Knowledge rate of students of the nursing graduation course on Basic Life Support

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Abstract— Objective: to analyze the knowledge of students of the Undergraduate Nursing Course of a Private Higher Education Institution in Belem, State of Pará, Brazil on Basic Life Support. Method: A cross-sectional, descriptive, exploratory study with a quantitative approach was carried out from September to October 2018. Result: In the evaluation of knowledge about Basic Life Support, on a scale of 0 to 100 points, it was verified that the lowest grade was 20.6 points and the highest was 90.4. The mean was 63.5 points, with a standard deviation of 15.5. The median was 64 points, with the interquartile deviation of 20 points (54 to 74 points). It was evidenced that 62% of the students had a grade lower than 70 points. And 19% scored less than 50 points. The population studied has reduced, and sometimes inadequate, knowledge about cardiorespiratory arrest and cardiopulmonary resuscitation, which may compromise the care provided, leading to damages to resuscitation and, consequently, to contribute to the appearance and / or aggravation of sequels, impacting on increased morbidity and mortality. Conclusion: it is understood that it is fundamental to establish training and evaluation of these, in a theoretical and practical, as a way to optimize and consolidate knowledge even during academic training.

Keywords— Cardiopulmonary resuscitation. Bachelor of Nursing. Education in Nursing.

I. INTRODUCTION

Though great advances in the care of victims of cardiorespiratory arrest (CA) have been achieved, there's still variability on the probability of survival, that can not be attributed exclusively to the clinical characteristics of the patient. In order to CA victims have bigger chances of survival and receive the highest quality care, which follows scientific evidences, it is necessary that the training in Cardiopulmonary Resuscitation (CPR) use educational principles based on research that translate scientific knowledge in practice[1,2,3]. These recommendations are based on the guidelines of the International Liaison Committee on Resuscitation (ILCOR) and the on the consensus of the American Heart Association (AHA)[4].

Basic Life Support (BLS) is composed by steps and maneuvers put in sequence, which include evaluation and immediate intervention in each phase[5]. Otherwise, CA is a sudden stop on heart mechanical activity confirmed by unconsciousness (a person with no response), central circulation absence (pulse of carotid or femoral are absent), and apnea (no breathing) or agonic breathing (gasping)[3,6].

CPR is the set of maneuvers performed after a CA with the objective of artificially maintaining the arterial flow to the brain and other vital organs until the return of spontaneous circulatio2n (RCE) occurs[7]. Great part of CPR's success is due to nurses' ability to perform qualitative care in this context. Thus, they need to know how to act with efficiency front these occurrences[3,6].

Most cases of CRP occur in adults, and the highest survival rates occur when the viewer has the attitude of triggering a primary sequence of saving actions[3]. In the meantime, there are undeniable advances in CPR maneuvers like everything else; and great challenges still to be achieved, since success in the procedure depends on qualitative actions carried out in a timely manner, and a trained and harmonious team[8].

In this context, knowledge building and skill development in BLS is necessary because the earlier a PCR recognition occurs and high quality CPR maneuvers are instituted, lives can be saved with fewer sequelae rates[3].

Survival chain emphasizes the need for rapid response through surveillance and prevention, early recognition of CA and activation of emergency services, high-quality and immediate CPR, early defibrillation, advanced immediate life support, and post-CA care initiated immediately after the spontaneous circulation return[1].

Efforts to gather scientific knowledge about PCR, and to establish a standard and uniformity for its treatment, have been carried out since the beginning of the 60's when ILCOR's creation; that systematized the CA approach through a wide scientific review, leading to the first international scientific consensus in 2000, and has been conducting periodic reviews of this consensus, which ones occurred in 2005, 2010, 2015 and 2018[1,3,9,10].

International resuscitation committees directed efforts on improving and producing knowledge about CPR, review periodically guidelines and turning simpler the care process[1]. It is also necessary to carry on research on teaching methods that might increase the retention of knowledge and skills in CPR[11].

The teaching strategies focused on the training of large-scale CPR maneuvers depend on the existence of local organizations capable of disseminating training geared to these techniques[9]. The greatest challenge, especially in Brazil, is to increase access to of CPR teaching and establish processes for continuous improvement of its quality[12].

