

Nursing care for patients in cardiorespiratory arrest: Nurses' knowledge and practice

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Abstract— Objective: to analyze nurses' knowledge and practices regarding the care provided to patients in cardiopulmonary arrest in the emergency room of a medium and high complexity public hospital in Belém, State of Pará, Brazil. Method: this descriptive, exploratory, qualitative study included ten nurses, who work in the urgency and emergency service. Data collection took place from February to March 2019 through semi-structured interviews. Thematic content analysis proposed by Bardin was used to construct the data. Results: the studied population has deficient and sometimes insufficient knowledge, mostly marked by mistaken speeches and uncertainties, revealing gaps in knowledge and divergences in relation to the resuscitation science consensus necessary to perform adequate care during a cardiorespiratory arrest, and may compromise the effectiveness of cardiopulmonary resuscitation, causing damage to resuscitation and, consequently, contribute to the emergence and / or aggravation of sequelae, which can impact on increased morbidity and mortality. Conclusion: knowledge deficiency is multifactorial, which may be related to the lack of continuous and permanent education, and the lack of personal motivation for the constant search for knowledge, in addition to the lack of incentive to update proposed by the head of the service in the studied scenario.

I. INTRODUCTION

Cardiorespiratory arrest (CRP) remains a worldwide public health problem. Although there have been many advances related to its prevention and treatment, the rate of mortality is still worrying. In Brazil, about 200,000 CRPs are estimated a year, half of the cases that occur in a hospital environment (Intra Hospital Cardiorespiratory Arrest) and the other half in environments such as homes, shopping malls, airports, stadiums and other spaces (Extra Hospital Cardiorespiratory Arrest)¹.

In 2020, until the month of May, it is estimated that more than 170 thousand people died of cardiovascular diseases, according to the "cardiometer" of the Brazilian Society of Cardiology. Despite not being the state with the highest mortality rates from acute myocardial infarction, the state of Pará in Brazil had a variation in the mortality rate from 2003 to 2012, a rate from 40.4% to 53.6%; values that show a clear growth trend².

Cardiorespiratory arrest is defined as abrupt interruption of heartbeat, respiratory movements and loss of consciousness, resulting in irreversible brain damage and death if cardiopulmonary resuscitation (CPR) maneuvers are not performed effectively and in a timely manner¹.

It is the situation considered as the greatest emergency attended in the hospital and pre-hospital environment, where in the latter, approximately 95% of patients die before arriving at the hospital³. The respiratory cardiac paradigm can be classified into four distinct rhythms, namely: Ventricular Fibrillation (FV), Ventricular Tachycardia Without Pulse (TVSP), Electrical Activity Without Pulse (AESP) and Asystole. When any of these modalities are found, CPR maneuvers must be promptly initiated, based on the premise that the brain does not support hypoxia for more than 5 minutes, which leads these individuals to suffer irreversible neurological injuries⁴.

CPR maneuvers aim to maintain the flow of oxygenated blood to the brain and other vital organs until the return of spontaneous circulation and the restoration of homeostasis occurs. These well-executed maneuvers can double and even triple the patient's chance of surviving, constituting the best chance of recovery of neurologically intact cardiopulmonary and brain function¹⁻³. Time is a crucial factor in this situation, it is estimated that for every minute that the patient remains in CRP without high quality CPR maneuvers, there is a reduction of approximately 7 to 10% in their chance of survival, leading to higher mortality in an extrahospital environment without intervention by health teams. Therefore, the Basic Life Support (BLS) and Advanced Life Support

maneuvers are essential to prevent the deterioration of the patient's clinical condition, enabling the maintenance of brain and coronary perfusion, and consequently increased survival with a lower degree of sequelae⁵.

Since CRP is a sudden event, it requires the health professional to quickly recognize and immediately start high-quality CPR maneuvers. For the assistance provided to have an effective result, it is essential that professionals are aware of their role in patient care and that they act quickly and efficiently, with the necessary technical skills and competences to perform this action, in order to reduce the possible complications of CRP, thus reducing morbidity and mortality⁶.

