Original Article

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EFFECTIVENESS OF A TEACHING MODEL IN A FIRST AID COURSE: A RANDOMIZED CLINICAL TRIAL

Fábio da Costa Carbogim[1]
Franciane Silva Luiz[1]
Larissa Bertacchini de Oliveira[2]
Patrícia Rodrigues Braz[1]
Kelli Borges dos Santos[1,2]
Vilanice Alves de Araújo Püschel[2]

[1]Universidade Federal de Juiz de Fora, Programa de Pós-Graduação em Enfermagem. Juiz de Fora, Minas Gerais, Brasil.
[2]Universidade de São Paulo, Programa de Pós-Graduação em Saúde do Adulto. São Paulo, São Paulo, Brasil.

ABSTRACT

Objective: to evaluate the effectiveness of the Active Teaching Model for Critical Thinking in a first aid course for undergraduate nursing students.
Method: a clinical, randomized, single blind and parallel trial, conducted at the Federal University of Viçosa (Brazil) in November 2016 with 102 undergraduate nursing students divided into experimental group and control group. In the experimental group, the *Problem Based Learning* methodology associated with the Active Teaching Model for Critical Thinking was used and, in the control group, only the *Problem Based Learning* methodology was employed to assess the difference in the average knowledge level of the groups, a test with 25 questions was applied before and after the educational intervention. To identify the effect of the measurement factors on the tests, the analysis of variance was used.
Result: a significant interaction effect was observed ($F_{1.100}$=11.138; p=0.001), indicating that the experimental group showed an improvement in the mean value of the grades between the pre- and post-test, with a high magnitude (*d*=1.10)
Conclusion: the teaching model was effective, being demonstrated by the performance of the experimental group, which presented significantly higher results in terms of knowledge.
Brazilian Registry of Clinical Trials, number U1111-1176-5343.

DESCRITPTOR: Nursing. Education nursing. First Aid. Problem-based learning. Clinical trial.

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EFETIVIDADE DE MODELO DE ENSINO EM UM CURSO DE PRIMEIROS SOCORROS: ENSAIO CLÍNICO RANDOMIZADO

RESUMO

Objetivo: avaliar a efetividade do Modelo de Ensino Ativo para o Pensamento Crítico em um curso de primeiros socorros para estudantes de graduação em enfermagem.
Método: ensaio clínico, randomizado, unicego e paralelo, realizado na Universidade Federal de Viçosa (Brasil). Em novembro de 2016, com 102 estudantes de graduação em enfermagem divididos em grupo experimental e grupo controle. No grupo experimental, foi utilizada a metodologia do *Problem Based Learning* associada ao Modelo do Ensino Ativo para o Pensamento Crítico e, no grupo controle, foi utilizada apenas a metodologia do *Problem Based Learning*. Para avaliar a diferença do nível de conhecimento médio dos grupos, foi aplicado teste com 25 questões, antes da intervenção educativa e após. Para identificar o efeito dos fatores de medida nos testes, foi utilizado análise de variância.
Resultado: foi observado efeito de interação significativo ($F_{1,100}$=11,138; p=0,001), indicando que o grupo experimental apresentou melhora na média das notas entre o pré e pós-teste, com elevada magnitude (*d*=1,10).
Conclusão: o modelo de ensino foi efetivo, sendo demonstrado pelo desempenho do grupo experimental, que apresentou resultados significativamente maiores em termos de conhecimento.
Registro Brasileiro de Ensaios Clínicos número U1111-1176-5343.

DESCRITORES: Enfermagem. Educação em enfermagem. Primeiros socorros. Aprendizagem baseada em problemas. Ensaio clínico.

EFECTIVIDAD DE UN MODELO DE ENSEÑANZA EN UN CURSO DE PRIMEROS AUXILIOS: UN ENSAYO CLÍNICO ALEATORIZADO

RESUMEN

Objetivo: evaluar la efectividad del Modelo de Enseñanza Activa para el Pensamiento Crítico en un curso de primeros auxilios para estudiantes universitarios de enfermería.
Método: ensayo clínico, aleatorizado, ciego simple y paralelo, realizado en la Universidad Federal de Viçosa (Brasil) en noviembre de 2016, con 102 estudiantes universitarios de enfermería, divididos en un grupo y uno de control. En el grupo experimental se utilizó la metodología del *Problem Based Learning* asociada al Modelo de Enseñanza Activa para el Pensamiento Crítico y, en el grupo de control, se utilizó solamente la metodología del *Problem Based Learning*. Para evaluar la diferencia del nivel de conocimiento medio entre los grupos se aplicó una prueba con 25 preguntas, antes y después de la intervención educativa. Para identificar el efecto de los factores de medida de las pruebas se utilizó el análisis de varianzas.
Resultado: se observó un efecto de interacción significativo ($F_{1,100}$=11,138; p=0,001), lo que indica que el grupo experimental presentó una mejoría en la media de las notas entre antes y después de la prueba, con una magnitud elevada (*d*=1,10).
Conclusión: el modelo de enseñanza fue efectivo, lo que quedó demostrado por el desempeño del grupo experimental, que presentó resultados significativamente mayores en términos de conocimiento.
Registro Brasileño de Ensayos Clínicos, número U1111-1176-5343.

DESCRIPTORES: Enfermería. Educación en enfermería. Primeros auxilios. Aprendizaje basado en problemas. Ensayo clínico.

