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RESEARCH ARTICLE

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EFFECTS OF REALISTIC SIMULATION ON THE NURSING KNOWLEDGE ABOUT CARDIOPULMONARY RESUSCITATION: A QUASI-EXPERIMENT IN A BRAZILIAN HOSPITAL

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ABSTRACT

A síndrome de Münchhausen **Objectives:** To analyze the effects of realistic simulation for the knowledge about cardiopulmonary resuscitation of the Nursing team in a teaching hospital. **Methodology:** A quasi-experimental study, of the before-and-after type, with an educational intervention, and conducted with 324 Nursing professionals from a Teaching Hospital in Southeast Brazil. Collection took place between 2017 and 2018, by using a structured instrument. **Results:** The participants were 108 Nurses, 211 Nursing Technicians, and 13 Nursing Assistants, 81.2% being female and aged 21 - 67 years old. It was observed that there was a significant difference between the means of the scores obtained before and after the educational action, showing that there was a gain in knowledge after the training with the use of active methodology through simulation. Pearson's Chi-square association test presented a significant association between the post-test scores and the professional category. **Conclusion:** It was concluded that the effects of realistic simulation for the knowledge about cardiopulmonary resuscitation are positive, effective and innovating, offering better learning opportunities.

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INTRODUCTION

Cardiorespiratory arrest (CRA) is an important public health problem and constitutes a priority condition for care, in which the agility and efficacy of the interventions adopted are crucial factors for the best outcome in the patient. It is characterized by lack of mechanical activity of the heart, confirmed by absence of pulse, irresponsiveness and apnea or agonal breathing (PATIL; HALPERIN; BECKER, 2015). Health professionals, mainly those who work in direct patient care, such as the Nursing team, must know not only how to recognize the signs of CRA, but also how to provide Cardiopulmonary Resuscitation (CPR) care and keep themselves updated on this subject matter. In general, there is a decline in knowledge regarding the CPR practices over time (BUKIRAN et al., 2014). The study evidenced that the professional's theoretical knowledge tends to decrease due to periodic changes in relation to updates on the topic (BUKIRAN et al., 2014). The mean time is three months for psychomotor skills and knowledge to decline after training programs (RAJESWARAN et al., 2018), so training on CPR must be applied periodically at six-month intervals (BUKIRAN et al., 2014; PLAGISOU et al., 2015). The care provided to a CRA victim depends on the rapid recognition of the event and on the performance of CPR maneuvers and rapid defibrillation; for this, it is necessary that the healthcare team has preparation and knowledge of these maneuvers. These aspects are crucial and can make a difference in survival and reduction of sequelae (BUKIRAN et al., 2014).

On this aspect, simulation assumes a strategic role in the teaching-learning process by attending to the students' learning singularities and maintaining the dialogical condition that respects their autonomy in the process of knowledge acquisition (COSTA et al., 2018). Simulation is a teaching-learning strategy, considered to be a dynamic process that is based on the creation of a hypothetical situation that incorporates a faithful representation of reality, which provides the students with greater capacity to act, controlling factors that could affect the way they act with a real patient, providing them with subsidies for safe and confident acting, in addition to being possible for them to evaluate their abilities and competences in a certain situation and to recognize their knowledge deficiencies in a certain area, allowing them to develop knowledge, abilities, and behaviors necessary for the practice, with the opportunity for repetition, feedback, evaluation, and reflection (COSTA et al., 2018; CRUZ, 2018; ROMAN et al., 2017; COSTA; ENDERS 2018; LESTANDER et al., 2015; TEIXEIRA et al., 2014; MEDINA; BARRIENTOS; NAVARRO, 2017; SILVEIRA; COGO, 2017). Given this, simulation, a pedagogical strategy, which is based on the active methodology; has as its main characteristic the use of technological resources, which allow those involved the possibility of improvement and experiences inherent to the Nursing profession and can contribute to the acquisition of competences and skills, in addition to reflecting in the improvement of the professional performance (COSTA et al., 2015), in a controlled (FABRI et al., 2017) and safe (OLIVEIRA; PRADO; KEMPFER, 2014; COSTA et al., 2019; O'DONNELL, 2016) environment. Therefore, the aim of this research was to analyze the effects of realistic simulation on the CPR knowledge of the Nursing team of a teaching hospital.

MATERIALS AND METHODS

A quasi-experimental study of the before-and-after type, with an educational intervention. The study population was made up of Nursing professionals, and the following inclusion criteria were used: nurses and nursing technicians and assistants who had been working at the institution for at least one year and were fully functional in their roles. For sampling, the total population of Nursing professionals who met the inclusion criteria was used, from the morning, afternoon, even and odd night shifts. The study was conducted in a large Teaching Hospital in the inland of Minas Gerais, Brazil, with 300 active beds, fully served by the Unified Health System.

