This week's PubMed 12th – 18th June 2022: articles of interest n = 39

CPR AND COVID-19

1. Emerg Med J. 2022 Jun 15:emermed-2021-212212. doi: 10.1136/emermed-2021-212212. Online ahead of print.

Association of the COVID-19 pandemic with bystander cardiopulmonary resuscitation for out-of-hospital cardiac arrest: a population-based analysis in Tokyo, Japan.

Shibahashi K(1), Kawabata H(2), Sugiyama K(3), Hamabe Y(3).

ABSTRACT

BACKGROUND: The impact of the COVID-19 pandemic on bystander cardiopulmonary resuscitation (CPR) for out-of-hospital cardiac arrest (OHCA) is unclear. This study aimed to investigate whether rates of bystander CPR and patient outcomes changed during the initial state of emergency declared in Tokyo for the COVID-19 pandemic. METHODS: This retrospective study used data from a population-based database of OHCA maintained by the Tokyo Fire Department. By comparing data from the periods before (18 February to 6 April 2020) and during the declaration of a state of emergency (7 April 2020 to 25 May 2020), we estimated the change in bystander CPR rate, prehospital return of spontaneous circulation, and survival and neurological outcomes 1 month after OHCA, accounting for outcome trends in 2019. We performed a multivariate regression analysis to evaluate the potential mechanisms for associations between the state of emergency and these outcomes. RESULTS: The witnessed arrest rates before and after the declaration periods in 2020 were 42.5% and 45.1%, respectively, compared with 44.1% and 44.7% in the respective corresponding periods in 2019. The difference between the two periods in 2020 was not statistically significant when the trend in 2019 was considered. The bystander CPR rates before and after the declaration periods significantly increased from 34.4% to 43.9% in 2020, an 8.3% increase after adjusting for the trend in 2019. This finding was significant even after adjusting for patient and bystander characteristics and the emergency medical service response. There were no significant differences between the two periods in the other study outcomes. CONCLUSION: The COVID-19 pandemic was associated with an improvement in the bystander CPR rate in Tokyo, while patient outcomes were maintained. Pandemic-related changes in patient and bystander characteristics do not fully explain the underlying mechanism; there may be other mechanisms through which the community response to public emergency increased during the pandemic.

CPR/MECHANICAL CHEST COMPRESSION

No articles identified.

REGISTRIES, REVIEWS AND EDITORIALS

1. Medicine (Baltimore). 2022 Jun 17;101(24):e29535. doi: 10.1097/MD.0000000000029535.

Adult influenza epidemic is associated with out-of-hospital cardiac arrest: From the All-Japan Utstein Registry, a prospective, nationwide, population-based, observational registry.

Suematsu Y(1), Kuwano T(1), Yamashita M(1), Tsutsui H(2), Sato N(3), Ikeda T(4), Nagao K(5), Yonemoto N(6), Tahara Y(7), Saku K(1), Miura SI(1)(8); Japanese Circulation Society with Resuscitation Science Study (JCS-ReSS) Group.

ABSTRACT

It has been reported that influenza infection is associated with out-of-hospital cardiac arrest of cardiac origin (OHCA-CA). However, the association between OHCA-CA and influenza epidemics in adults has not been well investigated.We analyzed data from the All-Japan Utstein Registry, a prospective, nationwide, population-based, observational study, regarding OHCA-CA cases and the Infectious Diseases Weekly Report for influenza cases: 17,710 OHCA-CA cases and 764,808 influenza cases were recorded between 2005 and 2015 in Fukuoka, Japan. The weekly average number of OHCA-CA cases was positively associated with the number of patients with influenza infection ($r = 0.70$, $P < .0001$). To eliminate the effects of season and age, we investigated only adults in winter. The weekly number of OHCA-CA cases was positively associated with the number of patients with influenza infection in weeks when there was a high frequency of influenza infection in adults ($r = 0.36$, $P = .006$), but not in weeks with a medium ($r = 0.26$, $P = .05$) or low frequency of influenza infection ($r = 0.003$, $P = 1.0$). In weeks during which there was a high frequency of influenza infection, the weekly number of OHCA-CA cases was positively associated with the number of influenza infections in males ($r = 0.37$, $P = .006$), but not females ($r = 0.18$, $P = .2$).The number of OHCA-CA cases was positively associated with the number of influenza infections in adult males during weeks in which there was a high frequency of influenza infections. To help prevent OHCA-CA in males, it might be beneficial to announce influenza epidemics specifically in adults, in addition to all ages.

2. Front Cardiovasc Med. 2022 May 31;9:899583. doi: 10.3389/fcvm.2022.899583. eCollection 2022.
Additive Impact of Interleukin 6 and Neuron Specific Enolase for Prognosis in Patients With Out-of-Hospital Cardiac Arrest - Experience From the HAnnover COoling REgistry.
Akin M(1), Sieweke JT(1), Garcheva V(1), Martinez CS(1), Adel J(1), Plank P(1), Zandian P(1), Sühs KW(2), Bauersachs J(1), Schäfer A(1).
ABSTRACT
BACKGROUND: Patients after out-of-hospital cardiac arrest (OHCA) are at increased risk for mortality and poor neurological outcome. We assessed the additive impact of interleukin 6 (IL-6) at admission to neuron-specific enolase (NSE) at day 3 for prognosis of 30-day mortality and long-term neurological outcome in OHCA patients. METHODS: A total of 217 patients from the HAnnover COoling REgistry with return of spontaneous circulation (ROSC) after OHCA and IL-6 measurement immediately after admission during 2017-2020 were included to investigate the prognostic value and importance of IL-6 in addition to NSE obtained on day 3. Poor neurological outcome was defined by cerebral performance category (CPC) ≥ 3 after 6 months. RESULTS: Patients with poor outcome showed higher IL-6 values (30-day mortality: 2,224 ± 524 ng/l vs 186 ± 15 ng/l, $p < 0.001$; CPC ≥ 3 at 6 months: 1,440 ± 331 ng/l vs 180 ± 24 ng/l, $p < 0.001$). IL-6 was an independent predictor of mortality (HR = 1.013/ng/l; 95% CI 1.007-1.019; $p < 0.001$) and poor neurological outcome (HR = 1.004/ng/l; 95% CI 1.001-1.007; $p = 0.036$). In ROC-analysis, AUC for IL-6 was 0.98 (95% CI 0.96-0.99) for mortality, but only 0.76 (95% CI 0.68-0.84) for poor neurological outcome. The determined cut-off value for IL-6 was 431 ng/l for mortality (NPV 89.2%). In patients with IL-6 > 431 ng/l, the combination with NSE < 46 µg/l optimally identified those individuals with potential for good neurological outcome (CPC ≤ 2). CONCLUSION: Elevated IL-6 levels at admission after ROSC were closely associated with 30-day mortality. The combination of IL-6 and NSE provided clinically important additive information for predict poor neurological outcome at 6 months.

3. Anatol J Cardiol. 2022 Jun;26(6):450-459. doi: 10.5152/AnatolJCardiol.2022.604.
Does Coronary Vasospasm Show a Better Prognosis in Out of Hospital Cardiac Arrest: Data from the Korean Cardiac Arrest Research Consortium (KoCARC) Registry.
Park HE(1), Na SH(1), Shin SD(2), Wi J(3), Kim SH(4), Choi J(5), Choi JI(6), Cho Y(7), Cha MJ(8), Kim KH(9).

ABSTRACT
BACKGROUND: Previous cohort studies focused on relative risk stratification among patients diagnosed with vasospastic angina, and it is unknown how much vasospasm accounts for the cause of out-of-hospital cardiac arrest, and whether prognosis differs. METHODS: From a registry data collected from 65 hospitals in Korea, 863 subjects who survived hospital cardiac arrest were evaluated. The patients with insignificant coro- nary lesion, vasospasm, and obstructive lesion were each grouped as group I, group II, and group III, respectively. The primary and secondary outcomes were survival to hospital discharge and good neurological function at discharge defined as cerebral performance index 1. RESULTS: At hospital discharge, 529 subjects (61.3%) survived. There was no significant dif- ference in survival according to coronary angiographic findings (P = .133 and P = .357, group II and group III compared to group I), but the neurological outcome was significantly bet- ter in groups II and III (P = .046 and P = .022, groups II and III compared to group I). Two mul- tivariate models were evaluated to adjust traditional risk factors and cardiac biomarkers. The presence of coronary artery vasospasm did not affect survival to hospital discharge (P = 0.060 and P = .162 for both models), but neurological function was significantly better (OR: 1.965, 95% CI: 1.048-3.684, P = .035, and OR: 1.706, 95% CI: 1.012-2.878, P = .045 for vasospasm, models I and II, respectively). CONCLUSIONS: Coronary vasospasm does not show better survival to hospital discharge, but shows better neurological outcomes. Aggressive coronary angiography and intensive medical treatment for adequate control of vasospasm should be emphasized to prevent and manage fatal events.