INTRODUCTION

First Aid (FA) for victims suffering from sudden illness or accidents, when provided effectively, directly influences the patient's prognosis and survival.[1] These are the initial procedures performed at the site, for a certain period of time, until a more complex approach is performed in a health service. However, prior to any intervention, the assessment of life-threatening conditions, including that of the caregiver who should assess the scenario in which the emergency occurs, is paramount.[2] After the first evaluation, acting with agility, safety and dexterity has a positive impact on situations such as trauma, hemorrhage, syncope, seizure, choking, cardiopulmonary arrest and other critical situations.

Therefore, basic knowledge on how to act in these situations is essential for all, but indispensable for health professionals and students, who are expected to master and expertise it.[1,3] In the case of students, the literature reveals that FA intervention skills appear late in undergraduate curricula, impacting the quality of actions.[1,3–5] This data points to the need for curricular reassessment and for the implementation of disciplines that make basic and introductory knowledge about FA possible in the first years of the course. However, regardless of the moment in which this knowledge is offered at the undergraduate level, it is indispensable, in addition to stimulating technical skills, to encourage the critical thinking (CT) ability in these situations. CT is a skill that can be stimulated and improved and that has a direct impact on the clinical decision making process in health.[5–8]

In the nursing literature, CT has been defined as a cognitive ability manifested by the ability to analyze, through logical reasoning and clinical judgment oriented to problem solving, being essential in situations of FA.[6–8] Therefore, the choice of the teaching methodology of the theoretical and practical contents is a major factor in stimulating the mental processes involved in the ability to think critically.

In this sense, several research studies have shown a relationship between PBL and the stimulation of the cognitive and metacognitive skills responsible for fostering learning.[5–7] Among them, the ability of CT, an essential competence in the clinical evaluation and decision making in FA.[7–10]

A study that employed the PBL's Active Teaching Model for Critical Thinking (ATMCT) in an educational intervention identified development and improvement of higher mental functions in the students participating in the research. It points out that ATCTM, as a set of guiding questions that direct CT, stimulated the students' cognitive and metacognitive abilities, such as analysis, evaluation, inference, rationality, interpretation and self-regulation.[11]

In order to assess knowledge before and after the Basic Life Support (BLS) educational intervention, a study conducted with 42 first-year medical students used the *Problem Based Learning* (PBL) methodology to mediate learning. The results showed a significant increase in correct answers in the post-test.[10] A systematic review[6] indicates PBL as the most used teaching intervention in the international literature to stimulate CT. However, it expresses that there is still a lack of randomized studies with high methodological rigor and experimental design that compare knowledge before and after applying diverse methodologies that stimulate CT and improve learning.

Given the above, this study is justified, which aimed to evaluate the effectiveness of the Active Teaching Model for Critical Thinking in a first aid course for undergraduate nursing students. Studies of this nature are relevant as they evaluate teaching methodologies in knowledge mediation based on the stimulation of cognitive and metacognitive skills. That said, it should be noted that this research is part of the multi-center research project coordinated by the Ibero-American Network of Nursing Education Research (*Red Iberoamericana de Investigación en Educación en Enfermería*, RIIEE), which places CT on its priority agenda.

METHOD

This is a randomized, single-blind, parallel group clinical trial developed with undergraduate nursing students from the Federal University of Viçosa, state of Minas Gerais, Brazil. To assess the effect or outcome, the dependent variable was the level of knowledge about first aid. The experimental group and the control group went through the same phases, themes and evaluations during the course, except for the insertion of ATCTM associated with PBL for the experimental group.

At the college in question, the degree is completed in five years, i.e., ten semesters, with an annual enrollment of up to 50 students. The eligible participants for the study were 171 nursing students who met the following inclusion criteria: being enrolled between the first and third year of the course (first to sixth semester/period) and without prior contact with the first aid theme. As exclusion criteria, we considered those who were away from the course by sick leave. It should be noted that in the current curriculum of the course, the theme is inserted from the fourth year (eighth semester/period). Of the 171 eligible academics, 108 students signed up for the course. Of these, 102 completed the educational intervention.

The R statistical software version 3.2.0 was used for sample size calculation, with a significance level of 5%, intraclass correlation of 0.5, mean effect size (d=0.5) and test power of 80%. The required sample would be 84 students, with 42 participants for each group. However, respecting the inclusion criteria and ensuring the representativeness of the groups, more students could participate than the minimum required.

The experimental and control group allocation was also randomized using the R software, version 3.0.2. For randomization, the sample function was used and the Marsenne-Twister pseudorandom algorithm, made by a hired professional, without any contact with the students. Of the 108 participants enrolled, 54 students made up the experimental group (EG) and 54were included in the control group (CG).

The same professional who performed the randomization was responsible for sending e-mails to the participants, stating course dates and times. It should be noted that neither the students nor the tutors knew which group was EG and which CG. Only the main researcher on the day of the intervention knew who made up one group or the other.

During the course, dropouts occurred in both classes. In the EG, two individuals dropped out and, in the CG, four. Thus, 52 students were allocated to the EG and 50 to the CG, according to the flow chart below (Figure 1):

Based on the allocation procedures, the EG accessed the PBL associated with the Active ATMCT[11] as an intervention methodology for teaching; the CG group, only traditional PBL.