CA is a dramatic event, responsible for high morbidity and mortality, even in situations of ideal care. Time is an important variable; it is estimated that each minute of PCR decreases by 10% the probability of survival[3,13]. Until few years ago, PCR was a synonym with death, because no more than 2% of the individuals survived this event. Nowadays, the survival rate reaches more than 70% if the assistance is early and effective and is substantially related to the time between the incident and the beginning of the resuscitation, and the technical effectiveness in performing the CPR maneuvers[8].

The assistance to CA must be performed quickly, firmly, safely and calmly, in order to avoid panic and mismatch among professionals. However, what is observed is that in the mean time, resuscitation efforts are tumultuous, with non-systematized actions that lead to overlapping of tasks, culminating in repetitive acts that lead to a crucial loss of time for patient survival[14].

Nursing professionals are usually the first to respond to a CA and initiate LBS maneuvers while awaiting the advanced support staff. The immediate, competent and safe application of CPR maneuvers by the first interventors are factors that contribute to the success of the care and, consequently, to the neurologically intact survival. Thus, it is necessary to mobilize the cognitive, psychomotor and affective abilities inherent to the Nurse's competence to act on these occurrences[14].

It is described that professionals and health graduates do not have satisfactory scientific knowledge both theoretical and practical in CA/CPR. This lack of knowledge is a consequence of the academic formation, in which the approaches on the subject are punctual and superficial, therefore, insufficient to provide the acquisition of solid knowledge necessary for the action against the CA[15,16,17].

Several Nursing Schools include content in their curricula with learning objectives focused on BLS. However, most of the nurses do not feel able effectively to act before the CA[3,4,17]. Despite the skills proficiency in BLS and Advanced Life Support (ALS) is one of the graduation objectives, there is still a great diversity on contents turned to the theme, between the different schools, so that the offered trainings do not comply the criteria described in the consensus of the science of resuscitation[18].

Thus, the present study aimed to analyze the knowledge of undergraduate Nursing students from a private Higher Education Institution (HEI) in Belem, State of Para, Brazil on BLS.

II.   METHOD

A cross-sectional, descriptive, exploratory study with a quantitative approach was carried out at a private HEI in Belem, State of Para, Brazil, from September to October 2018. The sample consisted of all the students enrolled in the 8th, 9th and 10th semester of course. The HEI has 9 classes, totaling a sample of N = 285 students. We adopted as sample error a margin of 5%, with a confidence level of 95% - establishing an initial sample of n = 164 students. For the purposes of sample calculation, a systematic random sampling was used on categorical variables, using the following formula[19]:

$$n = \frac{N \cdot Z2 \cdot p \cdot (1 - p)}{Z2 \cdot p \cdot (1 - p) + e2 \cdot (N - 1)}$$

In which:

n – calculated sample

N - population

Z – standard variable associated to the confidence level

p – true probability of the event

e – sample error

For this study we worked with a sample of 164 participants, representing 57.54% of the total sample.

A brief meeting was held with the students in the classroom, explaining the methodology and objectives of the research. After clarifying the doubts about the study, the Informed Consent Form (ICF) was given with the appropriate guidelines to be analyzed and signed by the possible participants of the research.

A structured questionnaire validated by Felix (2013)[20] was used, with 26 multiple choice questions, adapted to the new CPR guidelines, similar to that used by the American Heart Association (AHA) for training, with four possible answers and only one correct question , based on the AHA guidelines, 2015.

The data was stored in Windows® Office Access 2018 software and the results were tabulated and presented as tables and graphs. Statistical processing was done through the software Bioestat® 5.3 (21) and Statistical Package for the Social Sciences® (SPSS) 22.0.

To describe the sample profile according to the variables under study, it were built: frequency tables of the categorical variables (answers of the questions), with the absolute (n) and percentage (%) values; descriptive statistics of the continuous variables (age, gender, etc.), with mean values, standard deviation, minimum, maximum and median values. The evaluation of BLS knowledge was performed based on a scale from 0 to 100 points, in which 0 (zero) represents the lowest hit rate and 100 (a hundred) the highest index.

In the comparison of the categorical variables, the Chi-square test of adhesion was used. The analysis of variance (ANOVA) and the "Student's T-test" were applied to compare the performance in the knowledge test according to the semester and shift (21). The significance level adopted for the statistical tests was 5%, that is, $p \leq 0.05$.

