This week's PubMed 5th – 11th December 2021: articles of interest n = 42

CPR AND COVID-19

1. J Clin Med. 2021 Nov 30;10(23):5667. doi: 10.3390/jcm10235667.

How to Maintain Safety and Maximize the Efficacy of Cardiopulmonary Resuscitation in COVID-19 Patients: Insights from the Recent Guidelines.

Chojecka D(1), Pytlos J(1), Zawadka M(2), Andruszkiewicz P(2), Szarpak Ł(3)(4), Dzieciątkowski T(5), Jaguszewski MJ(6), Filipiak KJ(4), Gąsecka A(1).

ABSTRACT

Since December 2019, the novel coronavirus disease 2019 (COVID-19) caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) has remained a challenge for governments and healthcare systems all around the globe. SARS-CoV-2 infection is associated with increased rates of hospital admissions and significant mortality. The pandemic increased the rate of cardiac arrest and the need for cardiopulmonary resuscitation (CPR). COVID-19, with its pathophysiology and detrimental effects on healthcare, influenced the profile of patients suffering from cardiac arrest, as well as the conditions of performing CPR. To ensure both the safety of medical personnel and the CPR efficacy for patients, resuscitation societies have published modified guidelines addressing the specific reality of the COVID-19 pandemic. In this review, we briefly describe the transmission and pathophysiology of COVID-19, present the challenges of CPR in SARS-CoV-2-infected patients, summarize the current recommendations regarding the algorithms of basic life support (BLS), advanced life support (ALS) and pediatric life support, and discuss other aspects of CPR in COVID-19 patients, which potentially affect the risk-to-benefit ratio of medical procedures and therefore should be considered while formulating further recommendations.

2. J Clin Med. 2021 Nov 27;10(23):5573. doi: 10.3390/jcm10235573.

The Influence of COVID-19 on Out-Hospital Cardiac Arrest Survival Outcomes: An Updated Systematic Review and Meta-Analysis.

Bielski K(1)(2), Szarpak A(3), Jaguszewski MJ(4), Kopiec T(5), Smereka J(6)(7), Gasecka A(5), Wolak P(8), Nowak-Starz G(9), Chmielewski J(10), Rafique Z(11), Peacock FW(11), Szarpak L(8)(12).

ABSTRACT

Cardiopulmonary resuscitation in patients with out-of-hospital cardiac arrest (OHCA) is associated with poor prognosis. Because the COVID-19 pandemic may have impacted mortality and morbidity, both on an individual level and the health care system as a whole, our purpose was to determine rates of OHCA survival since the onset of the SARS-CoV2 pandemic. We conducted a systematic review and meta-analysis to evaluate the influence of COVID-19 on OHCA survival outcomes according to the PRISMA guidelines. We searched the literature using PubMed, Scopus, Web of Science and Cochrane Central Register for Controlled Trials databases from inception to September 2021 and identified 1775 potentially relevant studies, of which thirty-one articles totaling 88,188 patients were included in this meta-analysis. Prehospital return of spontaneous circulation (ROSC) in pre-COVID-19 and COVID-19 periods was 12.3% vs. 8.9%, respectively (OR = 1.40; 95%CI: 1.06-1.87; $p < 0.001$). Survival to hospital discharge in pre- vs. intra-COVID-19 periods was 11.5% vs. 8.2% (OR = 1.57; 95%CI: 1.37-1.79; $p < 0.001$). A similar dependency was observed in the case of survival to hospital discharge with the Cerebral Performance Category (CPC) 1-2 (6.7% vs. 4.0%; OR = 1.71; 95%CI: 1.35-2.15; $p < 0.001$), as well as in the 30-day survival rate (9.2% vs. 6.4%; OR = 1.63; 95%CI: 1.13-2.36; $p = 0.009$). In conclusion, prognosis of OHCA is usually poor and even worse during COVID-19.

3. Australas Emerg Care. 2021 Nov 30:S2588-994X(21)00082-8. doi: 10.1016/j.auec.2021.11.006. Online ahead of print.

Effect of delayed transport on clinical outcomes among patients with cardiac arrest during the coronavirus disease 2019 pandemic.

Chung H(1), Namgung M(2), Lee DH(3), Choi YH(4), Bae SJ(5).

ABSTRACT

BACKGROUND: The coronavirus disease 2019 (COVID-19) pandemic has prompted many changes. Revised cardiopulmonary resuscitation (CPR) recommendations were issued including increased requirement for personal protective equipment (PPE) during CPR and isolation rooms. We hypothesized that these changes might have affected transport times and distance. Accordingly, we investigated any differences in transport time and distance and their effect on patient neurologic outcomes at hospital discharge. METHODS: This retrospective study was conducted among patients who experienced cardiopulmonary arrest and were admitted to an emergency department during specific periods - pre-COVID-19 (January 1 to December 31, 2019) and COVID-19 (March 1, 2020, to February 28, 2021). RESULT: The mean transport distance was 3.5 ± 2.1 km and 3.7 ± 2.3 km during the pre-COVID-19 and COVID-19 periods, respectively ($p = 0.664$). The mean total transport time was 30.3 ± 6.9 min and 35.6 ± 9.3 min during the pre-COVID-19 and COVID-19 periods, respectively ($p < 0.001$). The mean activation time was 1.5 ± 2.2 min and 2.9 ± 4.5 min during the pre-COVID-19 and COVID-19 periods, respectively ($p = 0.003$). The mean transport time was 9.3 ± 3.5 min and 11.5 ± 6 min during the pre-COVID-19 and COVID-19 periods, respectively ($p = 0.001$). CONCLUSION: Total transport time, including activation time for out-of-hospital cardiac arrest patients, increased owing to increased PPE requirements. However, there was no significant difference in the neurological outcome at hospital discharge.

4. Ann Intensive Care. 2021 Dec 7;11(1):169. doi: 10.1186/s13613-021-00957-8.

Impact of the COVID-19 pandemic on the epidemiology of out-of-hospital cardiac arrest: a systematic review and meta-analysis.

Teoh SE(#)(1), Masuda Y(#)(1), Tan DJH(1), Liu N(2), Morrison LJ(3), Ong MEH(4)(5), Blewer AL(#)(6), Ho AFW(#)(7)(8).

ABSTRACT

BACKGROUND: The coronavirus disease 2019 (COVID-19) pandemic has significantly influenced epidemiology, yet its impact on out-of-hospital cardiac arrest (OHCA) remains unclear. We aimed to evaluate the impact of the pandemic on the incidence and case fatality rate (CFR) of OHCA. We also evaluated the impact on intermediate outcomes and clinical characteristics. METHODS: PubMed, EMBASE, Web of Science, Scopus, and Cochrane Library databases were searched from inception to May 3, 2021. Studies were included if they compared OHCA processes and outcomes between the pandemic and historical control time periods. Meta-analyses were performed for primary outcomes [annual incidence, mortality, and case fatality rate (CFR)], secondary outcomes [field termination of resuscitation (TOR), return of spontaneous circulation (ROSC), survival to hospital admission, and survival to hospital discharge], and clinical characteristics (shockable rhythm and etiologies). This study was registered in the International Prospective Register of Systematic Reviews (PROSPERO) (CRD42021253879). RESULTS: The COVID-19 pandemic was associated with a 39.5% increase in pooled annual OHCA incidence ($p < 0.001$). Pooled CFR was increased by 2.65% ($p < 0.001$), with a pooled odds ratio (OR) of 1.95 for mortality [95% confidence interval (95%CI) 1.51-2.51]. There was increased field TOR (OR = 2.46, 95%CI 1.62-3.74). There were decreased ROSC (OR = 0.65, 95%CI 0.55-0.77), survival to hospital admission (OR = 0.65, 95%CI 0.48-0.89), and survival to discharge (OR = 0.52, 95%CI 0.40-0.69). There was decreased shockable rhythm (OR = 0.73, 95%CI 0.60-0.88) and increased asphyxial etiology of OHCA (OR = 1.17, 95%CI 1.02-1.33). CONCLUSION: Compared to

the pre-pandemic period, the COVID-19 pandemic period was significantly associated with increased OHCA incidence and worse outcomes.

CPR/MECHANICAL CHEST COMPRESSION

1. Resuscitation. 2021 Dec 3:S0300-9572(21)00493-7. doi: 10.1016/j.resuscitation.2021.11.038. Online ahead of print.

The association of race with CPR quality following out-of-hospital cardiac arrest.

Schmicker RH(1), Blewer A(2), Lupton JR(3), Aufderheide TP(4), Wang HE(5), Idris AH(6), Aramendi E(7), Hagahmed MB(8), Traynor OT(8), Riccardo Colella M(4), Daya MR(3).

