

## Reflection and Updates: Cardiopulmonary Resuscitation – Guidelines 2015 – Contribution to Nursing

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### ABSTRACT

*The occurrence of cardiac arrest is a stressful and critical event. Despite technological advances in the training of cardiopulmonary resuscitation (CPR) techniques, mortality remains high, and patients survive up to discharge with high levels of neurological complications. The European Resuscitation Council guidelines and the American Heart Association as of 2015 hold the best recommendations in performing CPR.*

**Keywords:** Cardiac arrest, cardiopulmonary resuscitation, emergencies

## Reflexión y actualizaciones: Resucitación cardiopulmonar – Pautas 2015 – Contribución a la enfermería

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### RESUMEN

*La ocurrencia de un paro cardíaco es un evento estresante y crítico. A pesar de los avances tecnológicos en la práctica de técnicas de resucitación cardiopulmonar (RCP), la mortalidad sigue siendo alta, y los pacientes sobreviven al alta hospitalaria con altos niveles de complicaciones neurológicas. Las guías del Consejo Europeo de Resucitación y la Asociación Americana del Corazón a partir de 2015, poseen las mejores recomendaciones para realizar RCP.*

**Palabras clave:** Paro cardíaco, resucitación cardiopulmonar, emergencias

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### INTRODUCTION

This study addresses the scientific knowledge and reflections on the new guidelines on cardiac respiratory arrest (CRA), elucidating the relevance of the nursing professional to dominate, to acquire knowledge and to be updated on cardiopulmonary resuscitation (CPR) manoeuvres, since they constantly face this emergency situation.

The arrest of the heart is characterized as one of the most critical, stressful and decisive events for any health professional. Cardiac respiratory arrest is defined as the subtle cessation of systemic/respiratory circulation (1).

It is estimated that 200 000 CPR cases take place in Brazil: in hospitals, public places and residences. Ventricular fibrillation (VF) and no-pulse ventricular tachycardia (VT) are predominant in CRA

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outside hospitals and non-pulse electric activity with cardiac arrest in the hospitals (2).

It is noteworthy that clinical signs of unconsciousness and absence of breathing movements and pulse form the basis of the diagnosis of CRA on which CPR manoeuvres are implemented in order to maintain arterial blood flow to the brain and vital organs, minimizing brain injury until spontaneous circulation is re-established (3). Cardiopulmonary resuscitation is the best chance of brain and cardiopulmonary function restoration in CRA victims. When started early, even limited to chest compression at pre-hospital stage, it maximizes survival rates from 7% to 10% for each waiting minute (4).

The care to CRA is based on the assumptions of the *International Liaison Committee on Resuscitation* (5) consensus, and involves multidisciplinary team work either pre-hospital or intra-hospital (6). The role of the nurse in the relief team is highlighted because it is up to him/her to recognize early impending death. Besides that, nurses command the resuscitation steps, act as instructors of CPR manoeuvres for training teams and are articulators for the multi-professional team, thus providing efficient, synchronized, fast care with the maximum quality (6).

The new guidelines on CPR care published in 2015 bring the best care recommendations for patients in cardiovascular emergency situations considering efficiency, applicability and facility in teaching (7–11).

### SURVIVAL CHAIN

The care to CRA victims occurs in sequential steps: surveillance, prevention and early care to avoid deterioration of the main organs. These steps involve identification of CRA clinical signs starting with CPR manoeuvres of high-quality and post-resuscitation care, which is the Survival Chain.

The Survival Chain is based on a sequence of care to maximize chances of survival of CRA victims. It is composed of five items that link surveillance and prevention (7, 8): (a) surveillance, prevention and early recognition of CRA – calling the Emergency Medical Service (EMS); (b) early and high-quality CPR; (c) early defibrillator; (d) early advanced life support; (e) post-resuscitation care procedures after the return of spontaneous circulation and directed temperature control.

On current American Heart Association (AHA) guidelines, there are two developed Survival Chains: in- and out-of-hospital environment. On out-of-hospital assistance, the emphasis is on a fast response to a sudden event, incorporating social media technologies that

evoke rescuers available and capable to perform CPR, that are close to the victim suspected with CRA. With respect to intra-hospital assistance, the most important aspect is prevention of events based on incorporating the Fast Response Team (FRT) (7).

