Awardee. This manuscript provides a summary of the work presented by each of the finalists and provides a preview of the future of resuscitation science.

10. Heart Lung. 2023 Dec 9;64:100-106. doi: 10.1016/j.hrtlng.2023.12.004. Online ahead of print.
Racial and ethnic disparities in bystander resuscitation for out-of-hospital cardiac arrests.
Pu Y(1), Yang G(2), Chai X(2).

ABSTRACT

INTRODUCTION: Bystander-provided cardiopulmonary resuscitation (CRP) influences the survival rates of out-of-hospital cardiac arrests (OHCAs). Disparities on bystander resuscitation measures between Black, Hispanic, Asians and Non-Hispanic White OHCAs is unclear. Examining racial and ethnic differences in bystander resuscitations is essential to better target interventions. METHODS: 15,542 witnessed OHCAs were identified between April 1, 2011, and June 30, 2015 using the Resuscitation Outcomes Consortium Epidemiologic Registry 3, a multi-center, controlled trial about OHCAs in the United States and Canada. Multivariable logistic regression model was used to analyze the differences in bystander resuscitation (bystander CRP [B-CPR], CPR plus ventilation, automated external defibrillators/defibrillator application [B-AED/D], or delivery of shocks) and clinical outcomes (death at the scene or en route, return of spontaneous circulation upon first arrival at the

emergency department [ROSC-ED], survival until ED discharge [S-ED], survival until hospital discharge [S-HOS], and favorable neurological outcome at discharge) between Black, Hispanic, or Asian victims and Non-Hispanic White victims. RESULTS: Compared to OHCA victims in Non-Hispanic Whites, Black, Hispanic, and Asians were less likely to receive B-CPR (adjusted OR: 0.79; 95 % CI: 0.63-0.99), and B-AED/D (adjusted OR: 0.80; 95 % CI: 0.65-0.98) in public locations. And, Black, Hispanic, and Asian OHCAs were less likely to receive bystander resuscitation in street/highway locations and public buildings, and less likely to have better clinical outcomes, including ROSC-ED, S-ED and S-HOS. CONCLUSION: Black, Hispanic and Asian victims with witnessed OHCAs are less likely to receive bystander resuscitation and more likely to get worse outcomes than Non-Hispanic White victims.

11. Resusc Plus. 2023 Dec 4;17:100518. doi: 10.1016/j.resplu.2023.100518. eCollection 2024 Mar.
Comparison between a low-cost model (CPR Pillow) and a mannequin in training hands only cardiopulmonary resuscitation (CPR): A randomised trial.
Nehra A(1), Ravindra P(1)(2)(3), Bhat R(1)(2)(3), Nagesh SK(1)(4), Alok Y(1)(5), Nisarg S(1)(3), Shanmukhappa Maddani S(1)(2)(6), Balakrishnan JM(1)(3).
ABSTRACT
INTRODUCTION: CPR is an important lifesaving skill that can improve outcomes of patients in cardiac arrest. Mass training of hands-only CPR is one of the ways to spread information and teach this skill. Need for expensive CPR mannequins are a limiting factor in conducting such mass training programmes. This study assessed the effectiveness of a low-cost CPR pillow model in training hands-only CPR. METHODOLOGY: Two hundred and six undergraduate students underwent a two-hour CPR training session. They were randomly divided into two groups - mannequin group and CPR pillow group and practiced hands-only CPR on a standard mannequin and a low-cost CPR pillow model, respectively. Knowledge, attitude, and skill acquisition were objectively assessed and compared between the two groups. RESULTS: There was no statistical difference in hand positioning, chest compression rate and fraction, depth and overall CPR score between the two groups trained via mannequin and CPR Pillow ($P > 0.05$). The CPR pillow group had better percentage of chest recoil as compared to the mannequin group (86% vs 73%; $P < 0.001$). CONCLUSION: The use of low-cost homemade CPR devices such as our CPR pillow model is an acceptable alternative to mannequin for training hands-only CPR to lay rescuers.

