Reflexion and Updates: Cardiopulmonary Resuscitation – Guidelines 2015 – Contribution to Nursing

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ABSTRACT

The occurency of cardiac arrest (CPA) is a stressing and critical event. Despite technological advances on attending and on 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* (ERC) guidelines and the *American Heart Association* (AHA) as of 2015 hold the best recommendation in attending CPR

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INTRODUCTION

The present study addresses the scientific knowledge and reflections about the new guidelines to attending cardiac arrest (CPA) elucidating the relevance of the nursing professional to dominate, to acquire knowledge and to be update on cardiopulmonary resuscitation (CPR) maneuvers **,** since they constantly face this situation of emergency.

The heart arrest is characterized as one of the most critical, stressing and decisive events for any health professional. Cardiac arrest (PCA) is defined as the subtle cease of systemic / respiratory circulation in patients with restoration expectation of these functions and that are not a carrier of terminal-phase or non-curable (1) disease.

It is estimated 200.000 CPR cases in Brazil, in hospitals, public places and residences. The ventricular fibrillation heart rhythms (VF) and no-pulse ventricular tachycardia (NPVT) are predominant in CRA outside hospitals and non-pulse electric activity (NPEA) and heart arrest in the hospitals (2).

It´s noteworthy that clinical signs as unconsciousness, absence of breathing movements and pulse ground the diagnosis of cardiopulmonary arrest (CPA) before whom CPR maneuvers are implemented in order to maintain arterial blood flow to the brain and vital organs, minimizing this way brain injury until spontaneous circulation is reestablished (SCR) (3). CPR is the best chance of brain and cardiopulmonary function restoration of CPR victims.When started early, even limited to chest compression at pre-hospital, it maximizes survival rates from 7 to 10% for each waiting minute (4).

The care to CRA is based on the assumptions of *International Liason Comittee on Resuscitation* (ILCOR) (5) consensus and involves a multidisciplinary team work either in the pre-hospital as in the intra-hospital (6). This way, the role of the nurse in the relief team is highlighted because it is up to him/her the early recognition of situations of death risk potential. Besides that, they command resuscitation steps, act as educator of CPR maneuvers

training team and are articulators of the multi professional team, thus providing an 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 situation considering its efficiency, applicability and facility on integration to teaching (7-11).

Survival Chain

The care to CRA victims occur in sequential steps that seek surveillance, prevention and early care in order to avoid deterioration of the main organ. These steps involve identification of CRA clinical signs starting with CPR maneuvers of high quality and post resuscitation care, which is the Survival Chain.

The Survival Chain is based on a sequence of cares to maximize chances of CRA victim survival. It is composed by five items that links SURVEILLANCE and PREVENTION (7-8): (1) Surveillance, prevention and precocious recognition of CRA calling Emergency Medical Service (EMS). (2) precocious and high quality CPR, (3) precocious defibrillator (4) Precocious life advanced support (LAS), (5) post resuscitation care procedures after the return of spontaneous circulation (RCS) and directed temperature control (DTC).

On current AHA guidelines there are two developed Survival Chains that seek to attend CRA in distinct ways, in and out of hospital environment. On out of hospital assistance, the emphasis is on a fast response to a sudden event, incorporating social mídia technologies that evoke rescuers available and capable to perform CPR, that are close to the victim suspected with CRA. At the intra-hospital assistance, the most important aspect is prevention of events based on incorporating the Fast Response Team (7).

Still based on ERC and AHA guidelines, the CRA cares involve basically three steps: basic life support (BLS), advanced life support (ALS) and post cardiopulmonary resuscitation care that seek the reestablishment 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 maneuvers monitoring the quality of attending and outcomes obtained, until results considered ideal are reached (7).

Basic Life Support

BLS emphasize CRR through chest compression and ventilation. These maneuvers are not capable to reverse the cardiac rhythm but they keep brain and heart blood flow and are essential to obtain good results to the CRA victims (7, 8, 11). The emphasis on the new AHA guidelines remains on the quality of these chest compressions, and the success is determined by chest compressions made with adequate frequency and depth that favors survival and the best neurological prognosis (7).

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

The care provided by health professionals, 1 or 2 rescuers keep on 30 chest compressions followed by opening breathing airways with two ventilations, that is, for each cycle we have the relation 30:2 in which another rescuer should take turn every 2 or 5 cycles (7, 8, 11). It is noteworthy that at this stage maneuvers should be synchronized.

The sequence Compression Airways, Good, Breathing (CAG) remains in the literature recommendations since it minimizes delays in the start of chest compressions (7). The

evaluation of responsiveness and presence of adequate breathing must be done in a simultaneous and fast way, aiming to call the emergency medical service (EMS) (7, 8, 11) The recommendation remains that, after recognition of responsiveness and proper breathing absence – not considering gasping breathing type - SME must be called. Health professionals are authorized to check pulse and breathing simultaneously (7, 8).

The empirical administration of naloxona intramuscular (IM) or intranasal (IN) was added as a complement to life basic support according to AHA 2015 and it may be used on potentially fatal emergencies related to de 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 opioids overdose with documented success after naloxona administration in patients under risk (7).