ABSTRACT

INTRODUCTION: Previous studies have shown racial disparities in outcomes after out-of-hospital cardiac arrest. Although several treatment factors may account for these differences, there is limited information regarding differences in CPR quality and its effect on survival in underrepresented racial populations. METHODS: We conducted a secondary analysis of data from patients enrolled in the Pragmatic Airway Resuscitation Trial (PART). We calculated compliance rates with AHA 2015 high quality CPR metrics as well as compliance to intended CPR strategy (30:2 or continuous chest compression) based on the protocol in place for the first responding EMS agency. The primary analysis used general estimating equations logistic regression to examine differences between black and white patients based on EMS-assessed race after adjustment for potential confounders. Sensitivity analyses examined differences using alternate race definitions. RESULTS: There were 3004 patients enrolled in PART of which 1734 had >2 minutes of recorded CPR data and an EMS-assessed race (1003 white, 555 black, 176 other). Black patients had higher adjusted odds of compression rate compliance (OR: 1.36, 95% CI: 1.02-1.81) and lower adjusted odds of intended CPR strategy compliance (OR: 0.78, 95% CI: 0.63-0.98) compared to white patients. Of 974 transported to the hospital, there was no difference in compliance metric estimates based on ED-reported race. CONCLUSION: Compression rate compliance was higher in black patients however compliance with intended strategy was lower based on EMS-assessed race. The remaining metrics showed no difference suggesting that CPR quality differences are not important contributors to the observed outcome disparities by race.

2. Praxis (Bern 1994). 2021;110(16):955-957. doi: 10.1024/1661-8157/a003765.

[CME/Answers: Mechanical Assist Devices in Cardiopulmonary Resuscitation].

[Article in German; Abstract available in German from the publisher]

Oechslin L(1), Casso G(1), Wyss C(2).

ABSTRACT

Early high-quality cardiopulmonary resuscitation in the event of a cardiac arrest is the most effective measure to improve the outcome. With the aim of improving the quality of resuscitation and replacing the need of manual compression, various mechanical assist devices have been developed and are used in the clinical practice. When should they be used, whether do they lead to better outcomes and what injuries are they associated with? These questions have been examined in several studies and the following review will provide an overview.

REGISTRIES, REVIEWS AND EDITORIALS

1. BMJ Open. 2021 Dec 6;11(12):e047932. doi: 10.1136/bmjopen-2020-047932.

Incidence of out-of-hospital cardiac arrests and survival rates after 1 month among the Japanese working population: a cohort study.

Yamagishi Y(1), Oginosawa Y(2), Fujino Y(3), Yagyu K(1), Miyamoto T(1), Tsukahara K(1), Ohe H(1), Kohno R(4), Abe H(4).

ABSTRACT

OBJECTIVES: The prevention and improvement of the prognosis of out-of-hospital cardiac arrests (OHCAs) are important issues especially with respect to their social and economic significance in working populations. The age distribution of the working population in Japan is expected to change continually due to its ageing society and extension of retirement; however, few reports have examined the long-term condition of OHCA in the working population, defined by age. The aim of this study was to determine the incidence of OHCAs and the survival rates after 1 month, among the Japanese working population, defined by age, considering the changing age distribution. DESIGN AND SETTING: We analysed the All-Japan Utstein registry, a prospective, nationwide, population-based, observational registry (2005-2016). PARTICIPANTS: From the registry, 212 961 patients with OHCA from the Japanese working population (defined aged 20-69 years), with only cardiogenic aetiology participated in this study. These patients were further divided into four groups according to the type of citizen bystander (family, friends, work-colleagues and passers-by). PRIMARY AND SECONDARY OUTCOME MEASURES: The main outcomes were 1-month survival with favourable neurological outcomes. RESULTS: The incidence of OHCAs, in any age group, was almost constant during the 12-year period. The work-colleagues had the best prognosis despite having significantly longer times to initial defibrillations compared with the passers-by (13 vs 12 min, respectively, $p<0.001$) that was associated independently with 1-month survival with favourable neurological outcomes (adjusted OR: 0.94 (1 min increments), $p<0.001$). CONCLUSIONS: In the 12-year period, the incidence of OHCAs in any age group remained almost constant, whereas the prognosis improved each year. Reducing the time to initial defibrillation may further improve the prognosis of OHCAs with a work-colleague bystander.

2. Resuscitation. 2021 Dec 3:S0300-9572(21)00494-9. doi: 10.1016/j.resuscitation.2021.11.037. Online ahead of print.

Rearrest during hospitalisation in adult comatose out-of-hospital cardiac arrest patients: Risk factors and prognostic impact, and predictors of favourable long-term outcomes.

Hun Jung Y(1), Woon Jeung K(2), Youn Lee H(3), Kook Lee B(1), Hun Lee D(4), Shin J(5), Jai Lee H(6), Soo Cho I(7), Kim YM(8); Korean Hypothermia Network investigators.

ABSTRACT

BACKGROUND: Rearrest occurs commonly after initial resuscitation following out-of-hospital cardiac arrest (OHCA). We determined (1) the predictors of rearrest during hospitalisation that can be identified in the hours immediately after OHCA, (2) the association between rearrest and favourable long-term outcomes, and (3) the predictors of favourable long-term outcomes in rearrest patients. METHODS: Conditional multivariable logistic regression analyses were performed using the Korean Hypothermia Network prospective registry data, which included details of adult OHCA patients treated with targeted temperature management at 22 teaching hospitals in South Korea. RESULTS: Among the 1,233 patients, 260 (21.1%) experienced rearrest. Of the 192 patients resuscitated from first rearrest, 33 (17.2%) achieved 6-month favourable outcomes. Arrhythmia, heart failure, ST-segment elevation, lower initial Glasgow coma scale (GCS) motor score, higher initial lactate level, and antiarrhythmic drug use within 1 h were independently associated with rearrest. Higher lactate level and antiarrhythmic drug use were associated with shockable first rearrest, while arrhythmia, heart failure, ST-segment elevation, and lower GCS motor score were associated with non-shockable first rearrest. Rearrest was independently associated with a lower likelihood of 6-month favourable

outcomes (P = 0.003). Initial shockable rhythm after OHCA, absence of diabetes, shorter cumulative time to restoration of spontaneous circulation, coronary angiography, and hypophosphataemia within 7 d were independently associated with 6-month favourable outcomes in the patients resuscitated from first rearrest. CONCLUSIONS: Rearrest during hospitalisation after OHCA was inversely associated with 6-month favourable outcomes. We identified several risk factors for rearrest and prognostic factors for patients resuscitated from first rearrest.

IN-HOSPITAL CARDIAC ARREST

1. Acta Anaesthesiol Scand. 2021 Dec 6. doi: 10.1111/aas.14008. Online ahead of print.
Hospital-level variation in outcomes after in-hospital cardiac arrest in Denmark.
Stankovic N(1)(2), Andersen LW(1)(2)(3)(4), Granfeldt A(3), Holmberg MJ(1)(2)(5).
ABSTRACT
BACKGROUND: We investigated hospital-level variation in outcomes after in-hospital cardiac arrest (IHCA) in Denmark, and assessed whether variation in outcomes could be explained by differences in patient characteristics. METHODS: Adult patients (≥18 years old) with IHCA in 2017 and 2018 were included from the Danish IHCA Registry (DANARREST). Data on patient characteristics and outcomes were obtained from population-based registries. Predicted probabilities, likelihood ratio tests, intraclass correlation coefficients (ICCs), and median odds ratios (ORs) were calculated for return of spontaneous circulation (ROSC), survival to 30 days, and survival to 1 year. RESULTS: A total of 3340 patients with IHCA from 24 hospitals were included. We found that hospital-level variation in outcomes after IHCA existed across all measures of variation. The unadjusted median OR for ROSC, survival to 30 days, and survival to 1 year were 1.28 (95% confidence interval [CI]: 1.24, 1.45), 1.38 (95% CI: 1.33, 1.60), and 1.44 (95% CI: 1.39, 1.70), respectively. The unadjusted ICC suggest that 2.0% (95%: 1.6%, 4.4%), 3.3% (95%: 2.7%, 6.8%), and 4.3% (95%: 3.5%, 8.6%) of the total individual variation in ROSC, survival to 30 days, and survival to 1 year was attributable to hospital-level variation. These results decreased but persisted in the analyses adjusted for select patient characteristics. CONCLUSIONS: In this study, we found that outcomes after IHCA varied across hospitals in Denmark. However, only about 2%-4% of the total individual variation in outcomes after IHCA was attributable to differences between hospitals, suggesting that most of the individual variation in outcomes was attributable to patient-level variation.

