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IN-HOSPITAL PROFESSIONALS' KNOWLEDGE ABOUT BASIC LIFE SUPPORT IN CARDIAC ARREST

In-hospital professionals' knowledge about basic life support in cardiac arrest

Conocimiento de los profesionales intrahospitalarios sobre el soporte vital básico en la parada cardíaca

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ABSTRACT

Objective: to evaluate the effect of an educational intervention on the nursing team's knowledge about basic life support for adult cardiac arrest care in the in-hospital environment. **Method:** cross-sectional study with a quantitative approach, carried out with 25 nursing professionals in two hospitals in the western region of Santa Catarina - Brazil. A pre-test, educational intervention and post-test were applied. **Results:** there was a significant increase in the professionals' knowledge. Hospital A had a mean score of 7.23 in the pre-test, increasing to 11.33 in the post-test, with p-value ≤ 0.0001. Hospital B scored 6.07 in the pre-test, increasing to 11.15 in the post-test, p-value ≤ 0.0006. **Conclusion:** the intervention proved to be an effective strategy, since the pre-test results showed significant knowledge deficit, and after the educational intervention, showed improvement in most of the items evaluated in relation to specific care.

DESCRIPTORS: Cardiopulmonary arrest; Nursing; In-service training; Adult;

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RESUMO

Objetivo: avaliar o efeito da intervenção educativa no conhecimento da equipe de enfermagem sobre o suporte básico de vida para o atendimento à parada cardiorrespiratória de adultos no ambiente intra-hospitalar. **Método:** estudo transversal com abordagem quantitativa, realizado com 25 profissionais de enfermagem em dois hospitais de região oeste de Santa Catarina - Brasil. Avaliou-se por meio da aplicação de um pré-teste, intervenção educativa e pós-teste. **Resultados:** houve aumento significativo no conhecimento dos profissionais. O hospital A obteve a média de acertos de 7,23 no pré-teste, elevando para 11,33 no pós-teste, com valor de $p \leq 0,0001$. Já o hospital B pontuou 6,07 no pré-teste, progredindo para 11,15 no pós-teste, valor de $p \leq 0,0006$. **Conclusão:** a intervenção realizada demonstrou ser uma estratégia eficaz, visto que os resultados pré-teste demostravam déficit significativo de conhecimento, e após a intervenção educativa, mostraram melhoria na maioria dos itens avaliados em relação ao atendimento específico.

DESCRITORES: Parada cardiopulmonar; Enfermagem; Capacitação em serviço; Adulto;

RESUMEN

Objetivos: evaluar el efecto de una intervención educativa en el conocimiento del equipo de enfermería sobre el soporte vital básico para la atención del paro cardíaco del adulto en el ambiente intrahospitalario. **Método:** estudio transversal con abordaje cuantitativo, realizado con 25 profesionales de enfermería en dos hospitales de la región oeste de Santa Catarina - Brasil. Se aplicó un pre-test, una intervención educativa y un post-test. **Resultados:** hubo un aumento significativo de los conocimientos de los profesionales. El Hospital A obtuvo una puntuación media de 7,23 en el pre-test, aumentando a 11,33 en el post-test, con valor $p \leq 0,0001$. El Hospital B obtuvo una puntuación de 6,07 en el pre-test, aumentando a 11,15 en el post-test, con valor $p \leq 0,0006$. **Conclusión:** una intervención realizada demostró ser una estrategia eficaz, visto que os resultados previos demostraron un déficit significativo de conhecimento, y después de una intervención educativa, mostraron una mejoría na maioria dos itens avaliados em relação ao atendimento específico.

DESCRIPTORES: Parada cardiopulmonar; Enfermería; Formación en servicio; Adulto.