It should be noted that the ATMCT[11] is characterized by a teaching model that starts from guiding questions that aim to organize and expand the higher mental processes, something fundamental for the development of CT (Chart 1). It was developed based on the CT skills described in the Delphi Report of the American Philosophical Association,[12] and for each desired skill, guiding questions are applied to analyze a clinical case. According to the authors,[11] it can be applied in conjunction with PBL or separately.

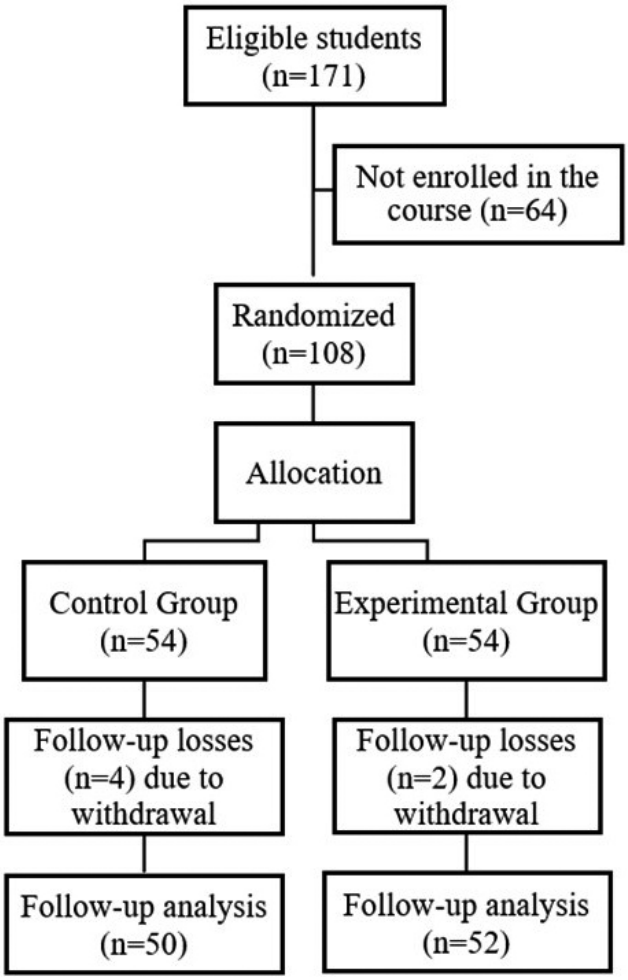

Figure 1 – Flowchart of the participants of the educational intervention

Chart 1 – Active Teaching Model for Critical Thinking (ATMCT)

Skills	Guiding questions per skill
Interpretation	How do I interpret this situation? What knowledge do I need to understand this situation?
Analysis	What information is relevant for me to understand this situation piece by piece? Is there any logic/meaning in the established actions?
Assessment	What data can be grouped to identify a problem? Are there strengths and weaknesses in the established actions?
Inference	What problems are identified, and which priorities require interventions? What conclusions could I draw regarding the problems?
Explanation	Based on the problems identified, how should actions be planned? In this situation, how would you act?
Self-evaluation	What is the most coherent and objective way for me to act in this situation? Are my judgments about actions rational or biased?

Source: adapted from Carbogim *et al*. [11]

The educational intervention took place in November 2016, between the 12th and 30th, lasted 25 hours, and addressed the theme of first aid for both groups, concurrently and in different physical spaces of the Federal University of Viçosa, in order to avoid contact and exchange of information

among the participants during the intervention. To operationalize the intervention, it was subdivided into a 5-hour meeting and two 10-hour meetings, with similar activities in both groups, mediated by tutors previously trained by the main researcher. This training was given at different times for the EG and the CG tutors, in the form of protocol instruction, i.e., with the steps to be followed for teaching the course content. The group of tutors comprised ten undergraduate nursing teachers with more than two years of experience, five allocated to instruct the control group and five to the experimental group. The syllabus offered to the groups addressed FA for trauma, hemorrhages, syncope, seizures, choking and accidents with venomous animals and about BLS, addressing care in cardiopulmonary arrest (CPA). To carry out the teaching activities, five computers with access to the Internet, notepads, pens and lab equipped with dummies for theoretical and practical activities under the guidance of tutors were provided for each group (CG and EG). In addition, for each CG and EG subgroup, on the second day, printed reference material was provided in accordance with the American Heart Association Guidelines.[13]

Throughout the course period, the only variation between the two groups was the proposal to insert the ATMCT associated with PBL to the EG, performed on the second day of intervention, with the BLS theme. The level of knowledge was similarly verified in both groups, before the intervention and after two weeks, through a questionnaire/test with 25 objective questions about FA, in which the student should mark a "V" for true and an "F" for false. The test (pre- and post-test) lasted an average of 20 minutes and was applied in different settings for the EG and CG.

For the activities, besides the clinical case about BLS and FA, a white board, projectors, computers of the institution and laptops were used. On the first day, the Free and Informed Consent Form was read and signed, applying the sociodemographic questionnaire and the pre-test (questionnaire). The pre-test consisted of 25 questions, subdivided into ten questions about BLS in cardiopulmonary arrest and 15 general questions about FA (five questions about trauma and hemorrhages; five about syncope, seizures and choking and five about accidents with venomous animals). The PBL methodology, step by step, to be employed in the development of a clinical case was also elucidated. It is noteworthy that, before the intervention, the clinical case was adjusted and validated by three specialists in the teaching and research of BLS and FA.

