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EDITORIAL COMMENT

Surviving a cardiac arrest: need for action now!

Sobreviver a uma paragem cardíaca: é necessário agir agora!

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Mortality after cardiac arrest (CA) remains very high despite advances in advanced life support (ALS) and post-resuscitation care. CA is usually divided into two categories: out-of-hospital (OHCA) and in-hospital (IHCA) cardiac arrest. Survival rates at hospital discharge vary considerably between studies and regions, but major studies report rates of 15% for IHCA[1] and 9% for OHCA in Europe.[2] Mortality generally results from post-resuscitation circulatory failure, mainly due to systemic ischemia-reperfusion, or post-anoxic brain injury, the two situations sharing similar risk factors.[3] Survival rates after OHCA are highly dependent on the organization of emergency medical services (EMS), rates of bystander basic life support (BLS), time to first defibrillation, quality of ALS and post-resuscitation care, i.e. the quality of the local chain of survival.[4] On the other hand, most patients who suffer IHCA will show signs of clinical deterioration in the hours preceding the event. While the quality of the chain of survival is also important, recognizing those at risk of CA and timely initiation of appropriate therapeutic interventions is of the utmost importance for preventing IHCA. Regarding functional outcomes, especially the crucial neurologic outcome of CA survivors, these are in part determined by the patient's underlying health status and arrest-specific factors, but many aspects of medical care may influence outcomes.[5] There are significant site-specific differences in functional outcomes after adjusting for patient-specific factors. The overall prevalence of good outcome can range from 11% to 63% between centers.[5] These differences are partially explained by in-hospital treatment decisions,[5] particularly regarding post-resuscitation care, for which many measures are associated with outcome, such as targeted temperature management, use of coronary angiography and percutaneous coronary intervention, mechanical circulatory support, glucose control, oxygenation and ventilation techniques, blood pressure management, sedation regimes, and prognostication. According to May et al.,[5] high-performing centers had faster time to target temperature, were more likely to have a target temperature of 33 °C and to perform unconscious cardiac catheterization and percutaneous coronary intervention, and had differing prognostication methods (which include modalities such as continuous electroencephalography and monitoring of somatosensory evoked potential).

Specialists in cardiology and intensive care medicine are in fact frequently involved in the early management of these patients, and close collaboration between departments is absolutely essential. The local incidence and outcomes of patients following CA are relevant issues in both cardiology and intensive care medicine, especially so in Portugal, given the scarcity of published data on this important subject. Unfortunately, at this time, there is no risk-adjustment standard for benchmarking hospital performance.[6]

In this context, Menezes Fernandes et al. performed a retrospective study of 187 patients (median age 67 years) admitted within 24 hours of CA of different etiologies to the intensive care medicine department of Faro Hospital

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between 1 January 2014 and 31 December 2018. The authors describe the characteristics, clinical outcomes and variables associated with survival and functional status at discharge. They compare the characteristics of CA and management in the intensive care unit (ICU) between survivors and non-survivors, and also between patients with good neurologic outcome (defined by cerebral performance category [CPC] of 1 or 2 at hospital discharge) and poor neurologic outcome (CPC 3 or 4). Finding factors associated with better survival and better neurologic outcome could help improve the management and consequently the prognosis of these patients, which is of the utmost importance. Unfortunately, patients who suffered CA due to ST-elevation myocardial infarction (the most frequent cause of out-of-hospital CA everywhere) or other cardiac cause of CA identified before hospital admission were admitted directly to the coronary ICU in the cardiology department and were excluded from the analysis.

In this series, most CAs occurred at the hospital (61%), mostly in the ward (36%). The first monitored rhythm was non-shockable in 87% of patients and the median time between CA and return of spontaneous circulation (ROSC) (downtime) was 10 min, which indicates a good organization of the local EMS. Presumed cardiac causes accounted for only 31% of CAs and of these, 33% were acute coronary syndrome, 32% acute or chronic decompensated heart failure and 32% pulmonary embolism. As expected, neurologic lesions were the main post-CA dysfunction (43%). In-hospital mortality was 63%, 45% of which was associated with withholding or withdrawal of life support. Forty-seven of the 69 patients who survived and were discharged were classified as CPC 1, resulting in a prevalence of good neurologic outcome of 25%. Mortality at 12 months was 72%, which is high but lower than in previous reports.[7]

Comparisons of CA characteristics and ICU management between survivors and non-survivors enable important conclusions to be drawn. First and foremost, non-immediate initiation of BLS, higher Simplified Acute Physiology Score II score and higher indexed duration of vasopressor support were found to be independent predictors of in-hospital mortality, while shockable rhythms were associated with improved survival. These conclusions highlight the importance of the pre-hospital approach, including immediate initiation of BLS and prompt defibrillation, supporting the need to train (and periodically re-train) populations both outside and inside the hospital. They also reinforce the impact of optimal post-resuscitation care on clinical outcome. Regarding neurologic outcomes, patients discharged with a good neurologic outcome (CPC 1 or 2), as expected, had significantly less frequent epileptic activity (in which the authors included myoclonus) and a shorter course of ventilatory support than those with CPC 3 or 4, but, unlike in other series,[8] there were no significant differences in terms of witnessed arrest, initiation of BLS, first monitored rhythm, downtime, Glasgow Coma Scale after ROSC, or implementation of the normothermia protocol. As expected, immediate BLS and downtime in patients who suffered OHCA were worse than in IHCA patients, but there were no statistically significant differences between their clinical outcomes, with mortality of 63% for both. One explanation for this phenomenon could be the well-organized local EMS, as stated by the authors, and as indicated by the good downtime in both groups. Finally, unlike some studies that report worse survival in women,[9] there were no significant differences in mortality or neurologic outcomes between the sexes. As observed above, excluding patients admitted directly to the coronary ICU meant that the prevalence of cardiac causes and the percentage of shockable rhythms were lower than in other series, which affected the overall results and clinical outcomes. This is one of the study's main limitations, but it is also of value, since this effect is less explored and more representative of the actual work of a general ICU.

Overall survival from CA, although increasing, remains comparatively low, and studies powered to show significant reductions in mortality typically need to recruit several thousand patients, which would be difficult in this dramatic scenario. Prospective controlled studies in resuscitation require collaboration across multiple sites, thorough organization and careful ethical consideration,[10] and we all look forward to seeing them soon. Meanwhile, it is essential to make a common effort, including the general population as well as the medical profession, to improve all links of the chain of survival, so that outcomes can be improved now.

Conflicts of interest

The author has no conflicts of interest to declare.

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