4. J Am Heart Assoc. 2022 Jun 14:e025048. doi: 10.1161/JAHA.121.025048. Online ahead of print.
Prediction of Prehospital Change of the Cardiac Rhythm From Nonshockable to Shockable in Out-of-Hospital Patients With Cardiac Arrest: A Post Hoc Analysis of a Nationwide, Multicenter, Prospective Registry.
Emoto R(1), Nishikimi M(2)(3)(4), Shoaib M(4)(5), Hayashida K(4), Nishida K(1), Kikutani K(2), Ohshimo S(2), Matsui S(1), Shime N(2), Iwami T(6).
ABSTRACT
Background Predicting a spontaneous rhythm change from nonshockable to shockable before hospital arrival in patients with out-of-hospital cardiac arrest can help emergency medical services develop better strategies for prehospital treatment. The aim of this study was to identify predictors of spontaneous rhythm change before hospital arrival in patients with out-of-hospital cardiac arrest and develop a predictive scoring system. Methods and Results We retrospectively reviewed data of eligible patients with out-of-hospital cardiac arrest with an initial nonshockable rhythm registered in a nationwide registry between June 2014 and December 2017. We performed a multivariable analysis using a Cox proportional hazards model to identify predictors of a spontaneous rhythm change, and a ridge regression model for predicting it. The data of 25 804 patients were analyzed (derivation cohort, n=17 743; validation cohort, n=8061). The rhythm change event rate was 4.1% (724/17 743) in the derivation cohort, and 4.0% (326/8061) in the validation cohorts. Age, sex, presence of a witness, initial rhythm, chest compression by a bystander, shock with an automated external defibrillator by a bystander, and cause of the cardiac arrest were all found to be independently associated with spontaneous rhythm change before hospital arrival. Based on this finding, we developed and validated the Rhythm Change Before Hospital Arrival for Nonshockable score. The Harrell's concordance index values of the score were 0.71 and 0.67 in the internal and external validations, respectively. Conclusions Seven factors were identified as predictors of a spontaneous rhythm change from nonshockable to shockable before hospital arrival. We developed and validated a score to predict rhythm change before hospital arrival.

5. Circ Cardiovasc Qual Outcomes. 2022 Jun 14:101161CIRCOUTCOMES121008755. doi: 10.1161/CIRCOUTCOMES.121.008755. Online ahead of print.
Variation in Out-of-Hospital Cardiac Arrest Survival Across Emergency Medical Service Agencies.
Garcia RA(1), Girotra S(2), Jones PG(1), McNally B(3), Spertus JA(1), Chan PS(1); CARES Surveillance Group.
ABSTRACT
BACKGROUND: Although studies have reported variation in out-of-hospital cardiac arrest (OHCA) survival by geographic location, little is known about variation in OHCA survival at the level of emergency medical service (EMS) agencies-which may have modifiable practices, unlike counties and regions. We quantified the variation in OHCA survival across EMS agencies and explored whether variation in 2 specific EMS resuscitation practices were associated with survival to hospital admission. METHODS: Within the Cardiac Arrest Registry to Enhance Survival, a prospective registry representing ≈51% of the US population, we identified 258 342 OHCAs from 764 EMS agencies with >10 OHCA cases annually during 2015 to 2019. Using hierarchical logistic regression, risk-standardized rates of survival to hospital admission were computed for each EMS agency. We quantified inter-agency variation in survival with median odds ratios and assessed the association of 2 resuscitation practices (EMS response time and the proportion of OHCAs with termination of resuscitation without meeting futility criteria) with EMS agency survival rates to hospital admission. RESULTS: Across 764 EMS agencies comprising 258 342 OHCAs, the median risk-standardized rate of survival to hospital admission was 27.3% (interquartile range, 24.5%-30.1%; range: 16.0%-45.6%). The adjusted median odds ratio was 1.35 (95% CI, 1.32-1.39), denoting that the odds of survival of 2 patients with identical covariates varied by 35% at 2 randomly selected EMS agencies. EMS agencies in the lowest quartile of risk-standardized survival had longer EMS response times when compared with the highest quartile (12.0±3.4 versus 9.0±2.6 minutes; P<0.001), and a higher proportion of OHCAs with termination of resuscitation without meeting futility criteria (27.9±16.1% versus 18.9±11.4%; P<0.001). CONCLUSIONS: Survival after OHCA varies widely across EMS agencies. EMS response times and termination of resuscitation practices were associated with agency-level rates of survival to hospital admission, suggesting potentially modifiable practices which can improve OHCA survival.

IN-HOSPITAL CARDIAC ARREST

1. Int J Cardiol. 2022 Jun 15:S0167-5273(22)00934-2. doi: 10.1016/j.ijcard.2022.06.034. Online ahead of print.
Refractory in-hospital cardiac arrest - no time to waste.
Møller JE(1), Sørensen PHM(2), Kjaergaard J(3).
NO ABSTRACT AVAILABLE

INJURIES AND CPR

No articles identified.

CAUSE OF THE ARREST

1. Am J Emerg Med. 2022 Jun 11;58:229-234. doi: 10.1016/j.ajem.2022.06.013. Online ahead of print.
Risk factors associated with peri-intubation cardiac arrest in the emergency department.

Yang TH(1), Chen KF(2), Gao SY(3), Lin CC(4).

ABSTRACT

BACKGROUND: Peri-intubation cardiac arrest is an uncommon, serious complication following endotracheal intubation in the emergency department. Although several risk factors have been previously identified, this study aimed to comprehensively identify risk factors associated with peri-intubation cardiac arrest. METHODS: This retrospective, nested case-control study conducted from January 1, 2016 to December 31, 2020 analyzed variables including demographic characteristics, triage, and pre-intubation vital signs, medications, and laboratory data. Univariate analysis and multivariable logistic regression models were used to compare clinical factors between the patients with peri-intubation cardiac arrest and patients without cardiac arrest. RESULTS: Of the 6983 patients intubated during the study period, 5130 patients met the inclusion criteria; 92 (1.8%) patients met the criteria for peri-intubation cardiac arrest and 276 were age- and sex-matched to the control group. Before intubation, systolic blood pressure and diastolic blood pressure were lower (104 vs. 136.5 mmHg, $p < 0.01$; 59.5 vs. 78 mmHg, $p < 0.01$ respectively) and the shock index was higher in the patients with peri-intubation cardiac arrest than the control group (0.97 vs. 0.83, $p < 0.0001$). Cardiogenic pulmonary edema as an indication for intubation (adjusted odds ratio [aOR]: 5.921, 95% confidence interval [CI]: 1.044-33.57, $p = 0.04$), systolic blood pressure < 90 mmHg before intubation (aOR: 5.217, 95% CI: 1.484-18.34, $p = 0.01$), and elevated lactate levels (aOR: 1.012, 95% CI: 1.002-1.022, $p = 0.01$) were independent risk factors of peri-intubation cardiac arrest. CONCLUSIONS: Patients with hypotension before intubation have a higher risk of peri-intubation cardiac arrest in the emergency department. Future studies are needed to evaluate the influence of resuscitation before intubation and establish airway management strategies to avoid serious complications.

2. J Vasc Surg Venous Lymphat Disord. 2022 Jun 14:S2213-333X(22)00255-4. doi: 10.1016/j.jvsv.2022.04.014. Online ahead of print.

Contemporary Practice Patterns and Outcomes of Systemic Thrombolysis in Acute Pulmonary Embolism.

Gayen S(1), Katz A(2), Dikengil F(3), Kwok B(4), Zheng M(3), Goldenberg R(4), Jamin C(5), Yuriditsky E(4), Bashir R(6), Lakhter V(6), Panaro J(7), Cohen G(7), Mohrien K(8), Rali P(3), Brosnahan SB(4).

