

# Out-of-hospital cardiac arrest: better prognosis when you know the cardiac rhythm and you can shock it

## Editorial

Out-of-hospital cardiac arrest (OHCA) is a major event and lethal entity as an outcome of ischemic heart disease, and remains a major public health issue worldwide.<sup>1</sup> The annual incidence rate and clinical outcomes are being studied globally as significant indicators of national health. As expected, reports on the incidence of OHCA around the world vary widely. According to a review and a worldwide meta-analysis, there is an incidence of cardiac arrest that varies from 45 to 84 per population of 100,000 people.<sup>2,3</sup> In addition, large cumulative meta-analysis conducted to date documented a mean survival to hospital admission rate of 24% and a low hospital discharge rate of only 8%.<sup>2-5</sup> This low rate of survival to hospital discharge ranges from 4.5% to 10.7%.<sup>6-13</sup> The variation may be due to different definitions, outcome measures, study sites, and populations.

Acute myocardial infarction (AMI) is known to be the most common cause of sudden cardiac arrest, and successful primary percutaneous coronary intervention (PCI) may improve survival in these patients.<sup>14-20</sup> Even if the role of PCI in OHCA might be controversial, diagnosing and treating an ongoing AMI as early as possible after OHCA is crucial to lowering mortality.<sup>21-24</sup> Accuracy in deciding whether to perform primary PCI is classically based on electrocardiographic (ECG) findings after recovery of spontaneous circulation. However, ECG changes may be difficult to interpret in patients resuscitated from OHCA, and the predictive value of ECG for acute coronary artery occlusion in this setting is poor.<sup>25</sup> Hence, it is not easy to properly select candidates for primary PCI especially in patients without ST-segment elevation. Although echocardiography and biomarkers are commonly used in OHCA patients, their role in predicting the etiology of cardiac arrest has not been adequately evaluated. The OHCA etiology is not always found, since there is great number of patients who has the first contact with health professionals at the event of the cardiac arrest itself. In addition, the predictive value of diagnostic tools for acute coronary artery occlusion after the recovery of spontaneous circulation may differ in different ethnics making a global comparison difficult.<sup>26,27</sup>

In this issue of the Journal of Cardiology and Current Research, Comisario RM<sup>28</sup> studied 88 cardiac arrest patients admitted to the emergency room of the Corrientes Cardiology Institute. Demographic information was collected, as well as, suspected cardiac arrest etiology, heart rhythm on admission, hospital survival, and 6 months survival. The findings are interesting and well compared to those of the literature. Cardiovascular causes of cardiac arrest corresponded to 39.8%. In-hospital survival was 25%, and 6 months survival was 12.5%. Variables associated to worse prognosis in the univariate analysis were non-cardiovascular cardiac arrest (OR 8.8; CI 1.7-43;  $p=0.003$ ), unknown cause of cardiac arrest (OR 1.79; CI 1.46 - 2.18;  $p=0.003$ ), but no variable was an independent predictor in multivariate analysis. In his report,<sup>28</sup> the mean survival was 76 days, and survival in patients discharged alive was 297 days (median 161 days). At follow-up patients had worse prognosis if admitted for non-cardiovascular origin of cardiac arrest ( $p=0.003$ ), patients without clear origin of

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cardiac arrest ( $p=0.0001$ ); and patients with non-shockable rhythms on admission ( $p=0.009$ ). Therefore, Comisario RM concluded that there is a worse prognosis in patients admitted for cardiac arrest secondary to non-cardiovascular causes, as well as, in patients without a clear origin of the cardiac arrest, and in those with non-shockable rhythms.<sup>28</sup> Hence, there is a better prognosis when you know the cardiac rhythm and you can shock it in OHCA patients. Indeed, it is much better to know what to treat than not knowing what made you died suddenly.

These findings are quite similar to those reported worldwide. In general, western countries have more studies on this topic.<sup>6-13</sup> Nevertheless, some Asian countries like Japan, South Korea and Taiwan have also paid much attention to this problem in recent years.<sup>29-32</sup> A recent article on OHCA reported results from an investigation done in Taiwan in patients who were 15 years of age or older.<sup>31</sup> They found a 13% probability of survival to hospital admission, and a 1-month survival rate of 17.3% among admitted OHCA patients.<sup>31</sup> A newer Taiwanese study investigated OHCA survival rates in a non-metropolitan area.<sup>32</sup> They demonstrated that the probability of survival on admission was 16.3%, and the chance of surviving to discharge was only 1.4%.<sup>32</sup> The CARES registry showed that the OHCA survival rate to hospital admission in patients with cardiac causes and pre-hospital CPR was 26%, and the overall survival rate to hospital discharge was 10%.<sup>33</sup> A ten year study in the 90s reviewing global OHCA survival rates reported that the survival rates to discharge in emergency care facilities were 6% in North America, 9% in Europe, and 11% in Australia.<sup>2</sup>

There is a clear decreasing trend in the incidence rate of OHCA worldwide. A recent study in Australia reported an OHCA incidence rate of 53 events per 100,000 person-years between the years 2004-2005, and a decreasing trend leading to a rate of 48 events per 100,000 person-years between the years 2009-2010.<sup>34</sup> In contrast, a recent study in South Korea showed that the OHCA incidence rate increased from 38 events per 100,000 person-years in 2006 to 47 in 2010.<sup>35</sup> While the incidence rates of OHCA in these countries had substantial differences ten years ago, they seemed to be reasonably

comparable in recent years, suggesting a trend toward more similar patterns of prevention and hospital care delivery across countries. These findings in the literature suggest that the chance of survival to hospital discharge or among OHCA patients has improved over time globally. This might reflect improvement in skills, resources, training, and post-resuscitation care in recent years.

It was observed that OHCA patients treated in advanced medical centers and those residing in metropolitan areas tended to have better survival chance. These findings are reasonable since metropolitan areas have more affluent healthcare resources for both pre-hospital services and post-resuscitation care. In addition, the medical centers may have more advanced technical support and training skills that are more effective in improving post-resuscitation care. Moreover, further advances in pathophysiological knowledge and medical therapeutic maneuvers can help develop cardiovascular disease preventive strategies. Further information on factors associated with post-OHCA prognosis can facilitate improvement in pre-hospital and in-hospital care to reduce morbidity and mortality in patients suffering OHCA.

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## Conflicts of interest

The authors declare there is no conflict of interests.

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