Still based on European Resuscitation Council (ERC) and AHA guidelines, the CRA care involves basically three steps (basic life support, advanced life support and post-cardiopulmonary resuscitation care) that seek the re-establishment of spontaneous circulation with minimum neurological complications (sequelae) (7–10). Continuous process improvements are needed that involve CRA victim care, evaluating team performance during CPR manoeuvres, monitoring the quality of performance and outcomes obtained, until results considered ideal are reached (7).

### BASIC LIFE SUPPORT

Basic life support emphasizes CPR through chest compression and ventilation. These manoeuvres are not sufficient to reverse the cardiac rhythm, but they maintain brain and heart blood flow and are essential in order to obtain good results for the CRA victims (7, 8, 11). The emphasis on the new AHA guidelines remains on the quality of these chest compressions, and success is determined by chest compressions made with adequate frequency and depth that favour survival and the best neurological prognosis (7).

The frequency of chest compressions was modified to 100–120 per minute with minimum depth of 5 cm, not exceeding 6 cm, with minimum of interruptions and complete return to the chest original position (7, 8). The addition of a higher limit of compression frequency is based on studies that show that a large number of compressions are correlated with incorrect depth thereof (7, 8, 11–14).

The care provided by health professionals, one or two rescuers, keep up 30 chest compressions followed by two ventilations, *ie* for each cycle, we have the relation 30:2 in which another rescuer should take turn every two or five cycles (7, 8, 11). It is noteworthy that at this stage, manoeuvres should be synchronized.

The sequence Compression, Airway, Breathing (CAB) remains the recommendation in the literature since it minimizes delays in the start of chest compressions (7). The evaluation of responsiveness and presence of adequate breathing must be done simultaneously and quickly, aiming to call early the EMS (7, 8, 11). The recommendation remains that after recognition of responsiveness and proper breathing absence

(not considering gasping breathing type), the EMS must be called. Health professionals are authorized to check pulse and breathing simultaneously (7, 8).

The empirical administration of intramuscular or intranasal naloxone was added as a complement to basic life support according to the AHA 2015 guidelines, and it may be used in potentially fatal emergencies related to the use of opioids since it reverses respiratory depression caused by these drugs. Its administration can be done by trained lay rescuers and health professionals. Epidemiological data show morbidities resulting from lethal opioid overdose with documented success after naloxone administration in patients at risk (7).

### **BASIC LIFE SUPPORT AND LAY PEOPLE**

Lay people (not trained) must be oriented to start chest compression without ventilation (hands-only) till an automated external defibrillator (AED) or any other trained rescuer arrives if the victim does not move or breathe normally (7, 8). The emergency medical mobile service attendants will provide relevant guidelines as to the place, frequency and depth of chest compressions.

The sequence CAB is strengthened to train lay people, starting with CPR manoeuvres through chest compressions before airway ventilation at the rate of 30:2 (7).

### **CALLING EMERGENCY MEDICAL SERVICE/FAST RESPONSE TEAM**

Identification of warning signs prior to CRA requires evaluation of the heart rate changes, breathing rate and level of consciousness. Warning signs are urinary volume under 50 ml over the last four hours and chest pain. If one of these signs is detected, if possible, call the FRT which will help stabilize the victim and therefore avoid the event (12, 13).

The FRT comprises a multi-professional health team that leads expertise in critical care at the bedside or wherever is necessary, aiming to get to the patient in a short time or at the moment of identification of any worsening clinical sign (15). They can be called after an evaluation of the team and, this way, stabilize and transfer the victim to an advanced care unit (12, 13).

The development of the FRT has grown parallel to the rise of interest in improving quality and safety of care for hospitalized patients. The Institute for Healthcare Improvement recommends the implementation of FRT as one of the six strategies that might mitigate the number of predictable damages during hospitalization and decrease intra-hospital death rates since it offers high-quality CPR to intra-hospital CRA victims (14).