ABSTRACT

OBJECTIVE: While systemic thrombolysis (ST) is standard of care in treatment of high-risk pulmonary embolism, large variation in real world usage exists, including use in intermediate-risk pulmonary embolism. There is a paucity of data defining the outcomes, practice patterns of ST dose, duration, and treatment in presumed or imaging confirmed pulmonary embolism. METHODS: We performed a multicenter retrospective study evaluating real world practice patterns of systemic thrombolysis use in the setting of acute pulmonary embolism (presumed versus imaging confirmed intermediate- and high-risk). Patients who received tissue plasminogen activator for pulmonary embolism between 2017 and 2019 were included. We compared baseline clinical characteristics, tissue plasminogen activator practice patterns, and outcomes in those with confirmed versus presumed pulmonary embolism. RESULTS: 104 patients received systemic thrombolysis for pulmonary embolism; 52 patients had confirmed pulmonary embolism and 52 patients had presumed pulmonary embolism. Significantly more patients treated for presumed pulmonary embolism experienced cardiac arrest (n=47, 90%) than those with confirmed pulmonary embolism (n=23, 44%, $p<0.01$). Survival to hospital discharge was 65% in patients with confirmed pulmonary embolism versus 6% for those with presumed pulmonary embolism ($p<0.01$). Systemic thrombolysis was contraindicated in 56% of patients with confirmed pulmonary embolism, with major bleeding in 26% but no intracranial hemorrhage. CONCLUSIONS: The in-hospital mortality of confirmed acute pulmonary embolism

remains high (35%) in contemporary practice in those treated with systemic thrombolysis. A large proportion of these patients had contraindications to systemic thrombolysis and major bleeding rates were significant. Confirmed pulmonary embolism had higher survival rate compared to presumed, including those with cardiac arrest. This observation suggests a limited role of empiric thrombolysis in cardiac arrest situations.

3. Eur Heart J Acute Cardiovasc Care. 2022 Jun 17:zuac065. doi: 10.1093/ehjacc/zuac065. Online ahead of print.

Characteristics and factors associated to patients discharging from hospital without an implantable cardioverter defibrillator after out-of-hospital cardiac arrest.

Sharifzadehgan A(1)(2)(3), Gaye B(2)(3), Rischard J(1)(2), Bougouin W(2)(3)(4), Karam N(1)(2)(3), Waldmann V(1)(2)(3), Narayanan K(2)(5), Dumas F(2)(3)(6), Gandjbakhch E(7)(8), Algalarrondo V(8)(9), Beganton F(2), Extramiana F(8)(9), Lellouche N(8)(10), Lamhaut L(2)(3)(11), Jost D(2)(11), Cariou A(2)(3)(12), Jouven X(1)(2)(3), Marijon E(1)(2)(3)(8).

ABSTRACT

AIMS: Guidelines recommend that in the absence of reversible cause for sudden cardiac arrest (SCA), implantable cardioverter defibrillator (ICD) should be performed to prevent further fatal event. We sought to describe the frequency and characteristics of patients discharged from the hospital without ICD after the SCA in the daily practice. METHODS AND RESULTS: From 2011 to 2018, all SCAs related to a cardiac cause admitted alive across the 48 hospitals of Great Paris Area were prospectively enrolled. Two investigators thoroughly reviewed each medical report to ensure accuracy of the assigned diagnosis towards identifying the cause of SCA and ICD implantation. Out of the 4314 SCA admitted alive at hospital admission, 1064 cardiac-related SCA survivors were discharged alive from hospital, including 356 patients (33.5%) with an ICD and 708 (66.5%) without. The principal underlying cause of SCA among those discharged without an ICD was acute coronary syndrome (ACS; 602, 85%), chronic coronary artery disease (41, 5.8%), structural non-ischaemic heart disease (48, 6.8%), and non-structural heart disease (17, 2.4%). Among ACS-related SCA, 93.8% (602/642) discharged without an ICD. The unique factor associated with non-ICD implantation in the setting of ACS was immediate coronary angioplasty (odds ratio 4.22, 95% confidence interval 1.86-9.30, $P < 0.001$). CONCLUSION: Two-thirds of SCA survivors were discharged without an ICD, mainly in the setting of ACS. The unique factor associated with non-ICD implantation among ACS was immediate coronary angioplasty emphasizing the fact that ACS definition must be precise since associated with ICD implantation or not.

4. Front Public Health. 2022 May 27;10:866376. doi: 10.3389/fpubh.2022.866376. eCollection 2022.

Clinical Analysis of Acute Organophosphorus Pesticide Poisoning and Successful Cardiopulmonary Resuscitation: A Case Series.

Yu G(1), Li Y(1), Jian T(1)(2), Shi L(1)(3), Cui S(1)(3), Zhao L(1)(3), Jian X(1)(3), Kan B(1)(4).

ABSTRACT

Acute organophosphorus pesticide poisoning (AOPP) with cardiac arrest has an extremely high mortality rate, and corresponding therapeutic strategies have rarely been reported. Therefore, this study aimed to explore the prognostic factors and effective treatments of AOPP-related cardiac arrest. This retrospective study was conducted in our department in the years 2018-2021. We conducted a descriptive analysis of the clinical manifestations, rescue strategies, and prognosis of patients with AOPP who had experienced cardiac arrest and successful cardiopulmonary resuscitation. This study included six cases of patients with AOPP in addition to cardiac arrest; in four cases, cardiac arrest occurred <12 h after ingestion, and in two, cardiac arrest occurred more than 48 h after ingestion. Five patients had not undergone hemoperfusion therapy before cardiac arrest,

and all six were treated with atropine during cardiopulmonary resuscitation and subsequent pralidoxine. Four patients recovered and were discharged from the hospital, one died in our department, and one was transferred to a local hospital and died there 2 h later. The last two patients had severe pancreatic injuries and disseminated intravascular coagulation. This, along with their death, might have been related to their prognosis. Cardiac arrest can occur in patients with severe AOPP for whom antidote administration was insufficient or not timely. Application of atropine and pralidoxine in a timely manner after cardiac arrest following AOPP is the key to successful treatment. This study provides useful guidelines for the treatment of similar cases in the future.

5. Med Princ Pract. 2022 Jun 16. doi: 10.1159/000525553. Online ahead of print.
Timing and identification of the cause and treatment of a cardiac arrest: a potential survival benefit?
Dewolf P, Wauters L, Clarebout G, Elen J.
ABSTRACT
OBJECTIVE: To evaluate how Mobile Medical Teams (MMTs) search for the aetiology of a cardiac arrest (CA) and to investigate the association between the discovery of aetiology and patient outcome. SUBJECT AND METHODS: Resuscitations of all adult patients that experienced an in- or out-of-hospital CA between 2016 and 2018 were video recorded. All video recordings were reviewed. The time to start of 'cause analysis' and time to treatment by the MMT were analysed. Also investigations performed during aetiologic evaluation were examined: heteroanamnesis, medical history questioning, clinical examinations, technical investigations and the use of the 4Hs and 4Ts method. RESULTS: In total 139 CA events were included. Aetiologic evaluation was performed by MMTs in only 75% of the resuscitations. In 20% of the evaluations, they did not use the recommended 4Hs and 4Ts method. Medical history questioning and heteroanamnesis were performed in the large majority, but often without clear cause. When aetiology was searched, a presumable aetiology was found in 46.8% of out-of-hospital CAs and 65.2% of in-hospital CAs. A significant association was found between return of spontaneous circulation and the discovery of presumable aetiology for out-of-hospital CAs ($p < 0.001$). The median time to treatment was 492s (recommended: 130s - 250s) for non-shockable rhythms and 422s (recommended: 270 - 390s) for shockable rhythms, up to twice the time advised according to the guidelines. CONCLUSION: The current approach for aetiologic evaluation is not ideal. Further research is needed to examine a more structured and simplified approach.