12. Resusc Plus. 2023 Nov 23;16:100504. doi: 10.1016/j.resplu.2023.100504. eCollection 2023 Dec.
Wolf Creek XVII Part 1: The future of cardiac arrest resuscitation.
Neumar RW(1).
ABSTRACT
The Wolf Creek Conference, initiated in 1975, is a well-established tradition providing a unique forum for robust intellectual exchange between thought leaders and scientists from academia and industry focused on advancing the science and practice of cardiac arrest resuscitation. The Wolf Creek XVII Conference was hosted by the Max Harry Weil Institute for Critical Care Research and Innovation in Ann Arbor, Michigan, USA on June 15-17, 2023. A major focus of the conference proceedings was to identify and prioritize the knowledge gaps, barriers to translation, and research priorities for six major domains in the field of resuscitation: (1) automated cardiac arrest diagnosis, (2) amplifying lay-responder response, (3) mobile AEDs, (4) physiology-guided CPR, (5) extracorporeal support, and (6) neuroprotection. In addition, industry scientists were given the opportunity to present and discuss cutting edge innovations. Finally, building off of the conference's theme of "The Future of Cardiac Arrest Resuscitation", the Weil Institute introduced the "Wolf Creek

Innovator in Cardiac Arrest and Resuscitation Award" to recognize early career investigators who were challenging current paradigms in resuscitation science. Similar to the early Wolf Creek Conferences, the goal was to fuel active discussion and debate among leading experts to determine where future research efforts should be focused. This manuscript provides an overview of the Wolf Creek XVII conference, and the individual manuscripts within this special edition of Resuscitation Plus describe the conference proceedings and outcomes in more detail. It is our intent that these publications will provide a roadmap for important academic and commercial advances in the field of cardiac arrest resuscitation.

POST-CARDIAC ARREST TREATMENTS

1. Am J Emerg Med. 2023 Dec 8;77:46-52. doi: 10.1016/j.ajem.2023.12.004. Online ahead of print.
The association between blood glucose levels on arrival at the hospital and patient outcomes after out-of-hospital cardiac arrest: A multicenter cohort study.
Taira T(1), Inoue A(2), Kuroda Y(3), Oosuki G(4), Suga M(4), Nishimura T(4), Ijuin S(4), Ishihara S(4).
ABSTRACT
BACKGROUND: This study aimed to investigate the association between blood glucose levels on arrival at the hospital and 1-month survival and favorable neurological outcomes in patients with OHCA using a large Japanese dataset. METHODS: This study was a secondary analysis of data from the JAAM-OHCA Registry. Adult (≥18 years) patients with witnessed OHCA transported to emergency departments and registered in the database from June 2014 to December 2019 were included in the study. The primary and secondary endpoints were 1-month survival and 1-month favorable neurological outcomes (Glasgow-Pittsburgh Cerebral Performance Category score 1 or 2), respectively. Patients were categorized into the following four groups based on blood glucose levels on arrival at the hospital: <80 mg/dL, 80-179 mg/dL, 180-299 mg/dL, and ≥300 mg/dL. RESULTS: This study included 11,387 patients. Survival rates were 1.3%, 3.1%, 7.0%, and 5.7% in the <80 mg/dL, 80-179 mg/dL, 180-299 mg/dL, and ≥ 300 mg/dL blood glucose groups, respectively. The rates of favorable neurological outcomes in each group were 0.4%, 1.5%, 3.3%, and 2.5%, respectively. Multivariable analysis showed that 180-299 mg/dL glucose was significantly associated with 1-month survival and favorable neurological outcomes compared with 80-179 mg/dL glucose (odds ratio [OR], 1.77; 95% confidence interval [CI], 1.34-2.31; $p < 0.001$ and OR, 1.52; 95 % Cl, 1.02-2.25; $p = 0.035$, respectively). In this study, blood glucose levels with the best outcomes likely ranged from 200 to 250 mg/dL based on the cubic spline regression model. CONCLUSIONS: Blood glucose level of 180-299 mg/dL on arrival at the hospital was significantly associated with 1-month survival and favorable neurological outcomes compared to blood glucose level of 80-179 mg/dL in patients with OHCA.