On the second day, PBL was used to mediate the teaching of the BLS theme from the clinical case about a cardiopulmonary arrest (CPA) situation in an out-of-hospital setting, dividing the EG and CG into small groups of eight to ten students, under the guidance of a tutor. On the third day of the course, without any methodological variation in teaching between the groups, we followed the approach of the first aid themes (hemorrhage and trauma, syncope, seizure, choking and accidents with venomous animals).

For the implementation of the PBL methodology, Berbel's[14] proposal was developed in seven phases: reading of a clinical case on the subject; problem identification; formulation of hypotheses; summary of hypotheses; formulation of learning objectives; study on the subject and return to the group for presentation of the results and discussion. In view of the comparative analysis of learning, on the second day, the ATNCT was inserted in phase two of the PBL.[11]

Thus, the students in the EG should analyze the clinical case of BLS in CPA according to the guiding questions of the ATMCT[11] in order to sharpen CT and hypothetically stimulate learning more effectively than in the CG (Chart 1). In the CG, as there was no introduction of the guiding questions, the students were instructed, in the second phase of the PBL, to list what they considered correct or incorrect in the case.

Considering the objective of the study, it was hypothesized that the students in the EG would be more stimulated to learn BLS in CPA with a better post-test performance when compared to those in the CG.

In the statistical analysis, the categorical data were expressed as absolute and relative frequency, and the continuous, as mean and standard deviation (SD). The assumptions on data normality were evaluated by the Kolmogorov-Smirnov test and the assumption of equality of variance by the Levene test. The Analysis of Variance (ANOVA) was applied for two factors and their interaction. The application of ANOVA allowed for the identification of the effect of the measurement factors of the EG (before and after the intervention), the CG (before and after the intervention) and the intergroup (EG and CG) on the test performance results. The delta (Δ) was related to the standardized difference between the pre- and post-test mean value, being presented in relative frequency.

The effect size was calculated using Cohen's *d*, adopting the classification <0.2, 0.5 and >0.8, being small, moderate and high respectively. To test differences between the EG and the CG regarding possible intervening qualitative variables (gender, age and period of the course), the chi-square test (χ^2) was used. All analyses were performed on the Statistical Package for the Social Sciences (SPSS) software, version 20.0 (IBM Corp., Armonk, NY), adopting the standard significance level of a 0.05 p-value and a 95% confidence interval.

The development of the study met the ethics standards in research involving human beings.

RESULTS

A total of 102 students participated in the study, mostly women (n=93; 91.0%). The mean age of the study participants was 22.1 ± 3.7 years old. Regarding skin color/race, the individuals declared themselves white (n=55; 53.9%), brown (n=42; 41.2%), black (n=4; 4.0%) and yellow (n=1; 0.9%). By means of the Pearson's chi-square test it was verified that the participants in the Experimental and Control groups did not differ significantly in age (χ^2=0.349; p=0.55), gender (χ^2=0.039; p=0.84) and college period (χ^2=3,338; p=0.07), considering a 95% confidence interval.

By the ANOVA method, a significant interaction effect was observed ($F_{1.100=}$22.296; p<0.001), indicating that the improvement in the mean value of the grades between the BLS pre- and post-test for the EG (6.3; SD=1.56 vs. 8.12; SD=1.25; Δ=40%) was higher than in the CG (6.32; SD=1.39 vs. 6.54; SD=1.37; Δ=6%). The effect size observed in the EG was of a high magnitude (*d*=1.15).

Figure 2 shows the mean difference between the BLS pre- and post- test for the EG and the CG.