The nursing team plays an important role in care during the CRP, as they are often the first to encounter the situation and initiate resuscitation maneuvers. For this reason, they must be technically prepared to act, knowing how to recognize the CRP and providing the necessary assistance adequately, considering that the patient's prognosis is directly associated with the speed and effectiveness of these actions. However, what has been reported in the literature is that the conduct performed by nurses during a CRP is still unsatisfactory, although they recognize the importance of the theme¹. On October 21, 2020, the new recommendations of the American Heart Association (AHA) Guidelines for CPR and Emergency Cardiovascular Care were published⁷.

In view of the constant updates that are made in the guidelines, it is necessary to train and constantly update the multidisciplinary teams so that they can provide adequate assistance to patients in the light of consensus. In this way, the importance of scientific knowledge marked out for the care of CRP is emphasized, with a quick and correct diagnosis to guarantee success in CPR regardless of the professional's specialty. In the meantime, then this study is justified, denoting the knowledge and practice of nurses working in urgent and emergency services, aiming to contribute to improving the quality of care for patients suffering from CPR, considering that nurses coordinate the teams that pass by longer time with patients and it is usually professionals who initiate CPR maneuvers. Thus, the following question emerged: what is the nurses' knowledge and attitudes about the care provided to patients in CPR?

In this sense, the study aimed to analyze the knowledge and practices of nurses about the care provided to patients in cardiorespiratory arrest in the emergency room of a public hospital of medium and high complexity in Belém, State of Pará, Brazil.

II. METHOD

Descriptive, exploratory research with a qualitative approach, carried out with 10 nurses who work in the urgency and emergency of a public hospital of medium and high complexity in Belém, State of Pará, Brazil, from February to March 2019. Participants were identified through alpha numeric codes, with the following denomination: “E1, E2, E3, respectively, in which the “ P ” means participant and the number the order in which they were addressed in the interview.

Nurses working in the urgency and emergency service of the institution where the study was located were invited to participate. The following inclusion criteria were used: i) Be nurse; ii) Have at least one year of experience in the emergency department; iii) Belong to the age group of 18 to 75 years; iv) Show interest and willingness to participate in the study. The following were excluded: i) The other professionals of the nursing team and the multidisciplinary team; ii) Those employees who were not part of the effective staff of professionals working in the emergency room; iii) Those who had less than one year of experience in the service; and iv) Those who reported unavailability at the time of data collection for reasons of sick leave, maternity leave, vacation, breaks, among other leave.

An interview script was used as an instrument for data collection, and the semi-structured interview was used as a technique. The interviewees' statements were recorded for transcription, analysis and interpretation. Sampling was carried out for convenience, through the snowball process, in which the service professionals indicated other individuals to participate in the research.

The sample closure was due to saturation around two thematic axes. Minayo (2017) describes that in this type of research, the researcher closes the group when, after the information collected with a certain number of individuals, new interviews start to present a number of repetitions in their content. The interview script contained items related to the participants' socio-demographic characterization and knowledge about CRP and CPR, such as: 1) What is a CRP ?; 2) What are the signs and symptoms of a CRP ?; 3) Describe how you develop your care for patients with CRP; 4) When faced with a CRP, what are the first procedures to be adopted?; 5) what is the frequency of compression and ventilation recommended by the current CPR guidelines?; 6) What are the cardiac rhythms that the defibrillator needs during a CRP and what loads should be used?; 7) What is the indication, route of administration and care with the drugs used during CRP? After reading and signing the informed

consent form, data were collected, on days and times scheduled according to the availability of the participants.

The content of the interviews was transcribed in an original way, preserving the expressions used by the participants. However, to use them as a unit of analysis, orthographic corrections were made, excluding language vices, exchange or absence of letters, but maintaining linguistic vices that have meaning in the context of speech.