Emphasis is given to compliance with the requirements of the National Health Council (NHC) through Resolutions n. 466/2012 and 510/16 of the National Council of Research Ethics (NCRE) and, accordingly, the research was duly authorized by the Research Ethics Committee (RCE) of the University Center of Maranhão (UNICEUMA), Certificate of Presentation to Ethics Appreciation: 89952518.7.0000.5084, approval number: 2.686.164.

III.   RESULTS

The sample consisted of n= 164 participants, from which 124 (75.6%) were female and 39 (23.8%) were male.

Regarding age, a minimum of 21 years and a maximum of 55 years, with a mean of 31 years and a standard deviation of 7 years, were observed. Students were 32.9% from the 8th semester; 33.5% from 9th; and 33.5% from the 10th (Table 1).

Table 1 - Sociodemographic characteristics of undergraduate Nursing students (n= 164) and Knowledge about BLS. Belem, State of Para, Brazil, 2018.

	Nursing students		Knowledge about BLS		
	n	**%**	**Mean**	**Standard Deviation**	**p-value**
Semester					**0.6608 (NS)**
8th semester	54	32,9	62,8	16,1	
9th semester	55	33,5	62,7	15,9	
10th semester	55	33,5	65,1	14,7	
Gender					**0.3425**

				(NS)
Female	124	75,6	63,0	14,9
Male	39	23,8	65,7	17,5
Other	1	0,6	50,0	---
Shift				0.1053 (NS)
Morning	38	23,2	59,8	20,1
Afternoon	73	44,5	66,0	13,1
Night	53	32,3	62,1	14,3

Source: Research data, 2018. NS - Not significant

Regarding the BLS knowledge rate analysis according to the semester, a p-value = 0.6608 was shown, which is not significant, demonstrating that there was no real difference between the semesters; 8th semester (mean 62.8 ± 16.1 points), 9th semester (mean 62.7 ± 15.9 points) and 10th semester (mean 65.1 ± 14.7 points) (Table 1).

With regard to the information source used by the students, it was identified that most use the internet as the main tool (67.7%) p-value <0.0001*. TV use was reported by 39% (64 students) and newspapers by 25.6% (42 students) as can be observed in table 2.

Regarding the professional activity distribution, it was verified that 60.4% work and 48.2% have other professional training, being Nursing Technician the most frequent formation (79.7%) (Table 2).

Table 2 – Information sources, training, work condition and professional performance of the students of the Undergraduate Nursing Course (n. 164). Belem, State of Para, Brazil, 2018.

	N	%	p-value
How do you get informed?			<0.0001*
TV	64	39,0	
Newspapers	42	25,6	
Internet	111	67,7	
Other	32	19,5	
Do you work?			0.0101*
Yes	99	60,4	
No	65	39,6	
Do you have another educational training?			0.6962
Yes	79	48,2	
No	85	51,8	
What's the other educational training? (n=79)			<0.0001*
Nursing technician	63	79,7	
Radiology technician	4	5,1	
Clinical pathology technician	1	1,3	
Hospital management	3	3,8	
Community Health Agent	1	1,3	
Oral health technician	1	1,3	
Drugstore assistant	1	1,3	
P.E. teacher	1	1,3	
Projects technician	1	1,3	

Source: Research data, 2018. * Chi-square grip.

The data revealed that 81.7% of the students performed an update on BLS (p-value <0.0001 *, highly significant), and this update was mostly performed through a college class (70.9%). Of the 134 (81.7%) who underwent update, they did it 6 months ago (median), ranging from 3 months to 1 year (Table 3).

Table 3- Update on BLS and teaching method used to update Nursing undergraduate students (n= 164). Belem, State of Para, Brazil, 2018.

|	N	%	p-value
Update on BLS			<0.0001*
Yes	134	81,7	
No	30	18,3	
Did it through (n=134)			<0.0001*
College classes	95	70,9	
Books	29	21,6	
Scientific papers	10	7,5	
Lectures	39	29,1	
Presential courses	44	32,8	
Online courses	9	6,7	
Other (s)	9	6,7	

Source: Research data, 2018. * Chi-square grip.

In the evaluation of BLS knowledge, on a scale of 0 to 100 points, it was verified that the lowest score was 20.6

points and the highest score was 90.4. The mean was 63.5 points, with a standard deviation of 15.5. The median was 64 points, with the interquartile deviation of 20 points (54 to 74 points) (Chart 1).