6. Aust J Rural Health. 2022 Jun 15. doi: 10.1111/ajr.12890. Online ahead of print.
Higher rates but similar causes of young out-of-hospital cardiac arrest in rural Australian patients.
Paratz ED(1)(2)(3), van Heusden A(1), Smith K(4)(5)(6), Ball J(1)(4), Zentner D(7)(8), Morgan N(9), Thompson T(7), James P(7), Connell V(10), Pflaumer A(10)(11)(12), Semsarian C(13), Ingles J(14), Parsons S(9)(15), Stub D(2)(4)(6), La Gerche A(1)(2)(3).
ABSTRACT
OBJECTIVE: To determine whether young rural Australians have higher rates or different underlying causes of out-of-hospital cardiac arrest (OHCA). DESIGN: A case-control design identified patients experiencing an OHCA, then compared annual OHCA rates and underlying causes in rural versus metropolitan Victoria. OHCA causes were defined as either cardiac or non-cardiac, with specific aetiologies including coronary disease, cardiomyopathy, unascertained cause of arrest, drug toxicity, respiratory event, neurological event and other cardiac and non-cardiac. For OHCAs with confirmed cardiac aetiology, cardiovascular risk profiles were compared. SETTING: A state-wide prospective OHCA registry (combining ambulance, hospital and forensic data) in the state of Victoria, Australia

(population 6.5 million). PARTICIPANTS: Victorians aged 1-50 years old experienced an OHCA between April 2019 and April 2020. MAIN OUTCOME MEASURES: Rates and underlying causes of OHCA in young rural and metropolitan Victorians. RESULTS: Rates of young OHCA were higher in rural areas (OHCA 22.5 per 100 000 rural residents vs. 13.4 per 100 000 metropolitan residents, standardised incidence ratio 168 (95% CI 101-235); confirmed cardiac cause of arrest 12.1 per 100 000 rural residents versus 7.5 per 100 000 metropolitan residents, standardised incidence ratio 161 (95% CI 71-251). The underlying causation of the OHCA and cardiovascular risk factor burden did not differ between rural and metropolitan areas. CONCLUSION: Higher rates of OHCA occur in young rural patients, with standardised incidence ratio of 168 compared to young metropolitan residents. Rural status did not influence causes of cardiac arrest or known cardiovascular risk factor burden in young patients experiencing OHCA.

7. Thorax. 2022 Jul;77(7):641-642. doi: 10.1136/thoraxjnl-2021-218296. Epub 2022 Jan 7.
Does impaired respiratory function lead to sudden cardiac death?
D'Cruz RF(1)(2)(3), Kaltsakas G(4)(2)(3).
NO ABSTRACT AVAILABLE

8. Thorax. 2022 Jul;77(7):641-642. doi: 10.1136/thoraxjnl-2021-218296. Epub 2022 Jan 7.
Does impaired respiratory function lead to sudden cardiac death?
D'Cruz RF(1)(2)(3), Kaltsakas G(4)(2)(3).
ABSTRACT
BACKGROUND: Growing evidence suggests that compromised lung health may be linked to cardiovascular disease. However, little is known about its association with sudden cardiac death (SCD). OBJECTIVES: We aimed to assess the link between impaired lung function, airflow obstruction and risk of SCD by race and gender in four US communities. METHODS: A total of 14 708 Atherosclerosis Risk in Communities (ARIC) study participants who underwent spirometry and were asked about lung health (1987-1989) were followed. The main outcome was physician-adjudicated SCD. Fine-Gray proportional subdistribution hazard models with Firth's penalised partial likelihood correction were used to estimate the HRs. RESULTS: Over a median follow-up of 25.4 years, 706 (4.8%) subjects experienced SCD. The incidence of SCD was inversely associated with FEV1 in each of the four race and gender groups and across all smoking status categories. After adjusting for multiple measured confounders, HRs of SCD comparing the lowest with the highest quintile of FEV1 were 2.62 (95% CI 1.62 to 4.26) for white males, 1.80 (95% CI 1.03 to 3.15) for white females, 2.07 (95% CI 1.05 to 4.11) for black males and 2.62 (95% CI 1.21 to 5.65) for black females. The above associations were consistently observed among the never smokers. Moderate to very severe airflow obstruction was associated with increased risk of SCD. Addition of FEV1 significantly improved the predictive power for SCD. CONCLUSIONS: Impaired lung function and airflow obstruction were associated with increased risk of SCD in general population. Additional research to elucidate the underlying mechanisms is warranted.

END-TIDAL CO_2

No articles identified.

ORGAN DONATION

No articles identified.

FEEDBACK

No articles identified.

DRUGS

1. Eur Heart J Acute Cardiovasc Care. 2022 Jun 14;11(5):389-396. doi: 10.1093/ehjacc/zuac026.
Delayed administration of epinephrine is associated with worse neurological outcomes in patients with out-of-hospital cardiac arrest and initial pulseless electrical activity: insight from the nationwide multicentre observational JAAM-OHCA (Japan Association for Acute Medicine) registry.
Enzan N(1), Hiasa KI(1), Ichimura K(2), Nishihara M(3), Iyonaga T(3), Shono Y(3), Tohyama T(4), Funakoshi K(4), Kitazono T(3), Tsutsui H(1).

ABSTRACT
AIMS: The delayed administration of epinephrine has been proven to worsen the neurological outcomes of patients with out-of-hospital cardiac arrest (OHCA) and shockable rhythm or asystole. We aimed to investigate whether the delayed administration of epinephrine might also worsen the neurological outcomes of patients with witnessed OHCA and initial pulseless electrical activity (PEA).
METHODS AND RESULTS: The JAAM-OHCA Registry is a multicentre registry including OHCA patients between 2014 and 2017. Patients with emergency medical services (EMS)-treated OHCA and initial PEA rhythm were included. The primary exposure was the time from the EMS call to the administration of epinephrine. The secondary exposure was the time to epinephrine dichotomized as early (≤15 min) or delayed (>15 min). The primary outcome was the achievement of a favourable neurological outcome, defined as Cerebral Performance Categories Scale 1-2 at 30 days after OHCA. Out of 34 754 patients with OHCA, 3050 patients were included in the present study. After adjusting for potential confounders, the delayed administration of the epinephrine was associated with a lower likelihood of achieving a favourable neurological outcome [adjusted odds ratio (OR) 0.96; 95% confidence interval (CI) 0.93-0.99; P = 0.016]. The percentage of patients who achieved a favourable neurological outcome in the delayed epinephrine group was lower than that in the early epinephrine group (1.3% vs. 4.7%; adjusted OR 0.33; 95% CI 0.15-0.72; P = 0.005). A restricted cubic spline analysis demonstrated that delayed epinephrine administration could decrease the likelihood of achieving a favourable neurological outcome; this was significant within the first 10 min.
CONCLUSIONS: The delayed administration of epinephrine was associated with worse neurological outcomes in patients with witnessed OHCA patients with initial PEA.

TRAUMA

1. CJEM. 2022 Jun;24(4):457-458. doi: 10.1007/s43678-022-00283-3. Epub 2022 Feb 21.
Traumatic cardiac arrest: unique considerations for the pediatric patient.
El Tawil C(1), LeBlanc PA(2), Beno S(2), Nemeth J(3).
NO ABSTRACT AVAILABLE

VENTILATION

No articles identified.

CERERBRAL MONITORING

1. Am J Emerg Med. 2022 Jun 15:S0735-6757(22)00354-0. doi: 10.1016/j.ajem.2022.05.046. Online ahead of print.
Corrigendum to "Association of the duration of on-scene advanced life support with good neurological recovery in out-of-hospital cardiac arrest" [American Journal of Emergency Medicine 50 (2021) 486-491].
Jang DH(1), Jo YH(2), Park SM(2), Lee KJ(3), Kim YJ(4), Lee DK(5).
NO ABSTRACT AVAILABLE

2. Eur Heart J Acute Cardiovasc Care. 2022 Jun 13:zuac066. doi: 10.1093/ehjacc/zuac066. Online ahead of print.
MicroRNA-9-3p: a novel predictor of neurological outcome after cardiac arrest.
Beske RP(1), Bache S(2)(3), Abild Stengaard Meyer M(1), Kjærgaard J(1), Bro-Jeppesen J(4), Obling L(1), Olsen MH(2), Rossing M(3)(5), Nielsen FC(3), Møller K(2)(5), Nielsen N(6), Hassager C(1).
ABSTRACT
AIMS: Resuscitated out-of-hospital cardiac arrest (OHCA) patients who remain comatose after hospital arrival are at high risk of mortality due to anoxic brain injury. MicroRNA are small-non-coding RNA molecules ultimately involved in gene-silencing. They show promise as biomarkers, as they are stable in body fluids. The microRNA 9-3p (miR-9-3p) is associated with neurological injury in trauma and subarachnoid haemorrhage. METHODS AND RESULTS: This post hoc analysis considered all 171 comatose OHCA patients from a single centre in the target temperature management (TTM) trial. Patients were randomized to TTM at either 33°C or 36°C for 24 h. MicroRNA-9-3p (miR-9-3p) was measured in plasma sampled at admission and at 28, 48, and 72 h. There were no significant differences in age, gender, and pre-hospital data, including lactate level at admission, between miR-9-3p level quartiles. miR-9-3p levels changed markedly following OHCA with a peak at 48 h. Median miR-9-3p levels between TTM 33°C vs. 36°C were not different at any of the four time points. Elevated miR-9-3p levels at 48 h were strongly associated with an unfavourable neurological outcome [OR: 2.21, 95% confidence interval (CI): 1.64-3.15, $P < 0.0001$). MiR-9-3p was inferior to neuron-specific enolase in predicting functional neurological outcome [area under the curve: 0.79 (95% CI: 0.71-0.87) vs. 0.91 (95% CI: 0.85-0.97)]. CONCLUSION: MiR-9-3p is strongly associated with neurological outcome following OHCA, and the levels of miR-9-3p are peaking 48 hours following cardiac arrest.