2. J Intensive Care Med. 2023 Dec 10:8850666231218963. doi: 10.1177/08850666231218963. Online ahead of print.
Impact of Preexisting Depression and Anxiety on Hospital Readmission and Long-Term Survival After Cardiac Arrest.
Coppler PJ(1), Brown M(1), Moschenross DM(2), Gopalan PR(2)(3), Presciutti AM(4)(5), Doshi AA(1), Sawyer KN(1), Frisch A(1), Callaway CW(1), Elmer J(1)(6)(7); University of Pittsburgh Post-Cardiac Arrest Service.
ABSTRACT
BACKGROUND: While sudden cardiac arrest (CA) survivors are at risk for developing psychiatric disorders, little is known about the impact of preexisting mental health conditions on long-term survival or postacute healthcare utilization. We examined the prevalence of preexisting psychiatric conditions in CA patients who survived hospital discharge, characterized incidence and reason for inpatient psychiatry consultation during these patients' acute hospitalizations, and determined the association of pre-CA depression and anxiety with hospital readmission rates and long-term survival.

We hypothesized that prior depression or anxiety would be associated with higher hospital readmission rates and lower long-term survival. METHODS: We conducted a retrospective cohort study including patients resuscitated from in- and out-of-hospital CA who survived both admission and discharge from a single hospital between January 1, 2010, and December 31, 2017. We identified patients from our prospective registry, then performed a structured chart review to abstract past psychiatric history, prescription medications for psychiatric conditions, and identify inpatient psychiatric consultations. We used administrative data to identify readmissions within 1 year and vital status through December 31, 2020. We used multivariable Cox regressions controlling for patient demographics, medical comorbidities, discharge Cerebral Performance Category and disposition, depression, and anxiety history to predict long-term survival and hospital readmission. RESULTS: We included 684 subjects. Past depression or anxiety was noted in 24% (n = 162) and 19% (n = 129) of subjects. A minority of subjects (n = 139, 20%) received a psychiatry consultation during the index hospitalization. Overall, 262 (39%) subjects had at least 1 readmission within 1 year. Past depression was associated with an increased hazard of hospital readmission (hazard ratio 1.50, 95% CI 1.11-2.04), while past anxiety was not associated with readmission. Neither depression nor anxiety were independently associated with long-term survival. CONCLUSIONS: Depression is an independent risk factor for hospital readmission in CA survivors.

TARGETED TEMPERATURE MANAGEMENT

1. Open Heart. 2023 Dec 14;10(2):e002459. doi: 10.1136/openhrt-2023-002459.
Factors influencing deviation from target temperature during targeted temperature management in postcardiac arrest patients.
Ochiai K(1)(2), Otomo Y(3)(4).
ABSTRACT
BACKGROUND: Targeted temperature management (TTM) is a recommended therapy for postcardiac arrest patients. Hyperthermia worsened the patient outcome, and overcooling increased the incidence of complications; therefore, a high-quality TTM is required. The target temperature tended to be modified worldwide after the TTM trial in 2013. Our institute modified the target temperature to 35°C in 2017. This study aimed to compare the conventional and modified protocols, assess the relationship between target temperature deviation and patient outcomes, and identify the factors influencing temperature deviation. METHODS: This single-centre, retrospective, observational study included adult out-of-hospital cardiac arrest patients who underwent TTM between April 2013 and October 2019. We compared the conventional and modified protocol groups to evaluate the difference in the background characteristics and details on TTM. Subsequently, we assessed the relationship of deviation (>±0.5°C, >37°C, or<33°C) rates from the target temperature with mortality and neurological outcomes. We assessed the factors that influenced the deviation from the target temperature. RESULTS: Temperature deviation was frequently observed in the conventional protocol group (p=0.012), and the modified protocol group required higher doses of neuromuscular blocking agents (NMBAs) during TTM (p=0.016). Other background data, completion of protocol, incidence of complications, mortality and rate of favourable neurological outcomes were not significantly different. The performance rate of TTM was significantly higher in the modified group than in the conventional protocol group (p<0.001). Temperature deviation did not have an impact on the outcomes. Age, sex, body surface area, NMBA doses and type of cooling device were the factors influencing temperature deviation. CONCLUSIONS: A target temperature of 35°C might be acceptable and easily attainable if shivering of the patients was well controlled using NMBAs. Temperature deviation did not have an impact on outcomes. The identified factors influencing deviation from target temperature might be useful for ensuring a high-quality TTM.