INTRODUCTION

Cardiorespiratory arrest (CRA) can be defined as a cardiological emergency which causes the heart's mechanical activity to stop, confirmed by the absence of visible and palpable respiratory and circulatory movements. To reverse this situation, cardiopulmonary resuscitation (CPR) maneuvers are used, which include a set of interventions carried out by a team of people, with the aim of re-establishing spontaneous cardiac circulation and the return of vital parameters.[1]

In the United States, the incidence of in-hospital CRA was approximately 209,000 cases in 2012, with a survival rate of 23.1%, and in out-of-hospital settings the figure is 382,800 cases, with a survival rate of 11.4%.[2] A study carried out between 1980 and 2012 showed that around 20% of deaths in Brazil were caused by cardiovascular diseases, with the South and Southeast regions of the country having the highest numbers.[3] The epidemiology of the number of CRA is conflicting and imprecise, due to underreporting or lack of records, but it is believed that around 50% of them occur in hospital environments, with asystole and Pulseless Electrical Activity (PEA) rhythms being predominant in this space, with a survival rate of around 17%.[4]

A study based on the medical records of patients who developed arrest rhythms showed signs and symptoms of decompensation up to eight hours before the event. The main ones were signs of shock, neurological deficit, malaise and symptoms suggestive of acute coronary syndromes, signaling the importance of identifying these signs and training the healthcare team providing first aid. Findings show a deficiency in the knowledge of professionals, from emergency care to the evolution of medical records.[5]

Understanding the importance of sequencing activities during CRA and that failure to do so in a coherent, systematic and quality manner directly interferes with a favorable clinical outcome, we asked ourselves: what is the effect of an educational intervention on the nursing team's knowledge of Basic Life Support in adult CRA in an in-hospital environment?

The aim of this study was to evaluate the effect of an educational intervention on the nursing team's knowledge of basic life support for adult CRA care in an in-hospital environment.

MÉTODO

This is a cross-sectional study with a quantitative approach to data, carried out in the Internal Medicine unit of a large general hospital (called hospital A) and a medium-sized general hospital (called hospital B), both located in the west of Santa Catarina.

Hospital A is a high- to medium-complexity facility with 337 doctors, 1032 employees, 25 medical specialties and approximately 1.3 million patients.6 Hospital B, on the other hand, is a medium-complexity facility with 50 employees and an average of 1,200 patients a month.

The population interviewed included nurses and nursing technicians from hospitals A and B. Data collection

took place between March and September 2021 at hospital A, and in July of the same year at hospital B. The sample size was measured based on a sample calculation obtained through a non-probabilistic selection for convenience with all the subjects who make up the nursing team, totaling 25 professionals (12 from hospital A and 13 from hospital B).

The inclusion criteria were nursing technician or nurse for more than 3 months, and the exclusion criteria were being on vacation, on sick leave or on leave for professional training, covering for staff on leave or vacation, or working sporadically at the hospitals in the study.

The questionnaire-type instrument "Adult Cardiopulmonary Resuscitation in Basic Life Support with the use of the Automatic External Defibrillator in the hospital environment" was used for data collection. 7 The first stage consisted of a questionnaire with 20 objective questions based on the guidelines published in 2015 by the American Heart Association2, based on the 5 links of survival (surveillance and prevention, recognition and activation of the emergency medical service, immediate high-quality CPR, rapid defibrillation and advanced life support and post-CRA care), as well as the process of evolution of CRA, which is not part of the links in the chain.

The second stage was an educational practice, following a pre-established CPR script, lasting approximately 40 minutes, covering the topics: vigilance and prevention, early recognition and calling for help, high-quality CPR, early defibrillation and advanced life support and post-CRA care.

The intervention at hospital A was carried out with 1 or 2 participants at a time, during work shifts. At hospital B, the educational intervention was carried out in a group, outside of working hours, with the participants demonstrating on a mannequin and then carrying out the procedures. The third stage was post-intervention data collection, when the same questionnaire was used to assess the positive or negative effects of the activity.

The data was stored in Microsoft Excel® spreadsheets, version 2016, and transferred to the GraphPad Prism 8.4 program. The qualitative variables are presented as frequencies, and the quantitative variables as mean (M) and standard deviation (SD). The paired Student's t-test was used to compare the means of the pre- and post-intervention instrument in the general sample (hospital A + hospital B), and the t-test for independent samples was used to compare the performance of hospital A and hospital B. A p-value ≤ 0.05 was considered significant.