From the collection of information, it proceeded to the construction of the data, from the methodological framework of thematic content analysis proposed by Bardin⁸. The study corpus made it possible to organize the content into empirical categories, grouped according to the theme extracted from the responses. The results allowed the construction of five empirical categories, namely: 1) Infrastructure and permanent education; 2) Identification of the clinical signs of CRP; 3) Nursing care in CRP; 4) Nursing care in CRP, chest compression and ventilation techniques; 5) Shockable rhythms, defibrillation and knowledge of the pharmacology used during attempts at CPR.

This research was submitted to the Research Ethics Committee of the Nursing undergraduate course at the University of the State of Pará, with Certificate of Presentation for Ethical Appreciation n^o: 50869415.8.0000.5170, opinion number: 1,346,432, date of ethical approval CEP / CONEP: 12/02/2015. All participants signed the Free and Informed Consent Term and Authorization Term for Voice Recording before participating in the study. The research was carried out following the norms that regulate research involving human beings contained in resolution n. 510/169 of the National Health Council / National Research Ethics Commission.

III. RESULTS AND DISCUSSION

Among the ten participants, nine were female and one male. Age ranged from 33 to 51 years, mean of 44.6, median of 46 years, with standard deviation of 6.5 and coefficient of variation of 14.65%. The training time ranged from eight to 35 years, average of 19.8, median of 20, with standard deviation of 8.7 and coefficient of variation of 46.95%. Among the ten participants, 90% have a lato sensu post-graduation (specialization) in the areas of Health Services Management, Primary Health Care, Adult and Neonatal Intensive Care, Hospital Infection Control, Occupational Health, Obstetrics and Family Health (Table 1).

Table 1 – Characterization of research participants regarding age group, gender, time since graduation, updating in CRP / CPR and specialization (n.10), Belém, Pará, Brazil, 2019.

| CODE | AGE | GENDER | TIME SINCE GRADUATION | UPDATING IN CRP / CPR | SPECIALIZATION |
|------|-----|--------|-----------------------|---|--|
| E1 | 50 | F | 27 years | PALS - Advanced Pediatric Life Support. | Health Service Management; Epidemiology; Primary Care for Family Health. |
| E2 | 33 | M | 8 years | Pré-Hospital Trauma Life Support – PHTLS; Advanced Cardiac Life Support – ACLS. | Adult Intensive Care and Neonatal Intensive Care. |
| E3 | 51 | F | 26 years | There is no information | Family Health; Health Service Management. |
| E4 | 51 | F | 25 years | - | - |
| E5 | 43 | F | 9 years | - | Public health; |
| E6 | 44 | F | 16 years | Polytrauma rescue in the pre-hospital and hospital – 2013; | Hospital Infection Control; Worker's health; Public health. |
| E7 | 36 | F | 12 years | Advanced Cardiac Life Support – ACLS – 2012 | Nephrology. |
| E8 | 50 | F | 19 years | There is no information– 2013. | Nursing work; Obstetrics; Family Health. |
| E9 | 48 | F | 25 years | There is no information– 2012. | Public health; Worker's health. |
| E10 | 40 | F | 21 years | There is no information– 2014. | Family Health. |

Source: field research, 2019.

Infrastructure and permanent education

In this category, the professionals discussed issues related to physical structure, human and material resources, which they believe reflect directly on the quality of care provided to patients in CRP. Thus, 70% of the interviewees mentioned that the place has technological support apparatus and an adequate multidisciplinary team for assistance, as observed in the following statements:

E2: “We have the basics to assist a patient in PCR, material, equipment, medication, which may be missing is still better team training, better team training”.

E4: “Here we have all the devices, we need a little more professional qualification, but we have the devices, medication if necessary”.

E6: “Yes, we have the stretcher, the bed, the appropriate bed, the board for cardiac massage, the monitors, the necessary drugs, the necessary staff, doctor, nurse, nursing technicians”.

E7: “There are all the resources besides the material, medicine, the monitoring devices and the complete team, in addition to the respirators, have all the support for cardiorespiratory arrest”.