Data collection took place at two different moments, before and after each educational intervention, between February 2017 and May 2018. A semi-structured instrument built specifically for this purpose was used, based on the 2017 American Heart Association guidelines, which was submitted to three nurses specialized in the area and then pilot-tested with 10 professionals. The data from the pilot test were not computed for the final sample of this study. The first part of the instrument, present only in the pre-test, consisted of variables to characterize the participants, namely: name, date of birth, professional category, performance sector, work shift, complementary training, type of employment contract, time of employment, and whether they had another job. The second part of the instrument dealt with the assessment of knowledge about CPR and included 20 multiple choice questions (MCQs), with four alternatives that dealt with the in-hospital chain of survival with the following themes: 1) surveillance and prevention of CRA; 2) recognition of CRA; 3) high-quality CPR (chest compressions and appropriate ventilations) for the adult; 4) defibrillation, including cardiac rhythms and specificities of the transvenous pacemaker; and 5) Advanced Life Support and post-CRA care. All the questions had the same weight and the total score the participants could obtain was 10 or 100%, if they answered all the questions correctly. The instrument was applied at two different moments, called "pre-test", applied immediately before the educational action, and "post-test", applied immediately after the educational action.

The data were coded, categorized and typed (double entry) in a *Microsoft Excel®* spreadsheet. Subsequently, they were exported and processed in the *Statistical Package for the Social Sciences®* (SPSS), version 16.0, for processing and analysis. The qualitative variables were analyzed according to descriptive statistics, by means of absolute and percentage frequency distribution, while for the quantitative variables, the descriptive measures of centrality (mean) and dispersion (standard deviation, minimum and maximum values) were used. For comparison of the pre- and post-test means, the *T* Test for paired samples was used, with a significance level of 0.01. For the association between the profile of the study participants and the scores obtained in the tests, Pearson's chi-square association test was performed. The variables with $p \leq 0.01$ were considered statistically significant associations. The educational intervention was repeated on 13 different occasions, with a total of 354 participants. The educational method was the lecture-dialog class, followed by the medium-fidelity realistic simulation teaching strategy. The following resources were used: *Dartsim* simulator, multiparameter monitor, defibrillator, mannequin, and a fictitious case. The realistic simulation was conducted by a specialist nurse from the institution. A Briefing session was held with general guidelines and exposition of the scenario objectives, guidelines for the use of the equipment, development, about the mannequins, roles, scenario time, and the patient's situation, contextualizing the clinical situation that would be experienced. After the scenario, a Debriefing session was held. The participants reflected and discussed the key points of the scenario, evaluated their experience, performance and emotions. An environment was promoted for the assimilation and consolidation of knowledge for learning and knowledge for future situations in their profession, as well as receiving feedback at the end. All the study participants accepted to take part and signed the Free and Informed Consent Form (FICF). This study was approved by the Research Ethics Committee of a federal university under Certificate of Presentation for Ethical Appreciation (*Certificado de Apresentação de Apreciação Ética*, CAAE) 52833415.3.0000.5154, respecting the ethical principles recommended for research involving human beings, according to Resolution 466/12 of the National Health Council.

RESULTS

A total of 324 Nursing professionals participated in this study: 108 (33.8%) nurses, 211 (66.2%) nursing technicians, and 13 (4.1%) nursing assistants. Predominance of female Nursing professionals was observed, with 263 (81.2%), aged 21 – 67 years old, with a mean age of 37 years old and a standard deviation of 9.6.

Table 1. Descriptive statistics and T-Test for paired samples for the pre- and post-test scores applied before and after the use of an active teaching-learning methodology in Uberaba-MG, 2020.

	Pre- and post-test scores				p
	Pre-test		Post-test		
	n	%	n	%	
Minimum	0	0	05	25	0.001
Mean	12	60	17	85	
Maximum	19	95	20	100	

Source: Elaborated by the authors.

Table 2. Association test of the post-test score applied after the use of an active teaching-learning methodology with the professional category of the professionals working in a Public Teaching Hospital in Uberaba-MG, 2020

Professional Category	Post-test score						p
	Below 70%		Over 70%		Total		
	n	%	n	%	n	%	
Nurse	6	6.6	102	94.4	108	100	0.001
Other members of the Nursing Team	47	22.3	164	77.7	211	100	
Total	53	16.6	266	83.6	319	100	

Source: Elaborated by the authors.