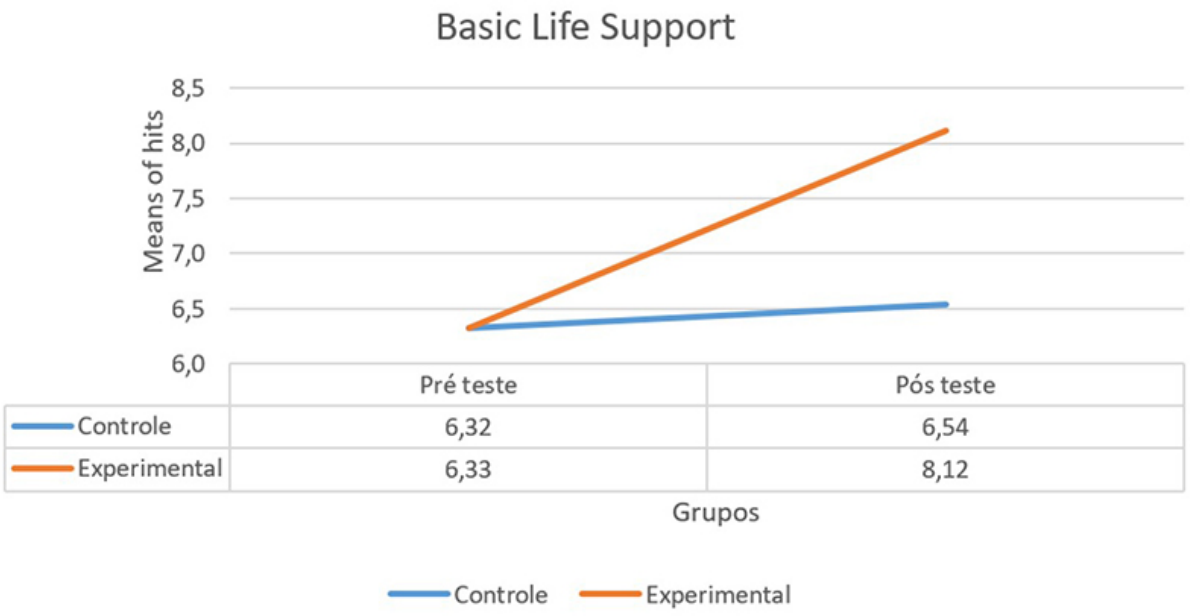

Figure 2 – Mean of knowledge in the basic life support test before and after the intervention, with a possible score from zero to ten points.

Regarding first aid knowledge (15 questions), the main effect was observed for the measured factor ($F_{1.100}$=19.246; p<0.001). Both the CG (11.76; SD=1.86 vs. 12.46; SD=1.30) and the EG (11.63; SD=2.04 vs. 12.87; SD=1.28) presented higher values in the post-test when compared to the pre-test. On average, the groups improved performance by 12% in FA.

Figure 3 shows the mean difference between the FA pre- and post-test for EG and CG.

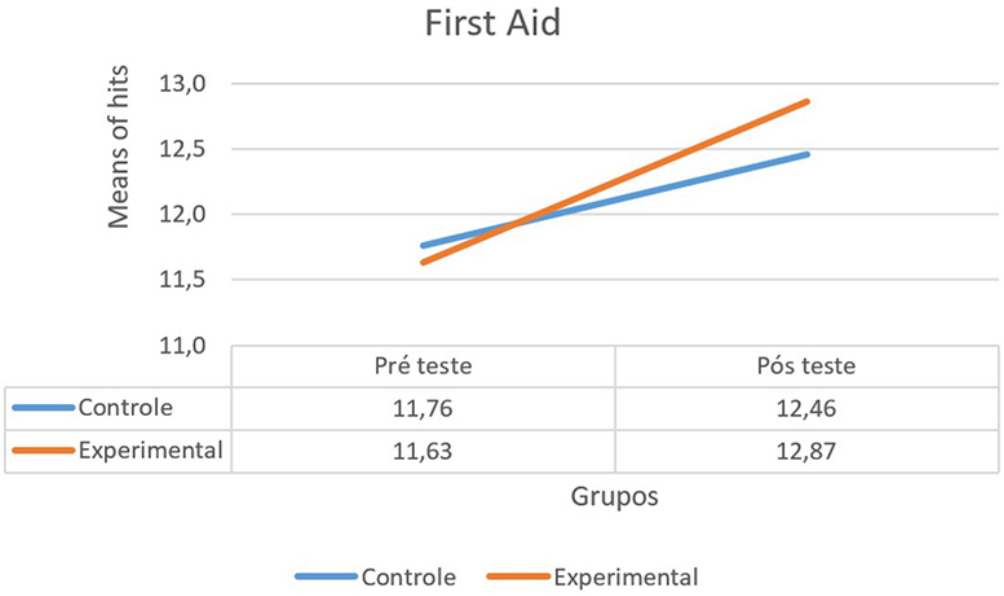

Figure 3 – Mean knowledge in the first aid test before and after the intervention, with a possible score from zero to 15 points.

Regarding the sum of the performance in the BLS and FA test (25 questions), a significant interaction effect was observed ($F_{1.100}$=11.138; p=0.001), indicating that the improvement in the mean value of the grades between the GE pre- and post-test (17.96; SD=2.74 vs. 20.98; SD=1.81; ∆=20%) was higher than in the CG (17.98; SD=2.43 vs. 19.06; SD=1.93; ∆=8%). The effect size observed in the EG was of a high magnitude (*d*=1.10).

Figure 4 shows the mean difference between BLS and FA pre- and post-test for the EG and the CG.

