

EFICÁCIA DA SIMULAÇÃO EM ENFERMAGEM NA APRENDIZAGEM DOS ESTUDANTES
EFFECTIVENESS OF NURSING SIMULATION IN STUDENT LEARNING
EFFECTIVIDAD DE LA SIMULACIÓN DE ENFERMERÍA EN EL APRENDIZAJE DE LOS ESTUDIANTES

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RESUMO

Introdução: A simulação permite aos estudantes, através da criação de cenários hipotéticos, desenvolverem competências, tornando-os mais ativos no processo de tomada de decisão face aos cuidados de enfermagem.

Objetivo: Avaliar a eficácia da simulação na aprendizagem dos estudantes do curso de licenciatura e ensino pós-graduado de enfermagem.

Métodos: Estudo quantitativo, descritivo e exploratório onde participaram 233 estudantes, dos quais 164 são do curso de licenciatura em enfermagem e 69 são do ensino pós-graduado. Como método de recolha de dados foi utilizado um inventário intitulado como "The Simulation Learning Effectiveness Inventory", após tradução para português. A análise dos dados foi realizada através do sistema operativo SPSS® versão 23.

Resultados: Os participantes do estudo apresentaram valores médios elevados em todas as variáveis avaliadas: curso, recurso, debriefing, habilidades clínicas, confiança, resolução de problemas, colaboração, preparação e resultado.

Conclusão: A simulação revela-se uma metodologia de ensino eficaz nos cursos de licenciatura e ensino pós-graduado de enfermagem.

Palavras-chave: simulação; aprendizagem; eficácia; estudantes de enfermagem

ABSTRACT

Introduction: Simulation allows students, through the creation of hypothetical scenarios, to develop skills, making them more active in the decision-making process in relation to nursing care.

Objective: To evaluate the effectiveness of simulated practices in the learning of undergraduate and graduate nursing students.

Methods: Quantitative, descriptive and exploratory study in which 233 students participated, of which 164 are from the nursing undergraduate course and 69 are from postgraduate education. As a method of data collection, an inventory called "The Simulation Learning Effectiveness Inventory" was used, after translate to Portuguese language. Data analysis was performed using the SPSS® version 23.

Results: Study participants had a higher average response in all variables evaluated: course, resource, debriefing, clinical skills, confidence, problem solving, collaboration, preparation and result.

Conclusion: Simulation proves to be an effective teaching methodology in undergraduate and postgraduate nursing courses.

Keywords: simulation technique; learning; efficacy; nursing students

RESUMEN

Introducción: La simulación permite a los estudiantes, a través de la creación de escenarios hipotéticos, desarrollar habilidades, haciéndolos más activos en el proceso de toma de decisiones en relación al cuidado de enfermería.

Objetivo: Evaluar la efectividad de la simulación en el aprendizaje de estudiantes de pregrado y posgrado de enfermería.

Métodos: Estudio cuantitativo, descriptivo y exploratorio en el que participaron 233 estudiantes, de los cuales 164 son del curso de pregrado en enfermería y 69 son de educación de posgrado. Como método de recolección de datos, se utilizó un inventario llamado "El Inventario de Simulación de Efectividad de Aprendizaje", después de la traducción al portugués. El análisis de los datos se realizó con el sistema operativo SPSS® versión 23.

Resultados: Los participantes del estudio tuvieron una respuesta promedio superior en todas las variables evaluadas: curso, recurso, información, habilidades clínicas, confianza, resolución de problemas, colaboración, preparación y resultado.

Conclusión: La simulación demuestra ser una metodología de enseñanza eficaz en los cursos de pregrado y posgrado en enfermería.

Palabras Clave: simulación; aprendizaje; eficacia; estudiantes de enfermeira

INTRODUCTION

Over the years, as a result of technological advances, higher education institutions in health, training health professionals to be increasingly prepared to practice nursing, have been concerned with the use of different learning methodologies which enhance academic success. There is a constant search for ways to promote effective learning for nursing students, due to the complexity of the interventions that they will have to implement in their clinical practice (Shin, Park & Kim, 2014).