In all its phases, this study complied with the terms of CNS Resolution No. 466/2012, observing the principles of anonymity, autonomy, non-maleficence and beneficence, with a favorable opinion from the Human Research Ethics Committee CAAE 43525421.7.0000.0116.

RESULTS

Twenty-five health professionals took part in the study, with a mean age of 33.84 years (SD 9.4 years), the majority being white (64%) and single (48%). The study population was mostly made up of nursing technicians (68%), with a predominance of 1 to 5 years working at the institution (40%) and 1 to 5 years working in the health sector (44%). The majority had no specialization in healthcare (72%) and had not taken BLS (92%) or ACLS (96%) (Table 1).

Table 1 – Sociodemographic characteristics. Chapecó, SC, Brazil, 2021

Variable	N	%
Work shift		
M	9	(36,0)
A	11	(44,0)
N	5	(20,0)
Age group		
18 to 27 years old	8	(32,0)
28 to 37 years old	6	(24,0)
38 to 47 years old	10	(40,0)
≥ 48 years old	1	(4,0)
Color/race		
White	16	(64,0)
Pardo	6	(24,0)
Yellow	2	(8,0)
Indigenous	1	(4,0)
Marital status		
Married	6	(24,0)
Divorced	4	(16,0)
Stable union	3	(12,0)
Single	12	(48,0)
Occupation		
Nurse	8	(32,0)
Nursing Technician	17	(68,0)
Length of time at the institution		
<1 year	8	(32,0)
1 a 5 years	10	(40,0)
>5 years	7	(28,0)
Time working in the health sector		
<1 year	5	(20,0)

1 to 5 years	11	(44,0)
>5 years	9	(36,0)
Specialization in health		
Yes	7	(28,0)
No	18	(72,0)
Has already taken the BLS*		
Yes	2	(08,0)
No	23	(92,0)
Has taken ACLS**		
Yes	1	(04,0)
No	24	(96,0)

* Basic Life Support
** Advanced Cardiovascular Life Support
Source: The authors

Table 2 shows that in the pre-test at hospital A, there were only 2 questions with a hit rate of ≥ 70%. In the post-test at hospital A, there was a significant increase in correct answers after the intervention, with an index of over 70% in 8 questions. We also noticed that from the pre-test to the immediate post-test, 13 questions showed a statistical increase in hits, 4 maintained their values and 2 questions reduced their score.

Table 3 shows that in the pre-test for hospital B, there were no items with a score ≥ 70%. We also noticed that from the pre-test to the immediate post-test, 16 questions showed a statistically significant increase in hits (p=0.0006), 2 maintained their values and 2 questions reduced their score.

Table 2 – Distribution of correct answers by professionals at hospital A in the two stages of the study. Chapecó, SC, Brazil, 2021

	Question	Pre-test hospital A		Post-test hospital A	
		n	%	N	%
1st Link	1	3	(25,0)	6	(50,0)
	2	6	(50,0)	8	(66,7)
2nd Link	3	7	(58,3)	10	(83,7)
	4	7	(16,7)	9	(75,7)
	5	7	(58,3)	9	(75,0)
	6	8	(66,7)	8	(66,7)
	7	2	(16,7)	9	(75,0)
	8	3	(25,0)	11	(91,7)
3rd Link	9	5	(41,7)	9	(75,0)
	10	8	(66,7)	8	(66,7)
	11	4	(33,3)	7	(58,3)
	12	3	(25,0)	8	(66,7)
	13	10	(83,3)	10	(83,7)
	14	2	(16,7)	3	(25,0)
	15	4	(33,3)	4	(33,3)
4rd Link	16	4	(33,3)	5	(41,7)
	17	5	(41,0)	2	(50,0)
	18	0	(00,0)	0	(66,7)
5rd Link	19	10	(83,7)	10	(83,7)
	20	1	(08,3)	0	(00,0)

Source: The authors

Graph 1 shows the average and standard deviation of the correct answers in each of the two stages applied in hospital A. In the first questionnaire, the average number of correct answers was 7.83 ± 4.41, while in the second, the average rose to 11.33 ± 4.31.