2. Intern Med J. 2021 Dec 5. doi: 10.1111/imj.15637. Online ahead of print.
CoBRA: COde Blue Retrospective Audit in a Metropolitan Hospital.
Paul RA(1), Beaman C(2), West DA(3), Duke GJ(4).
ABSTRACT
BACKGROUND: In-hospital cardiac arrest (IHCA) is an uncommon but challenging problem. This study aims to investigate the management and outcomes of IHCA, and investigate the effect of introducing a Medical Emergency Team (MET) on IHCA prevalence. METHODS: Retrospective medical record review of 176 adult IHCA episodes at Box Hill Hospital, a university-affiliated public hospital in metropolitan Melbourne, from July 2012 to June 2017. Inpatients receiving cardiopulmonary resuscitation for IHCA, in inpatient wards, intensive care unit, cardiac catheterisation laboratory, and operating theatres, were included. Data collected included demographics, resuscitation management, and outcomes. Average treatment effect (ATE) was derived from margins estimates and linear regression fitted to hospital outcome, adjusted for IHCA factors. An exponentially-weighed moving average control chart was used to explore IHCA prevalence over time. RESULTS: 65.3% of IHCA patients died in hospital. IHCA prevalence was unchanged after the introduction of a dedicated MET service. Factors associated with higher likelihood of survival to discharge were initial cardiac of rhythm ventricular tachycardia (VT) (ATE 0.10 (95%CI = -0.03-0.25)) or ventricular

fibrillation (VF) (ATE 0.28 (95% CI=0.11-0.46)), cardiac monitoring at time of arrest (ATE 0.06 (95%CI = -0.04-0.16)), and time to return of spontaneous circulation (ATE 0.023 (95%CI=0.015-0.031)). CONCLUSION: IHCA is uncommon and is associated with high mortality. IHCA prevalence was unchanged after the introduction of a dedicated MET service. Factors associated with improved survival to hospital discharge were initial rhythm VT or VF, cardiac monitoring, and shorter resuscitation times.

3. Intern Med J. 2021 Dec 5. doi: 10.1111/imj.15638. Online ahead of print.
Non-beneficial resuscitation during in-hospital cardiac arrests in a metropolitan teaching hospital.
Crosbie D(1), Ghosh A(1), Van Ekeren N(1), Dowling M(1), Hayes B(2)(3), Cross A(1)(4), Jones D(5)(6).
ABSTRACT
PURPOSE: To describe the prevalence of non-beneficial resuscitation attempts in hospitalised patients and identify interventions that could be used to reduce these events. METHODS: A retrospective analysis was conducted of all adult IHCAs receiving cardiopulmonary resuscitation (CPR) in a teaching hospital over nine years. Demographics and arrest characteristics were obtained from a prospectively collected database. Non-beneficial CPR was defined as CPR being administered to patients who had a current not for resuscitation (NFR) order in place or who had an NFR order enacted on a previous hospital admission. Further antecedent factors and resuscitation characteristics were collected for these patients. RESULTS: There were 257 IHCAs, of which 115 (44.7%) occurred on general wards, with 19.8% of all patients surviving to discharge home. There were 39 (15.2%) instances of non-beneficial CPR of which 28/39 (72%) occurred in unmonitored patients on the ward comprising nearly a quarter (28/115) of all arrests in this patient group. A specialist had reviewed 30/39 (76.9%) of these patients, and 33.3% (13/39) had a medical emergency team (MET) review prior to their arrest. CONCLUSIONS: Over one in seven resuscitation attempts were non-beneficial. MET reviews and specialist ward rounds provide opportunities to improve the documentation and visibility of NFR status.

4. Intensive Crit Care Nurs. 2021 Dec 7:103164. doi: 10.1016/j.iccn.2021.103164. Online ahead of print.
Effect of a backboard on chest compression quality during in-hospital adult cardiopulmonary resuscitation: A randomised, single-blind, controlled trial using a manikin model.
Cuvelier Z(1), Houthoofdt R(2), Serraes B(3), Haentjens C(4), Blot S(5), Mpotos N(6).
ABSTRACT
INTRODUCTION: Chest compression quality during in-hospital resuscitation is often suboptimal on a soft surface. Scientific evidence regarding the effectiveness of a backboard is scarce. This single-blinded manikin study evaluated the effect of a backboard on compression depth, rate and chest recoil performed by nurses. Sex, BMI, age and clinical department were considered as potential predictors. METHODS: Using self-learning, nurses were retrained to achieve a minimal combined compression score at baseline. This combined score consisted of ≥70% compressions with depth 50-60 mm, ≥70% compressions with complete release (≤5mm) and a mean compression rate of 100-120 bpm. Subsequently, nurses were allocated to a backboard or control group and performed a two-minute cardiopulmonary resuscitation test. The main outcome measure was the difference in proportion of participants achieving a combined compression score of ≥70%. RESULTS: In total 278 nurses were retrained, 158 nurses dropped out and 120 were allocated to the backboard (n = 61) or control group (n = 59). The proportion of participants achieving a combined compression score of ≥70% was not significantly different (p = 0.475) and suboptimal in both groups: backboard group 47.5% (backboard) versus 41.0% (control). Older age (≥51 years) was associated with a lower probability of achieving a combined compression score >70% [OR = 0.133; 95% confidence interval (CI), 0.037-0.479; p = 0.002]. CONCLUSION: Using a backboard did not significantly improve compression quality in our study. Important decay of compression skills was observed in both groups, highlighting the importance of frequent retraining, particularly in some age groups.

INJURIES AND CPR

No articles identified.

CAUSE OF THE ARREST

1. Am J Emerg Med. 2021 Dec;50:636-639. doi: 10.1016/j.ajem.2021.09.030. Epub 2021 Sep 24.
Significance of medical intervention for non-traumatic hemorrhagic cardiac tamponade.
Yanagawa Y(1), Jitsuiki K(2), Ota S(2), Muramatsu KI(2), Kushida Y(2), Nagasawa H(2), Takeuchi I(2), Ohsaka H(2), Omori K(2), Ishikawa K(2).

ABSTRACT
BACKGROUND: The outcomes of patients with cardiac arrest induced by non-traumatic hemorrhagic cardiac tamponade are poor. PURPOSE: We retrospectively investigated the significance of medical intervention with pericardiocentesis and/or pericardiotomy for non-traumatic hemorrhagic cardiac tamponade. METHODS: From January 2013 to April 2021, we retrospectively reviewed the medical charts of all patients with cardiac arrest in a prehospital setting or emergency room due to cardiac tamponade confirmed by an ultrasound examination with or without an invasive procedure (pericardiocentesis and/or pericardiotomy) and computed tomography findings, including those obtained at autopsy imaging. The subjects were divided into two groups: the Intervention (+) group, which included subjects who underwent pericardiocentesis or pericardiotomy, and the Intervention (-) group, which included subjects who did not undergo pericardiocentesis or pericardiotomy. Variables were then compared between the two groups. RESULTS: There were 68 patients with non-traumatic cardiac tamponade. All three survival cases had witnessed collapse, and the initial rhythm was pulseless electrical activity (PEA).There were no statistically significant differences in the sex, age, means of transportation, bystander chest compression, electric shock, or adrenalineor FDP levels between the two groups.However, the number with witnessed collapse, PEA, rupture of the heart;the ratio of obtaining return of spontaneous circulation; and the survival ratio were significantly greater in the Intervention (+) group than in the Intervention (-) group. CONCLUSION: Based on the results of preliminary study, we hypothesized that invasive medical intervention for patients with cardiac arrest induced by non-traumatic hemorrhagic cardiac tamponade might be useful for obtaining return of spontaneous circulation and a survival outcome, especially for patients with witnessed collapse with PEA as the initial rhythm.

2. Resuscitation. 2021 Dec 3:S0300-9572(21)00491-3. doi: 10.1016/j.resuscitation.2021.11.035. Online ahead of print.
Aetiology of resuscitated out-of-hospital cardiac arrest treated at hospital.
Wittwer MR(1), Zeitz C(2), Beltrame JF(2), Arstall MA(3).