ULTRASOUND AND CPR

No articles identified.

ORGANISATION AND TRAINING

1. EClinicalMedicine. 2022 May 12;48:101446. doi: 10.1016/j.eclinm.2022.101446. eCollection 2022 Jun.
Individualised prognosis in out-of-hospital cardiac arrest: The case for P-ROSC in Asian people.
Testa A(1), Versaci F(2), Biondi-Zoccai G(3)(4).
NO ABSTRACT AVAILABLE

2. Eur J Emerg Med. 2022 Jun 9. doi: 10.1097/MEJ.0000000000000950. Online ahead of print.

Public interest in cardiac arrest and cardiopulmonary resuscitation: a Google Trends analysis of the global online search traffic.
Birkun A(1), Baldi E(2), Böttiger BW(3)(4).
NO ABSTRACT AVAILABLE

3. Am J Emerg Med. 2022 May 31;58:175-185. doi: 10.1016/j.ajem.2022.05.039. Online ahead of print.
Prognostic value of the shock index and modified shock index in survivors of out-of-hospital cardiac arrest: A retrospective cohort study.
van Bergen KMG(1), van Kooten L(1), Eurlings CGMJ(2), Foudraine NA(3), Lameijer H(4), Meeder JG(5), Rahel BM(5), Versteegen MGJ(1), van Osch FHM(6), Barten DG(1).
ABSTRACT
BACKGROUND: There is a lack of rapid, non-invasive tools that aid early prognostication in patients with return of spontaneous circulation (ROSC) after Out-of-Hospital Cardiac Arrest (OHCA). The shock index (SI) and modified shock index (MSI) have shown to be useful in several medical conditions, including myocardial infarction. In this study, we assessed the prognostic value of SI and MSI at Emergency Department (ED) triage on survival to discharge of OHCA patients. METHODS: A single-center retrospective observational cohort study. All OHCA patients with a period of ROSC between 2014 and 2019 were included. Data collection was based on the Utstein criteria. The SI and MSI at ED triage were calculated by dividing heart rate by systolic blood pressure or mean arterial pressure. Survival rates were compared between patients with a high and low SI and MSI. Subsequent Cox regression analysis was performed. MAIN RESULTS: A total of 403 patients were included, of which 46% survived until hospital discharge. An elevated SI and MSI was defined by SI ≥ 1.00 and MSI ≥ 1.30. Survival to discharge, 30-day- and one-year survival were significantly lower in patients with an elevated SI and MSI ($p < 0.001$). An elevated SI and MSI was also associated with a higher rate of recurrent loss of circulation in the ED ($p < 0.001$). The 30-day survival hazard ratio was 2.24 (1.56-3.22) for SI and 2.46 (1.71-3.53) for MSI; the one-year survival hazard ratio was 2.20 (1.54-3.15) for SI and 2.38 (1.66-3.40) for MSI. CONCLUSION: Survival to discharge and 30-day survival are lower in OHCA patients with an elevated SI and MSI at ED triage. Further studies are warranted to elucidate the causational mechanisms underlying the association between elevated SI or MSI and worse outcomes.

4. Acta Anaesthesiol Scand. 2022 Jun 14. doi: 10.1111/aas.14104. Online ahead of print.
"Do not resuscitate" order and end-of-life treatment in a cohort of deceased in a Norwegian University Hospital.
van der Werff HFL(1), Michelet TH(1), Fredheim OM(1)(2)(3), Steine S(1).
ABSTRACT
BACKGROUND: A "Do not resuscitate" (DNR) order implies that cardiopulmonary resuscitation will not be started. Absent or delayed DNR orders in advanced chronic disease may indicate suboptimal communication about disease stage, prognosis, and treatment goals. The study objective was to determine clinical practice and patient involvement regarding DNR and the prevalence of life-prolonging treatment in the last week of life. METHODS: A cross-sectional observational study was made of a cohort of 315 deceased from a large general hospital in Norway. Data on DNR and other treatment limitations, life-prolonging treatment in the last week of life, and cause of death were obtained from medical records. RESULTS: A DNR order was documented for 287 (91%) patients. Almost half the DNR orders, 142 (49%), were made during the last seven days of life. The main causes of death were cancer (31%), infectious diseases (31%) and cardiovascular diseases (19%). The most frequent life-prolonging treatments during the last week of life were intravenous fluids in 221

patients (70%) and antibiotics in 198 (63%). During the last week of life 103 (36%) patients received ICU treatment. Death by cancer (odds ratio 2.5, 95% confidence interval 1.24-5.65) and DNR decision made by a palliative care physician (odds ratio 3.4, 95% CI 1.21-3.88) were predictors of not receiving life-prolonging treatment. CONCLUSION: The findings of a high prevalence of life-prolonging treatment in the last week of life and DNR orders being made close to the time of death indicate that decisions about limiting life-prolonging treatment are often postponed until the patient's death is imminent.

5. Rev Esp Cardiol (Engl Ed). 2022 Jun 11:S1885-5857(22)00124-4. doi: 10.1016/j.rec.2022.05.015. Online ahead of print.
Survival after out-of-hospital cardiopulmonary resuscitation before ambulance arrival in the Basque Country. [Article in English, Spanish]
Ballesteros-Peña S(1), Jiménez-Mercado ME(2), Fernández-Aedo I(3).
NO ABSTRACT AVAILABLE

6. Resuscitation. 2022 Jun 11:S0300-9572(22)00569-X. doi: 10.1016/j.resuscitation.2022.06.006. Online ahead of print.
Neonatal simulation training decreases the incidence of chest compressions in term newborns.
Eva SM(1), Reinhold S(2), Theresa K(3), Nicola S(4), Martin H(4), Lukas H(5), Jens SC(6).
ABSTRACT
AIM OF THE STUDY: To determine the effectiveness of a multidimensional neonatal simulation-based medical education training programme on direct and indirect patient outcome parameters. METHODS: This was a retrospective analytical study with a historical control group in a level II neonatal care unit (1,700 births per year). A multidimensional interdisciplinary training programme on neonatal resuscitation was implemented in 2015; pre-training (2012-2014) and post-training (2015-2019) eras were compared in terms of mortality (direct outcome) and the received intervention level immediately after birth (indirect outcome). Intervention levels were defined as follows: A) short-term non-invasive ventilation, B) prolonged non-invasive ventilation (>5 inflation breaths), C) chest compressions. RESULTS: Of 13,950 neonates born during the study period, 826 full-term newborns received one of the three intervention levels for adaptation after birth. A total of 284 (34.4%) patients received short-term non-invasive ventilation (A), 477 (57.8%) had prolonged ventilation (B), and 65 (7.9%) chest compressions (C), respectively. Comparing the pre- and post-training eras, there was no significant reduction in mortality, and no significant changes were found in groups A or B. However, the risk for chest compressions (group C) decreased significantly from 0.91% in the pre-training era to 0.20% in the post-training era ($p < 0.001$). CONCLUSION: Although there was no significant effect on neonatal mortality, regular interdisciplinary simulation training decreased the number of administered chest compressions immediately after birth. Further studies are needed to test indirect outcome-related parameters, such as frequency of chest compressions as a measure of effectiveness and impact of medical training.

POST-CARDIAC ARREST TREATMENTS

1. Resuscitation. 2022 Jun 9;176:88-89. doi: 10.1016/j.resuscitation.2022.05.018. Online ahead of print.
Early brain imaging after cardiac arrest: Beware the red flags.
Benghanem S(1), Cariou A(2).
NO ABSTRACT AVAILABLE

TARGETED TEMPERATURE MANAGEMENT

1. Intern Emerg Med. 2022 Jun 16. doi: 10.1007/s11739-022-03011-y. Online ahead of print.
Immediate coronary angiography and systematic targeted temperature management are associated with improved outcome in comatose survivors of cardiac arrest.
Dall'Ara G(1), Compagnone M(2), Spartà D(2), Carletti R(2), Grotti S(2), Guerrieri G(3), Gaetani S(4), Cortigiani M(5), Maitan S(4), Fabbri A(5), Ottani F(6)(7), Caravita L(2), Tarantino F(2), Galvani M(2)(7).