ELECTROPHYSIOLOGY AND DEFIBRILLATION

1. Resuscitation. 2023 Dec 11:110082. doi: 10.1016/j.resuscitation.2023.110082. Online ahead of print.

The Impact of Double Sequential Shock Timing on Outcomes During Refractory Out -of-Hospital Cardiac Arrest.

Rahimi M(1), Drennan IR(2), Turner L(3), Dorian P(4), Cheskes S(5).

ABSTRACT

BACKGROUND: Animal studies suggest the efficacy of double sequential external defibrillation (DSED) may depend on the interval between the two shocks, or "DSED interval". No human studies have examined this concept. OBJECTIVES: To determine the relationship between DSED interval and termination of ventricular fibrillation (VFT), return of spontaneous circulation (ROSC), survival to hospital discharge, and favourable neurological status (MRS < 2) for patients in refractory VF. METHODS: We performed a retrospective review of adult (≥18 years) out-of-hospital cardiac arrest between January 2015 and May 2022 with refractory VF who received ≥1 DSED shock. DSED interval was divided into four pre-defined categories. We examined the association between DSED interval and patient outcomes using general estimated equation logistic regression or Fisher's exact test. RESULTS: Among 106 included patients, 303 DSED shocks were delivered (median 2, IQR 1-3). DSED intervals of 75-125 msec (OR 0.39, 95% CI 0.16-0.98), 125-500 msec (OR 0.36, 95% CI 0.16-0.82), and >500 msec (OR 0.27, 95% CI 0.11-0.63) were associated with lower probability of VF termination compared to <75 msec interval. DSED interval of >75 msec was associated with lower probability of ROSC compared to <75 msec interval (OR 0.37, 95% CI 0.14-0.98). No association was noted between DSED interval and survival to hospital discharge or neurologic outcome. CONCLUSIONS: Among patients in refractory VF a DSED interval of less than 75 msec was associated with improved rates of VF termination and ROSC. No association was noted between DSED interval and survival to hospital discharge or neurologic outcome.

PEDIATRICS AND CHILDREN

1. CJEM. 2023 Dec 15. doi: 10.1007/s43678-023-00624-w. Online ahead of print.

Completeness and accuracy of digital charting vs paper charting in simulated pediatric cardiac arrest: a randomized controlled trial.

St-Onge-St-Hilaire A(1), Cheng A(1)(2), Davidson J(2), Wan B(2), Lin Y(3).

ABSTRACT

OBJECTIVES: To determine if data collected through digital charting are more complete and more accurate compared to traditional paper-based charting during simulated pediatric cardiac arrest. METHODS: We performed a single-center simulation-based randomized controlled trial. Participants were randomized to a novel handheld digital charting device (intervention group) or to the standard resuscitation paper chart (control group). Participants documented two 15-min simulated pediatric cardiac arrest scenarios. We compared the charting completeness between the two groups. Completeness score (primary outcome) was established by calculating a completeness score for each group based on a list of pre-determined critical tasks. Charting accuracy (secondary outcome) was compared between the two groups, defined as the time interval between the real-time task performance and charted time. RESULTS: Charting data from 34 simulated cardiac arrest events were included in the analysis (n = 18 intervention; n = 16 control). The paper charting group had a higher completeness score (median (IQR) paper vs digital: 72.0% (66.4-76.9%) vs 65.0% (58.5-66.4%),

p = 0.015). For accuracy, the digital charting group was superior to the paper charting group for all pre-established critical tasks. CONCLUSION: Compared to paper-based charting, digital charting group captured more critical tasks during pediatric simulated resuscitation and was more accurate in the time intervals between real-time tasks performance and charted time. For tasks charted, paper-based charting was significantly more complete and more detailed during simulated pediatric cardiac arrest.