The lack of training reported by the interviewees is a serious problem for patient care, since the nursing professional must have scientific knowledge and practical experience to act in urgent and emergency situations, as they are usually responsible for initiating the BLS and as they are close to the patients for 24 hours, they are therefore responsible for identifying signs of cardiopulmonary breathing or any other worsening of the patient's clinical condition and initiating CPR maneuvers

when indicated. In addition to CPR procedures, nurses must coordinate an emergency care team, planning the necessary care, requiring continuous professional training from this professional, so that in this way they can develop critical and reflective reasoning, with quick decision making¹¹.

Studies show that nursing professionals generally have insufficient theoretical and practical knowledge, whom they consider to be ideal for performing high quality CPR based on consensus, and this deficit is associated with the absence or training with ineffective methods^{12,13,14}. In this study, this aspect was evident in the statements of the participants:

E2: "What we observe, a negative point that interferes with assistance is the lack of training of the team, especially the technical nursing team".

E4: "I see as a point that needs improvement, the training of the team. We are placed in a sector and do not have the training, we are learning".

E3: "First, the lack of an update course to assist patients in cardiac arrest, according to the physical structure that is not adequate to provide this type of care".

On this subject, the lack of training, motivation for the opportunity of the first job and the need to work, ends up allowing the performance of individuals with little experience in these services, which leads professionals to learn to work in this sector with routine, being sometimes "Trained" by colleagues themselves. In view of this problem, permanent education in this context is essential, aiming at training professionals in the sector; fundamental strategy so that there is a revision in the way of working, of the educational precepts, in order to make possible a qualification to the professionals, and to obtain as a result improvement of the services provided¹¹.

A study carried out at the Cardiology Units of a Hospital at the Federal University of Paraná, Brazil, showed an increase of 29.7% of correct answers in questions about cardiorespiratory arrest and CPR, when applying the same questionnaire before and after an action of Health education. In the same study, indexes higher than the initial one were obtained when the questionnaire was applied three and six months after training, corroborating with the premise that it is important to carry out continuous training, with intervals not exceeding three and six months, aiming to improve the retention of knowledge¹⁴.

Health care requires a structure and processes that, when integrated, produce a system that optimizes outcomes. An effective care system comprises all these

structural elements, processes, systems and patient outcomes, in a structure of continuous quality improvement⁷. The data show a lack of investment in training and qualification for emergency professionals, which could be the differential when carrying out actions related to CPR, which could, in conjunction with other factors, reduce the sequelae rates and increase survival neurologically intact in patients suffering from cardiorespiratory arrest.

Identification of clinical signs of cardiac arrest

In this category, statements related to knowledge about the identification of clinical signs of CRP were grouped. According to the new recommendations of the AHA Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care, the clinical signs of cardiorespiratory arrest are unconsciousness (unresponsiveness), absent breathing (apnea) or gasping (agonized breathing present in 40% to 60% cardiorespiratory arrest) and absence of central pulse (carotid or femoral). Early recognition of these signs allows for faster intervention with the immediate start of resuscitation maneuvers, which provides greater survival for individuals affected by cardiorespiratory arrest.

Searching for success in emergency care in CPR, the AHA presented, based on a wide literature review carried out by peers, the new guidelines, in which it is recommended that care should be quick, effective and in a timely manner, with an emphasis on chest compression high-quality, high-quality external ventilation, artificial ventilation and early defibrillation when indicated, using the algorithm to meet quality requirements (CAB, in which: C - means "Compression, A - Opening of the airways and B - Good ventilation")⁷.

Among the 10 nurses interviewed, 6 presented speeches with statements that meet the recommendations of the literature and consensus of the science of resuscitation. It was evidenced in the speeches that, although they mention the clinical findings of cardiorespiratory arrest, there seems to be conceptual confusion about such signs, in addition to presenting outdated knowledge about current consensus, which can compromise care in this context, as can be seen in the following statements:

E1: "That's when we see the answers using A, B, C, D. The patient who does not respond, we evaluate skin tone, the upper airways, the degree of consciousness, in this sense checking whether it is a stop or not".

E2: "There is no pulse, no breathing, bradycardia, sweating, decreased level of consciousness".

E5: "Breath below 18, SPO2 less than 85%, blood pressure = 80x50mmHg, loss of consciousness, heart rate less than 50bpm".