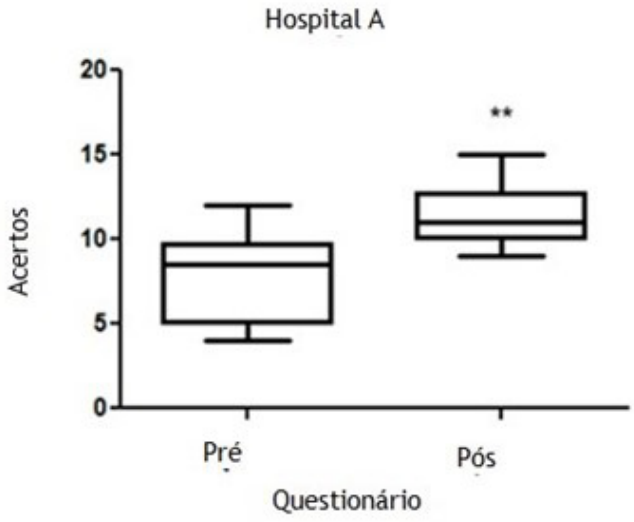
Graph 2 shows the average and standard deviation of the correct answers in each of the two stages applied in hospital B. In the first questionnaire, the average number of correct answers was 6.07 ± 3.09, while in the second, the average rose to 11.15 ± 1.83.

Table 3 – Distribution of correct answers by professionals at hospital B in the two stages of the study. Chapecó, SC, Brazil, 2021

	Question	Pre-test hospital B		Post-test hospital B	
		n	%	N	%
1st Link	1	0	(00,0)	5	(38,4)
	2	8	(61,5)	10	(77,0)
2st Link	3	4	(30,7)	10	(77,0)
	4	4	(30,7)	10	(77,0)
	5	7	(58,3)	11	(84,6)
	6	3	(23,0)	8	(61,5)
	7	3	(23,0)	9	(69,2)
	8	1	(07,7)	8	(61,5)
3st Link	9	6	(46,1)	11	(84,6)
	10	6	(46,1)	8	(61,5)
	11	5	(38,4)	8	(61,5)
	12	2	(15,3)	10	(77,0)
	13	5	(38,4)	10	(77,0)
	14	3	(23,0)	4	(30,7)
	15	5	(38,4)	6	(46,1)
4st Link	16	3	(23,0)	2	(15,3)
	17	6	(46,1)	5	(38,4)
	18	1	(07,7)	1	(07,7)
5st Link	19	7	(58,8)	9	(69,2)
	20	0	(00,0)	0	(00,0)

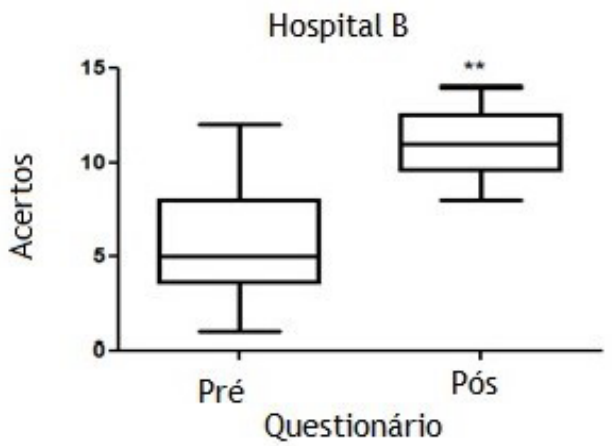
Source: The authors

Graph 1 – Average number of correct answers in the two stages, pre-test and post-test for hospital A. Chapecó, SC, Brazil, 2021



** P<0,0001
Source: The authors

Graph 2 – Average number of correct answers in the two stages, pre-test and post-test for hospital B. Chapecó, SC, Brazil, 2021