2. Resuscitation. 2023 Dec 12:110075. doi: 10.1016/j.resuscitation.2023.110075. Online ahead of print.
Pediatric Cardiac Arrest: A Review of Recovery and Survivorship.
Pinto NP(1), Scholefield BR(2), Topjian AA(3).
NO ABSTRACT AVAILABLE

3. Int Emerg Nurs. 2023 Dec 11;72:101381. doi: 10.1016/j.ienj.2023.101381. Online ahead of print.
Parental supporter during pediatric resuscitation: Qualitative exploration of caregivers' and healthcare professionals' experiences and perceptions.
Ghavi A(1), Hassankhani H(2), Powers K(3), Sawyer A(4), Karimi B(5), Kharidar M(6).
ABSTRACT
BACKGROUND: Child resuscitation is a critical and stressful time for family caregivers and healthcare professionals. The aim of this study was to explore caregivers' and healthcare professionals' experiences and perceptions of a parental supporter during pediatric cardiopulmonary resuscitation to provide guidance to healthcare professionals on supporting parents and other family caregivers during resuscitation. METHODS: This study used an exploratory descriptive qualitative approach. The setting was two large referral pediatric governmental hospitals. Participants were 17 caregivers who had experienced their child's resuscitation, and 13 healthcare professionals who served on resuscitation teams in emergency rooms or intensive care wards. Semi-structured, in-depth interviews were conducted and data were analyzed using thematic analysis. COREQ guidelines were followed. RESULTS: Participants shared their experiences and perceptions of a parental supporter during pediatric resuscitation in three themes: 1) Requirement for the presence of a parental supporter, 2) Expectations of the parental supporter, and 3) Characteristics of the parental supporter. CONCLUSIONS: Study findings highlight the need for a parental supporter during pediatric resuscitation; however, there is no defined parental supporter role in current guiding policies due to limited research on this role. More research on the parental supporter role is needed so effective policies and protocols can be developed to enhance family-centered care practices in pediatric emergency and acute care settings.

EXTRACORPOREAL LIFE SUPPORT

1. Resuscitation. 2023 Dec 13:110091. doi: 10.1016/j.resuscitation.2023.110091. Online ahead of print.
Intra-Aortic Balloon Pump in Patients with Extracorporeal Cardiopulmonary Resuscitation after Cardiac Arrest Caused by Acute Coronary Syndrome.
Nishimura T(1), Inoue A(2), Taira T(2), Suga M(2), Ijuin S(2), Hifumi T(3), Sakamoto T(4), Kuroda Y(5), Ishihara S(2); SAVE-J II study group.
ABSTRACT
BACKGROUND: This study evaluated the association between intra-aortic balloon pump (IABP) use in patients with out-of-hospital cardiac arrest (OHCA) caused by acute coronary syndrome (ACS) who received extracorporeal cardiopulmonary resuscitation (ECPR) and 30-day outcomes. METHODS:

This study was a secondary analysis of data from the SAVE-J II study, a retrospective, multicenter registry study involving 36 participating institutions in Japan. Patients with cardiac arrest caused by ACS who received ECPR were divided into two groups depending on whether or not they received IABP. The primary outcome was 30-day survival. Subgroup analysis was performed to detect what type of patients were mostly associated with improved outcomes. RESULTS: Of 2,157 patients registered in the SAVE-J II study, 877 patients were enrolled in this study, 702 patients in the IABP group and 175 patients in the non-IABP group. Multivariable logistic regression analysis did not reveal a significant difference in 30-day survival (OR 1.37, 95% CI 0.91-2.07, p=0.13). In the subgroup analysis, 30-day survival among patients without percutaneous coronary intervention (PCI) and stenosis of multiple coronary vessels were associated with IABP use. CONCLUSIONS: IABP use in patients with OHCA with ACS who received ECPR is not associated with 30-day survival. The use of IABP in patients who did not have PCI and have multiple coronary vessel stenoses warrants further study.

