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ORIGINAL ARTICLE

Nursing team knowledge on cardiopulmonary resuscitation

Conhecimento da equipe de enfermagem sobre ressuscitação cardiopulmonar

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ABSTRACT

The objective of this study was to identify the theoretical knowledge of the nursing team on the cardiopulmonary resuscitation manoeuvres in basic life support, associating such knowledge to sociodemographic, economic and professional training variables. This is a cross-sectional, descriptive and quantitative study, in which the data were obtained from questionnaires applied to 351 employees of a nursing team of an emergency service and intensive care units. There was a decline in the subjects' knowledge about resuscitation and cardiopulmonary arrest over time. Socio-economic and professional factors were associated with the knowledge of nursing professionals. It is suggested that training with shorter intervals would increase the degree of retention and knowledge of the nursing team.

Descriptors: Education, Nursing; Emergencies; Heart Arrest; Cardiopulmonary Resuscitation; Knowledge.

RESUMO

Objetivou-se identificar o conhecimento teórico da equipe de enfermagem sobre as manobras de ressuscitação cardiopulmonar em suporte básico de vida, associando tal conhecimento às variáveis sociodemográficas, econômicas e de formação profissional. Trata-se de estudo transversal, descritivo e quantitativo, cujos dados foram obtidos de questionários aplicados a 351 funcionários de uma equipe de enfermagem de um serviço de emergência e de unidades de terapia intensiva. Houve declínio do conhecimento dos sujeitos sobre ressuscitação e parada cardiopulmonar com o passar do tempo. Fatores socioeconômicos e profissionais estiveram associados ao conhecimento dos profissionais de enfermagem. Sugere-se que treinamentos com menores intervalos aumentem o grau de retenção e o conhecimento da equipe de enfermagem.

Descritores: Educação em Enfermagem; Emergências; Parada Cardíaca; Ressuscitação Cardiopulmonar; Conhecimento.

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INTRODUCTION

Cardiorespiratory arrest (cardiac arrest) is an important public health problem and is a condition that requires priority care, in which the quickness and effectiveness of the interventions adopted are crucial factors for the best outcome of the patient[1]. Cardiac arrest (CA) is characterized by the lack of mechanical activity of the heart, confirmed by an absence of pulse, irresponsiveness and apnea or agonal breathing[1].

The integration between structure, people, training, equipment, processes, protocols and policies capable of producing a system that optimizes survival and patient safety can contribute to a better outcome of the victim in cardiac arrest. In order to ensure the continuous improvement of the quality of care, the American Heart Association (AHA) recommends the use of the survival chain[2].

In order to prevent in-hospital CA (IHCA), patients depend on an adequate surveillance system, which includes multiparametric monitoring, increased clinical surveillance of the critically ill patient and application of risk scores, which can help the early recognition of patient deterioration. In addition, immediate activation of the rapid response team is recommended when acute clinical deterioration is imminent[2].

Basic life support (BLS) is considered the primary resuscitation sequence in cases of cardiac arrest, including immediate recognition of the condition, activation of the emergency department, immediate high-quality cardiopulmonary resuscitation (CPR) and rapid access to the defibrillator[2].

CPR involves a sequence of manoeuvres and procedures designed to maintain cerebral and cardiac circulation and ensure the survival of patient[1]. CA is determined by four cardiac rhythms: asystole, pulseless electrical activity, ventricular fibrillation (VF) and pulseless ventricular tachycardia, the last two rhythms being treated with electric shock to the heart by a defibrillator[1].

Health professionals, especially those who act in the direct care of the patient, such as the nursing staff, should know not only to recognize the signs of CA, but also to provide care of BLS and keep up to date on this subject. In general, there is a decline in knowledge regarding CPR practices over time[3].

A study showed that a professional's theoretical knowledge tends to decrease due to periodic updates on the subject[3]. The average time is three months for psychomotor skills and knowledge to decrease after training programs[4], so CPR training should be applied periodically at six-month intervals[3,5].