Simulation, as a pedagogical methodology, has become an integral part of the curriculum in order to promote the acquisition of students' knowledge and skills, because of their responsibility in practicing health care (Duarte, 2015). It also contributes to the development of personal, cognitive, psychomotor and affective skills, valuing and perfecting multidisciplinary work, providing students with the opportunity to repeat actions, get feedback, evaluate performance and critically think about their interventions as future health professionals (Costa, Medeiros, Martins, Cossi & Araújo, 2017; Chen, Huang, Liao & Liu, 2015). Simulation has proved to be a methodology through which it is possible for students to partially or entirely reproduce real-life scenarios through hypothetical scenarios, with investment in their decision-making process as well as in their self-confidence and responsibility (Filho & Scarpelini, 2007). It is recommended that each simulation session should contain a process of ten to fifteen minutes for briefing, an equal amount of time for the simulation and more time (approximately twenty to thirty minutes) for debriefing, in order to obtain results which will enable greater efficiency in learning (Park, McMillan, Cleary, Conway, Murphy & Griffiths, 2013). The simulation provides an ideal safe and controlled environment for the students to train their clinical practice without fearing repercussions for their errors (Chen, Huang, Liao & Liu, 2015).

In view of what was discussed above and observing the importance that simulation has acquired in the context of training nursing students with a focus on their learning, the aim of this study is to evaluate the effectiveness of simulation in the learning of undergraduate and graduate nursing students.

1. THEORETICAL FRAMEWORK

The use of simulation has proved to be a significant learning strategy along students' academic path, since they actively participate in constructing their own knowledge, thus assuming a role of co-participant in the development of their expertise and the process of decision-making (Jerônimo, Campos, Peixoto & Brandão, 2018). Student learning is effective if they become aware of learning as the result of the process of behaviour change (Kristanto, 2017), which comes from the experience provided by simulation.

The simulation can take place through various environments such as virtual reality, computer simulation, standard patients and low/medium/high-fidelity mannequins. However, with high-fidelity mannequins, the level of learning effectiveness is higher (Chen, Huang, Liao & Liu, 2015). The use of these mannequins, which have advanced sound and image technology, allows students to achieve multiple learning objectives. It is thus a fundamental method in teaching nursing students (Duarte, 2015).

According to Miles (2018), skills for clinical practice can be optimized with simulation learning, promoting integration of the nursing process, critical thinking and the further development of fundamental interventions in clinical practice. Simulation enhances students' critical thinking skills in setting priorities, making decisions, performing the best care and working as a team with a significant impact on the quality of care (Jesus, Ramos, Silva, Gomes & Silva, 2017), due to the fact that clinical practice requires high level of responsibility for students and health professionals (Duarte, 2015). Simulation is a methodology that promotes the transfer of learning, relating theoretical knowledge to relevant clinical issues, through which students discriminate knowledge by levels of relevance and mentally structure the process of solving a clinical problem (Miles, 2018). Therefore, it is a methodology that can have a significant impact on nursing students' learning and their ability to solve problems, promoting the training of decision-making in environments that give them greater security. Simulation learning, integrated into curriculum plans, can better prepare students for clinical practice (Miles, 2018).

Simulation experiences can offer an opportunity for more realistic learning, where students can be supported to critically analyse what is taught in institutions of higher learning and clinical practice, leading it to acquisition, development and change (Berragan, 2013).

An advantage of using simulation in nursing is the ability for students to analyse their own actions during the simulation, reflect on skills and observe the decisions of others (King, 2018).

In this context, it is essential that higher education institutions and teachers are proficient and aware of how they will use the simulation methodology in the different courses, in order to promote the effectiveness of learning using simulation.

2. METHODS

This is a quantitative, descriptive and exploratory research study.

2.1 Sample

The sampling method is accidental non-probabilistic, with a total of 233 students participating in the nursing undergraduate course, the postgraduate intensive care and emergency course and the postgraduate medical-surgery nursing specialization course at a higher education institution in the central region of Portugal. The students of these courses were included due to the high number of simulation hours in their curriculum, namely, in the areas of trauma, basic life support, advanced life support, dialysis techniques and ventilation.

2.2 Data collection instruments and procedures

Data collection took place from March 2019 to February 2020. A questionnaire composed of two parts was constructed: the first part refers to the sociodemographic characterization of the target population and the second part is a Portuguese translation of the "The Simulation Learning Effectiveness Inventory" (Chen, Huang, Liao & Liu, 2015) with a total Cronbach's alpha of 0.96. With the authors' permission, the inventory translated into Portuguese and then reverse-translation since it was originally in English. It is operationalized by a 5-point Likert scale that varies between semantic fields (I totally disagree and I totally agree).

The inventory consists of 32 items that are grouped into the following dimensions: course (items: 1,2,3), resource (items: 4,5,6,7), debriefing (items: 8,9,10,11), clinical skills (items: 12,13,14,15,16), confidence (items: 17,18,19,20,21), problem solving (items: 22,23,24,25,26,27, 28) and collaboration (items: 29,30,31,32). The aggregation of the course and resource is called preparation. Clinical skills, confidence, problem solving and collaboration are aggregated to the results. Debriefing is exclusively aggregated to the process. The calculation of the variables that resulted from the aggregation was based on the average, ignoring the nulls of the inventory items that they comprise. The application of the inventory occurred after the students of the areas mentioned above had carried out the simulation scenarios in their academic curriculum.