ABSTRACT
INTRODUCTION: Precipitating aetiology of out-of-hospital cardiac arrest (OHCA), as confirmed by diagnostic testing or autopsy, provides important insights into burden of OHCA and has potential implications for improving OHCA survivorship. This study aimed to describe the aetiology of non-traumatic resuscitated OHCAs treated at hospital within a local health network according to available documentation, and to investigate differences in outcome between aetiologies. METHODS: Observational retrospective cohort study of consecutive OHCA treated at hospital within a local health network between 2011-2016. Cases without sustained ROSC (≥20 minutes), unverified cardiac arrest, and retrievals to external acute care facilities were excluded. A single aetiology was

determined from the hospital medical record and available autopsy results. Survival to hospital discharge was compared between adjudicated aetiologies. RESULTS: In the 314 included cases, distribution of precipitating aetiology was 53% cardiac, 18% respiratory, 3% neurological, 6% toxicological, 9% other, and 11% unknown. A presumed cardiac pre-hospital diagnosis was assigned in 235 (84%) cases, 20% of which were incorrect after exclusion of unknown cases. Rates of survival to hospital discharge varied significantly across aetiologies: cardiac 64%, respiratory 21%, neurological 0%, toxicological 58%, other 32% ($p<0.001$). A two-fold difference in survival was observed between cardiac and non-cardiac aetiologies (64% versus 29%, excluding unknown, $p<0.001$). CONCLUSIONS: Non-cardiac aetiologies represented a substantial burden of resuscitated OHCA treated at hospital within a local health network and were associated with poor outcome. The results confirmed that true aetiology was not evident on initial examination in 1 in 5 cases with a pre-hospital cardiac diagnosis.

END-TIDAL CO_2

No articles identified.

ORGAN DONATION

No articles identified.

FEEDBACK

1. Prehosp Emerg Care. 2021 Dec 7:1-8. doi: 10.1080/10903127.2021.2015025. Online ahead of print.

A novel assessment using a panoramic video camera of resuscitation quality in patients following out-of-hospital cardiac arrest.

Kuang HK(1), Chen HH(2), Chen YL(1)(3), Yiang GT(1)(3), Chiang WC(4)(5).

ABSTRACT

The assessment of cardiopulmonary resuscitation and teamwork quality in prehospital settings has always been challenging. Currently, commercialized quality-monitored chest pads and single-angle cameras are being used to monitor prehospital the resuscitation quality in patients following out-of-hospital cardiac arrest (OHCA). However, both these methods have drawbacks. In New Taipei City, we introduced the panoramic video camera as a novel method to assess the resuscitation quality of OHCA patients to monitor both technical skills and teamwork. The panoramic video camera enabled a comprehensive evaluation of prehospital resuscitation, thereby allowing team members to evaluate their performance by reviewing the video after resuscitation. This is the first step toward improving the evaluation of prehospital resuscitation. Using this panoramic video camera and a high-speed internet connection, real-time resuscitation feedback from the dispatch center or medical directors can be provided promptly, thus, making prehospital resuscitation safe and efficient.

DRUGS

No articles identified.

TRAUMA

1. Int J Environ Res Public Health. 2021 Dec 3;18(23):12769. doi: 10.3390/ijerph182312769.
Association of Nights and Weekends with Survival of Traumatic Out-of-Hospital Cardiac Arrest following Traffic Collisions: Japanese Registry-Based Study.
Fukuda T(1)(2), Ohashi-Fukuda N(3), Sekiguchi H(1), Inokuchi R(4), Kukita I(1).
ABSTRACT
BACKGROUND: The process of care for traumatic out-of-hospital cardiac arrest (OHCA) may be different at night and on the weekend. However, little is known about whether the rate of survival after OHCA is affected by the time of day and day of the week. METHODS: This observational study analyzed the Japanese government-led nationwide population-based registry data of OHCA patients. Patients who experienced traumatic OHCA following traffic collisions from 2013 to 2017 were included in the study. A multivariable logistic regression model was used to examine the association of both time of day (day/evening vs. night) and day of the week (weekday vs. weekend) with outcomes after traumatic OHCA. Night was defined as 23:00 p.m. to 6:59 a.m., and weekends were defined as Saturday and Sunday. The primary outcome was one-month survival. RESULTS: A total of 8500 patients (mean [SD] age, 57.7 [22.3] years; 68.6% male) were included. 2267 events (26.7%) occurred at night, and 2482 events (29.2%) occurred on weekends. Overall, 173 patients (2.0%) survived one month after OHCA. After adjusting for potential confounders, one-month survival during the day/evening (148/6233 [2.4%]) was significantly higher than during the night (25/2267 [1.1%]) (adjusted OR, 1.95 [95%CI, 1.24-3.07]), whereas there was no significant difference in one-month survival between weekdays (121/6018 [2.0%]) and weekends (52/2482 [2.1%]) (adjusted OR, 0.97 [95%CI, 0.69-1.38]). CONCLUSIONS: One-month survival after traumatic OHCA was significantly lower during the night than during the day/evening, although there was no difference in one-month survival between weekdays and weekends. Further studies are warranted to investigate the underlying mechanisms of decreased survival at night.

VENTILATION

1. Resuscitation. 2021 Dec 6:S0300-9572(21)00506-2. doi: 10.1016/j.resuscitation.2021.11.040. Online ahead of print.
Hyperoxia in resuscitation of out-of-hospital cardiac arrest patients - Is less more?
Leidel BA(1).
NO ABSTRACT AVAILABLE

CERERBRAL MONITORING

1. Medicine (Baltimore). 2021 Dec 10;100(49):e28164. doi: 10.1097/MD.0000000000028164.
The association of early diarrhea after successful resuscitation following out-of-hospital cardiac arrest with neurological outcome: A retrospective observational study.
Schriefl C(1), Steininger P(2), Clodi C(1), Mueller M(1), Poppe M(1), Ettl F(1), Nuernberger A(1), Grafeneder J(1), Losert H(1), Schwameis M(1), Holzer M(1), Sterz F(1), Schoergenhofer C(3).
ABSTRACT
Gastrointestinal ischemia with reperfusion tissue injury contributes to post-cardiac arrest syndrome. We hypothesized that diarrhea is a symptom of intestinal ischemia/reperfusion injury and investigated whether the occurrence of early diarrhea (≤12 hours) after successful cardiopulmonary resuscitation is associated with an unfavorable neurological outcome.We analyzed data from the

Vienna Clinical Cardiac Arrest Registry. Inclusion criteria comprised ≥18 years of age, a witnessed, non-traumatic out-of-hospital cardiac arrest, return of spontaneous circulation (ROSC), initial shockable rhythm, and ST-segment elevation in electrocardiogram after ROSC with consecutive coronary angiography. Patients with diarrhea caused by other factors (e.g., infections, antibiotic treatment, or chronic diseases) were excluded. The primary endpoint was neurological function between patients with or without "early diarrhea" (≤12 hours after ROSC) according to cerebral performance categories.We included 156 patients between 2005 and 2012. The rate of unfavorable neurologic outcome was higher in patients with early diarrhea (67% vs 37%). In univariate analysis, the crude odds ratio for unfavorable neurologic outcome was 3.42 (95% confidence interval, 1.11-10.56, P = .03) for early diarrhea. After multivariate adjustment for traditional prognostication markers the odds ratio of early diarrhea was 5.90 (95% confidence interval, 1.28-27.06, P = .02). In conclusion, early diarrhea within 12 hours after successful cardiopulmonary resuscitation was associated with an unfavorable neurological outcome.

2. Neurocrit Care. 2021 Dec 6. doi: 10.1007/s12028-021-01402-1. Online ahead of print.
Status Myoclonus: A Nuanced Predictor of Poor Outcome Post Cardiac Arrest.
Kramer AH(1).
NO ABSTRACT AVAILABLE

3. Chest. 2021 Dec;160(6):e677. doi: 10.1016/j.chest.2021.07.047.
Predicting Brain Death After Out-of-Hospital Cardiac Arrest With a Score: Is It Possible?
Yip YY(1), Cheung EH(2).
NO ABSTRACT AVAILABLE

4. Resuscitation. 2021 Dec 1:S0300-9572(21)00489-5. doi: 10.1016/j.resuscitation.2021.11.033. Online ahead of print.
GFAp and tau protein as predictors of neurological outcome after out-of-hospital cardiac arrest: a post hoc analysis of the COMACARE trial.
Jaana H(1), Marika L(2), Ashton Nicholas J(3), Matti R(4), Johanna H(5), Pekka J(5), Hans F(6), Tobias C(7), Ville P(5), Kaj B(8), Henrik Z(9), Skrifvars Markus B(10); COMACARE study groups.
ABSTRACT
AIM: To determine the ability of serum glial fibrillary acidic protein (GFAp) and tau protein to predict neurological outcome after out-of-hospital cardiac arrest (OHCA). METHODS: We measured plasma concentrations of GFAp and tau of patients included in the previously published COMACARE trial (NCT02698917) on intensive care unit admission and at 24, 48, and 72h after OHCA, and compared them to neuron specific enolase (NSE). NSE concentrations were determined already during the original trial. We defined unfavourable outcome as a cerebral performance category (CPC) score of 3-5 six months after OHCA. We determined the prognostic accuracy of GFAp and tau using the receiver operating characteristic curve and area under the curve (AUROC). RESULTS: Overall, 39/112 (35%) patients had unfavourable outcomes. Over time, both markers were evidently higher in the unfavourable outcome group (p<0.001). At 48h, the median (interquartile range) GFAp concentration was 1514 (886-4995) in the unfavourable versus 238 (135-463) pg/ml in the favourable outcome group (p<0.001). The corresponding tau concentrations were 99.6 (14.5-352) and 3.0 (2.2-4.8) pg/ml (p<0.001). AUROCs at 48 and 72h were 0.91 (95% confidence interval 0.85-0.97) and 0.91 (0.85-0.96) for GFAp and 0.93 (0.86-0.99) and 0.95 (0.89-1.00) for tau. Corresponding AUROCs for NSE were 0.86 (0.79-0.94) and 0.90 (0.82-0.97). The difference between the prognostic accuracies of GFAp or tau and NSE were not statistically significant. CONCLUSIONS: At 48 and 72h,

serum both GFAp and tau demonstrated excellent accuracy in predicting outcomes after OHCA but were not superior to NSE.