The objective of this study was to identify the theoretical knowledge of the nursing team on BLS, as well as to associate such knowledge to sociodemographic, economic and professional training variables.

METHOD

This is a cross-sectional, descriptive and quantitative study, conducted in a university hospital located in the south of the city of São Paulo (SP), which serves a region with more than five million inhabitants. The study population consisted of 351 nursing professionals, including nursing assistants and technicians, and nurses from the emergency service and Intensive Care Units (ICU), who were working during the data collection period from February to September 2017.

The tools used to obtain the data were a questionnaire with sociodemographic information (age, gender, education, marital status, occupation, income, length of professional experience and length of experience in critical care units) and a structured instrument developed by the authors to assess the nursing team's knowledge of CA and BLS, based on the AHA guidelines for cardiopulmonary resuscitation and emergency cardiovascular care[2]. All the information contained in the questionnaire was previously submitted for evaluation and adjustments by a group of BLS nurse instructors at the university hospital.

The instrument consisted of objective questions containing four alternatives (only one correct), which addressed important and indispensable points for any health professional. The questionnaire response pattern was evaluated considering the alternative indicated in each question, when the only correct alternative was indicated.

The variables were stored in Excel® spreadsheets and a descriptive analysis of the data was performed for sociodemographic characterization and knowledge of BLS. For continuous variables, mean, standard deviation, median, minimum and maximum were calculated; for categorical variables, frequency and percentage. To compare the number of correct answers for categorical variables of interest, the nonparametric Mann-Whitney test (two categories) or Kruskal-Wallis (three or more categories) were used. To compare the number of correct answers by age, the Spearman correlation coefficient was used, and to compare personal income with previous CPR training, the chi-square test was used. The significance level considered in all analyses was 5% ($p<0.05$).

The project was approved by the Research Ethics Committee of the institution under nº CAAE 65405517.6.0000.5505.

RESULTS

The questionnaires were applied to 351 (65.2%) nursing professionals who worked in the emergency room and intensive care units.

Table 1 shows the sociodemographic and economic data of the study population. The mean age was 36.4, with a predominance of females (74.6%), white (48.9%) and married (37.1%).

There was an association between the number of correct answers and profession, time of training, time of professional experience, previous training in CA and time of completion of training of research participants (Table 2).

Professionals with specialization in non-critical areas had fewer correct answers than those with specialization in critical areas. With regard to income and the number of correct answers, professionals who had personal income between one and three minimum wages had fewer correct answers than those with higher income.

Nurses had a higher number of correct answers in relation to nursing technicians and assistants, but the number of correct answers of assistants was higher than that of nursing technicians.

Table 1. Sociodemographic and economic data of the study population. São Paulo, SP, Brazil, 2017.

Variables	Total
Gender, n (%)	
Female	262 (74.6)
Male	89 (25.4)
Age	
Mean (standard deviation)	36.44 (7.57)
Education (in years), n (%)	
Twelve	131 (37.6)
Sixteen	81 (23.2)
Eighteen	130 (37.2)
Twenty	4 (1.1)
More than twenty	3 (0.9)
Area of specialisation, n (%)	
Critical	87 (71.3)
Non-critical	35 (28.7)
Marital status, n (%)	
Married	124 (37.1)
Single	120 (35.9)
Stable relationship	41 (12.3)
Widower	3 (0.9)
Separated	46 (13.8)
Personal income (minimum salary)*, n (%)	
1-3	103 (30.0)
3-5	155 (45.2)
>5	85 (24.8)
Income dependant persons	
Mean (standard deviation)	2.76 (1.38)

*Minimum wage at the time of research: R$ 934,00.

Table 2. Association between the theoretical knowledge of the nursing team about basic life support and profession, time of training, time of professional experience, previous training in cardiac arrest and time of completion of training (n=351). São Paulo, SP, Brazil, 2017.

