



## KNOWLEDGE AND SKILLS OF NURSING SCHOLARS ON BASIC LIFE SUPPORT

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### ABSTRACT

To evaluate the theoretical knowledge and skills of nursing interns on cardiopulmonary arrest. A descriptive study has been performed with 28 nursing students from a public institution in the north of Ceará. To collect data, a questionnaire has been applied with 24 objective questions about basic life support and simulated cardiorespiratory arrest situation. In the data analysis, descriptive statistics and binomial testing were used. Academic skills deficit was evidenced especially in the depth ( $p = <0,000$ ) and correct speed ( $p = <0,000$ ) of the compressions. This University needs to provide a higher level of knowledge and skills in order to improve undergraduate nursing students in emergency procedures such as chest compressions.

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## INTRODUCTION

In the world scenario, CPA, defined as the cessation of cardiac mechanical activity and confirmed by the absence of signs of circulation, is considered a public health problem, especially when it occurs out of a hospital environment where the most important determinant for survival is early onset of the cardiopulmonary resuscitation (CPR) maneuvers performed by the health professional or the layman trained in BLS actions (Grasner *et al.*, 2016). Cardiac and respiratory impairment is severely incompatible with life, requiring rapid and effective intervention.

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That race against time occurs so intensely that 7 to 10% chance of survival is lost every minute without assistance after the involvement by CRA (Gonzalez *et al.*, 2013). Numerous studies show that survival rates and patient outcomes after CRA are directly related to the speed with which CPR is initiated and the quality of its performance (Pettersen, *et al.*, 2018). Thus, early and quality care through standardized actions has a greater probability of intervention effectiveness, avoiding mortality, brain lesions and irreversible sequels (Ferreira *et al.*, 2014). However, even nowadays, knowledge and skills about CPR among health professionals and students remain scarce, causing harm to patients. Because of this, constant updating and investment in training and skills are indispensable for the improvement of team performance in supporting the life of many individuals (Ferreira *et al.*, 2012).

It is imperative that during an undergraduate nursing course the student has the possibility to develop competencies to act in an emergency situation with scientific knowledge and adequate abilities considering that, with the evolution of the care of victims of CRA, nurses have become active participants in the care team, taking responsibility for the care provided to these victims. Although, during nurses training, the theoretical and practical contents related to CRA and CPR maneuvers have been given superficially, limited, and often do not meet the needs of students (Kumar *et al.*, 2008). This situation is considered of concern facing the fact that these students will be inserted in the labor market, becoming responsible for attending to the individual in a CRA situation in an effective way, which will contribute to reduce the number of deaths and complications resulting from this clinical situation (Oliveira *et al.*, 2014). In this perspective, it is evident the importance of nursing scholars to have a mastery in the management of necessary care when facing an emergency situation such as CRA, since adequate knowledge about quality CPR care may have a positive impact on the outcome of patients' lives. Contributing to the training of the nursing student in order to perform effectively in CPR is fundamental to improve the assistance provided to the population in emergency situations. Given the relevance of the correct execution of CPR, it is pertinent that more nursing students are able to offer better quality CPR and, therefore, there is a greater chance of survival for the individual affected by the CPR. From this perspective, these questions arise: what is the knowledge of nursing scholars through the theory learned in the classroom, regarding PCR and Basic Life Support? Are there differences in knowledge and skills in cardiopulmonary resuscitation?. Thus, the objective of this study is to evaluate the theoretical knowledge and the abilities of nursing interns on CRA.

## MATERIALS AND METHODS

This is a descriptive/exploratory study, with a quantitative approach, developed in a Higher Education Institution (HEI) of public character, located in the northern region of the state of Ceará. This HEI offers a full-time Nursing course, organized in a modular manner, in 10 semesters, with a conclusive regime in five years and a workload of 5060 hours. Data collection took place in May 2018, after the authorization of the Coordination of the Nursing Course and the approval of the Ethics Committee in Research of the mentioned University under protocol numbered 2.529.077/2018. Population of this study was composed by nursing students of the 7th semester, which refers to the module "The person in critical condition", which counts with 180 hours of theoretical and practical contents on urgency and emergency. The choice of students in the 7th semester is justified because it is assumed that the research topic was approached in a comprehensive and recent way, thus enabling a better exploration of the theme. The sample was defined by convenience, according to the students' willingness to participate in the study, according to the following inclusion criteria: age equal to or greater than 18 years, being duly enrolled in the course and module and agreeing to voluntarily participate in the study. Students who had some technical course or preparation for the subject as firefighters and nursing technicians were excluded from the sample. Thus, the sample consisted of 28 students. Initially, one of the researchers requested permission to approach the students to the coordinator of the module. Following this, students were approached in the classroom during the break