Chart 1 shows that 62% of students scored lower than 70 points, and 19% scored less than 50 points.

Chart 1 - Evaluation of the SBV knowledge of undergraduate nursing students (n. 164). Belém, State of Pará, Brazil, 2018.
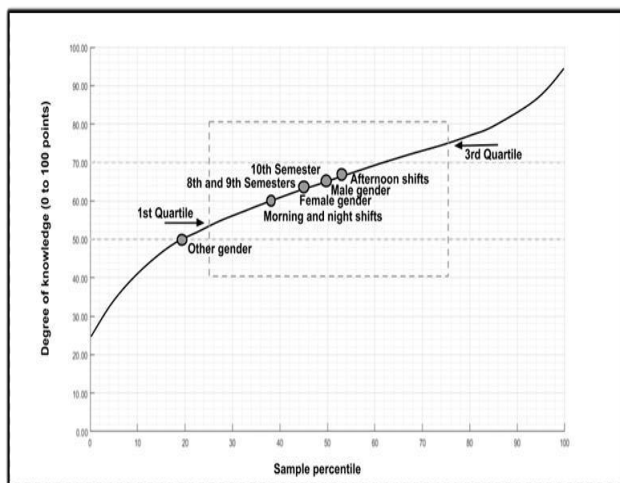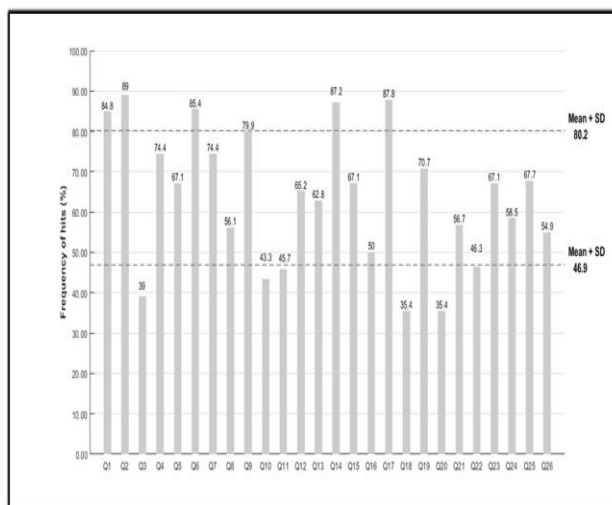

Source: Research data, 2018.

Also on the BLS knowledge, the items with a high level of significance, the items with higher level of knowledge and correctness were: Question 1, about cardiorespiratory arrest definition; Question 2, about the responsiveness of an unconscious person; Question 6, related to the proportion between chest compressions and ventilations according to the current CPR protocol; Question 14, on the importance of establishing BLS maneuvers early for both professionals and lay people; and Question 17, which was about care that should be taken when using an Automated External Defibrillator (AED) (Chart 2).

On the other hand, the items with a low index of knowledge and answers were the questions: Question 3, which was about the sequence of the BLS on adults; Question 10, about the time for the alternation between the appliers of chest compressions; Question 11, about the links that make up the survival chain of the extra-hospital CA; Question 18 on the contraindication for the use of AED; and Question 20, that focused on the steps after the shock application by the AED, as can be observed in chart 2.

Graph 2 - Evaluation of the SBV knowledge of undergraduate Nursing students (n= 164). Belém, State of Pará, Brazil, 2018.

Source: Research data, 2018.

The correlation analysis between the students' age and the obtained score showed a non significant result with p-value= 0.5246, performed by Pearson's Linear Correlation and the low Correlation Coefficient (r = 0.0532) (Chart 3).

Chart 3 - Evaluation of the knowledge about SBV of students of the Undergraduate Nursing Course (n. 164). Belem, State of Para, Brazil, 2018.
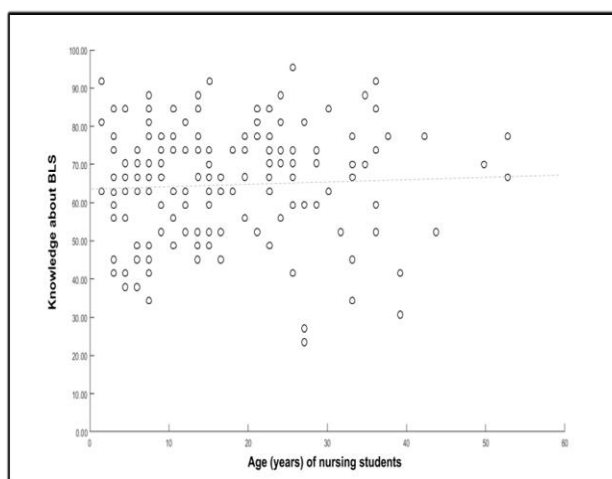
Source: Research data, 2018.