ULTRASOUND AND CPR

No articles identified.

ORGANISATION AND TRAINING

1. Eur Heart J Acute Cardiovasc Care. 2021 Dec 10:zuab115. doi: 10.1093/ehjacc/zuab115. Online ahead of print.
Volunteer first-responder activation in out-of-hospital cardiac arrest-a lot of potential and a lot of unknowns.
Folke F(1)(2)(3), Hansen CM(1)(4).
NO ABSTRACT AVAILABLE

2. JMIR Res Protoc. 2021 Dec 10;10(12):e30238. doi: 10.2196/30238.
The Communicating Narrative Concerns Entered by Registered Nurses (CONCERN) Clinical Decision Support Early Warning System: Protocol for a Cluster Randomized Pragmatic Clinical Trial.
Rossetti SC(1)(2), Dykes PC(3)(4), Knaplund C(1), Kang MJ(3)(4), Schnock K(3)(4), Garcia JP Jr(3), Fu LH(1), Chang F(3), Thai T(3), Fred M(5), Korach TZ(3)(4), Zhou L(3)(4), Klann JG(4), Albers D(1)(6), Schwartz J(2), Lowenthal G(3), Jia H(2), Liu F(1), Cato K(2).
ABSTRACT
BACKGROUND: Every year, hundreds of thousands of inpatients die from cardiac arrest and sepsis, which could be avoided if those patients' risk for deterioration were detected and timely interventions were initiated. Thus, a system is needed to convert real-time, raw patient data into consumable information that clinicians can utilize to identify patients at risk of deterioration and thus prevent mortality and improve patient health outcomes. The overarching goal of the COmmunicating Narrative Concerns Entered by Registered Nurses (CONCERN) study is to implement and evaluate an early warning score system that provides clinical decision support (CDS) in electronic health record systems. With a combination of machine learning and natural language processing, the CONCERN CDS utilizes nursing documentation patterns as indicators of nurses' increased surveillance to predict when patients are at the risk of clinical deterioration. OBJECTIVE: The objective of this cluster randomized pragmatic clinical trial is to evaluate the effectiveness and usability of the CONCERN CDS system at 2 different study sites. The specific aim is to decrease hospitalized patients' negative health outcomes (in-hospital mortality, length of stay, cardiac arrest, unanticipated intensive care unit transfers, and 30-day hospital readmission rates). METHODS: A multiple time-series intervention consisting of 3 phases will be performed through a 1-year period during the cluster randomized pragmatic clinical trial. Phase 1 evaluates the adoption of our algorithm through pilot and trial testing, phase 2 activates optimized versions of the CONCERN CDS based on experience from phase 1, and phase 3 will be a silent release mode where no CDS is viewable to the end user. The intervention deals with a series of processes from system release to evaluation. The system release includes CONCERN CDS implementation and user training. Then, a mixed methods approach will be used with end users to assess the system and clinician perspectives. RESULTS: Data collection and analysis are expected to conclude by August 2022. Based on our previous work on CONCERN, we expect the system to have a positive impact on the mortality rate and length of stay. CONCLUSIONS: The CONCERN CDS will increase team-based situational

awareness and shared understanding of patients predicted to be at risk for clinical deterioration in need of intervention to prevent mortality and associated harm.

3. J Clin Med. 2021 Dec 2;10(23):5688. doi: 10.3390/jcm10235688.
Early Identification of Resuscitated Patients with a Significant Coronary Disease in Out-of-Hospital Cardiac Arrest Survivors without ST-Segment Elevation.
Youn CS(1), Yi H(2), Kim YJ(3), Song H(1), Kim N(4), Kim WY(3).
ABSTRACT
This study aimed to develop a machine learning (ML)-based model for identifying patients who had a significant coronary artery disease among out-of-hospital cardiac arrest (OHCA) survivors without ST-segment elevation (STE). This multicenter observational study used data from the Korean Hypothermia Network prospective registry (KORHN-PRO) gathered between October 2015 and December 2018. We used information available before targeted temperature management (TTM) as predictor variables, and the primary outcome was a significant coronary artery lesion in coronary angiography (CAG). Among 1373 OHCA patients treated with TTM, 331 patients without STE who underwent CAG were enrolled. Among them, 127 patients (38.4%) had a significant coronary artery lesion. Four ML algorithms, namely regularized logistic regression (RLR), random forest classifier (RF), CatBoost classifier (CBC), and voting classifier (VC), were used with data collected before CAG. The VC model showed the highest accuracy for predicting significant lesions (area under the curve of 0.751). Eight variables (older age, male, initial shockable rhythm, shorter total collapse duration, higher glucose and creatinine, and lower pH and lactate) were significant to ML models. These results showed that ML models may be useful in developing early predictive tools for identifying high-risk patients with a significant stenosis in CAG.

4. Am J Emerg Med. 2021 Dec;50:733-738. doi: 10.1016/j.ajem.2021.09.058. Epub 2021 Sep 29.
Clinical prediction rule of termination of resuscitation for out-of-hospital cardiac arrest patient with pre-hospital defibrillation given.
Sun KF(1), Poon KM(2), Lui CT(3), Tsui KL(4).
ABSTRACT
OBJECTIVE: To derive a clinical prediction rule of termination of resuscitation (TOR) for out-of-hospital cardiac arrest (OHCA) with pre-hospital defibrillation given. METHOD: This was a retrospective multicenter cohort study performed in three emergency departments (EDs) of three regional hospitals from 1/1/2012 to 31/12/2018. Patients of OHCA aged ≥18 years old were included. Those with post-mortem changes, return of spontaneous circulation and receiving no resuscitation in EDs were excluded. A TOR rule was derived by logistic regression analysis based on demographics and end-tidal carbon dioxide level of included subjects with pre-hospital defibrillation given. RESULTS: There were 447 included patients had received pre-hospital defibrillation, in which 148 had return of spontaneous circulation (ROSC), with 22 survived to discharge (STD). Independent predictors for death on or before ED arrival (no ROSC) included EMS call to ED time >20 min and ETCO2 level <20 mmHg from first three sets. A 2-criteria rule predicting death on or before ED arrival by fulfilling both of the independent predictors had a specificity of 0.95 (95% CI 0.90-0.98) and positive predictive value (PPV) of 0.95 (95% CI 0.90-0.98), if 2nd set of ETCO2 was used. The positive likelihood ratio was 10.04 (95% CI 4.83-20.89). CONCLUSION: The 2-criteria TOR rule for OHCA patients with pre-hospital defibrillation had a high specificity and PPV for predicting death on or before ED arrival.

5. Am J Emerg Med. 2021 Dec;50:618-624. doi: 10.1016/j.ajem.2021.09.044. Epub 2021 Sep 23.
Time to specialty care and mortality after cardiac arrest.

Zadorozny EV(1), Guyette FX(1), Flickinger KL(1), Martin-Gill C(1), Amoah K(2), Artist O(2), Mohammed A(3), Condle JP(1), Callaway CW(1), Elmer J(4), Coppler PJ(5); Pittsburgh Post Cardiac Arrest Service.