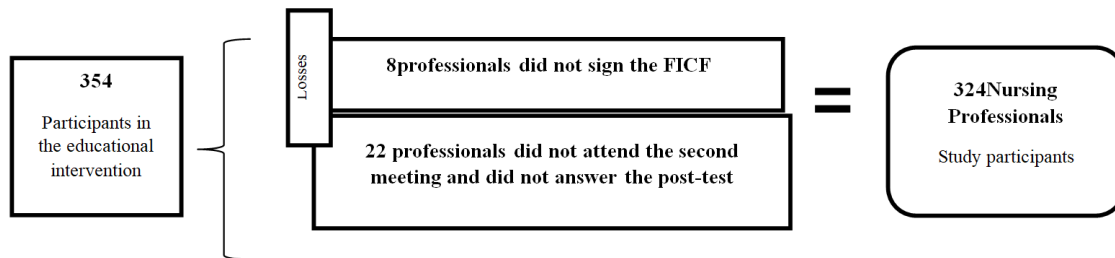


Figure 1. Number of professionals participating in the study. Uberaba (MG), 2021

The professionals interviewed reported having 1 | 37 years of employment contract, with a mean of 3 years and a standard deviation of 7. Regarding the shifts, 95 (30.2%) work in the morning, 94 (29.8%) in the afternoon, 92 (29.2%) in the evening, and 34 (10.8%) full-time. Only 34 (10.8%) professionals had more than one employment contract. The pre-test score varied from 0 to 19 points (0%-95%) with a mean of 12 points (60%). The post-test score ranged from 5 to 20 points (25%-100%) with a mean of 17 points (85%). Through the T-Test for paired samples, it was observed that there was a significant difference between the means of the scores obtained before and after the educational action, with $p < 0.01$ (99% confidence level). There was also a significant association between the post-test score applied after the use of an active teaching-learning methodology and the professional category, demonstrated by Pearson's chi-square association test and the frequency table.

DISCUSSION

In this study, a predominantly female and young sample was observed, with a mean age of 37 years old. These results corroborate a recent research study with national representation carried out by the Federal Nursing Council (*Conselho Federal de Enfermagem*, COFEN) in partnership with the Oswaldo Cruz Foundation (Fiocruz), which found that Nursing is predominantly a female profession in full rejuvenation (MANCIA, 2016). Among the main factors that influence the quality of CPR, the following stand out: the high number of professionals and people in the scenario, the lack of harmony and the stress of team members, team disorganization, environment, insufficient communication, or even absence of information or incorrect transmission, lack of leadership at the time of the intervention in CPR, and lack of qualification and permanent training of the professionals (LIMA et al., 2019). A literature review has shown that numerous patients with Coronavirus (COVID-19) evolved to a severe condition and, consequently, to CRA. With this new reality caused by the pandemic, it has become even more necessary to follow the CPR maneuvers recommended by guidelines

(MACHADO et al., 2020). Thus, it is essential to have a trained team that recognizes a CRA situation instantly and starts the indicated procedures quickly and rigorously (MACHADO et al., 2020). Education and training of personnel for CRA care are fundamental conditions for improving performance and achieving satisfactory results. Therefore, there are aspects of skills development and retention related to providing care for the hospital environment and which require permanent education of the team for skills development, minimizing errors, and optimizing results. An example of this is simulated training, which can contribute to the training of the personnel (LIMA et al., 2016). Simulation has been used as a facilitating strategy for teaching basic and advanced life support, and the impact of this was observed in this study, showing a significant difference between the means of the scores obtained before and after the educational action, as well as in other studies. According to a quasi-experimental study conducted in Montes Claros-MG (MEIRA JÚNIOR et al., 2016), there were gains in knowledge and skills after the training based on a simulation performed with physicians and nurses. According to a review conducted among medical and nursing students, simulation provides higher levels of theoretical knowledge compared to classic instructor-led training (GARCÍA-SUÁREZ et al., 2019). The study showed that the simulation contributed to a gain in theoretical learning, as well as to improved CPR performance (TOBASE et al., 2017). Simulation improves the performance of skills that are part of neonatal resuscitation among nurses, such as vital signs measurements and chest compression (VAIL et al., 2018). It is observed from the results of this study that there was a significant association between the post-test scores and the occupational category. This reality can be justified by the fact that the nurse is the team leader and the person responsible for solving problems, proposing and promoting changes, pointing solutions to what does not meet the needs of the patients and the team. Therefore, the use of realistic simulation is an effective and innovating strategy, which favors learning opportunities and training sessions. It enables expanding the relationships between theory and practice in a safe environment. It allows recognizing and modifying work processes and significantly contributing in the transformation of various

realities in health. In addition, it contributes to overcoming technicism and the reproduction of habits and routines that are inadequate for the professional practice. It is understood that the limitation of this study is related to its quasi-experimental design with a single group, as there was no control group, nor randomized.

CONCLUSION

From this study, it is concluded that simulation is an active methodology with a positive contribution in the teaching-learning process of the Nursing Team, showing gains in knowledge. In addition to that, it is an approach that makes teaching more dynamic by developing ideas, leadership, teamwork, creativity, problem solving, autonomy, critical thinking, and evolution of skills and competences.

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