





In-hospital cardiorespiratory arrest: a current challenge

Paro cardiorrespiratorio hospitalario: un desafío en la actualidad

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To the Editor:

In-hospital CRA is certainly a serious problem as between 0.4 and 2.0% of the patients admitted will require cardiopulmonary resuscitation. The different services available in a medical facility, the myriad of clinical settings of the patients, their morbidity and the necessary treatments will all contribute to turn this situation into a real challenge for the team of professionals who have to cope with it¹.

In-hospital CRAs are more likely to happen than out-of-hospital CRAs and are associated with a worse prognosis and lower survival rate despite the fact that the hospital environment should be the best setting for survival from such an adverse event. Roughly one to five adults per 1000 admissions suffer from in-hospital CRA and in the case of children the figure is 0.005 per bed on a yearly basis².

Unlike out-of-hospital CRA –where the main cause in adults is coronary artery disease due to atherosclerosis– in the in-hospital setting patients are older, presenting some additional pathologies. Respiratory failure accompanied by severe hypoxia is commonly the primary cause in the pediatric group; being practically never of cardiac origin, and if so, is more likely in children with congenital heart disease and during the post-operative period of cardiovascular surgery².

The most common forms of presentation in adults are asystole and pulseless electrical activity, resulting in worse survival¹. A U.S. national register of cardiopulmonary resuscitation study³ including nearly 37.000 in-hospital CRA events demonstrated that in approximately 70% of cases the initial rhythm in adults is asystole or pulseless electrical activity while in almost 25% of cases is ventricular fibrillation or pulseless ventricular tachycardia. The research also proved that overall survival is low, namely around 18%: with 11% and 36%, respectively, for the above-mentioned scenarios.

The typical terminal rhythm in children is brady-

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cardia with progression to asystole⁴. Ventricular tachycardia and fibrillation have been reported in 15% or less of children or teenagers who have suffered from CRA^{1,4}.

In-hospital CRAs yield slightly better results when compared to out-of-hospital CRAs, with restoration of circulation in 44% of patients and survival in 17-18%³. The former represent a potentially avoidable cause of morbidity and mortality as CRAs occurring in hospital admitting areas, even without monitoring, are not necessarily so sudden or unpredictable events. These patients often have slow and progressive physiological deterioration, hence the importance of early detection of these signs and appropriate treatment to prevent cardiorespiratory arrest.

Warning signs to watch for are heart arrhythmias, significant hypotension, sudden changes in heart rate, altered level of consciousness, respiratory silence, gasping or agonizing breathing, pallor and cyanosis. Healthcare providers should be trained to recognize and respond to this medical emergency⁵. Health personnel arriving immediately after identifying the situation by making a diagnosis based on the presence of warning signs, absence of central pulses, identification of characteristic CRA life-threatening arrhythmias or heart rhythms on the monitor, should proceed to activate the emergency code and simultaneously start basic life support maneuvers until the hospital emergency team or other qualified personnel arrive to continue the resuscitation process now by means of advanced life support maneuvers; emphasizing on early defibrillation if the initial CRA rhythm has an indication for this procedure, as it is the case of ventricular fibrillation and pulseless ventricular tachycardia⁶.

Quality cardiopulmonary resuscitation will only be achievable if an effective heart rate (120 beats per minute), adequate depth of heart compressions (**Table**), passive chest decompression, and reduced interruptions in compressions and resuscitation are ensured^{4,7}.

The most important factors determining survival and quality of life after CRA resuscitation are: a) the patient's previous clinical state, b) the cause and triggering mechanism of the event, c) the time from CRA to initiation of cardiopulmonary resuscitation (when basic resuscitation is initiated within the first 4 minutes and advanced resuscitation within the first 8 minutes, survival rates are improved), d) the time and quality of resuscitation maneuvers and e) post-resuscitation intensive care, which is aimed at improving neurological and cardiovascular status, and

the systemic response triggered by the ischemia/reperfusion process⁷.

Decisions to stop resuscitation maneuvers are always extremely difficult but according to the guidelines^{4,5,8,9} they must be abandoned when:

- The patient regains spontaneous circulation and breathing.
- It is confirmed that CRA occurred as a consequence of the natural course of an incurable process.
- There is evidence that the resuscitation maneuvers were started over 10 minutes late, except in cases of drowning, accidental hypothermia or barbiturate poisoning.
- There are no signs of cardiac electrical activity after 30 minutes of properly starting resuscitation maneuvers.

Despite the great achievements in terms of resuscitation, an overwhelming lack of preparation persists in terms of the appropriate behavior when dealing with CRA. This has resulted in increased morbidity and mortality among hospitalized patients. Perhaps the problem lies in the fact that health professionals and especially those not directly engaged in the emergency department show little interest in the issue.

Another negative factor is the shortage of updating, training and education programs targeted to the careers of medicine, nursing and health technologies¹. It is crucial to address these shortcomings and keep promoting the training of medical and paramedical staff facing such an emergency situation.

Table. Recommended depth of heart (sternal) compressions during cardiopulmonary resuscitation⁴⁻⁷.

Patients	Depth
Adults and children over 8 years	5 cm
Children under 8 years	3.75 cm
Newborns and infants	2.5 cm

CONFLICT OF INTERESTS

None declared.

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