E7: "It is when the patient arrives without any respiratory function and sometimes with no heartbeat. There was a respiratory arrest but there is a heartbeat or sometimes he arrives without both".

There were many conceptual misunderstandings in the nurses' statements, in addition to being outdated. Regarding the "ABCD" mnemonic mentioned by participant E1, AHA updated it in its 2010 consensus for CAB, as already mentioned. It should be noted that individuals in bradycardia are not in cardiorespiratory arrest, as well as hypotensive individuals; these findings, when present, represent hemodynamic instability, which if not managed early and clinically stabilized can lead to cardiac arrest. Respiratory function may or may not be preserved, considering its function in its widest dimension (uptake, diffusion and use of oxygen by the cells) even in apnea, however with a decrease in the level of consciousness there is a deficit in the stimulus of the respiratory center in the central nervous system; there may be airway obstruction due to tongue fall, among other factors that are associated with impaired ventilatory/respiratory functions, but its function can still be preserved in another dimension.

When analyzing the nurse's statement E5, it is possible to notice the total ignorance and disagreement of the clinical signs of cardiorespiratory arrest mentioned, with the consensus of the science of resuscitation. In the response of nurse E1, it was noticed the disagreement and the lack of updates about the recommendations. Thus, it appears that this professional is unaware of the consensus and updates of AHA7. It is observed that the interviewee prioritizes the evaluation of skin color and upper airways before the evaluation of other parameters of greater relevance, which bring clear and greater benefits for the survival of patients victims of cardiorespiratory arrest recommended by peers in the guidelines.

It can be seen that the E7 professional believes that cardiopulmonary breathing is the absence of respiratory function and "sometimes the absence of heartbeat". It is worth mentioning that the absence of cardiac movements is one of the clinical manifestations of the respiratory cardiac paradigm. That is, there will always be an interruption of the heartbeat, otherwise it cannot be considered as cardiorespiratory arrest. Furthermore, professional E2 mentioned bradycardia as clinical evidence of cardiopulmonary arrest, however it does not fit as evidence of cardiac arrest reported in the consensus, since in cardiac arrest there is a decrease in heart rate and

no absence of mechanical activity, which characterizes cardiac arrest¹.

In this study, the question with the highest rate of correct answers was about the recognition of cardiorespiratory arrest, as it diverges from another study, which revealed that only 33.3% of nurses and 68.9% of nursing technicians have clear concepts and detected the cardiorespiratory arrest correctly¹⁵.

Nursing care in cardiorespiratory arrest

In this category, the statements related to the nurse's actions in front of an adult victim in cardiorespiratory arrest were grouped. With regard to the initial actions of the nurse towards the individual in intra-hospital cardiorespiratory arrest, it is evident that the individuals interviewed here have basic knowledge, and prioritize the fundamental actions recommended by the current consensus, however there are still deficits of knowledge and conceptual non-conformities, as can be seen in the following statements:

E1: "First procedure is massage and intubation".

E3: "We start to massage the patient and do the ventilation process with AMBU".

E9: "We provide cardiac massage at the same time doing ventilation and intubation, another professional does the medication part".

It should be noted here that the most appropriate and accepted term in the scientific world for "cardiac massage" is "external chest compression". Professionals E1 and E9 refer to intubation, making it clear that this procedure is performed in this context as a nurse's action, however it is worth mentioning that it is assigned to the medical professional to perform a definitive advanced airway, orotracheal intubation, according to the Exercise of Medicine Law (Law No. 12,842 / 2013)¹⁶. When a cardiorespiratory arrest occurs, nursing should assist in the procedures of intubation, drug administration, monitoring, and other actions applicable to each member of the nursing team in accordance with current legislation¹⁷.