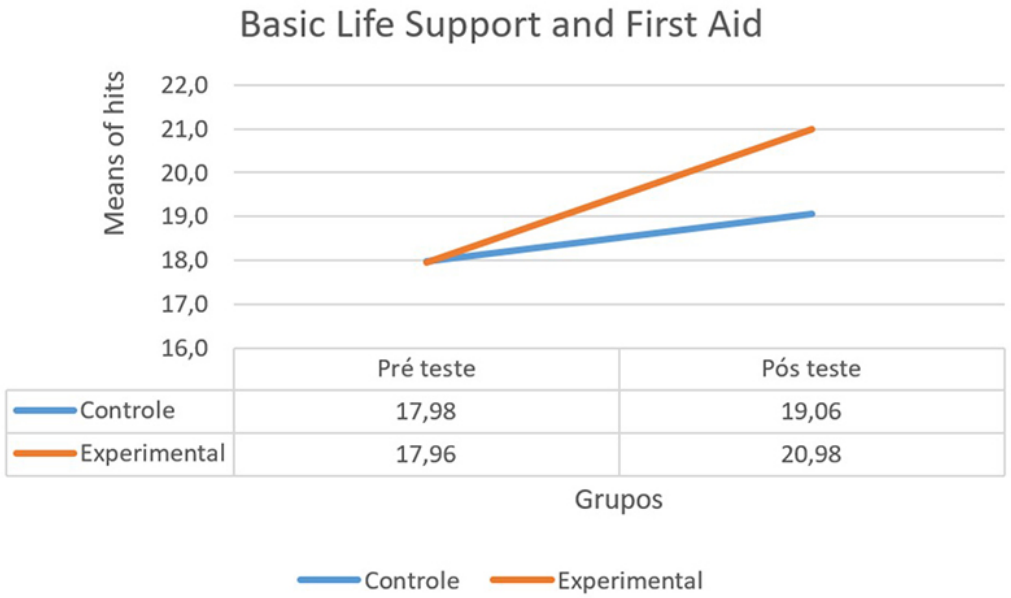

Figure 4 – Mean knowledge of the basic life support and first aid test before and after the intervention, with a possible score from zero to 25 points

DISCUSSION

First-aid care requires knowledge and skills that will impact on the performance of the rescuer and that will reduce complications for the victim.[15–17] Thus, in addition to technical skills, it is expected that the rescuer, in an emergency situation, make use of cognitive and metacognitive skills for an accurate decision making, considering the specificities found. In this sense, teaching first aid through models or methodologies that stimulate CT and Clinical Reasoning (CR) seems appropriate and important for the training of the health professionals.

In the present study, the aim was to test the effectiveness of a teaching model in the development of a FA course, stimulating CT skills. No significant correlation of the test results was found regarding gender, age and race. A study[16] conducted in Africa also found no correlation between FA knowledge and gender ($p>0.07$) and age ($p>0.11$). However, another study[18] demonstrated a positive trend among the test results with the participants' age progression.

It should be noted that both groups of students had an approximate knowledge before the educational intervention. Regarding the pre-test, for the FA questions, the CG presented a slightly higher mean value of right answers than the EG, while in the BLS questions the average of answers was relatively similar between the groups. However, in line with other studies that evaluated the pre-test scores for students without previous contact with the subject, the percentage of correct answers was below 80%.[19–20]

In the post-test, the EG group presented a higher average of hits, with a high magnitude of the observed effect. Thus, it can be deduced that the EG, after the educational intervention, had a relatively higher knowledge than the CG ($p<0.0001$). However, both the EG and the CG had a general improvement in knowledge (FA and BLS) post-intervention, with a standardized difference between pre- and post-test of 6% for the CG and of 40% for the EG. Considering that the groups were homogeneous, and both were taught by the PBL, it can be inferred that ATMCT exerted an influence on content learning. These results corroborate with the initial hypothesis that the EG would obtain better post-test results when compared to the CG.

A similar research assessed the first-aid knowledge of 110 first-year medical and nursing students. It used the PBL method, evaluated before and after the course and achieved a significant increase in correct answers after the test. There was an increase in the right answers to the BLS questions, from 40.9% in the pre-test to 89.09% in the post-test, representing a significant advance ($p=0.002$) in the knowledge of the subject.[3]

Another study evaluated the knowledge about BLS of 664 health students. Of the respondents, only 0.15% achieved 84% of correct answers, the minimum percentage of aptitude established by the American Heart Association.[16]

A research study using the *Objective Structured Clinical Examination* compared knowledge before and after an educational intervention on BLS. The post-test (8.5; SD=1.44) showed a significantly higher average number of correct answers than the pre-test (4.9; SD=2.07) in relation to the desirable skills.[20]

It should be noted that inquiry-type investigations,[15,21] which do not have to evaluate educational interventions in FA, tend to show significantly lower results in knowledge when compared to studies employing training.[22–23]

In this sense, some authors[3,15,24–25] reiterate the necessary offer of a solid theoretical base in the training of FA, mediated by methodologies that enable the acquisition and improvement of technical and intellectual skills in health education.

Thus, it is assumed that teaching conceived as a dynamic process of interaction and formation of consciousness becomes a social, cultural and political activity that awakens meanings and meanings

for each action learned and practiced.[6,16] In this logic, active and realistic methodologies have been increasingly employed in the training of health professionals, in view of the greater stimulation of cognitive and metacognitive skills, such as CT, a firing device of clinical judgment and decision making.[6–9,16,23] Thus, in addition to teaching the adequate protocols and executions on topics such as FA and BLS, it is necessary to establish purposeful reasoning with a view to better decision making, directly implying the survival of victims.[15–16,26]

As a limitation of the study, it is noteworthy that, although the questionnaire/test was evaluated by experts for content validity, at the time of the research no statistical tests had been employed to verify its reliability. In addition, the late post-test was not performed, assessing the knowledge retention of students in the medium and long term.

CONCLUSION

The study aimed to evaluate the effectiveness of ATMCT in a first aid course offered to undergraduate nursing students. In this sense, the results showed that ATMCT, associated with PBL, was more effective in stimulating and mediating knowledge, with significant results for the group of students who used it.

Having the results, it is believed that the great challenge of the teacher is to promote a meaningful teaching that mobilizes the critical intellectual development of nursing students, considering it to be the basis for clinical reasoning and decision making. Thus, for the teaching of first aid, methodologies that provide questioning, interaction and reflection activities can significantly help in the integration of information and learning.

It is believed that the results of this research are relevant for health and nursing education, since the ATMCT, associated with the PBL, has proven to be an effective teaching technology in the students' performance.

