

14 A NOVEL REPRESENTATION OF ECG BEAT-TO-BEAT VARIATION

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Background Heart rate variability (HRV) is believed to strongly associate with autonomic nervous system. So far, majority of efforts in HRV research are deriving sophisticated parameters with linear and nonlinear techniques. Furthermore, researchers have been focusing on developing advanced signal processing tools for efficient noise removal and accurate QRS detection, prior to HRV parameter calculation.

Method We propose a novel representation of beat-to-beat variation in ECG, called heart rate n-variability (HRnV), as an alternative to conventional HRV. The derivation of HRnV parameters are based on n RR intervals with or without overlaps. We can create many sets of HRnV parameters which are promising at generating extra information from limited data source. We conducted a simulation study by using the ECG record of subject #16 265 from MIT-BIH Normal Sinus Rhythm Database.

Results Among the time domain parameters, we observed that the values were generally incremental with the increase of n. We observed the same trend of value change in frequency domain parameters. In nonlinear analysis, the differences between HRV and HRnV on Poincare plot measures were obvious, while those on entropy and detrended fluctuation analysis (DFA) metrics were not.

Conclusion HRnV measures enable us to augment the conventional HRV with many more parameters. We believe that HRnV is an important addition to HRV and will have great potential in analyzing prehospital ECGs.

Conflict of interest None.

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15 CARDIAC ARREST SURVIVAL VERSUS DEFIBRILLATION DELAY DURING ONGOING CPR

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Background In case of cardiac arrest with ventricular fibrillation (VF CA), several studies confirmed decrease of survival chance by 10% per minute when resuscitation is NOT performed. On the other side, only a rare data are available to evaluate the influence of defibrillation delay when resuscitation IS performed until defibrillation is available.

Method This is a retrospective analysis of VF CA from Prague Utstein-style registry data from 2003 to 2018. We compared the outcome of patients where the collapse due to ventricular fibrillation onset was directly witnessed by EMS crew so that the defibrillation was available immediately (EMS-WITNESSED group) with outcome of patients who collapsed before emergency call, layperson CPR (without AED) was provided and the patients were found with VF CA by responding EMS crew (LAYERPERSON-WITNESSED group).

Results In EMS-WITNESSED group there were 325 patients and 151 survivors (CPC 1–2), while in LAYERPERSON-WITNESSED group there were 1741 patients and 679 survivors.

That gives survival rates 46.5% and 39.0% respectively; RR=0.88. The average EMS response time (call-to-patient) was 8:48 min.

Conclusion If layperson CPR is performed from collapse to EMS arrival, the chance of survival from VF CA with defibrillation after almost 9 min after collapse reached as much as 88% as compared to the ideal situation where immediate defibrillation is available. Thus, maximal effort including dispatcher-assisted CPR should be focused to support layperson CPR. More studies are needed to clearly evaluate the real life benefit of AED programs in municipal setting.

Conflict of interest None.

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16 LONG TERM EFFECTS OF DISPATCHER-ASSISTED CPR – DID WE TOUCH THE CEILING?

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Background Dispatcher-assisted CPR (D-CPR) is recognized to be an important part of the ‘chain of survival’ in case of pre-EMS-arrival out-of-hospital cardiac arrest (OHCA). In Prague, D-CPR was introduced in 2003 and since 2006 it should be provided in a routine manner for all calls suspected from OHCA. The aim of the study is to compare the influence of D-CPR to bystander CPR (B-CPR) rates for confirmed OHCA cases in different phases of D-CPR implementation.

Method This is a retrospective analysis of B-CPR rates from Prague Utstein-style OHCA registry after 5, 10 and 15 years of implementation of D-CPR, as compared to the ‘baseline’ in 2003.

Results Rates of B-CPR in 2003, 2008, 2013 and 2018 were 13.6%, 69.2%, 81.6% and 81.0% respectively. There was a highly significant difference between 2003 and 2008 rates ($p < 0.0001$), as well as between 2008 and 2013 rates ($p < 0.01$), but there is no difference between 2013 and 2018 rates (n/s).

Conclusion Full implementation of D-CPR in Prague took more than 5 years. The implementation was associated with very significant increase of B-CPR ratio, which reached as much as 80% in the second period (5–10 years after start of the implementation). Nevertheless, after reaching this level, the L-CPR ratio now remains stable for several years and it seems this method reached its maximum. To increase B-CPR rates significantly over 80% we probably need some new approaches.

Conflict of interest None.