In this context, the main aspects of Advanced Life Support in adult cardiology are: emphasis on performing high quality CPR maneuvers; early administration of vasopressor (administration of adrenaline during shockable and non-shockable rhythms is associated with increased rates of hospital survival); early administration of antiarrhythmic drugs in rhythms refractory to defibrillation, early defibrillation when indicated, recognition of reversible causes of cardiorespiratory arrest, installation of advanced airways, quality ventilation avoiding hyperventilation, in addition to

maintaining critical points of the BLS, such as: chest compressions in the frequency minimum of 100 not exceeding 120 compressions per minute, allow the full return of the chest to each compression, change the massagers every 2 minutes to avoid exhaustion and minimally interrupt CPR maneuvers. In addition, the use of hemodynamic monitoring, with waveform capnography can optimize the quality of CPR and serves as an indicator of Spontaneous Circulation Return and is an indicator for the cessation of attempts in CPR maneuvers^{7,18}.

Regarding the aspects related to the nurses' practice that refer to Advanced Life Support, the following statements stand out:

E5: "We administer medication prescribed by the doctor, check vital signs, administer oxygen".

E8: "We check for breath, check for airway obstruction, keep the airway clear so that medications can be administered".

The testimony of participant E5 relates to checking vital signs when assisting cardiorespiratory arrest. However, classic vital signs are more present in evaluations of patients in post-paradigm-respiratory care. The nurse must constantly evaluate and monitor the patient, but in addition to paying attention to the classic vital signs (blood pressure, heart rate, respiratory rate, temperature and pain), he must expand this monitoring with saturimetry/pulse oximetry, waveform capnography, cardioscopy, capillary glycemia, Noninvasive or invasive blood pressure (NIBP), blood gas when available, among other parameters of clinical and laboratory importance, in order to identify any sign of return of spontaneous circulation, complication and thus prevent damage and sequelae, increasing this forms the neurologically intact survival among these patients¹⁹.

It should be noted that participant E8 refers to the maintenance of permeable routes for drug administration, although it sounds strange, this is a method that can be used as an alternative in CPR procedures, in the event of the impossibility of IV or IO access. Although many drugs can be absorbed by the lung, the endotracheal route is not recommended as preferred. Studies report that drugs such as lidocaine, adrenaline, atropine, naloxone and vasopressin can be effectively absorbed via the endotracheal route. It is described that the administration of these drugs through the endotracheal route, during CPR, results in lower plasma concentrations when compared to the same doses administered intravenously (IV).

Animal studies suggest that low plasma concentrations of adrenaline, after endotracheal administration, may

produce beta-adrenergic effects, resulting in vasodilation. If intravenous IV and intraosseous (IO) access are not possible to be established, adrenaline, lidocaine and vasopressin can be used by the endotracheal route, paying attention to the change in dose from 2 to 2,5 times higher than the doses administered by route intravenous, and dilution in 5 to 10 ml of saline or sterile water²⁰.

Chest compression and ventilation techniques

When asked about the techniques of external chest compressions and ventilation, the following speeches emerged:

E2: "The ratio is 30 massages for 2 breaths in patients not intubated. The technique is one hand extended over the other at the level of the sternum, so you can make the thoracic comprehensions".

E10: "30 compressions for 2 breaths. Hands splayed fingers interlaced and positioned in the region of the sternum, lightly presses the left hand with a depth of 5 cm allowing time for the return with a rhythm of about 80 - 100 movements per minute".

We can see that the statements of the professionals analyzed here correctly describe the relationship between external chest compression and ventilation recommended by the current guidelines, 30 compressions for 02 ventilations. However, when referring to the technique used in CPR, the interviewees took the placing of hands on the sternum bone as an anatomical reference, however without defining the exact location of the hand, to be positioned on which sternal follow-up. What is believed to be an action that can compromise the quality of CPR^{4,7}. In addition, participant E10 mentions that the frequency to be used is "more or less 80 - 100 movements per minute", again denoting outdated and ignorance about the technique recommended by the consensus, both with regard to the frequency of compressions, the appropriate depth and laterality of the hands.