REFERENCES

1. Everett-Thomas R, Yero-Aguayo M, Valdes B, Valdes G, Shekhter I, Rosen LF, et al. An assessment of CPR skills using simulation: Are first responders prepared to save lives? Nurse Educ Pract. [Internet]. 2016 Jul [cited 2018 Sept 8]; 19:58-62. Available from: https://dx.doi.org/10.1016/j.nepr.2016.05.003
2. Galindo Neto NM, Caetano JA, Barros LM, Silva TM, Vasconcelos EM. First aid in schools: construction and validation of an educational booklet for teachers. Acta Paul Enferm [Internet]. 2017 Jan [cited 2018 Sept 8]; 30(1):87-93. Available from: https://dx.doi.org/10.1590/1982-0194201700013
3. Marques MD, Lopes Jr. LC, Bomfim EO, Gomes CP, Pavelqueires S. The teaching of first aid from the perspective of a problem - oriented curriculum. Rev Pesqui Cuid Fundam. [Internet]. 2014 Sept [cited 2018 Sept 8]; 6(4):1485-95. Available from: https://doi.org/10.9789/2175-5361.2014.v6i4.1485-1495
4. Al-Mohaissen MA. Knowledge and attitudes towards basic life support among health students at a Saudi Women's University. Sultan Qaboos Univ Med J. [Internet]. 2017 Feb [cited 2018 Apr 07]; 17(1):e59-e65. Available from: https://dx.doi.org/10.18295/squmj.2016.17.01.011
5. Oliveira LB, Díaz LJ, Carbogim Fda C, Rodrigues AR, Püschel VA. Effectiveness of teaching strategies on the development of critical thinking in undergraduate nursing students: a meta-analysis. Rev Esc Enferm USP [Internet]. 2016 Apr [cited 2018 Sept 8]; 50(2):355-64. Available from: https://dx.doi.org/10.1590/S0080-623420160000200023

6. Cui C, Li Y, Geng D, Zhang H, Jin C. The effectiveness of evidence-based nursing on development of nursing students' critical thinking: a meta-analysis. Nurse Educ Today. [Internet]. 2018 June [cited 2018 Sep 08]; 65: 43-53. Available: https://dx.doi.org/10.1016/j.nedt.2018.02.036

7. Carbogim FC, Oliveira LB, Püschel VA. Critical thinking: concept analysis from the perspective of Rodger's evolutionary method of concept analysis. Rev Latino-Am Enfermagem [Internet]. 2016 Sept [cited 2018 Sept 8]; 24:e2785. Available from: https://dx.doi.org/10.1590/1518-8345.1191.2785

8. Riegel F, Crossetti MGO. Theoretical frameworks and instruments for evaluation of critical thinking in nursing and education. Rev Gaúcha Enferm [Internet]. 2018 Jul [cited 2018 Sept 08]; 39:e2017-0097. Available from: https://dx.doi.org/10.1590/1983-1447.2018.2017-0097

9. Wosinski J, Belcher AE, Durrenberger Y, Allin A-C, Stormacq C, Gerson L. Facilitating problem-based learning among undergraduate nursing students: a qualitative systematic review. Nurse Educ Today [Internet]. 2018 Jan [cited 2018 Sept 8]; 60: 67-74. Available from: https://doi.org/10.1016/j.nedt.2017.08.015

10. Pande S, Pande S, Parate V, Pande S, Sukhsohale N. Evaluation of retention of knowledge and skills imparted to first-year medical students through basic life support training. Adv Physiol Educ [Internet]. 2014 Mar [cited 2018 Sept 8]; 38(1):42-5. Available from: https://dx.doi.org/10.1152/advan.00102.2013

11. Carbogim FC, Oliveira LB, Mendonça ET, Marques DA, Friedrich DBC, Püschel VAA. Teaching critical thinking skills through problem based learning. Texto Contexto Enferm [Internet]. 2017 Nov [cited 2018 Sept 8]; 26(4):e1180017. Available from: http://dx.doi.org/10.1590/0104-07072017001180017

12. Facione P. Critical thinking: A statement of expert consensus for purposes of educational assessment and instruction. California: California Academic Press. [Internet]. 1990 [cited 2018 Sept 10]. Available from: https://ctfe.gmu.edu/wp-content/uploads/2012/08/12-The-Delphi-Report-on-Critical-Thinking.pdf

13. American Heart Association. Guidelines for cardiopulmonary resuscitation and emergency cardiovascular care. Circulation [Internet]. 2015 [cited 2018 Dec 21]. Available from: https://eccguidelines.heart.org/wp-content/uploads/2015/10/2015-AHA-Guidelines-Highlights-Portuguese.pdf

14. Berbel NA. “Problematization” and Problem-Based Learning: different words or different ways? Interface (Botucatu) [Internet]. 1998 [cited 2018 Sept 08]; 2(2):139-54. Available from: http://dx.doi.org/10.1590/S1414-32831998000100008

15. Afzalimoghaddam M, Talebideloi M, Talebian MT, Farahmand S. Evaluation of the Effectiveness of Basic Life Support Training on the Knowledge and Skills. Patient Saf Qual Improv [Internet]. 2014 [cited 2017 Sept 15]; 2(2):73-6. Available from: http://psj.mums.ac.ir/pdf_2518_247ae1fafee198f5c3e0fdd2fdb79871.html