IV. DISCUSSION

The results showed that the mean participants' age was 31 years, with a minimum of 21 and a maximum of 55. In the meantime, this research is in line with other studies[3,22] – including a survey carried out in 2012 by the National School of Public Health (NSPH), together with the National Federation of Nurses (FNE), the Brazilian

Nursing Association (BNA) and the Federal Nursing Council (FNC), which showed that Brazilian Nursing professionals have age range from 26 to 55 years, with a higher frequency in the range of 26 to 35 years – representing 35.98% of all professionals working with Nursing in Brazil.

The female gender was predominant. This result corroborates the results of other studies, in which the percentage of women was also predominant[3,22,23]. Thus, although there have been significant changes on the profession's profile, Nursing is still predominantly performed by women[22,23], since care as the essence of life maintenance has been attributed to the female gender throughout history, from the pre-patriarchal eras to the present day[3].

Regarding the ways of updating, the internet had greater emphasis as a source of information, representing 67.7%. It leads to infer that these students' knowledge has a tendency of developing in the theoretical scope, from online / virtual sources (which are easy to access) and not in face-to-face participation in theoretical-practical courses – which bring greater benefits towards technical and scientific foundation for the development of skills and competencies, that are fundamental in the care of CPR. It's said because these courses relate theory and practice, giving the student greater possibilities for understanding and understanding, as well as being more meaningful[14].

Although the participants reported that they performed updates on BLS (81.7% p-value <0.0001*, highly significant) – mostly performed through a college class (70.9%), with a period ranging from 3 months to 1 year (81.7%) – there is a low level of knowledge. Considering so, it is inferred that the contents taught in the college did not meet their learning objectives and the criteria described in the consensus of the science of resuscitation.

In this scope, a study carried out at a private University of Porto (Portugal) with 149 students, from the 1st, 2nd, 3rd and 4th years of Nursing graduation, showed that they had sufficient theoretical knowledge about BLS in adults, since most obtained correct answers higher than 70% in all series. However, it is important to point out that this is another country's reality[4]. Successful experiments in before-and-after studies, however, demonstrate that the knowledge and skills of nurses and Nursing students seem to improve following CPR training. However, in six weeks, knowledge and skills begin to decline, although they remain significantly larger than the initial one. Training programs improve CPR competence, but individuals are unable to maintain the same competence, even for a short period[24].

A similar study with 83 third-year undergraduate nursing students, from which 90.4% of participants had not received any training in CPR before the study, concluded that theoretical information and CPR practiced had a positive impact on the level of knowledge and nurses' practical skills in the following month[25]. However, there was a significant decrease in the level of information and correct preservation of the practical application six months after the training. Corroborating with these data, it is described that the knowledge and skills of BLS deteriorate in less than three to six months. The use of frequent evaluations will identify the individuals who need refresher courses[2,3,26].

In this understanding, it is considered relevant to expose the students early to this procedure, that is, to promote these skills early in the course, to be reinforced in the following years[27]. Trainings should include students in realistic contexts, which provide the acquisition of solid knowledge and skills. Among the qualifications, the theoretical-practical ones present better results, since they offer better return in the construction of skills and competences[6,12,14].

CA victims need fast and effective assistance, thereby increasing their chances of survival. Thus, early recognition of CA followed by early institution of high quality CPR maneuvers are essential strategies to increase the chances of survival in this population[3]. In this context, it is understood that the preparation of future health professionals should be based on methodologies and practices that subsidize actions qualitatively, taking into account an epidemiological reality and needs that emerge from the reality they are inserted.

The importance of future professionals in the effective implementation of CPR maneuvers in situations bordering on life, such as CRP, is noticeable. This training should be carried out from the beginning of the graduation and improved in subsequent years. It also should be facilitated by qualified teaching staff, in a way that allows knowledge sharing and collective construction of skills and competences, based on current consensuses[2].