ABSTRACT

INTRODUCTION: Out of hospital cardiac arrest (OHCA) patients are often transported to the closest emergency department (ED) or cardiac center for initial stabilization and may be transferred for further care. We investigated the effects of delay to transfer on in hospital mortality at a receiving facility. METHODS: We included OHCA patients transported from the ED by a single critical care transport service to a quaternary care facility between 2010 and 2018. We calculated dwell time as time from arrest to critical care transport team contact. We abstracted demographics, arrest characteristics, and interventions started prior to transport arrival. For the primary analysis, we used logistic regression to determine the association of dwell time and in-hospital mortality. As secondary outcomes we investigated for associations of dwell time and mortality within 24 h of arrival, proximate cause of death among decedents, arterial pH and lactate on arrival, sum of worst SOFA subscales within 24 h of arrival, and rearrest during interfacility transport. RESULTS: We included 572 OHCA patients transported from an outside ED to our facility. Median dwell time was 113 (IQR = 85-159) minutes. Measured in 30 min epochs, increasing dwell time was not associated with in-hospital mortality, 24-h mortality, cause of death and initial pH, but was associated with lower 24-h SOFA score (p = 0.01) and lower initial lactate (p = 0.03). Rearrest during transport was rare (n = 29, 5%). Dwell time was associated with lower probability of rearrest during transport (OR = 0.847, (95% CI 0.68-1.01), p = 0.07). CONCLUSIONS: Dwell time was not associated with in-hospital mortality. Rapid transport may be associated with risk of rearrest. Prospective data are needed to clarify optimal patient stabilization and transport strategies.

6. Resuscitation. 2021 Dec 3:S0300-9572(21)00490-1. doi: 10.1016/j.resuscitation.2021.11.034. Online ahead of print.

aImpact of Dispatcher-Assisted Cardiopulmonary Resuscitation on Performance of Termination of Resuscitation Criteria.

Limkakeng AT(1), Ye JJ(1), Staton C(1), Yng Ng Y(2), Sh Leong B(3), Shahidah N(4), Yazid M(5), Gordee A(6), Kuchibhatla M(6), Eh Ong M(7); Singapore PAROS Investigators.

ABSTRACT

Current Advanced Life Support Termination of Resuscitation (TOR) guidelines suggest when to cease cardiopulmonary resuscitation (CPR). With the significant increase of Dispatch-Assisted CPR (DA-CPR) programs, the impact of DA-CPR on the TOR criteria performance is not clear METHODS: We conducted a secondary analysis of a prospectively collected registry, the Pan-Asian Resuscitation Outcomes Study. We included patients >15 years old with out-of-hospital cardiac arrest between 2014 and 2017 (after implementation of Singapore's DA-CPR program). We excluded patients with non-cardiac etiology, known do-not-resuscitate status, and healthcare provider bystanders. All cases were collected in accordance to Utstein standards. We evaluated the addition of DA-CPR to the diagnostic performance of TOR criteria using logistic regression modeling. The primary outcome was performance for predicting non-survival at 30 days. Sensitivity, specificity, and positive and negative predictive values were calculated. RESULTS: Of the 6,009 cases, 319 (5.3%) were still alive at 30 days. Patients had a mean age of 67.9 (standard deviation 15.7) years and were mostly male and Chinese. Almost half of patients had no bystander CPR. The TOR criteria differentiating DA-CPR from unassisted bystander CPR has a specificity of 94% and predictive value of death of 99%, which was not significantly different from undifferentiated CPR criteria. There were differences in adjusted association with survival between unassisted and DA-CPR CONCLUSION: Advanced life support TOR criteria retain high specificity and predictive value of death in the context of DA-CPR. Further

research should explore the differences between unassisted CPR and DA-CPR to understand differential survival outcomes.

7. Cardiol Res Pract. 2021 Nov 24;2021:3180987. doi: 10.1155/2021/3180987. eCollection 2021.
Racial and Socioeconomic Disparities in Out-Of-Hospital Cardiac Arrest Outcomes: Artificial Intelligence-Augmented Propensity Score and Geospatial Cohort Analysis of 3,952 Patients.
Monlezun DJ(1)(2), Samura AT(3), Patel RS(4), Thannoun TE(5), Balan P(6).
ABSTRACT
INTRODUCTION: Social disparities in out-of-hospital cardiac arrest (OHCA) outcomes are preventable, costly, and unjust. We sought to perform the first large artificial intelligence- (AI-) guided statistical and geographic information system (GIS) analysis of a multiyear and multisite cohort for OHCA outcomes (incidence and poor neurological disposition). METHOD: We conducted a retrospective cohort analysis of a prospectively collected multicenter dataset of adult patients who sequentially presented to Houston metro area hospitals from 01/01/07-01/01/16. Then AI-based machine learning (backward propagation neural network) augmented multivariable regression and GIS heat mapping were performed. RESULTS: Of 3,952 OHCA patients across 38 hospitals, African Americans were the most likely to suffer OHCA despite representing a significantly lower percentage of the population (42.6 versus 22.8%; $p < 0.001$). Compared to Caucasians, they were significantly more likely to have poor neurological disposition (OR 2.21, 95%CI 1.25-3.92; p=0.006) and be discharged to a facility instead of home (OR 1.39, 95%CI 1.05-1.85; p=0.023). Compared to the safety net hospital system primarily serving poorer African Americans, the university hospital serving primarily higher income commercially and Medicare insured patients had the lowest odds of death (OR 0.45, $p < 0.001$). Each additional $10,000 above median household income was associated with a decrease in the total number of cardiac arrests per zip code by 2.86 (95%CI -4.26- -1.46; $p < 0.001$); zip codes with a median income above $54,600 versus the federal poverty level had 14.62 fewer arrests ($p < 0.001$). GIS maps showed convergence of the greater density of poor neurologic outcome cases and greater density of poorer African American residences. CONCLUSION: This large, longitudinal AI-guided analysis statistically and geographically identifies racial and socioeconomic disparities in OHCA outcomes in a way that may allow targeted medical and public health coordinated efforts to improve clinical, cost, and social equity outcomes.

8. Ann Emerg Med. 2021 Dec 1:S0196-0644(21)01384-6. doi: 10.1016/j.annemergmed.2021.10.016. Online ahead of print.
The Use of Artificial Intelligence to Predict the On-Scene Return of Spontaneous Circulation in the Out-of-Hospital Setting: A Time to Do More for Cardiac Arrest?
Lee S(1), Okubo M(2).
NO ABSTRACT AVAILABLE

9. Annu Int Conf IEEE Eng Med Biol Soc. 2021 Nov;2021:5459-5462. doi: 10.1109/ EMBC46164. 2021.9630113.
Identification of an optimal CPR chest compression protocol.
Daudre-Vignier C, Laviola M, Das A, Bates DG, Hardman JG.
ABSTRACT
In this study, we used a high-fidelity integrated computational model of the respiratory and cardiovascular systems to investigate cardiopulmonary resuscitation (CPR) after cardiac arrest in a virtual healthy subject. For the purpose of this work, a newly developed thoracic model has been integrated to the current model, to study the influence of external chest compressions upon the arrested circulation during CPR. We evaluated the chest compression (CC) parameters, namely, end

compression force, compression rate, and duty cycle to optimize the coronary perfusion pressure and the systolic blood pressure, using a genetic algorithm. While the sternal displacement associated with the CC force agreed with the ERC guidelines, the CC rate and duty cycle were respectively higher and lower than the ones recommended by the ERC guidelines. The effect of these CC parameters on cardiac output (CO) were also assessed. The end compression force was the parameter with the largest impact on CO, while the compression rate and duty cycle scarcely influence it. Relevance- Our results may aid in understanding the underlying pathophysiology of cardiac arrest and help guide research into the refinement of CPR strategies, without sacrificing animals or conducting clinical trials, which are difficult to undertake in crisis scenarios.

POST-CARDIAC ARREST TREATMENTS

1. Am J Emerg Med. 2021 Dec;50:670-674. doi: 10.1016/j.ajem.2021.09.059. Epub 2021 Sep 25.
The role of the lactate/albumin ratio in predicting survival outcomes in patients resuscitated after out-of-hospital cardiac arrest: A preliminary report.
Kokulu K(1), Sert ET(2).

ABSTRACT
OBJECTIVE: To investigate the effect of lactate/albumin (L/A) ratio on survival to discharge in patients who have had out-of-hospital cardiac arrest (OHCA). METHODS: We analyzed adult patients (aged ≥18 years) who were admitted to our hospital's emergency department (ED) due to OHCA between January 2018 and June 2020 and who achieved return of spontaneous circulation after successful resuscitation. Blood lactate and albumin concentrations were obtained within the first 10 min after admission to the ED. Patients were grouped according to clinical outcomes. The primary outcome was survival until hospital discharge. The groups were then statistically compared. RESULTS: In this study, 235 OHCA patients were analyzed, 42 (17.9%) of whom had survived until discharge. The L/A ratio was higher in the non-survivor group than in the survivor group (2.0 (interquartile range: 1.4-2.8) vs 1.4 (0.9-1.9); $P < 0.001$). A low L/A ratio was significantly associated with survival at discharge (odds ratio: 2.55; 95% confidence interval (CI): 3.24-11.08; $P < 0.001$). In the prediction of survival to discharge, the area under the curve (AUC) for the L/A ratio (AUC: 0.823) was higher than that for lactate (AUC: 0.762) or albumin (AUC: 0.722) alone. Moreover, the predictive value of L/A ratio for survival to discharge might significantly improve when the cutoff value is higher than 1.62. CONCLUSION: The L/A ratio is more valuable than the lactate or albumin levels alone in predicting survival to discharge. Our findings indicate that a combination of these parameters might increase the predictability of survival to discharge in OHCA patients.