2. Perfusion. 2023 Dec 15:2676591231222365. doi: 10.1177/02676591231222365. Online ahead of print.

Extracorporeal cardiopulmonary resuscitation versus conventional cardiopulmonary resuscitation for patients with refractory out-of-hospital cardiac arrest: A retrospective propensity matching analysis.

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ABSTRACT

OBJECTIVE: The incidence of out-of-hospital cardiac arrest (OHCA) is high. Though extracorporeal cardiopulmonary resuscitation (ECPR) has been considered a potential treatment for refractory cardiac arrest after failure of conventional cardiopulmonary resuscitation (CCPR), the benefit of ECPR in refractory OHCA remains uncertain. METHODS: In this retrospective cohort study, we included patients with refractory OHCA who visited the Emergency Department of the Aerospace Center Hospital between January 2018 and April 2023. We divided the patients into the ECPR Group and the CCPR Group. The primary endpoint of the study was the neurological function of the patients in both groups 3 months after the cardiac arrest. We used propensity score matching to reduce selection bias and identified factors associated with good neurological function when OHCA was treated with ECPR by performing univariate and multivariate correlation analyses on surviving patients with good neurological function in the ECPR group. RESULTS: During the study period, we enrolled 133 patients, consisting of 33 in the ECPR group and 100 in the CCPR group. The survival rate of patients with good neurological function at discharge was 18.2% (6/33 cases) in the ECPR group and 9% (9/100 cases) in the CCPR group, p = .20. Three months after discharge, the survival rate of patients with good neurological function was 15.2% (5/33 cases) in the ECPR group and 8% (8/100 cases) in the CCPR group, p = .31. Using propensity score matching, we identified 22 pairs of patients for further analysis. Among these, 3 months after discharge, the survival rate of patients with good neurological function was 13.6% (3/22 cases) in the ECPR group and 4.5% (1/22 cases) in the CCPR group, p = .61, and the survival rate at discharge was 18.2% (4/22 cases) in the ECPR group and 4.5% (1/22 cases) in the CCPR group, p = .34. The univariate analysis of patients with good neurological function in the ECPR group showed that time without perfusion, hypoperfusion time, and PCI treatment were associated factors affecting the prognosis of neurological function in patients, while multivariate analysis showed that hypoperfusion time was independently associated with good neurological function, with an OR (95% CI) of 1.06 (1.00-1.14) and p = .05. CONCLUSION: Our findings suggested that ECPR failed to significantly improve neurological outcome in patients with refractory OHCA; however, the small sample size in this study may be insufficient to detect clinically relevant differences. In addition, hypoperfusion time may be a key predictive factor in identifying candidates for ECPR.

3. Pediatr Crit Care Med. 2023 Dec 13. doi: 10.1097/PCC.0000000000003423. Online ahead of print.

Early Cardiac Arrest Hemodynamics, End-Tidal Co2, and Outcome in Pediatric Extracorporeal Cardiopulmonary Resuscitation: Secondary Analysis of the ICU-RESUScitation Project Dataset (2016-2021).