Basic Life Support and Lay People

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

The sequence CAG is strengthened to trained lay people, starting CPR maneuvers through chest compressions before opening airways at proportion 30:2 (7).

Calling Emergency Medical Service / Fast Response Team (FRT)

The previous identification of warning signs that prior CRA require evaluation of heart rate changes (HR), breathing rate (BR) and level of consciousness. Warning signs are urinary volume under 50 ml on the last 4 hours and chest pain. If one of these signs are detected, if

possible, call Fast Response Team which will help stabilize the victim and, therefore, avoid the event (12, 13).

The Fast Response Team is formed by a multi professional health team that lead expertise in critical care to the bedside or wherever is necessary, aiming to meet the patient in short time or at the moment of identification of any clinical worsening sign (15). They can be called after an evaluation of the unity team and, this way, stabilize and transfer the victim to a advanced care unity (12, 13).

The FRT development has grown parallel to the rise of interest in improving quality and safety of care for hospitalized patients. The *Institute for Healthcare Improvement* (IHI) 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 rate since it offers high quality CPR to intra-hospital CRA victims (14).

Studies show that fast response team implementation avoid CRA, decrease number of days in critical care united and improve survival conditions (12, 13).

Advanced Life Support

The European Resuscitation Council guidelines of 2015 bring up the importance of immediate care to CRA victims until emergency medical service arrives. Advanced life support complements basic life support and the precocious use of the automatic external defibrillator (AED) favors survival of the victim (8, 12, 15).

Vasopressin associated to epinefrin was removed from the new guidelines because it didn´t offer advantages compared to isolated use of epinefrin during CRA.

The recommendation of immediate administration of epinefrin in CRA with not shocking rhytms, remains. On ventricular fibrillation (VF) and pulseless ventricular

tachycardia (VT) rhytms, despite little significance evidences, the use of adrenalin might be started from the second shock (7, 15, 16).

As in vasoconstrictor agents the evidences regarding the benefits of anti arrythimic drugs post CRA are limited, however amiodaron remains as the drug chosen to treat VT/VT refractory after the use o vasoconstrictor and a new difibrillation.

Lidocain is indicated in the absence of amiodaron and can be started or continued after spontaneous circulation return in CRAs due to VT/VT (9, 17).

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

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

The extracorporeal circulation has been added as strategy of advanced life support to CRA victims that do not respond to conventional. Its indication should take into consideration the cost / benefit to the client, been indicated though to potentially reversible disease cases and heart transplants (8). Literature, although scarce, reports the efficiency a support to conventional CPR when dealing with cardiac arrest of several etiologies because it favors the client's life with minimum neurological complications and, in cases of failure, it brings benefits to maintenance of potential donor of organ and tissue (19, 20).

The 2015 guidelines also emphasize the post CRP care that look for decrease mortality due to hemodynamic instability, limiting injuries on brain and other organs. For such, the best oxygenation control is required through artificial airway obtainment to start mechanic ventilation and minimally invasive monitoring with the help of (pulse) oximetry and capnography, adjusting fraction of inspired oxygen (FiO2) suitable for saturation of 94-96%,

since hyperoxia favors oxidative stress and a worse neurological prognosis. On the other hand, the hemodynamic goals aim to adequate cardiac debt through blood volume replacement and vasodilator amines. (8, 10, 17).

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

The directed temperature control has proven beneficial in cases of coma post CRA during the first 24 hours and after this period, as it serves as neuroprotective, decreasing cerebral metabolic demand. It is recommended to select one and only temperature target between 32°C and 36°C knowing that it is indifferent the selected value to the neurological prognosis. The computed tomography must also be used in order to evaluate brain ischemia post CRA (8, 10, 17, 21,22).

Final considerations

Starting from the premise that the professionals working on health services need to be up to date and capable for the abilities required on CPR care. In this context, the arrival of patients with different clinical profile, with several care priorities (from immediate to not urgent) in health services, require of these health professional – and of an important, way the nursing team, the CRA recognition and proper use of basic CPR maneuvers, handling AED.

Taking into consideration that most of the time the nurse is the member of the team that first face the situation of CRA, he or she needs to know about care emergency , take 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 maneuvers efficiently.

The immediate confirmation of CRA as well as recognize the gravity of the situation is of fundamental importance because it allows prompt start of reanimation maneuvers. Time is an important variable, it is estimated that at each minute 10% of survival probability are lost. Therefore it is a dramatic situation, responsible for high morbidity even in situation of ideal care.

The main issue to be considered is the importance, for the professional, to keep informed and up to date in order to offer a safer attendance, considering the quality of maneuvers, knowledge and actualization of new international guidelines in CPR.

AUTHORS' NOTE

RC Machado participated in the design and description of the study, manuscript review and final version approved. RSL Moreira participated in the design and description of the study, manuscript review and final version approved. CLF Albuquerque participated in the design and description of the study, manuscript review and final version approved. SA Oliveira participated in the design and description of the study, manuscript review and final version approved. The authors declare that they have no conflicts of interest.

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