between classes so as not to hinder the development of academic activities. Students were informed about the objectives of the study and invited to participate voluntarily in the research. After the agreement and signing of the Written Informed Consent Form (WICF), data were collected. A questionnaire was used as a data collection technique, containing variables of interest, organized in two parts: profile of the students - age, gender, training courses in BLS after admission to graduation and participation in academic leagues of (Consorti *et al.*, 2010), adapted by the researchers based on the guidelines of the American Heart Association (AHA, 2015). After completing the knowledge test, participants were asked to respond to a simulated CPR situation and individually conducted to a room where two monitors were present and to evaluate the teaching-learning process of students' ability to practice CPR maneuvers, presenting a case of an irresponsive patient. Practice was performed on a Prestan® adult CPR manikin, which is a doll with anatomical proportions and human-like thoracic resistance, with a click sound that signals the correct depth of compression. A standard model for evaluating the practice of cardiopulmonary resuscitation was used as a checklist that allows the evaluation of the execution of 15 items that compose it (Neto, 2018), which was filled during the time of collection by a practitioner nurse and expertise on the theme. Data obtained were tabulated in the Excel 2016 program and analyzed in the statistical program Statistical Package for the Social Sciences (SPSS) version 20 for Windows. Binomial test was used to verify the percentage of correctness of the items related to the knowledge and ability on CRA, in which  $p$  values higher than 0.05 indicated that there were a number of correct answers among the students, statistically not inferior to 85%, rejecting null hypothesis.

## RESULTS

The 28 students who participated in the process of evaluation of theoretical knowledge and abilities had as main characteristics the predominance of female sex, with 78,5% in relation to male sex. The mean age was 22,7 years old and standard deviation was 2,833, being 39,2% up to 21 and 60,7% between 22 and 34 years old. Regarding the experience of students in courses or training in urgency and emergency area, it was identified that 53,5% had not previously taken courses, and only 10,7% had already participated in urgency and emergency academic leagues. Regarding the theoretical knowledge of students about the clinical signs of a CRA, 92,9% ( $p = 0,937$ ) of the students stated that this situation is characterized by loss of consciousness and absence of the carotid pulse. When questioned about the timing to start chest compressions, 42,8% of the students responded according to the AHA guidelines, which recommends the initiation of compressions after verifying that the victim has no pulse and immediately after the shock. Regarding the AHA survival current, 32,1% described the correct sequence. Considering the number of compressions per minute to be performed in adult victims, 64,3% ( $p = 0,005$ ) correctly answered the question, that is, 35,7% do not know that 100 to 120 compressions per minute should be performed per adult victim. Regarding the positioning in which the victim should be in order to perform the cardiac massage, correct answers were 100%. On the depth of chest compression during compression, 57,1% responded correctly. When asked about the sequence of positioning of the hands and arms in the thoracic compression maneuver, only 50% of participants indicated the correct sequence.

**Table 1. Distribution of students' responses in knowledge assessment - Sobral, Ceará, Brazil, 2018**

| Item  | Correct* |       | p-value† |
|---|----------|-------|----------|
|   | N        | %     |          |
| Definition of CRA   | 26       | 92,9  | 0,937    |
| Verifying the responsiveness of a victim who has been unconscious | 27       | 96,4  | 0,989    |
| Location to check the heartbeat of the victim                     | 28       | 100   | 1        |
| When you start compressions                                       | 12       | 42,9  | <0,000   |
| Links of the survival chain                                       | 9        | 32,1  | <0,000   |
| How to act when detecting a victim's irresponsibility             | 23       | 82,1  | 0,413    |
| Care in using the AED   | 23       | 82,1  | 0,413    |
| Positioning of hands and arms during CPR                          | 14       | 50,0  | <0,000   |
| Position of the victim  | 28       | 100,0 | 1        |
| Number of compressions per minute                                 | 18       | 64,3  | 0,005    |
| Number of compressions and emergency breaths                      | 25       | 89,3  | 0,812    |
| Compression of the thorax in centimeters                          | 16       | 57,1  | 0,000    |
| Time for another person to do the compression                     | 23       | 82,1  | 0,413    |
| Strength during compression                                       | 23       | 82,1  | 0,413    |
| When to stop the compressions                                     | 22       | 78,6  | 0,235    |
| Concept of AED  | 27       | 96,4  | 0,989    |
| Sequence when using AED   | 20       | 71,4  | 0,048    |
| First Concern When assisting an unconscious Victim                | 25       | 89,3  | 0,812    |
| Routes of drug administration during CRA                          | 22       | 78,6  | 0,235    |
| Most commonly used drugs during CRA                               | 24       | 85,7  | 0,622    |
| Purpose of drugs used   | 20       | 71,4  | 0,048    |
| Responsible for checking the crash cart                           | 25       | 89,3  | 0,812    |
| Measures to ventilate the victim of CRA                           | 19       | 67,9  | 0,017    |
| Shock-Proof PCR rhythms   | 17       | 60,7  | 0,001    |