Yates AR(1), Naim MY(2), Reeder RW(3), Ahmed T(4), Banks RK(3), Bell MJ(5), Berg RA(2), Bishop R(6), Bochkoris M(7), Burns C(8), Carcillo JA(7), Carpenter TC(6), Dean JM(3), Diddle JW(5), Federman M(9), Fernandez R(1), Fink EL(7), Franzon D(10), Frazier AH(11)(12), Friess SH(13), Graham K(2), Hall M(1), Hehir DA(2), Horvat CM(7), Huard LL(9), Maa T(1), Manga A(13), McQuillen PS(10), Morgan RW(2), Mourani PM(14), Nadkarni VM(2), Notterman D(15), Pollack MM(5), Sapru A(9), Schneiter C(6), Sharron MP(5), Srivastava N(9), Tilford B(4), Viteri S(16), Wessel D(5), Wolfe HA(2), Yeh J(7), Zuppa AF(2), Sutton RM(2), Meert KL(4).

ABSTRACT

OBJECTIVES: Cannulation for extracorporeal membrane oxygenation during active extracorporeal cardiopulmonary resuscitation (ECPR) is a method to rescue patients refractory to standard resuscitation. We hypothesized that early arrest hemodynamics and end-tidal Co2 (ETco2) are associated with survival to hospital discharge with favorable neurologic outcome in pediatric ECPR patients. DESIGN: Preplanned, secondary analysis of pediatric Utstein, hemodynamic, and ventilatory data in ECPR patients collected during the 2016-2021 Improving Outcomes from Pediatric Cardiac Arrest study; the ICU-RESUScitation Project (ICU-RESUS; NCT02837497). SETTING: Eighteen ICUs participated in ICU-RESUS. PATIENTS: There were 97 ECPR patients with hemodynamic waveforms during cardiopulmonary resuscitation. INTERVENTIONS: None. MEASUREMENTS AND MAIN RESULTS: Overall, 71 of 97 patients (73%) were younger than 1 year old, 82 of 97 (85%) had congenital heart disease, and 62 of 97 (64%) were postoperative cardiac surgical patients. Forty of 97 patients (41%) survived with favorable neurologic outcome. We failed to find differences in diastolic or systolic blood pressure, proportion achieving age-based target diastolic or systolic blood pressure, or chest compression rate during the initial 10 minutes of CPR between patients who survived with favorable neurologic outcome and those who did not. Thirty-five patients had ETco2 data; of 17 survivors with favorable neurologic outcome, four of 17 (24%) had an average ETco2 less than 10 mm Hg and two (12%) had a maximum ETco2 less than 10 mm Hg during the initial 10 minutes of resuscitation. CONCLUSIONS: We did not identify an association between early hemodynamics achieved by high-quality CPR and survival to hospital discharge with favorable neurologic outcome after pediatric ECPR. Candidates for ECPR with ETco2 less than 10 mm Hg may survive with favorable neurologic outcome.

4. ESC Heart Fail. 2023 Dec 13. doi: 10.1002/ehf2.14615. Online ahead of print.

Ventricular fibrillation/ventricular tachycardia within 72 h of VA-ECMO: incidence, outcomes, risk factors, and management.

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ABSTRACT

AIMS: Veno-arterial extracorporeal membrane oxygenation (VA-ECMO) is an important technique for the treatment of refractory cardiogenic shock and cardiac arrest; however, the early management of ventricular fibrillation/ventricular tachycardia (VF/VT), within 72 h of VA-ECMO, and its effects on patient prognosis remain unclear. METHODS AND RESULTS: We retrospectively analysed patients at the First Affiliated Hospital of Nanjing Medical University who underwent VA-ECMO between January 2017 and March 2022. The patients were divided into two groups, VF/VT and nVF/VT, based on whether or not VF/VT occurred within 72 h after the initiation of VA-ECMO. We utilized logistic regression analysis to evaluate the independent risk factors for VF/VT in patients undergoing VA-ECMO and to ascertain whether the onset of VF/VT affected 28 day survival rate, length of intensive care unit stay, and/or other clinical prognostic factors. Subgroup analysis was performed for the VF/VT group to determine whether defibrillation affected prognosis. In the present study, 126 patients were included, 65.87% of whom were males (83/126), with a mean age of 46.89 ± 16.23, a 28 day survival rate of 57.14% (72/126), an incidence rate of VF/VT within 72 h of