** P<0,0001
Source: The authors

DISCUSSION

The sociodemographic data showed that the study population was mostly made up of nursing technicians, with an average of 1 to 5 years of experience in the health sector, an average age of 33.84, white and single. This information corroborates research that examined the role of nurses in CPR in hospitals with superior and inferior performance in the IHCA, which shows a characteristic of women, white, with an average age of 33.6 years.8

The results found in the study were statistically significant. However, there was a low rate of correct answers in the pre--test, with 7.23 ± 4.41 in hospital A and 6.07 ± 3.09 in hos-

pital B. A study carried out to evaluate an on-site theoretical and practical training program for nursing professionals on basic life support obtained similar findings in its study, in which the health professionals achieved a 42.8% percentage of correct answers in the pre-test of the training program on basic CPR maneuvers.[9]

However, we can see that both hospitals achieved a significant improvement in performance in the post-test. Hospital A with 11.33 ± 4.31 and Hospital B with 11.15 ± 1.83. This result reaffirms the results obtained in the research9 cited above, with a post-test score of 70%, highlighting the importance of carrying out CRA training for these professionals, since this knowledge needs to be reviewed on a daily basis.

One study compared periodic CRA training every 2 or 4 months with non-periodic training. The research showed that periodic in-situ simulations contributed more effectively to the knowledge and skills of the teams, compared to long--term training.[10]

The questionnaire applied is divided into the links of the chain of survival, which was constructed with the aim of organizing and prioritizing measures pertinent to CRA care, both in the in-hospital and pre-hospital environments, with some specificities for each location.

The study was carried out in a hospital environment, so we opted to use the links recommended for this purpose. As such, the discussions were divided into "Surveillance and prevention" (first link), "Recognition and activation of the emergency medical service" (second link), "Immediate high--quality CPR" (third link), "Rapid defibrillation" (fourth link), and "Advanced life support and post-CRA care" (fifth link). Question 20 concerns the evolution of CRA and does not enter into the discussion of the links.

A 2021 study, with a quasi-experimental approach, without a control group, of the before-and-after type. The research used the same questionnaire as an evaluation tool. It was applied to professional nurses and nursing technicians in the pre-hospital and in-hospital environment.[11]

The first link deals with the clinical assessment of the patient. Hospital A achieved a 25% increase in correct answers in the post-test, and hospital B 38.4%. The 202111 study showed an increase of 9.73% in the overall sum of the categories. Findings highlight that more than half of CRAs in the hospital environment are foreshadowed by changes in vital signs and physiological status. This is a common scenario in sectors where monitoring is not continuous. As such, it is understood that early recognition of events would reduce, help or even prevent the CRA event, enabling more assertive conduct.[12]

The second link, Recognition and activation of the emergency medical service, assesses the victim's responsiveness, along with checking for breathing and pulse. This moment is crucial for defining the interventions that will precede it. Hospital A scored an increase of 36% and hospital B 33.7% on this item. Another study found an increase of 22.42%.[11]

The third link, called high-quality immediate CPR, saw an increase of 38% in hospital A, and 26.9% in hospital B. In this study, there was an increase of 20%.[11] Similarly, in another 2018 study, which evaluated performance after CRA training for primary care professionals, the items on "calling the help service" and "starting chest compressions", obtained results of 82.0% and 95.5% correct, respectively, demonstrating the effectiveness of the actions.[13]

This item concerns compressions and ventilations, elements which, when applied together with rhythm assessment and defibrillation, constitute the main pillar of CRA care. High-quality CPR significantly increases coronary perfusion pressure (CPP). Studies show that spontaneous circulation only returned after CPP ≥ 15 mmHg was reached during compressions. Therefore, knowledge of these items is responsible for favorable outcomes.[2]

With regard to the fourth link in the chain of survival, called Rapid defibrillation, which concerns the use of the Automated External Defibrillator (AED), the results were not favorable in the study, with the lowest scores in the study. Hospital B had a -0.06% reduction in post-test scores, and hospital A had a -1.66% reduction. This data does not corroborate the previous study, which showed an increase of 19.4%.[11]