ABSTRACT
Rapid and systematic access to coronary angiography (CAG) and target temperature management (TTM) might improve outcome in comatose patients who survive cardiac arrest (CA). However, there is controversy around indicating immediate CAG in the absence of transmural ischemia on the electrocardiogram after return of spontaneous circulation (ROSC). We evaluated the short- and long-term outcome of patients undergoing systematic CAG and TTM, based on whether culprit lesion percutaneous coronary intervention (PCI) was performed. All consecutive comatose CA survivors without obvious extra-cardiac causes undergoing TTM were included. Analysis involved the entire population and subgroups, namely patients with initial unshockable rhythm, no ST elevation on electrocardiogram, and good neurological recovery. We enrolled 107 patients with a median age of 64.9 (57.7-73.6) years. The initial rhythm was shockable in 83 (77.6%). Sixty-six (61.7%) patients underwent PCI. In-hospital survival was 71%. It was 78.8% and 58.5% in those undergoing or not PCI ($p = 0.022$), respectively. Age, time from CA to ROSC and culprit lesion PCI were independent predictors of in-hospital survival. Long-term survival was significantly higher in patients who underwent PCI (respectively 61.5% vs 34.1%; Log-rank: $p = 0.002$). Revascularization was associated with better outcomes regardless of initial rhythm (shockable vs non-shockable) and ST deviation (elevation vs no-elevation), and improved the long-term survival of patients discharged with good neurological recovery. Systematic CAG and revascularization, when indicated, were associated with higher survival in comatose patients undergoing TTM, regardless of initial rhythm and ST deviation in the post-ROSC electrocardiogram. The benefit was sustained at long-term particularly in those with neurological recovery.

2. Ther Hypothermia Temp Manag. 2022 Jun 16. doi: 10.1089/ther.2022.0008. Online ahead of print.
The Association Between Induction Rate and Neurologic Outcome in Patients Undergoing Targeted Temperature Management at 33°C.
Lee DH(1), Lee BK(1)(2), Cho YS(1), Jeung KW(1)(2), Jung YH(1)(2), Ryu SJ(1), Kim DK(1).

ABSTRACT
To determine the association between the induction rate and 6-month neurologic outcomes in out-of-hospital cardiac arrest (OHCA) survivors who underwent targeted temperature management (TTM). This retrospective observational study analyzed data prospectively collected from adult comatose OHCA survivors treated with TTM at the Chonnam National University Hospital in Gwangju, Korea, between October 2015 and December 2020. We measured the core body temperature (BT) through an esophageal probe and recorded it every 5 minutes throughout TTM. Induction time was defined as the elapsed time between the initiation of TTM and the achievement of target BT of 33°C. We calculated the induction rate as the change of BT divided by induction time. The primary outcome was a poor 6-month neurologic outcome, defined as cerebral performance category 3-5. Of the OHCA survivors, 218 patients were included, and 137 (62.8%) patients had a poor neurologic outcome. Patients with a poor neurologic outcome had lower BT at the initiation of TTM, shorter induction time, and higher induction rate than those with good neurologic outcomes. After adjusting for confounders, induction time (odds ratio [OR] 0.995; 95% confidence interval [CI],

0.992-0.999) and induction rate (OR 2.362; 95% CI, 1.178-4.734) were independently associated with poor neurologic outcome. BT at TTM initiation was not associated with a poor neurologic outcome. Induction rate was independently associated with a poor neurologic outcome in OHCA survivors who underwent TTM at 33°C.

ELECTROPHYSIOLOGY AND DEFIBRILLATION

No articles identified.

PEDIATRICS AND CHILDREN

1. Am Heart J. 2022 Jun 12:S0002-8703(22)00127-2. doi: 10.1016/j.ahj.2022.06.003. Online ahead of print.

Risk Factors and Outcomes of Sudden Cardiac Arrest in Pediatric Heart Transplant Recipients.

Hollander SA(1), Barkoff L(2), Giacone H(3), Adamson GT(3), Kaufman BD(3), Motonaga KS(3), Dubin AM(3), Chubb H(3).

ABSTRACT

BACKGROUND: Sudden cardiac arrest (SCA) is a prevailing cause of mortality after pediatric heart transplant (HT) but remains understudied. We analyzed the incidence, outcomes, and risk factors for SCA at our center. METHODS: Retrospective review of all pediatric HT patients at our center from 1/1/2009-9/1/2021. SCA was defined as an abrupt loss of cardiac function requiring cardio-pulmonary resuscitation and/or mechanical circulatory support (MCS). Events that occurred in the setting of limited resuscitative wishes, or while on MCS were excluded. Patient characteristics and risk factors were analyzed. RESULTS: Fourteen of 254 (6%) experienced SCA at a median of 3 (1, 4) years post-HT. Seven (50%) events occurred out-of-hospital. Eleven (79%) died from their initial event, 2 (18%) after failure to separate from extracorporeal membrane (ECMO). In univariate analysis, black race, younger donor age, prior acute cellular rejection (ACR) episode, pacemaker and/or ICD in place, and pre-mortem diagnosis of allograft vasculopathy were associated with SCA (P=0.003-0.02). In multivariable analysis, history of ACR, younger donor age, and black race retained significance. [OR=6.3, 95% CI: 1.6-25.4, P=0.01], [OR=0.9, 95% CI: 0.8-1, P=0.04], and [OR=7.3, 95% CI: 1.1-49.9, P=0.04], respectively. SCA occurred in 3 patients with a functioning ICD or pacemaker, which failed to restore a perfusing rhythm. CONCLUSIONS: SCA occurs relatively early after pediatric HT and is usually fatal. Half of events happen at home. Those who received younger donors, have a history of ACR, or are of black race are at increased risk. ICDs/pacemakers may offer limited protection.

EXTRACORPOREAL LIFE SUPPORT

1. J Intensive Care. 2022 Jun 17;10(1):30. doi: 10.1186/s40560-022-00622-7.

Extracorporeal cardiopulmonary resuscitation with temperature management could improve the neurological outcomes of out-of-hospital cardiac arrest: a retrospective analysis of a nationwide multicenter observational study in Japan.

Sakurai T(#)(1), Kaneko T(#)(2), Yamada S(1), Takahashi T(1).

ABSTRACT

BACKGROUND: Target temperature management (TTM) is an effective component of treating out-of-hospital cardiac arrest (OHCA) after return of spontaneous circulation in conventional cardio-pulmonary resuscitation. However, therapeutic hypothermia (32-34 °C TTM) is not recommended

based on the results of recent studies. Extracorporeal cardiopulmonary resuscitation (ECPR) with veno-arterial extracorporeal membrane oxygenation is another promising therapy for OHCA, but few studies have examined the effectiveness of ECPR with TTM. Therefore, we hypothesized that ECPR with TTM could have the effectiveness to improve the neurological outcomes for adults following witnessed OHCA, in comparison to ECPR without TTM. METHODS: We performed retrospective subanalyses of the Japanese Association for Acute Medicine OHCA registry. We focused on adults who underwent ECPR for witnessed OHCA. We performed univariate (the Mann-Whitney U test and Fisher's exact test), multivariable (logistic regression analyses), and propensity score analyses (the inverse probability of the treatment-weighting method) with to compare the neurological outcomes between patients with or without TTM, among all eligible patients, patients with a cardiogenic cause, and patients divided into subgroups according to the interval from collapse to pump start (ICPS) (> 30, > 45, or > 60 min). RESULTS: We analyzed data for 977 patients. Among 471 patients treated with TTM, the target temperature was therapeutic hypothermia in 70%, and the median interval from collapse to target temperature was 249 min. Propensity score analysis showed a positive association between TTM and favorable neurological outcomes in all patients (odds ratio 1.546 [95% confidence interval 1.046-2.286], P = 0.029), and in patients with ICPS of > 30 or > 45 min, but not in those with ICPS of > 60 min. The propensity score analysis also showed a positive association between TTM and favorable neurological outcomes in patients with a cardiogenic cause (odds ratio 1.655 [95% confidence interval 1.096-2.500], P = 0.017), including in all ICPS subgroups (> 30, > 45, and > 60 min). CONCLUSION: Within patients who underwent ECPR following OHCA, ECPR with TTM could show the potential of improvement in the neurological outcomes, compared to ECPR without TTM.