VA-ECMO initiation of 27.78% (35/126), and 80% of whom (28/35) received extracorporeal cardiopulmonary resuscitation. The incidence of VF/VT resulting from cardiac arrest at an early stage was significantly higher than that of refractory cardiogenic shock (80% vs. 20%; P = 0.022). The restricted cubic spline model revealed a U-shaped relationship between VF/VT incidence and initial heart rate (iHR), and multivariate logistic regression analysis showed that an iHR > 120 b.p.m. [odds ratio (OR) 6.117; 95% confidence interval (CI) 1.672-22.376; P = 0.006] and hyperlactataemia (OR 1.125; 95% CI 1.016-1.246; P = 0.023) within 1 h of VA-ECMO initiation were independent risk factors for the occurrence of VF/VT. VF/VT was not found to be associated with the 28 day survival of patients undergoing VA-ECMO support, nor did it affect other secondary endpoints. Defibrillation did not alter the overall prognosis in patients with VF/VT during VA-ECMO. CONCLUSIONS: An iHR > 120 b.p.m. and hyperlactataemia were independent risk factors for the occurrence of VF/VT within 72 h of VA-ECMO initiation. The occurrence of VF/VT does not affect, nor does defibrillation in these patients improve the overall patient prognosis.

5. Thromb Haemost. 2023 Dec 11. doi: 10.1055/a-2225-5173. Online ahead of print.
The effect of cytokine adsorption on leukocyte and platelet activation after extracorporeal cardiopulmonary resuscitation.
Zahn T(1), Schanze N(2), Staudacher D(1), Wengenmayer T(1), Maier S(3), Benk C(4), Gauchel N(3), Dürschmied D(2), Supady A(1).
ABSTRACT
Post-cardiac arrest syndrome (PCAS) is a frequent complication following successful cardiopulmonary resuscitation and correlates with poor outcome. PCAS is characterized by an excessive inflammatory response to whole-body ischemia and reperfusion. Cytokine adsorption was suggested as an adjunctive treatment option for the removal of cytokines from the patients' blood to restore the physiological equilibrium of pro- and anti-inflammatory activity and thus mitigate hemodynamic instability and end-organ complications. To better understand the cellular effects of cytokine adsorption in patients receiving extracorporeal cardiopulmonary resuscitation (ECPR) after in- and out-of-hospital cardiac arrest (IHCA, OHCA), we compared the activation status of neutrophils, monocytes, and platelets as well as the formation of platelet-leukocyte complexes in intravenous whole blood samples from an exploratory subgroup from the randomized CYTER study. At 48 hours after initiation of ECPR, flow cytometry analyses did neither reveal significant differences in neutrophil (CD11b, CD66b, L-selectin, and PSGL-1) and monocyte (CD11b, L-selectin, and PSGL-1) surface molecule expression nor in circulating platelet-monocyte complexes between patients receiving cytokine adsorption and those without. CD11b and CD66b expression on circulating neutrophils were significantly increased at 48 hours in patients who died until day 30. In conclusion, our data did not show a relevant effect of cytokine adsorption on neutrophil and monocyte activation during the first 48 hours after initiation of ECPR. Yet, an observed relationship between activation of neutrophils and mortality may highlight their potential role in the pathophysiology of PCAS.

EXPERIMENTAL RESEARCH

No articles identified.

CASE REPORTS

1. J Vasc Access. 2023 Dec 12:11297298231200035. doi: 10.1177/11297298231200035. Online ahead of print.
Serendipitous thrombolysis of a thrombosed arteriovenous graft during cardiopulmonary resuscitation and treatment of suspected pulmonary embolism.

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ABSTRACT

Acute pulmonary embolism and cardiac arrest are rare complications of graft declotting interventions. This case report describes a successful serendipitous thrombolysis of a thrombosed arteriovenous graft during cardiopulmonary resuscitation and treatment of suspected pulmonary embolism in a 72-year-old male patient.