\*Frequency and percentage of correct answers out of the total of assessed scholars;

† Binomial Test.

**Table 2. Aspects of the skill assessment procedure (practice) - Sobral, Ceará, Brazil, 2018**

| Hability  | Correct* |      | p-value† |
|---|----------|------|----------|
|   | N        | %    |          |
| 1. Places the hands on the shoulders of the victim and move them                            | 16       | 55,2 | 0,000    |
| 2. Emits sound to call for victim   | 19       | 65,5 | 0,017    |
| 3. Called for help  | 19       | 65,5 | 0,017    |
| 4. Observe the victim's chest and abdomen for respiratory movements                         | 15       | 51,7 | <0,000   |
| 5. Positioned next to / near the shoulder of the victim                                     | 18       | 62,1 | 0,005    |
| 6. Overlapped his/her hands   | 20       | 69,0 | 0,048    |
| 7. Positioned the hypothenar region of the lower hand on the center of the victim's chest   | 17       | 58,6 | 0,001    |
| 8. Positioned his/her shoulders at 90 ° to the victim's chest                               | 18       | 62,1 | 0,005    |
| 9. Started chest compressions   | 22       | 75,9 | 0,235    |
| 10. Maintained straight arms (without flexing elbows) during chest compressions             | 17       | 58,6 | 0,001    |
| 11. Moved his torso for application of force in the compressions                            | 15       | 51,7 | <0,000   |
| 12. Performed chest compressions at a minimum depth of five cm                              | 7        | 24,1 | <0,000   |
| 13. Performed chest compressions at the correct speed (100 to 120 / min)                    | 8        | 27,6 | <0,000   |
| 14. Allowed the return of the chest to the anatomical resting position between compressions | 8        | 27,6 | <0,000   |
| 15. Did not interrupt the compressions  | 14       | 48,3 | <0,000   |

\*Frequency and percentage of correct answers out of the total of assessed scholars;

† Binomial Test.

Regarding the correct sequence to use the Automatic External Defibrillator (AED), 71.4% ( $p = 0,048$ ) correctly reported the follow-up to the shock. However, 39,2% among scholars did not know what the shockable rhythms were during CRA. In the evaluation of students' ability, 55,2% placed their hands on the victim's shoulder and moved them. Among 28 academic students, 65,5% ( $p = 0,017$ ) emitted sound to call the victim and called for help and 75,9% ( $p = 0,235$ ) initiated chest compressions. Regarding chest compressions, 24,1% ( $p = 0,000$ ) performed chest compressions at a minimum depth of five centimeters, 27,6% performed chest compressions at the correct speed (100 to 120/min) and allowed the return of the chest to the anatomical resting position between compressions.

## DISCUSSION

The victim in CRA needs prompt and effective care, increasing their chances of survival. Thus, early recognition of CRA followed by the establishment of BLS are essential strategies for survival.

Thus, it is understood that the preparation of future health professionals should be based on methodologies and practices that subsidize actions and effectively serve the general population (Silva *et al.*, 2017). The objective of the initial evaluation of the victim of CRA is the immediate detection of clinical signs suggestive for CRA. In this sense, the first course to be taken by the rescuer is the assessment of the patient's level of consciousness and carotid pulse, which will present unconsciousness and absence of pulse (Oliveira *et al.*, 2014). In that study, most participants (96,4%) correctly answered this question, indicating compliance in the recognition of the individual in CRA. After this step, chest compressions should be started immediately when the victim has no pulse (AHA, 2015). AHA However, less than half of the participants ( $p < 0,000$ ) correctly answered this question, which points out the need for theoretical reinforcement on the basic procedures of the BLS. Regarding students' knowledge about the chain of survival recommended by the AHA guideline of 2015, it was observed that only 32,1% of the students were absent from a study carried out in a public university in the state of Bahia,