2. Resuscitation. 2022 Jun 14:S0300-9572(22)00568-8. doi: 10.1016/j.resuscitation.2022.06.007. Online ahead of print.

Clinical outcomes among out-of-hospital cardiac arrest patients treated by extracorporeal cardiopulmonary resuscitation: the CRITICAL study in Osaka.

Okada Y(1), Irisawa T(2), Yamada T(3), Yoshiya K(4), Park C(5), Nishimura T(6), Ishibe T(7), Kobata H(8), Kiguchi T(9), Kishimoto M(10), Kim SH(11), Ito Y(12), Sogabe T(13), Morooka T(14), Sakamoto H(15), Suzuki K(16), Onoe A(17), Matsuyama T(18), Kobayashi D(19), Nishioka N(19), Matsui S(20), Yoshimura S(19), Kimata S(19), Kawai S(19), Makino Y(19), Kiyohara K(21), Zha L(20), Kitamura T(20), Iwami T(22).

ABSTRACT

AIM: Extracorporeal cardiopulmonary resuscitation (ECPR) is performed in refractory out-of-hospital cardiac arrest (OHCA) patients, and the eligibility has been conventionally determined based on three criteria (initial cardiac rhythm, time to hospital arrival within 45 minutes, and age <75 years) in Japan. Owing to limited information, this study descriptively determined neurological outcomes after applying the three criteria among OHCA patients who underwent ECPR. METHODS: This study conducted a post-hoc analysis of data from the Comprehensive Registry of Intensive Care for OHCA Survival (CRITICAL) study. This was a multi-institutional prospective observational study of OHCA patients in Osaka Prefecture, Japan. All adult (aged ≥18 years) OHCA patients with internal medical causes treated with ECPR between 1 July 2012 and 31 December 2019 were evaluated. We described one-month neurological favourable outcomes based on the three criteria (initial shockable, time to hospital arrival within 45 minutes, and age <75 years), and we compared them using the chi-square test. RESULTS: Among 18,379 patients screened from the CRITICAL study database, we included 517 OHCA patients treated by ECPR; 311 (60.2%) patients met all three criteria. Favourable neurological outcomes were as follows: patients meeting no or one criterion: 2.3% (1/43), those meeting two criteria: 8% (13/163), and those meeting all criteria: 16.1% (50/311) (P-value=0.004). CONCLUSIONS: In this study, approximately 60% of patients treated by ECPR met the three criteria (initial shockable, time to hospital arrival within 45 minutes, and age<75 years), and the greater the number of criteria met, the better were the neurological outcomes achieved.

EXPERIMENTAL RESEARCH

1. Nitric Oxide. 2022 Jun 15:S1089-8603(22)00068-4. doi: 10.1016/j.niox.2022.06.005. Online ahead of print.

Inhaled nitric oxide improves post-cardiac arrest outcomes via guanylate cyclase-1 in bone marrow-derived cells.

Miyazaki Y(1), Hayashida K(1), Ikeda K(1), Marutani E(1), Magliocca A(1), Nagashima F(1), Ikeda T(1), Tainsh RET(1), Buys ES(1), Ichinose F(2).

ABSTRACT

RATIONALE: Nitric oxide (NO) exerts its biological effects primarily via activation of guanylate cyclase (GC) and production of cyclic guanosine monophosphate. Inhaled NO improves outcomes after cardiac arrest and cardiopulmonary resuscitation (CPR). However, mechanisms of the protective effects of breathing NO after cardiac arrest are incompletely understood. OBJECTIVE: To elucidate the mechanisms of beneficial effects of inhaled NO on outcomes after cardiac arrest. METHODS: Adult male C57BL/6J wild-type (WT) mice, GC-1 knockout mice, and chimeric WT mice with WT or GC-1 knockout bone marrow were subjected to 8 minutes of potassium-induced cardiac arrest to determine the role of GC-1 in bone marrow-derived cells. Mice breathed air or 40 parts per million NO for 23 hours starting at 1 hour after CPR. RESULTS: Breathing NO after CPR prevented hypercoagulability, cerebral microvascular occlusion, an increase in circulating polymorphonuclear neutrophils and neutrophil-to-lymphocyte ratio, and right ventricular dysfunction in WT mice, but not in GC-1 knockout mice, after cardiac arrest. The lack of GC-1 in bone marrow-derived cells diminished the beneficial effects of NO breathing after CPR. CONCLUSIONS: NO/GC-dependent signaling in bone marrow-derived cells is essential for the beneficial effects of inhaled NO after cardiac arrest and CPR.

2. Shock. 2022 May 26. doi: 10.1097/SHK.0000000000001939. Online ahead of print.

Inhibition of Nitrosative Stress Attenuates Myocardial Injury and Improves Outcomes After Cardiac Arrest and Resuscitation.

Wang F(1)(2)(3)(4)(5), Yuan Q(1)(2)(3)(4)(5), Cao S(1)(2)(3)(4)(5), Li R(1)(2)(3)(4)(5), Zhang J(1)(2)(3)(4)(5), Yang K(1)(2)(3)(4)(5), Xu F(1)(2)(3)(4)(5), Chen Y(1)(2)(3)(4)(5).

ABSTRACT

OBJECTIVES: Nitrosative stress is widely involved in cell injury via inducing the nitration modification of a variety of proteins. This study aimed to investigate whether inhibition of nitrosative stress attenuated myocardial injury and improved outcomes in a rat model of cardiac arrest (CA) and cardiopulmonary resuscitation (CPR). METHODS: Adult male Wistar rats were subjected to asphyxia-induced cardiac arrest and subsequently resuscitation. One minute after return of spontaneous circulation (ROSC), rats were randomized and administered the nitrosative stress inhibitor, FeTMPyP (1 or 3 mg/kg), or normal saline as a placebo. 3-Nitrotyrosine (3-NT), mean arterial pressure (MAP), heart rate (HR), mortality, electrocardiogram (ECG), left ventricular ejection fraction (EF) and fractional shortening (FS), and levels of myocardial apoptosis were evaluated. The concentrations of lactate, creatine kinase MB isoenzyme (CK-MB), and angiotensin II (Ang II), were measured in blood samples. RESULTS: 3-NT level was significantly increased in the heart after ROSC. Administration of FeTMPyP (1 or 3 mg/kg) attenuated the increase of 3-NT in the myocardium. Inhibition of nitrosative stress improved survival and attenuated CA/CPR-induced reperfusion injury by maintaining the stability of MAP and HR, and reducing the accumulation of lactic acid. Post-cardiac arrest rats had higher serum CK-MB and Ang II than healthy rats, while EF and FS were lower in healthy rats. Inhibition of nitrosative stress not only alleviated ischemic heart injury but also reduced the

occurrence of CA/CPR-induced of arrhythmias. Moreover, nitrosative stress mediated the upregulation of Cleaved caspase-3 and downregulation Bcl-2, which was abolished by FeTMPyP. CONCLUSIONS: Inhibition of nitrosative stress is a novel molecular target to alleviate myocardial injury and improve outcomes in a rat model of CA/CPR.

3. NMR Biomed. 2022 Jul;35(7):e4692. doi: 10.1002/nbm.4692. Epub 2022 Feb 12.
Development of a cardiovascular magnetic resonance-compatible large animal isolated heart model for direct comparison of beating and arrested hearts.
Scott AD(1)(2), Jackson T(3), Khalique Z(1)(2), Gorodezky M(1)(2), Pardoe B(3), Begum L(3), Bruno VD(4)(5), Chowdhury RA(2)(6), Ferreira PF(1)(2), Nielles-Vallespin S(1)(2), Roehl M(1)(2), McCarthy KP(7), Sarathchandra P(2)(8), Rose JN(9), Doorly DJ(9), Pennell DJ(1)(2), Ascione R(4)(5), de Silva R(1)(2), Firmin DN(1)(2).
ABSTRACT
Cardiac motion results in image artefacts and quantification errors in many cardiovascular magnetic resonance (CMR) techniques, including microstructural assessment using diffusion tensor cardiovascular magnetic resonance (DT-CMR). Here, we develop a CMR-compatible isolated perfused porcine heart model that allows comparison of data obtained in beating and arrested states. Ten porcine hearts (8/10 for protocol optimisation) were harvested using a donor heart retrieval protocol and transported to the remote CMR facility. Langendorff perfusion in a 3D-printed chamber and perfusion circuit re-established contraction. Hearts were imaged using cine, parametric mapping and STEAM DT-CMR at cardiac phases with the minimum and maximum wall thickness. High potassium and lithium perfusates were then used to arrest the heart in a slack and contracted state, respectively. Imaging was repeated in both arrested states. After imaging, tissue was removed for subsequent histology in a location matched to the DT-CMR data using fiducial markers. Regular sustained contraction was successfully established in six out of 10 hearts, including the final five hearts. Imaging was performed in four hearts and one underwent the full protocol, including colocalised histology. The image quality was good and there was good agreement between DT-CMR data in equivalent beating and arrested states. Despite the use of autologous blood and dextran within the perfusate, T2 mapping results, DT-CMR measures and an increase in mass were consistent with development of myocardial oedema, resulting in failure to achieve a true diastolic-like state. A contiguous stack of 313 5-µm histological sections at and a 100-µm thick section showing cell morphology on 3D fluorescent confocal microscopy colocalised to DT-CMR data were obtained. A CMR-compatible isolated perfused beating heart setup for large animal hearts allows direct comparisons of beating and arrested heart data with subsequent colocalised histology, without the need for onsite preclinical facilities.