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17 HOW FAR AND HOW LONG TO DO? PCO2 AND LACTATE AS POSSIBLE PREDICTORS OF SURVIVAL IN TRAUMATIC CARDIAC ARREST

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Background The factors associated with the survival of Traumatic cardiac arrest (TCA) have been analyzed by many authors. Trying to define a limit on resuscitation efforts: How

far and how long to do. The blood analysis has not been described until now, as possible predictor of survival in these patients. Aim: To analyze pH, lactate, bases excess (BE) and pCO₂ as possible predictive factors of survival in patients who suffer TCA.

Method Observational Study of patients suffered from TCA in 2016, 2017 and 2018 assisted by our EMS. Collection data from medical records and databases of hospital follow-ups. Data processing and data analysis: quantitative variables are described by central and dispersion measures and qualitative variables by frequency distribution. COR as survival analysis. Excel and SPSS v. 20.0.

Results We analyzed 112 TCA in which CPR is performed and recovered spontaneous circulation 49 (43.75%). After 7 days, 7.14% survived. At the arrival EMS, mean pH was 7.14 (SD 0.15), pCO₂ 66.57 (ED 20.61), BE -6.09 (ED 6.23) and Lactate 6.51 (ED 3.82). Lactate and PCO₂ showed significant relationship in analysis of survival curve after 7 days ($p < 0,05$).

Conclusion The survival in TCA was 7.14% of patients after 7 days. - Lactate and PCO₂ are related to survival at 7 days in our series. - It's necessary more robust studies that can define the factors related to the survival in TCA, but it seems that the biological clock can be one of them.

Conflict of interest There is no conflict of interest.

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18 TRAUMATIC CARDIAC ARREST: IS SURVIVAL POSSIBLE?

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Background Survival in traumatic PCR has been considered almost impossible, so it was even question whether it was indicated to perform CPR. Nowadays, several studies publish variable survival rates but they are a reality.

Aim To analyze the survival of patients suffering from traumatic CRP treated by an emergency service.

Method Observational study of patients suffered from traumatic cardiac arrest in 2016, 2017 and 2018 assisted by our EMS. Collection data from medical records and databases of hospital follow-ups. Scope: City of Madrid. Data processing and data analysis: quantitative variables are described by central and dispersion measures and qualitative variables by frequent distribution. Excel and SPSS v.20.0.

Results 303 cardiac arrest of traumatic origin were selected, of which CPR is performed in 155 (51.2%). Of these, CPR was abandoned for futility in 43 (27.74%). Rest of patient were 112 (with complete CPR), 49 (43.75%) recovered the spontaneous circulation. After 6 hours, 33 patients were alive (29.46%). After 24 hours 16.96% and after 7 days 7.14%.

Conclusion Survival in traumatic cardiac arrest is possible, 7.14% of patients are alive after 7 days. - Our survival rates are comparable to those of other series published in the scientific journals. - It's possible that survival will improve in the next years due to the new management of TCA.

Conflict of interest There is no conflict of interest.

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19 LIVESTREAMING FROM SMARTPHONES TO THE DISPATCH CENTER IN REAL EMERGENCY CALLS

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Background Currently, the emergency medical dispatchers rely solely on the spoken word when assessing and triaging emergency calls. We aimed to explore if livestreaming by bystanders could be useful during emergency calls.

Method In a 3 months period, livestreaming could be added to the emergency call at the Emergency Medical Services, Copenhagen. Nine medical dispatchers were trained to instruct laypersons to ad livestreaming at a 1 day simulation-based course before the period. For livestreaming caller received a text message with a link. When activating the link, the smartphone camera opened, allowing video to be streamed encrypted to the dispatcher. GoodSAM provided the technical solution.

Results In 68 cases, the caller had a smartphone and the dispatcher suggested livestreaming which succeeded in 33 cases. Reasons for no livestreaming were refusal from bystander (n=6) or patient (n=2), text message not received before ambulance arrival (n=17), and technical issues or caller skills (n=11). The dispatchers found the live video recording useful in all cases. In 8 cases (24%) the patient was considered more critical ill when livestreaming was added, whereas in 8 (24%) cases the patient was considered less sick. Change in ambulance priority response was done in 3 cases after the dispatchers had video. Among 25 callers interviewed 22 experienced livestreaming as an advantage.

Conclusion Adding video livestreaming to the emergency call seems useful for the medical dispatchers to improve patient assessment and to provide the appropriate emergency response. The callers found livestreaming an advantage. Technical issues/experiences, however, need to be improved.

Conflict of interest The authors declare that they have no competing interests.

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20 IMPACT OF PHYSICIAN-STAFFED HELICOPTERS ON PATIENT OUTCOMES: A SYSTEMATIC REVIEW

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Background Management of pre-hospital patients remains a challenge. In developed countries a physician-staffed helicopter emergency medical service (PS-HEMS) is used in addition to ground emergency medical service (GEMS), but the effect is debated. This systematic review aimed to evaluate the effect