Although in the hospital environment only 20% of CRAs present with shockable initial rhythms, early defibrillation is related to more favorable outcome rates and can increase the survival rate of the victim who benefits from it by up to 70%. On the other hand, every minute of delay in defibrillation reduces the possibility of a reversible outcome by around 10 to 12%.[14]

Literature that used a quantitative, quasi-experimental approach, of the pre-test, theoretical-practical class and post--test type, showed significantly low results in relation to the use of the AED. The questions had a weight equivalent to 1, with only a 0.2 overall average.11 These findings reflect insufficient knowledge regarding the use of such an important and decisive piece of equipment in a CRA. These findings may be associated with a lack of handling and familiarity with the device, as well as ignorance of its importance.[13]

Questions 17 and 18 of the questionnaire, which cover the fourth link, mention the use of the AED as the equipment to be used for rhythm assessment, however, when it comes to an in-hospital environment, the defibrillator of choice is the manual defibrillator, since it is more effective, a factor which contributed to an unfavorable result in relation to the questions involving the use of the AED, given that in the training the manual defibrillator used in the institution was used as a model.

In relation to question 17, it states that the recommended course of action for professionals in a scenario in which the AED assesses heart rhythm and does not indicate shock is to "Assess the victim's pulse and breathing". However, the assessment of breathing and pulse is carried out simultaneously

with the rhythm check, with the aim of reducing the time taken to pause compressions.[2]

In an in-hospital environment, the pulse and rhythm are checked simultaneously, so that after checking the rhythm, quality chest compressions are immediately started, in order to minimize pauses in compressions, since the pulse has already been checked, leading to the question being wrong.

Question 18 gives the alternative of switching off the equipment and keeping the paddles attached to the victim's chest after CRA. However, when it comes to a manual defibrillator, this is not done, since the paddles are not attached to the chest, and the cardiac tracing is checked using cables and electrodes.[2] Therefore, the procedures are different, leading to an error in the question.

The fifth and final link, called Advanced life support and post-CRA care, showed a small increase in correct answers in hospital A (5.35%), but in hospital B, the result was the same as in the pre- and post-test. In the 2021[11] study, there was a reduction of -3.54% in overall correct answers. Care in the post-CRA period is critical and requires constant monitoring and vigilance. Most of them focus on stabilization and hemodynamic, respiratory and neurological support, requiring various interventions and complementary tests in an attempt to remedy and stabilize the possible cause of the pathophysiological disorder that caused the event.[12]

Finally, with regard to question 20, which doesn't include a specific link, but does cover the use of the Utstein Registration Protocol, the number of correct answers was almost zero, since this protocol is not standardized in the two hospitals studied, and is not covered in the training syllabus, given that it was not part of the research objectives to create mechanisms to improve hospital records after CRA. However, we understand the relevance and need for training on this subject.

In summary, basic knowledge of CPR is inherent to nursing professionals. This reinforces the importance of adequate training on a regular basis in the services, thus contributing to the development of knowledge and evidence-based practices, significantly helping in the continuous learning process.[15,16]

It should be noted that this study is limited to just two hospital units in western Santa Catarina, confining the results to the local professional profile.

As for the contribution to practice, it is important to evaluate, qualify and quantify the knowledge of the teams of professionals who work in in-hospital care in relation to basic life support. The purpose of this research is to help evaluate the institution's continuing education actions, enabling and aiming to improve the quality of the service provided, with a view to improving the communication, leadership and performance of the professionals who provide emergency care.[16]

CONCLUSION

The intervention proved to be an effective strategy, since the pre-test results showed a significant knowledge deficit, and after the educational intervention, the post-test showed significant improvements in almost all the items assessed in relation to CPR care. However, some items related to the use of the AED remained with low scores, showing that doubts and difficulties regarding the use of the equipment remained, demonstrating that the teaching-learning process must be a constant, with periodic and not isolated sensitizations.

The process of improvement is linked to everyday experiences, but skills can be improved through effective educational interventions. As such, continuing education helps to fill the knowledge gaps in the service, enabling better quality and safety in the care provided, directly influencing patient survival.

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