4. Transl Res. 2022 Jun 9:S1931-5244(22)00137-2. doi: 10.1016/j.trsl.2022.06.006. Online ahead of print.
Reassessment of mitochondrial cyclophilin D as a target for improving cardiac arrest outcomes in the era of therapeutic hypothermia.
Jahandiez V(1), Pillot B(2), Bidaux G(2), Bolbos R(3), Stevic N(1), Wiart M(2), Ovize M(2), Argaud L(1), Cour M(4).
ABSTRACT
Uncertainty exists regarding whether cyclophilin D (CypD), a mitochondrial matrix protein that plays a key role in ischemia-reperfusion injury, can be a pharmacological target for improving outcomes after cardiac arrest (CA), especially when therapeutic hypothermia is used. Using CypD knockout mice (CypD-/-), we investigated the effects of loss of CypD on short-term and medium-term outcomes after CA. CypD-/- mice or their wild-type (WT) littermates underwent either 5-minute CA

followed by resuscitation with/without hypothermia at 33-34 C (targeted temperature reached within minutes after resuscitation), or a sham procedure. Brain and cardiac injury were assessed using echocardiography, neurological scores, MRI and biomarkers. Seven-day survival was compared using Kaplan-Meier estimates. The rate of restoration of spontaneous circulation was significantly higher in CypD-/- mice (with shorter cardiac massage duration) than in WT mice ($p<0.05$). Loss of CypD significantly attenuated CA-induced release of troponin and S100ß protein, and limited myocardial dysfunction at 150 minutes after CA. Loss of CypD combined with hypothermia led to the best neurological and MRI scores at 24 hours and highest survival rates at 7 days compared to other groups ($p<0.05$). In animals successfully resuscitated, loss of CypD had no benefits on day-7 survival while hypothermia was highly protective. Pharmacological inhibition of CypD with cyclosporine A combined with hypothermia provided similar day-7 survival than loss of CypD combined with hypothermia. CypD is a viable target to improve success of cardiopulmonary resuscitation but its inhibition is unlikely to improve long-term outcomes, unless therapeutic hypothermia is associated.

CASE REPORTS

1. Indian Pacing Electrophysiol J. 2022 Jun 16:S0972-6292(22)00078-X. doi: 10.1016/j.ipej.2022.06.001. Online ahead of print.

Cardiac arrest secondary to arrhythmogenic right ventricular cardiomyopathy in an adolescent male.

Jan M(1), Shillingford MS(1), Turbendian HK(2), Ferns SJ(3).

ABSTRACT

Arrhythmogenic right ventricular cardiomyopathy (ARVC) is a rare, genetically-inherited cardiomyopathy that may be fatal. We present the case of a 17 year old male who presented after a witnessed cardiac arrest with indeterminate echocardiogram and electrocardiogram (ECG) findings for a specific etiology. Genetic testing revealed a mutation in the PKP2 and DSC2 genes, consistent with ARVC. This report outlines the presentation of ARVC as an aborted sudden cardiac death episode in a previously asymptomatic teenager, investigations for ARVC and highlights the importance of adequate cardiopulmonary resuscitation in the overall prognosis. Implantable cardiac defibrillator (ICD) placement for secondary prevention is necessary.

2. Transl Cancer Res. 2022 May;11(5):1445-1450. doi: 10.21037/tcr-22-617.

Successful adrenaline treatment of perioperative severe bronchospasm combined with a silent lung: two case reports.

Liu T(#)(1), Hong Y(#)(1), Peng Y(1), Lu Y(1), Cao L(1).

ABSTRACT

BACKGROUND: Silent lung is a rare and potentially fatal disease. It is a critical sign of strong bronchospasm or extensive mucus plug blockage, which can result in the obvious weakening of breathing sounds or even disappearance of breathing sounds. Silent lung has an acute onset and rapid progress, which seriously threatens the life of patients. It needs early diagnosis, timely and effective treatment to reverse the persistent severe bronchospasm of patients. If not handled in time, silent lung can cause rapid onset of severe hypoxemia, hypoxic brain injury, and even cardiac arrest. Few studies have been reported on the causes and specific treatments for silent lungs. CASE DESCRIPTION: We report 2 rare cases of silent lung in this article and summarize the pathogenesis, inducing factors, clinical manifestations of perioperative silent lung. We also review the literature and discuss our solutions and propose other possible solutions for the treatment of silent lung emergencies in clinical settings in order to provide reference for clinical practice of anesthesiologists. Of the patients, 1 displayed a sudden decrease in ventilation volume, an increase in airway

resistance, and was changed to pure oxygen. The manual ventilation failed, and there was no fluctuation of the thorax and no respiratory sound during auscultation. Cardiopulmonary resuscitation (CPR) was initiated when cardiac arrest was imminent after hypoxia. The other patient had high airway resistance after anesthesia-induced endotracheal intubation, could not be ventilated, and the carbon dioxide (CO_2) waveform at the end of breathing disappeared. CONCLUSIONS: Both patients had severe bronchospasm; that is, silent lung. The 2 patients improved after hand-controlled ventilation and the administration of adrenaline and methylprednisolone, and ultimately recovered ventilation.

3. Cureus. 2022 May 11;14(5):e24902. doi: 10.7759/cureus.24902. eCollection 2022 May.
Catastrophic Events of Cardiac Sarcoidosis: A Case Report.
Riasat M(1), Khan A(2), Ehtesham M(3), Meghrajani V(4), Hafez A(5).
ABSTRACT
Cardiac sarcoidosis (CS) can be silent in most patients with extrapulmonary sarcoidosis. Atrioventricular (AV) block is the most common clinical presentation, but it can also present as fatal ventricular arrhythmias and sudden cardiac death. Endomyocardial biopsy is the gold standard; however, it is not sensitive since CS can involve the myocardium in a patchy distribution. Our case depicts a female who presented with syncope; however, her hospital course was complicated by multiple cardiac arrests. Her initial laboratory tests, including an autoimmune workup, were unremarkable. Cardiac magnetic resonance and fluorodeoxyglucose (FDG) positron emission tomography (PET) imaging revealed intramyocardial delayed enhancement of the basal anteroseptal (non-ischemic distribution) and patchy foci of increased uptake in the anteroseptal and inferior myocardial region, respectively. The patient was started on intravenous methylprednisolone, and her condition slowly improved. Post-discharge, the patient followed in the outpatient clinic with a repeat FDG-PET scan revealing resolution of myocardial FDG uptake. She also underwent bronchoscopy with lymph node biopsy showing granulomas and endobronchial biopsy confirming pulmonary sarcoidosis.

4. JBJS Case Connect. 2022 Jun 8;12(2). doi: 10.2106/JBJS.CC.22.00181. eCollection 2022 Apr 1.
Fatal Fulminant Fat Embolism Syndrome in Adult Spine Deformity Surgery: A Case Report.
Mohar J(1)(2).
ABSTRACT
CASE: A 68-year-old woman was scheduled to undergo elective correction of coronal spinal malalignment after a previous lumbar instrumented fusion. In the final stages of the operation, the patient became hemodynamically unstable. Her systemic condition worsened subsequently, leading to cardiac arrest followed by unsuccessful resuscitation. An autopsy revealed a massive fat embolism in the lungs. CONCLUSIONS: The diagnosis of fat embolism syndrome (FES) is clinical, and treatment is supportive, with no clinical or investigative criteria that can facilitate diagnosis in a patient under general anesthesia. This is the first description of FES in adult spinal deformity surgery.