Studies show that the implementation of a FRT avoids CRA, decreases the number of days in the critical care unit and improves survival conditions (12, 13).

### **ADVANCED LIFE SUPPORT**

The ERC guidelines of 2015 bring up the importance of immediate care to CRA victims until the EMS arrives. Advanced life support complements basic life support, and the precocious use of the AED favours survival of the victim (8, 12, 15).

Vasopressin in association with epinephrine was removed from the new guidelines because vasopressin did not offer any advantage compared to isolated use of epinephrine during CRA.

The recommendation of immediate administration of epinephrine in CRA without mechanical shocks remains. In VF and pulseless VT, despite only little significant evidence, the use of adrenalin might be started from the second shock (7, 15, 16).

As with vasoconstrictor agents, the evidence regarding the benefits of anti-arrhythmic drugs post-CRA are limited. However, amiodarone remains the drug chosen to treat VT refractory after the use of vasoconstrictors and defibrillation.

Lidocaine is indicated in the absence of amiodarone and can be started or continued after spontaneous circulation returns in CRA due to VT (9, 17).

Another important item of advanced life support is the treatment of potentially reversible causes such as hypoxia, hypo/hypercalcaemia and other electrolytic disturbances, hypo/hyperthermia, hypovolaemia, pneumothorax, cardiac tamponade, coronary or pulmonary thrombosis, and toxins (intoxication).

Therefore, the new guidelines on CPR provide clinical orientation based on scientific evidence for the treatment of each one of these causes considered special (17, 18).

Extracorporeal circulation has been added as a strategy of advanced life support for CRA victims who do not respond. Its indication should take into consideration the cost/benefit to the patient. It is indicated for potentially reversible diseases and heart transplant cases (8). The literature, although scarce, reports the efficiency and effectiveness of extracorporeal support to conventional CPR when dealing with cardiac arrest from several aetiologies because it favours the quality of the patient's life with minimal neurological complications and, in cases of failure, it provides benefits for the maintenance of potential donor of organs and tissues (19, 20).

The 2015 guidelines also emphasize the post-CRP care that looks for decreased mortality due to haemodynamic instability, limiting injuries to the brain and other organs. For such, the best control of oxygenation is through artificial airway and mechanic ventilation, and minimally invasive monitoring with the help of (pulse) oximetry and capnography, adjusting fraction of inspired oxygen suitable for saturation of 94–96%, since hyperoxia favours oxidative stress and a worse neurological prognosis. On the other hand, the haemodynamic goals aim to adequately replace cardiac debt through blood volume replacement and vasodilator amines (8, 10, 17).

Coronary angiography must be done urgently for patients with suspected CRA of a cardiac aetiology and with ST segment elevation on the ECG, and it cannot be delayed until coma state sets in. Studies correlate emergency coronary revascularization with survival and positive functional outcomes (10, 12, 17).

Directed temperature control has proven beneficial in cases of coma post-CRA during the first 24 hours and even after this period, as it is neuroprotective, decreasing cerebral metabolic demand. Computed tomography must also be used in order to evaluate brain ischaemia post-CRA (8, 10, 17, 21, 22).

## FINAL CONSIDERATIONS

The professionals working in health services need to be up-to-date in knowledge and capabilities required for CPR care. In this context, the arrival of patients with different clinical profiles, with several care priorities (from immediate to non-urgent) to health services, require of the health professionals the recognition of CRA, proper use of basic CPR manoeuvres and use of the AED.

Taking into consideration that most of the time, it is the nurse who is first present when there is CRA, he or she needs to know about emergency care, make fast decisions, evaluate priorities and establish immediate action. The standardization of CPR approaches helps in adopting a single language among health professionals in order to perform manoeuvres efficiently.

The immediate confirmation of CRA as well as recognition of the gravity of the situation are of fundamental importance because it allows prompt start of resuscitation manoeuvres. Time is an important variable: it is estimated that after each minute, 10% of survival probability is lost.

The main issue to be considered is the importance of the professional being informed and up-to-date in order to offer best practice.

## AUTHORS' NOTE

The authors participated in the design and description of the study, reviewed the manuscript and approved the final version. The authors declare that they have no conflicts of interest.

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