Variables	Theoretical knowledge of basic life support	
Age	R	p- value *
	-0.26	<0.0001
	Mean (Standard deviation)	p- value
Personal income		
From 1 to 3 minimum wages	8.12 (1.95)	0.0018**
More than 3 to 5 minimum wages	8.85 (1.73)	
More than 5 minimum wages	9.00 (1.57)	
Profession		
Nurse	9.56 (1.35)	<0.0001***
Nursing technician	8.17 (1.85)	
Nursing assistant	8.23 (1.75)	
Period of training		
Less than 1 year	9.27 (1.9)	<0.0001***
From 1 to 3 years	9.35 (1.68	
From 4 to 5 years	9.12 (1.75)	
More than 5 years	8.35 (1.75)	
Period of professional experience		
Less than 1 year	9.12 (1.54)	0.0001***
From 1 to 3 years	9.24 (1.69)	
From 4 to 5 years	9.07 (1.67)	
More than 5 years	8.33 (1.79)	
Previous training in cardiorespiratory arrest		
Basic life support	8.6 (1.68)	0.0060****
Advanced life support	9.06 (1.7)	
Training completion time		
Between 6 months and 1 year	9.35 (1.36)	0.0008***
More than 1 to 5 years	8.72 (1.77)	
More than 5 years	8.12 (1.62)	
Specialization in areas		
Critical	9.49 (1.39)	0.0124****
Non-critical	8.86 (1.4)	

*Spearman's correlation coefficient; **Chi-square test; *** Kruskal-Wallis; **** Mann-Whitney.

With respect to the period of training, professionals with more than five years of training had fewer correct answers than those with less than five years.

Regarding the performance of previous CPR training, professionals with advanced life support (ALS) training had a higher number of correct answers than those without training or with training in BLS.

The mean number of correct answers was higher among professionals who completed the training between six months to one year prior to the study; and one year to five years when compared to those who completed more than five years ago.

When age was associated with the number of correct answers, it was observed that the higher the age of the professional, the fewer correct answers were selected in the questionnaire.

Regarding the link between personal income and previous training in CA, professionals with personal income between one and three minimum wages presented a higher percentage of lack of training than those with higher incomes.

It was observed that concerning knowledge in CPR only 40.8% of respondents knew how to recognize the sequence of care of the survival chain. Most professionals (92.8%) reported signs that identify a CA. Regarding the correct location for pulse verification in unconscious adults, the majority (92.8%) of professionals verified the carotid pulse, and 75.4% of participants reported that the time should not exceed 10 seconds.

When asked about body posture for CT, the professionals who partially answered this question had not marked the alternative about the position of the rescuer's hands; 32.8% answered incorrectly, and only 20.6% of the nurses answered this question correctly. Regarding the compression/ventilation ratio, only 37% completely answered this question.

Regarding the "fast defibrillation" link, the majority of participants knew how to correctly answer concerning the use of the automatic external defibrillator (AED) 93.3%.

DISCUSSION

There have been significant advances in recent years to the prevention and treatment of CA and cardiovascular alterations, but there are still many deaths associated with this event. Care for victims of cardiac arrest depends on the rapid recognition of the event and the performance of CPR manoeuvres and rapid defibrillation; for this, it is necessary that the health team are prepared and knowledgeable in these manoeuvres. These aspects are crucial and can make a difference in survival and reduction of sequelae[3].

Regarding the performance of previous training on CA, 169 participants reported training in BLS and 107 in ALS, with the mean of correct answers being higher among professionals who completed the training between six months and five years ago than those who completed it longer ago. Associated with this, professionals with ALS training had a higher number of correct answers than those without training or with BLS training.

A study found a similar result, in which the mean time of completion of the course of BLS and ALS had been higher for one year, and it was identified that the nurses interviewed had knowledge deficits about the recognition of CA, sequence of BLS and ventilation/compression ratio[6]. The AHA reinforces the need for BLS retraining more frequently for professionals who are likely to encounter situations of CA[2]. Although increasing evidence shows that recertification in BLS and ALS every two years is inadequate for most people, the ideal time for retraining has not yet been determined[2].