TARGETED TEMPERATURE MANAGEMENT

1. J Clin Med. 2021 Dec 3;10(23):5697. doi: 10.3390/jcm10235697.
Intracranial Pressure Patterns and Neurological Outcomes in Out-of-Hospital Cardiac Arrest Survivors after Targeted Temperature Management: A Retrospective Observational Study.
Song H(1)(2), Kang C(1), Park J(1)(2), You Y(1), In Y(2)(3), Min J(2)(3), Jeong W(1), Cho Y(1), Ahn H(1)(2), Kim D(4).

ABSTRACT
We aimed to investigate intracranial pressure (ICP) changes over time and the neurologic prognosis for out-of-hospital cardiac arrest (OHCA) survivors who received targeted temperature management (TTM). ICP was measured immediately after return of spontaneous circulation (ROSC) (day 1), then at 24 h (day 2), 48 h (day 3), and 72 h (day 4), through connecting a lumbar drain catheter to a manometer or a LiquoGuard machine. Neurological outcomes were determined at 3 months after ROSC, and a poor neurological outcome was defined as Cerebral Performance Category 3-5. Of the

91 patients in this study (males, n = 67, 74%), 51 (56%) had poor neurological outcomes. ICP was significantly higher in the poor outcome group at each time point except day 4. ICP elevation was highest between days 2 and 3 in the good outcome group, and between days 1 and 2 in the poor outcome group. However, there was no difference in total ICP elevation between the poor and good outcome groups (3.0 vs. 3.1; p = 0.476). All OHCA survivors who had received TTM had elevated ICP, regardless of neurologic prognosis. However, the changing pattern of ICP levels differed depending on the neurological outcome.

2. Am J Emerg Med. 2021 Dec;50:707-712. doi: 10.1016/j.ajem.2021.09.037. Epub 2021 Sep 22.
QRS duration predicts outcomes in cardiac arrest survivors undergoing therapeutic hypothermia.
Chen JY(1), Huang CH(1), Chen WJ(2), Chen WT(1), Ong HN(1), Chang WT(1), Tsai MS(3).
ABSTRACT
BACKGROUND: Whether the electrocardiography (ECG) serial changes predict outcomes in cardiac arrest survivors undergoing therapeutic hypothermia remains unclear. METHODS AND RESULTS: This retrospective observational study enrolled 366 adult nontraumatic cardiac arrest survivors who underwent therapeutic hypothermia in a tertiary transfer center during 2006-2018. The ECG at return of spontaneous circulation (ROSC), during hypothermia and after rewarming were analyzed. 295 cardiac arrest survivors were included. Compared with the survivors, the non-survivors had longer QRS durations at the ROSC (118.33 ± 32.47 ms vs 106.88 ± 29.78 ms, p < 0.001) and after rewarming (99.26 ± 25.07 ms vs 93.03 ± 19.09 ms, p = 0.008). The enrolled patients were classified into 4 groups based on QRS duration at the ROSC and after rewarming, namely (1) narrow-narrow (narrow QRS at ROSC and narrow QRS after rewarming, n = 156), (2) narrow-wide (n = 29), (3) wide-narrow (n = 87), and (4) wide-wide (n = 23) group. The wide-wide group had the worst survival rates [odds ratio (OR) = 0.141, p = 0.001], followed by the narrow-wide group (OR 0.223, p = 0.003) and the wide-narrow group (OR 0.389, p = 0.003). CONCLUSIONS: In cardiac arrest survivors given therapeutic hypothermia, QRS durations at the ROSC, after rewarming and their changes may predict survival to hospital discharge.

3. J Clin Med. 2021 Nov 30;10(23):5643. doi: 10.3390/jcm10235643.
Differential Effectiveness of Hypothermic Targeted Temperature Management According to the Severity of Post-Cardiac Arrest Syndrome.
Kikutani K(1), Nishikimi M(1), Shimatani T(1), Kyo M(1), Ohshimo S(1), Shime N(1).
ABSTRACT
International guidelines recommend targeted temperature management (TTM) to improve the neurological outcomes in adult patients with post-cardiac arrest syndrome (PCAS). However, it still remains unclear if the lower temperature setting (hypothermic TTM) or higher temperature setting (normothermic TTM) is superior for TTM. According to the most recent large randomized controlled trial (RCT), hypothermic TTM was not found to be associated with superior neurological outcomes than normothermic TTM in PCAS patients. Even though this represents high-quality evidence obtained from a well-designed large RCT, we believe that we still need to continue investigating the potential benefits of hypothermic TTM. In fact, several studies have indicated that the beneficial effect of hypothermic TTM differs according to the severity of PCAS, suggesting that there may be a subgroup of PCAS patients that is especially likely to benefit from hypothermic TTM. Herein, we summarize the results of major RCTs conducted to evaluate the beneficial effects of hypothermic TTM, review the recent literature suggesting the possibility that the therapeutic effect of hypothermic TTM differs according to the severity of PCAS, and discuss the potential of individualized TTM.

ELECTROPHYSIOLOGY AND DEFIBRILLATION

1. Resuscitation. 2021 Dec 6:S0300-9572(21)00505-0. doi: 10.1016/j.resuscitation.2021.11.039. Online ahead of print.

Maximum Expected Survival Rate Model for Public Access Defibrillator Placement.

Pourghaderi A(1), Kogtikov N(2), Lees MH(3), Cai W(4), Pin Pek P(5), Fu Wah Ho R(6), Ming Ng W(7), Kwak J(8), Elgin White A(9), Lynn Lim S(10), Shao Wei Lam S(11), Eng Hock Ong M(12).

ABSTRACT

AIM: Mathematical optimization of automated external defibrillator (AED) placement has demonstrated potential to improve survival of out-of-hospital cardiac arrest (OHCA). Existing models mostly aim to improve accessibility based on coverage radius and do not account for detailed impact of delayed defibrillation on survival. We aimed to predict OHCA survival based on time to defibrillation and developed an AED placement model to directly maximize the expected survival rate. METHODS: We stratified OHCAs occurring in Singapore (2010 to 2017) based on time to defibrillation and developed a regression model to predict the Utstein survival rate. We then developed a novel AED placement model, the maximum expected survival rate (MESR) model. We compared the performance of MESR with a maximum coverage model developed for Canada that was shown to be generalizable to other settings (Denmark). The survival gain of MESR was assessed through 10-fold cross-validation for placement of 20 to 1000 new AEDs in Singapore. Statistical analysis was performed using $\chi 2$ and McNemar's tests. RESULTS: During the study period, 15,345 OHCAs occurred. The power-law approximation with R2 of 91.33% performed best among investigated models. It predicted a survival of 54.9% with defibrillation within the first two minutes after collapse that was reduced by more than 60% without defibrillation within the first 4 minutes. MESR outperformed the maximum coverage model with P-value <0.05 (<0.0001 in 22 of 30 experiments). CONCLUSION: We developed a novel AED placement model based on the impact of time to defibrillation on OHCA outcomes. Mathematical optimization can improve OHCA survival.

PEDIATRICS AND CHILDREN

1. Resuscitation. 2021 Dec 3:S0300-9572(21)00492-5. doi: 10.1016/j.resuscitation.2021.11.036. Online ahead of print.

Biomarkers Associated with Mortality in Pediatric Patients with Cardiac Arrest and Acute Respiratory Distress Syndrome.

Gardner MM(1), Kirschen MP(2), Wong HR(3), McKeone DJ(4), Scott Halstead E(5), Thompson J(2), Himebauch AS(2), Topjian AA(2), Yehya N(6).