Regarding the actions after the recognition of cardiorespiratory arrest, according to the AHA, external chest compressions should be performed at a frequency of 100 to 120 / min, compressing to a depth of at least 2 inches (5cm), not exceeding (2,4 inch) 6 cm, allow the full return of the chest to each compression and minimize interruptions; the professional must take care not to perform the compressions more or less than the recommended frequency, as well as not to compress more than 2.4 inches (6 cm) or lean on the patient's chest in the interval between compressions. This priority focuses on changing the pattern from ABC to CAB, increasing the emphasis on prioritizing compression over airway opening and ventilation⁷.

The main aspects to be observed in CPR are frequency, depth, return of the chest to each compression and minimal interruption. For adequate tissue oxygenation, it is essential to minimize interruptions in chest compressions and maximize the amount of time chest compressions generate blood flow¹⁸.

Regarding the technique and anatomical points that should be used as a reference for performing external chest compressions, only the tenar and hypotenar region of a hand (randomized clinical trials describe that the dominant hand had better CPR quality and better outcomes) should be positioned on the lower half of the victim's sternum bone, and the other hand overlapping the first, interlacing the fingers, with the hand that first touches the flat chest, without the rest of the rescuer's hand touching the victim's chest. Furthermore, it is recommended to extend the arms and keep them at a 90° angle, perpendicular to the victim's body^{7,18-21}.

Shockable rhythms, defibrillation and knowledge of the pharmacology used during attempts at Cardiopulmonary Resuscitation

In this category, it was found that there is a lack of knowledge related to the identification of cardiac arrest rhythms that require defibrillation, as well as the loads used in the defibrillator during cardiorespiratory arrest. No professional knew how to answer the rhythms that require defibrillation, and only one professional mentioned the load used in the defibrillator during cardiorespiratory arrest, however, his response was not adequate when compared to current consensus. The data found here converge with the study carried out in Pernambuco, Brazil, in which most nurses and nursing technicians did not know how to recognize the rhythms of cardiorespiratory arrest, scientifically described in the literature, namely: TVSP, FV, AESP and asystole¹.

Regarding the knowledge of cardiac arrest rhythms, a survey conducted with nursing professionals who work in the Intensive Care Unit, revealed that these professionals considered only asystole as a cardiorespiratory arrest modality, not pointing out the other modalities (FV, TVSP and AESP), in addition to not understanding which rhythms require defibrillation and in which there is no shock recommendation¹⁵.

Cardiopulmonary arrest occurs in 3 phases, namely: electrical phase, in which there is a cardiac collapse; circulatory or hemodynamic phase, characterized by deprivation of substrates necessary for metabolism; and metabolic phase, with acidosis and cellular dysfunction. Cardiopulmonary arrest can be caused by four rhythms or modalities: FV, TVSP, AESP and asystole. The victim's survival depends on the integration of the BLS, the

Advanced Life Support in Cardiology, and post-resuscitation care, in addition to the care in the recovery phase recommended in the current CPR guidelines of 2020. For victims of cardiopulmonary in the FV modalities and TVSP, performing CPR and early defibrillation has shown a significant increase in survival^{7,18-22}. However, there are no recommendations on shock delivery in cardiopulmonary arrest due to asystole and AESP⁷. Despite the clear recommendation in consensus and guidelines, some studies have pointed out that health professionals often recognize asystole and AESP as shockable cardiac rhythms^{1,7}, as can be seen in the statements:

E2: "Atrial fibrillation, ventricular tachycardia, using 260J of load. Using 1 or 2 mg of adrenaline".

E6: "Asystole and atrial fibrillation, starting with 50J, according to patient assessment and medical advice".

When comparing the findings of this study with the guidelines and consensus on the topic, we show that the professionals evaluated here lack knowledge about the subject, as it was evident in the statements, that they do not know which rhythms need defibrillation, as well as which loads are used in the defibrillator. It is described that when performing the monitoring, and the revealed pace is either FV or TVSP, there is a clear recommendation to defibrillate, considering that the studies describe better survival rates in this group of patients. In the biphasic defibrillator, the shock energy must be between 120 and 200J, according to the manufacturer's guidelines. In the single-phase defibrillator, the recommended load is 360J^{7,23}.