16. Tavares LF, Bezerra IM, Oliveira FR, Sousa LV, Raimundo RD, Sousa EC, et al. Knowledge of health sciences undergraduate students in objective tests on Basic Life Support. J Hum Growth Dev [Internet]. 2015 [cited 2017 Sept 15]; 25(3):297-306. Available from: https://dx.doi.org/10.7322/jhgd.106002

17. Katona LB, Douglas WS, Lena SR, Ratner KG, Crothers D, Zondervan RL, et al. Wilderness first aid training as a tool for improving basic medical knowledge in South Sudan. Prehosp Disaster Med [Internet]. 2015 Dec [cited 2018 Sept 9]; 30(6):574-8. Available from: https://dx.doi.org/10.1017/S1049023X15005270

18. Dixe MD, Gomes JC. Knowledge of the Portuguese population on Basic Life Support and availability to attend training. Rev Esc Enferm USP [Internet]. 2015 Aug [cited 2018 Sept 9]; 49(4):640-9. Available from: http://dx.doi.org/10.1590/S0080-623420150000400015

19. Abolfotouh M.A, Alnasser MA, Berhanu AN, Al-Turaif DA, Alfayez A.I. Impact of basic life-support training on the attitudes of health-care workers toward cardiopulmonary resuscitation and defibrillation. BMC Health Serv. Res. [Internet]. 2017 Sept [cited 2018 Sept 9]; 17: 674. Available from: https://dx.doi.org/10.1186/s12913-017-2621-5

20. Yunus M, Mishra A, Karim HMR, Raphael V, Ahmed G, Myrthong CE. Knowledge, Attitude and Practice of Basic Life Support (BLS) among junior doctors and students in a Tertiary Care Medical Institute. Int J Res Med Sci. [Internet]. 2015 Dec [cited 2018 Sep 9]; 3:3644–50. Available from: https://dx.doi.org/10.18203/2320-6012.ijrms20151416

21. Kapoor R, Vyas S, Mashru P, Mehta A, Mehta A, Mehta S, et al. Impact of training on knowledge and attitude regarding first aid among students of schools of Ahmedabad. Natl J Community Med. [Internet]. 2017 [cited 2017 Dec 31]; 8(7):380-4. Available from: http://www.njcmindia.org/home/download/1050

22. Raffaa H, Ayaman A, Saad S, Ahmed A, Abdull MA, Hadeel A, et al. Medical Students' Knowledge and Practices Related to Basic Life Support. Ave. J Cairo Univ [Internet]. 2016 [cited 2017 Dec 31]; 84(1):1383-9. Available from: http://medicaljournalofcairouniversity.net/home2/images/pdf/2016/December/020.pdf

23. Bezerra IM, Machado MF, Souza OF, Antão JY, Dantas MN, Reis AO, et al. Professional activity in the context of health education: a systematic review. J Hum Growth Dev [Internet]. 2014 [cited 2017 Sept 15]; 24(3):255-62. Available from: https:// dx.doi.org/10.7322/jhdg.88909

24. Fabri RP, Mazzo A, Martins JCA, Fonseca AS, Pedersoli CE, Miranda FBG, et al. Development of a theoretical-practical script for clinical simulation. Rev Esc Enferm USP [internet]. 2017; 51:e03218. Available from: https://dx.doi.org/10.1590/S1980-220X2016016403218.

25. Ahmad A, Akhter N, Mandal RK, Areeshi MY, Lohani M, Irshad M, et al. Knowledge of basic life support among the students of Jazan University, Saudi Arabia: Is it adequate to save a life? Alexandria J Medicine [Internet]. 2018 June [cited 2018 Sept 9]. Available from: https://doi.org/10.1016/j.ajme.2018.04.001

26. Costa AMA, Sousa FTC, Áfio CJ, Silva AAC, Moura SGG, Miguel GNN. Nursing dissertations and theses on the mobile emergency care servisse: a biblimetric study. Texto Contexto Enferm [Internet]. 2018 Mar [cited 2018 Sept 9]; 27(1):e3500016. Available from: http://dx.doi.org/10.1590/0104-07072018003500016

NOTES

CONTRIBUTION OF AUTHORITY

Study design: Carbogim FC, Püschel VAA, Oliveira LB.
Data collection: Carbogim FC, Püschel VAA, Oliveira LB.
Analysis and interpretation of data: Carbogim FC, Püschel VAA, Oliveira LB.
Discussion of the results: Carbogim FC, Luiz FS, Püschel VAA, Oliveira LB, Braz PR, Santos KB.
Writing and/or critical review of content: Carbogim FC, Luiz FS, Püschel VAA, Oliveira LB, Braz PR, Santos KB.
Review and final approval of the final version: Carbogim FC, Luiz FS, Püschel VAA, Oliveira LB, Braz PR, Santos KB.

ETHICS COMMITTEE IN RESEARCH

Approved by the Research Ethics Committee of the *Universidade Federal de Viçosa* under Opinion No.1,321,946, Certificate of Presentation for Ethical Appraisal No. 45536215.9.3001.5153. Brazilian Registry of Clinical Trials, under number U1111-1176-5343.

CONFLICT OF INTEREST

There is no conflict of interest.

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CORRESPONDENCE AUTHOR

Fábio da Costa Carbogim
fabiocarbogim@gmail.com