ABSTRACT

AIM: of the Study: To identify plasma biomarkers associated with cardiac arrest in a cohort of children with acute respiratory distress syndrome (ARDS), and to assess the association of these biomarkers with mortality in children with cardiac arrest and ARDS (ARDS+CA). METHODS: This was a secondary analysis of a single-center prospective cohort study of children with ARDS from 2014-2019 with 17 biomarkers measured. Clinical characteristics and biomarkers were compared between subjects with ARDS+CA and ARDS with univariate analysis. In a sub-cohort of ARDS+CA subjects, the association between biomarker levels and mortality was tested using univariate and bivariate logistic regression. RESULTS: Biomarkers were measured in 333 subjects: 301 with ARDS (median age 5.3 years, 55.5% male) and 32 ARDS+CA (median age 8 years, 53.1% male). More arrests (69%) occurred out-of-hospital with a median CPR duration of 11 (IQR 5.5, 25) minutes. ARDS severity, PRISM III score, vasoactive-ionotropic score and extrapulmonary organ failures were worse in the ARDS+CA

versus ARDS group. Eight biomarkers were elevated in the ARDS+CA versus ARDS cohort: sRAGE, nucleosomes, SP-D, CCL22, IL-6, HSP70, IL-8, and MIP-1b. sRAGE, SP-D, and CCL22 remained elevated when the cohorts were matched for illness severity. When controlling for severity of ARDS and cardiac arrest characteristics, sRAGE, IL-6 and granzyme B were associated with mortality in the ARDS+CA group. CONCLUSION: sRAGE, IL-6 and granzyme B were associated with cardiac arrest mortality when controlling for illness severity. sRAGE was consistently higher in the ARDS+CA cohort compared to ARDS and retained independent association with mortality.

2. Oman Med J. 2021 Nov 30;36(6):e320. doi: 10.5001/omj.2021.104. eCollection 2021 Nov.
Epidemiology of Drowning Incidents among Children at Sultan Qaboos University Hospital Oman.
Jeswani NL(1), Khilji MF(1), Rizvi S(2), Al Reesi A(1).

ABSTRACT

OBJECTIVES: We sought to study the epidemiology of drowning among children reported at Sultan Qaboos University Hospital in Oman. METHODS: We conducted a retrospective study of the patients who presented to the emergency department with a history of drowning over 10 years from January 2008 to December 2017. Patients with children aged one to 18 years old were included in the study. The data including demographics, timing and location of drowning, season, adult supervision, swimming ability, medical risk factors, duration of submersion, on spot resuscitation, emergency medicine department assessment, and hospital management and outcome were collected from electronic hospital information system using a preformed proforma. The outcome was categorized into either full recovery, severe neurological injury, or brain death based on the pediatric cerebral performance category (PCPC). A good outcome represents a score of 1-3 points, and a PCPC of 4-6 points corresponds to a poor outcome. We calculated correlation for all variables with the outcome by using chi-square and Fisher's exact tests. A p-value of < 0.050 is taken as significant value. RESULTS: A total of 74 patients were included in the study; 54 (73.0%) were male, and 47 (63.5%) were aged < 6 years old. More than half (59.4%) of drownings happened in swimming pool, 21 (28.4%) children were unsupervised during the incident, and 39 (52.7%) required cardiopulmonary resuscitation (CPR). Out of all studied subjects, three (4.1%) were brain dead, and two (2.7%) developed severe neurological injury. On univariate analysis, the following variables were statistically significant (p < 0.050), predicting the poor outcome like lack of adult supervision, duration of submersion >10 minutes, asystole, Glasgow Coma Scale < 8, temperature < 35 oC, pH < 7, anion gap > 20, blood glucose > 10 mmol/L, abnormal chest X-ray findings, rewarming, CPR, intubation, inotropic support, and pediatric intensive care unit admission. CONCLUSIONS: Our study suggests that children, especially males under the age of six with no swimming ability, need strict supervision next to bodies of water. Furthermore, preventive measures might include raising community awareness about the risk factors of drowning, commencing public CPR lessons, and strict pool safety regulation by related authorities.

EXTRACORPOREAL LIFE SUPPORT

No articles identified.

EXPERIMENTAL RESEARCH

1. J Clin Med. 2021 Nov 23;10(23):5484. doi: 10.3390/jcm10235484.

A Multifunctional, Low-Volume Resuscitation Cocktail Improves Vital Organ Blood Flow and Hemostasis in a Pig Model of Polytrauma with Traumatic Brain Injury.

St John AE(1), Wang X(1), Ringgold K(1), Lim EB(1), Chien D(1), Statz ML(1), Stern SA(1), White NJ(1).

ABSTRACT

The resuscitation of polytrauma with hemorrhagic shock and traumatic brain injury (TBI) is a balance between permissive hypotension and maintaining vital organ perfusion. There is no current optimal solution. This study tested whether a multifunctional resuscitation cocktail supporting hemostasis and perfusion could mitigate blood loss while improving vital organ blood flow during prolonged limited resuscitation. Anesthetized Yorkshire swine were subjected to fluid percussion TBI, femur fracture, catheter hemorrhage, and aortic tear. Fluid resuscitation was started when lactate concentration reached 3-4 mmol/L. Animals were randomized to one of five groups. All groups received hydroxyethyl starch solution and vasopressin. Low- and high-dose fibrinogen (FBG) groups additionally received 100 and 200 mg/kg FBG, respectively. A third group received TXA and low-dose FBG. Two control groups received albumin, with one also including TXA. Animals were monitored for up to 6 h. Blood loss was decreased and vital organ blood flow was improved with low- and high-dose fibrinogen compared to albumin controls, but survival was not improved. There was no additional benefit of high- vs. low-dose FBG on blood loss or survival. TXA alone decreased blood loss but had no effect on survival, and combining TXA with FBG provided no additional benefit. Pooled analysis of all groups containing fibrinogen vs. albumin controls found improved survival, decreased blood loss, and improved vital organ blood flow with fibrinogen delivery. In conclusion, a low-volume resuscitation cocktail consisting of hydroxyethyl starch, vasopressin, and fibrinogen concentrate improved outcomes compare to controls during limited resuscitation of polytrauma.

CASE REPORTS

1. Fetal Pediatr Pathol. 2021 Dec 6:1-3. doi: 10.1080/15513815.2021.2011994. Online ahead of print.

Cardiac Tamponade - a Cause of Sudden Death in a Premature Newborn.

Nunes Marques MI(1), Bento Guerra A(1), Antunes S(1), Martins L(1), Carvalho L(2).

ABSTRACT

BACKGROUND: Cardiac tamponade is a potential complication in neonates with central venous catheters (CVC). Cardiac tamponade may be due to infection, a CVC related complication, or parental nutrition (PN) effusion. CASE REPORT: This is a preterm (30 weeks gestational age), very low birth weight male, admitted to the Neonatal Intensive Care Unit, requiring nasal continuous positive airway pressure. PN was provided via an umbilical venous catheter. An unexpected cardiac arrest occurred on the third day of life with an unsuccessful resuscitation. Autopsy revealed pericardial effusion composed of PN fluid with cardiac tamponade as the cause of death. CONCLUSION: Cardiac tamponade due to total PN effusion in the premature neonate may be fatal. The mechanism of the epicardial/pericardial effusion is not known.

2. Chest. 2021 Dec;160(6):e665-e667. doi: 10.1016/j.chest.2021.03.075.

A 73-Year-Old Woman With Pulseless Electrical Activity Arrest.

Shah R(1), Zhang L(2), Galen BT(3).

NO ABSTRACT AVAILABLE

3. Int J Obstet Anesth. 2021 Nov 3:103237. doi: 10.1016/j.ijoa.2021.103237. Online ahead of print.
Liver injury as a complication of cardiopulmonary resuscitation following cesarean delivery.
Bell AG(1), Webber R(2), Reid C(3), Kumar A(1).
NO ABSTRACT AVAILABLE

4. Cardiovasc Revasc Med. 2021 Dec 3:S1553-8389(21)00769-7. doi: 10.1016/j.carrev.2021.11.043. Online ahead of print.
Recurrent syncope and ventricular arrhythmias induced by coronary artery spasm.
Guevara A(1), Patel M(2), DeLurgio D(3).
ABSTRACT
We present a case of recurrent coronary artery spasm induced ventricular arrhythmias. A 73-year-old female developed a syncopal episode requiring brief cardiopulmonary resuscitation (CPR) with later spontaneous resolution and bradycardia. During admission, the patient had a recurrent syncopal episode while in supine position. Upon reviewing cardiac monitor, it was noted that the syncope coincided with a series of recorded arrhythmias. Invasive cardiac angiogram revealed a non-obstructive lesion at the right coronary artery with no other abnormalities suggesting spastic activity as the source of the arrhythmia. Subsequently, the patient successfully underwent an Implantable Cardioverter- Defibrillator (ICD) placement and stenting in the right coronary. Patient symptoms resolved and no further arrhythmias were detected in the ICD recording.