Regarding the use of vasopressors, represented here by the adrenaline reported by the professional E2, we observed convergence with the current guidelines with regard to the drug of first choice. However, the nurse ponders about the dose to be administered in the wrong way, considering 1 to 2 mg. In a study conducted in a public university hospital in the interior of Paraná, Brazil, it was identified that there was a significant difference in the number of correct answers regarding issues related to the route of administration, drug used and mechanism of action, when performing analysis pre and post educational action, demonstrating that nursing professionals are unaware of the characteristics and indications of the drugs used during CPR. Given this, the importance of continuing education in the hospital environment is emphasized once again, especially in emergency services²⁴.

It is a consensus that after the first shock, CPR is performed for 2 minutes, followed by a rhythm check on the monitor. If FV or TVSP rhythms persist, a new high energy shock is performed, followed by CPR for 2 minutes. The timing for administering the vasopressor has not been established, and its onset should be considered after establishing an intravenous or intraosseous approach. Early administration of vasopressors has the ability to optimize myocardial blood flow before the next shock. At any pace of cardiorespiratory arrest, the first vasopressor drug of choice should be adrenaline. Although the level of evidence is limited, administration of adrenaline is recommended at a dose of 1 mg every 3 to 5 minutes via IV or IO^{7,18}.

Participant E6 states that Asystole and atrial fibrillation (AF) are the stopping rhythms that require defibrillation, and that the load to be used is 50J, however Assístolia is a pace in which defibrillation is not indicated because it does not present benefits in clinical trials. In this modality, it is necessary, then, to promote high quality CPR, administration of vasopressor drugs, in addition to recognizing and treating the reversible causes of cardiorespiratory arrest (5H and 5T). Atrial fibrillation, mentioned by these participants, is not recognized as a rhythm of CRP, and despite being a potentially fatal arrhythmia, it is not characterized as cardiac arrest because there is electrical, mechanical and metabolic activity^{7,25}.

IV. CONCLUSION

The objective of analyzing nurses' knowledge and practices regarding the care provided to patients in cardiorespiratory arrest in the emergency department of a public hospital of medium and high complexity in Belém, State of Pará, Brazil was achieved as demonstrated in the results.

It was evident that the studied population has deficient and sometimes insufficient knowledge, mostly marked by mistaken speeches and uncertainties, revealing gaps in knowledge and divergences in relation to the resuscitation science consensus necessary to perform adequate care during a cardiac arrest. Knowledge deficiency is multifactorial, and may be related to the lack of continuous and permanent education in the service analyzed, and the lack of personal motivation for the constant search for knowledge, in addition to the lack of incentive for updating proposed by the management in the studied scenario.

It is understood that cardiorespiratory arrest is a sudden event that demands from nurses the scientific knowledge, technical skill and critical reasoning, as these

professionals are most often the first to identify and initiate CPR maneuvers. In this sense, inadequate knowledge about cardiorespiratory arrest and CPR can contribute to the worsening and / or the appearance of permanent sequelae, thus increasing the morbidity and mortality of assisted patients.

The significant number of incorrect answers in this research evidenced the need to update all nurses who work in the studied scenario, with the realization of theoretical and practical training in a continuous and periodic way about the actions performed in the face of a cardiorespiratory arrest, in order to enable that professionals provide fast, safe and effective assistance within what is recommended in the international consensus of the AHA Cardiopulmonary Resuscitation science, maintaining the uniformity of the conducts between the teams and thus improving the care provided to the patient, and consequently the neurologically intact survival.

Thus, it is conjectured that some of these professionals may be encouraged to perform the service motivated by the fulfillment of actions associated with solidarity, without, often, having knowledge based on the theme.

The limitations of the study were to carry out only the theoretical knowledge approach and not have evaluated the practical skills, in addition to a small sample of the participants, which does not allow for more comprehensive results and generalizations. Additionally, the study was carried out in a specific region of Brazil, which makes it difficult to generalize the results obtained for a national and international scenario.

It is understood that the institution of training and their evaluation is fundamental, in a theoretical and practical way, as a way to optimize and consolidate knowledge continuously, in periods not exceeding three to six months, which may be the subject of other studies.

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