There is evidence that, after CPR training, skills and knowledge deteriorate after one to six months, when there is no continuous practice, leading to low professional performance in the care of cardiac arrest and, consequently, decreased patient survival[7].

Regarding the knowledge on the survival chain, only 40.8% (n=139) of professionals knew how to recognize this sequence of care. A prospective, multicentre study conducted in Japan pointed out that the completion of the five steps of the survival chain significantly improved the neurological outcomes of victims of CA[8]. The survival chain is an ideal sequence of actions that should be followed so that patients with cardiovascular emergencies and risk or confirmed CA have a better chance of survival, with better neurological outcomes and quality of life[2].

Regarding the identification of a CA, most professionals were able to recognise these signs. Regarding the correct location for pulse checking in unconscious adults, most would check the carotid pulse stating that the time should not exceed 10 seconds. The absence of carotid pulse is a determining clinical sign of CA, and its verification should be between five and 10 seconds, in order to minimize interruptions[2].

The results of this study with respect to most of the patients trained in CPR, being female, and age were similar to another study conducted with nurses working in critical and non-critical units, conducted in a school hospital in a city in the interior of Minas Gerais[6]. Another study showed that the nursing staff of the hemodialysis sector of a university hospital in Minas Gerais presented unsatisfactory knowledge about CA, with a low average of correct answers in the questionnaire, but the most correct answers among the participants was about the recognition of CA and initial care, similarly to this study[9].

When questioned about the body posture to perform CT, the professionals who partially answered this question

had not marked the alternative about the position of the hands of the rescuer. Regarding the compression/ventilation ratio, most of them did not agree with the issue in its entirety. The difficulty in the correct positioning of the hands during CPR may be related to the fact that the retention of knowledge and skills acquired in training courses can be lost over time, reinforcing that professionals should receive regular training, because the performance of effective and immediate CPR is decisive for better survival rates and reduction of sequelae[2].

No scientific evidence was found to point to the reason why professionals confused the positioning of hands and arms during CPR. This finding is concerning, since the quality of resuscitation is directly related to patient survival. The literature points out that the quality of CPR, related to the correct positioning of the hands, depth and speed, decreases after two minutes of direct chest compressions, due to the rescuer's fatigue[10].

The 2010 CPR guidelines recommended the midline as the hand position on the sternum for chest compressions during CPR, given its practicality. However, studies with computed tomography identified that the intermammillary line in adults corresponds to the ascending aorta, the aortic root or the left ventricle outflow tract, and not to the left ventricle itself. Thus, chest compressions between the mammary line or the centre of the thorax, as some literature still cites, are no longer recommended[11,12]. On the other hand, the CPR guidelines of 2020 instruct the use of the heel of a hand in the lower half of the sternum, in the middle of the chest[13].

With regard to the "rapid defibrillation" link, most participants knew how to correctly respond to the use of automatic external defibrillator (AED), as recommended by the latest guidelines of the AHA[2]. However, other studies have found that professionals still face insecurity and anxiety in using the AED, due to lack of knowledge and training for handling the device[4,14,15]. Such results are concerning considering the importance of defibrillation, since the most frequent rhythm of CA in adults is VF, and the most effective treatment for such cases is defibrillation[2].

The literature points out that the skills acquired for CPR are characterized as difficult to teach and, once they are learned, difficult to retain[15,16], with deterioration of knowledge and skills over time[2]. Professionals involved in the care of patients in cardiac arrest should participate in continuous training and capacity-building actions, in order to ensure the success of care[16,17].

In this research, nurses had a higher rate of correct answers in relation to the nursing technicians and assistants. In addition, professionals specialized in critical areas had higher rates of success than those in non-critical areas. Although there is a higher probability of CA in critical units, it is important to emphasize that health professionals may face this situation at any level of health care to the population, and the training in CPR of these professionals is extremely important.