where 84,4% of the nursing students answered correctly about the chain of survival (Silva *et al.*, 2015). Concerning the positioning of hands and arms during CPR, it was noticed that only half of students describe the sequence for correct positioning during the chest compression maneuvers. Research performed in a hospital in MinasGerais identified that only 56,2% of nurses knew the positioning of hands and arms (Alves *et al.*, 2013). Following AHA guidelines, cardiac rhythms that are shocking in CRA are ventricular fibrillation and tachycardia. The majority of CRA victims are in the heart rhythm of ventricular fibrillation or pulseless ventricular tachycardia. For these victims, the initial elements of BLS are chest compressions and early defibrillation (AHA, 2010). In this study, 60,7% of undergraduates knew these rhythms. Regarding the relationship between the performance tests, the results lead us to infer that there was a difference between the theoretical and practical performance of the students, corroborating with several national studies carried out in public and private universities (Silva *et al.*, 2017; Silva *et al.*, 2015; Caveião *et al.*, 2017; Gomes and Braz, 2012). An international study, conducted in India, also identified that nursing students performed well on the theoretical test of CPR, however, resuscitation skills were deficient (Sangamesh *et al.*, 2017). In general, it has been observed that undergraduates have skill deficits in several aspects, such as positioning the hands correctly and keeping arms straight, moving their torso to apply force, performing chest compressions at the correct depth and speed, allowing the return of the to the anatomical resting position between the compressions. A study carried out with 8th semester nursing students at a University in Rio de Janeiro found that 75% of the students did not have the ability to correctly perform chest compressions maneuvers (Gomes and Braz, 2012).

AHA emphasizes that 100 to 120 chest compressions per minute should be performed, with a minimum depth of five centimeters, so that CPR is considered of good quality, guaranteeing the maintenance of circulation and oxygenation of the body, responsible for conducting oxygen to vital organs (AHA, 2015). AHA In this study, it was observed that the minority of the undergraduates (27,6%) performed the correct compressions per minute, while only 24,1% made the compressions at the depth recommended by the AHA. The importance of compressing the chest to a depth of at least five centimeters is justified by the fact that this will create a greater blood flow, mainly by increasing intrathoracic pressure and directly compressing the heart (AHA, 2015). Another component for quality CPR comprises achieving full chest return after each compression. However, only 27,6% of students allowed the return of the thorax to the anatomical resting position when performing the compressions. The total return of the chest wall creates a relative negative intrathoracic pressure that promotes venous return and blood flow (AHA, 2015). The level of knowledge and skill of prospective nurses about CRA is something that needs to be considered and improved through continuing education policies to ensure that the health team has up-to-date knowledge and is prepared in theory and practice to avoid complications and outcomes fatalities in emergency situations (Alegria *et al.*, 2017). In this sense, we value the adoption of methods that stimulate effective student participation through active methodologies in all stages of the teaching-learning process of CRA, such as the simulation method (Costa *et al.*, 2015), and the Objective Clinical Examination (OSCE), which has been introduced with an assessment tool in the nursing scenario and has gained

space as an evaluation tool, since it facilitates the identification of clinical acumen in students, as well as being an excellent opportunity for scholars to reflect on their performance and clinical skills / abilities (Medeiros *et al.*, 2014).

## Conclusion

From the findings of this study, it is inferred that nursing scholars have theoretical knowledge about CPR, however, they present a skill deficit in chest compression maneuvers recommended by the American Heart Association. The points identified as deficient were the links of survival chain, moment of compression onset, positioning of hands and arms, shockable rhythms, speed and depth of compression and return of the chest between compressions. In view of the observed aspects, the relevance of the training to strengthen the teaching of scholars is verified, from a perspective of continuing education in order to stimulate them about the basic steps necessary for the care of victims of CRA. Thus, this study may favor reflective discussions about the reformulation and intensification in the nursing students' education, in theoretical and practical knowledge related to the subject. Universities need to provide a higher level of knowledge and skills regarding the attendance of CRA, with a view to improving undergraduate nursing students in relation to emergency procedures such as chest compressions. Although the study presents limitations because it presents only the knowledge and abilities of a group, it was possible to identify their level of skills, evidencing a deficit in the attendance to the CRA. In order to improve students' knowledge and skills in patient care in CRA, new studies must be carried out, with a larger number of students and different classes, in order to list and compare new data and evidence on this subject.

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