The purpose of CPR is to make the heart, lung and brain return to their normal range, and because it is understood as a set of maneuvers designed to guarantee oxygenation to all vital organs, especially the heart, lungs and brain, it has great relevance[2,28].

Worryingly, on a scale of 0 to 100 points, it was found that 62% of the students had a grade lower than 70 points; and 19% scored less than 50 points.

Corroborating the study, a survey of 664 undergraduate students in the Medical, Nursing, Physiotherapy,

Pharmacy, Nutrition, and Occupational Therapy courses at seven HEI's in São Paulo, Brazil, found that only one participant scored at or above 84% and the others fell short of this AHA indicator. The results imply that efforts should be made so that curricular BLS components are introduced in the curricula in a more consistent way, from the first year of graduation and during the subsequent years, so that knowledge and skills are improved and, in turn, implemented effectively[12].

The items with a high level of significance and a higher level of knowledge and correct answers were questions related to: definition of cardiorespiratory arrest; assessment of the responsiveness of a person who is fainted; proportion between chest compressions and ventilation, according to the current CPR protocol; the importance of establishing early BLS maneuvers for both professionals and lay people; and about the care to be taken when using an AED.

On the other hand, the items with a low index of knowledge and correct answers were questions about: the sequence of the BLS in adults; time for the alternation between the people who apply the chest compressions; links that make up the survival chain of extra hospital CRP; contraindication for the use of the AED and the steps after the application of the AED shock.

This result allows us to infer that the students' knowledge about essential points of the current CPR guideline is unsatisfactory and needs to be improved, given that in the case of incorrectly performed maneuvers, there may be important neurological sequelae related to the decrease or absence of brain oxygenation, morbidity and mortality[3,28].

It should be emphasized that it is not enough to know what CPR maneuvers are and their function, while the knowledge about the correct positioning for maneuvers; AED use; relation between thoracic compression and ventilation; frequency; depth; defibrillator loads; drugs used at a CA, among other maneuvers, are not validated and scientifically substantiated[3,28].

Regarding chest compression, ventilation and compression depth, a correct response rate of 67.1%; 85.4% and 74.4%, respectively, was observed. According to the new AHA 2015 guidelines, the number of compressions per minute for adult CA victims should be at least 100 not exceeding 120 compressions per minute, in a ratio of 30 compressions for two ventilations and a depth of at least 5 cm not exceeding 6 cm[1].

These results demonstrate that the students investigated have reduced and sometimes inadequate knowledge for the care of CA victims. However, training is relevant and deserves to be systematically instituted as a way to optimize knowledge, contributing to academic training.

The lack of knowledge about the topic, evidenced in this research, has the potential to negatively and directly affect the care of CA victims. Thus, in order to perform the maneuvers efficiently, the domain of basic knowledge in CPR is taken as paramount. In addition, it is fundamental that the theoretical discussions are associated with practice, in order to provide future professionals with quality assistance to.

In this context, it is considered important to motivate the academy to mobilize in the student attitudinal competences that allow the latter to assume his or her share of responsibility, just as the teacher commits himself to this process, encouraging them in the search for the construction of their knowledge.

V. CONCLUSION

The objective of analyzing the knowledge of the Nursing Undergraduate Program students from a private HEI in Belem, State of Para, Brazil, on Basic Life Support, was achieved according to the results presented.

It was verified that the studied population has reduced and sometimes inadequate knowledge about CA and BLS, which can compromise the care provided, causing damage to resuscitation and, consequently, contribute to the appearance and / or aggravation of permanent sequelae, impacting on increase morbidity and mortality increase.

In many responses, the presence of disparate knowledge might be observed related to the theoretical basis of the science of resuscitation, proposed by the consensuses of the AHA, 2015. Thus, it is conjectured that some of these students may be encouraged to perform care motivated by compliance with solidarity actions without, often, having a knowledge base on the subject.

The limitations of the study were to carry out only the theoretical knowledge approach and did not evaluate the practical skills. Besides, the sample of participants was small, which may hinder the generalization of these results in other realities.

It becomes reasonable to be fundamental the institutionalization of trainings and their evaluation, in theoretical and practical scopes, as a way to optimize and consolidate knowledge during academic training, which may be the subject of further studies.

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