In another study it was also found that the higher the level of education and performance in a critical unit, the higher the rate of accuracy of the assessed questions[5]. Research shows the importance of training, because the higher the level of education of nursing professionals, the lower the mortality rates and complications in patients[5,18,19].

Most of the professionals in this study had a specialization; of these, 71.3% (n=87) were specialized in critical areas. In this study, professionals from non-critical areas had fewer successes than professionals from critical areas. A similar result was found in another study, in which 71.2% (n=52) of the professionals said they had some specialization. However, of these, only 13 professionals were specialized in critical areas. Again, we see the need for in-service training[4].

Professionals from non-critical sectors are less frequently faced with situations of CA and the need for CPR, but this does not prevent them from experiencing these events. Frequent training should be offered through continuing education, feedback and debriefing after cardiac arrest care, to improve the learning and skills development of employees. Feedback and debriefing, after the practice of skills and simulations, allow the professionals involved to have the opportunity to reflect on their performance and receive structured feedback on how to improve their performance in the future[20].

In this study, the professionals with personal income below three minimum wages had a higher percentage of absence in training prepared by the institution and a lower number of adjustments than professionals with higher incomes. These factors may be related to professional dissatisfaction, high weekly workload of nursing professionals, poor remuneration and double working hours and, consequently, difficulties to attend complementary training courses[21]. Although the hospital offers training in BLS and ALS, to improve patient care in cardiac arrest, professionals were not required to participate in the course, which may be a contributing factor to absenteeism.

Permanent Health Education (PHE), implemented through the National Policy of Continuing Education in Health (PNEPS), became the strategy of the Unified Health Service (SUS) for the training of health teams in all areas of care, involving professionals of higher and technical levels, through learning during working hours, aiming at the transformation of professional practices. The PHE must have guaranteed space in the employees' workload and consider the qualification of all members of the multi-

professional team[22]. Education in work environments leads to greater safety in care and deepening of knowledge of professionals, providing professional satisfaction and improved patient care[23].

A study conducted in India with 632 patients who suffered CA demonstrated that nurses who underwent training in BLS and ALS prior to care achieved significant improvement in survival when discharging patients after hospital cardiac arrest[24].

The time of professional experience also had an influence on the number of correct answers in this study: professionals with more than five years of experience had a lower rate of correct answers than professionals with less than five years of experience. This finding may be related to the longer time interval without CPR retraining of these professionals. In contrast to these results, a study revealed that professionals with previous experience in CA care tended to be involved in this type of care due to the acquisition of knowledge and skills in other care[25].

The limitations of this study include the fact that the participants were recruited in only one hospital in a limited area of São Paulo, which does not allow the results to be generalized. New studies should be conducted, comparing public and private scenarios, and in different regions of the country. Another limitation was the non-validation of the structured instrument developed by the authors to evaluate the nursing team's knowledge about CA and BLS.

CONCLUSION

The professionals' knowledge about cardiorespiratory arrest and cardiopulmonary resuscitation was greater in the issues that addressed the site of pulse palpation in unconscious victims and the indications and correct use of automatic external defibrillator. The correct answers were lower in questions about the survival chain and the correct positioning of the hands and the frequency of external chest compressions.

The highest rates of accuracy were related to the highest level of education, income greater than three minimum wages, specialization in critical areas, time of experience less than five years and training in advanced life support completed less than five years previously. The fewest correct answers were associated with work in non-critical areas.

The findings of this study contribute to health institutions to promote and encourage continuous and periodic training of nursing professionals, as well as to reassess their knowledge and skills, with the intention of reviewing and developing teaching strategies aimed at the real difficulties of professionals to attend CA, because adequate CPR and rapid defibrillation are determining factors of the survival rates of these individuals.

This study contributes to the practice, because by identifying the main areas of knowledge deficit, it is possible to implement individualized and more effective education strategies to assist cardiorespiratory arrest situations.

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