2.3 Data analysis

The data were subjected to descriptive and inferential statistics according to the nature of the variables using the Statistical Package for the Social Sciences® software version 23. Using the T test for two different samples, the difference in the group means was verified for the undergraduate nursing students and the group of graduate students (postgraduate intensive care nursing and postgraduate specialization in medical-surgical nursing) regards the inventory dimensions related to effectiveness of learning using simulation. The level of significance was set at $p < 0.05$. The study was only implemented after approval by the Board of Directors and the Ethics Committee of the higher education institution where the study was conducted (opinion 01/2019), having respected all ethical/deontological issues.

3. RESULTS

A total of 233 students participated in the study, 164 (70.4%) attending the nursing degree course (61 (26.2%) in the first year, 36 (15.5%) in the second year, 42 (18, 0%) in the third year and 25 (10.7%) in the fourth year). The remaining 69 (29.6%) participants were from postgraduate courses, 28 (12.1%) from the intensive care and emergency postgraduate courses and 41 (17.6%) from the postgraduate medical-surgical specialization course. The vast majority of the students are female (76.8%, $n = 179$) and have an average age of 26 years (± 8.75), varying between 17 and 54 years of age.

The participants attending postgraduate courses have an average of 3 years (± 6.99) of professional experience ranging from 1 to 34 years. They work predominantly in the emergency department (6.4%, $n = 15$) or in the operating theatre (5.6%, $n = 13$), with the remaining 88% ($n = 41$) being dispersed among other services with a frequency less than 1.

Regarding the learning effectiveness of undergraduate students ($n = 164$), it appears that all dimensions have a level of agreement with mean values of approximately 4 (Table 1).

Table 1 - Dimensions of the learning effectiveness of undergraduate students

	Minimum	Maximum	Mean	Standard Deviation
Course	2.00	5.00	4.01	0.47
Resource	1.75	5.00	3.97	0.61
Debriefing/Process	2.50	5.00	4.02	0.53
Clinical Skills	2.80	5.00	4.16	0.50
Confidence	2.60	5.00	4.07	0.52
Problem Solving	2.43	5.00	4.07	0.50
Collaboration	2.50	5.00	4.14	0.52
Preparation	2.29	5.00	3.99	0.49
Result	2.67	5.00	4.10	0.44

The learning effectiveness of graduate students (postgraduate in intensive care and emergency and postgraduate specialization in medical-surgical nursing, $n = 69$) is slightly higher than that of students in the undergraduate course (Table 2).

Table 2 - Dimensions of the learning effectiveness of graduate students

	Minimum	Maximum	Mean	Standard Deviation
Course	2.67	5.00	4.29	0.58
Resource	3.00	5.00	4.30	0.58
Debriefing/Process	3.00	5.00	4.37	0.56
Clinical Skills	3.00	5.00	4.46	0.51
Confidence	3.00	5.00	4.33	0.55
Problem Solving	3.00	5.00	4.31	0.52
Collaboration	3.00	5.00	4.46	0.54
Preparation	3.00	5.00	4.29	0.53
Result	3.00	5.00	4.38	0.48

For all of the participants, clinical skills and collaboration stand out with higher mean values. As dimensions of the preparation, course and resource have the lowest mean values.

Using the T test for independent samples, it was found that there are differences with statistical significance between the graduate and the undergraduate students for the course variable, $t(230)=3.90$, $p=0.001$. Graduate students show greater ownership of the course with regard to learning objectives. Graduate students report significantly greater efficiency in debriefing than undergraduate students, $t(230)=4.57$, $p=0.02$. Confidence is significantly higher for the graduate students than for the undergraduate students, $t(230)=3.46$, $p=0.03$. There are statistically significant differences between the graduate and undergraduate students for problem solving, $t(230)=3.34$, $p=0.04$. Graduate students show greater problem-solving skills using simulation than the undergraduate nursing students. Learning outcomes using simulation are significantly higher for graduate students, $t(230)=4.26$, $p=0.04$.

All of the dimensions correlate significantly (Table 3).

Table 3 - Correlation matrix between the variables

	Course	Resource	Debriefing/ Preparation	Clinical Skills	Confidence	Problem Solving	Collaboration	Preparation	Result
Course	<i>r</i> 1	0.615 [‡]	0.639 [‡]	0.581 [‡]	0.539 [‡]	0.555 [‡]	0.522 [‡]	0.845 [‡]	0.617 [‡]
Resource	<i>r</i>	1	0.631 [‡]	0.632 [‡]	0.533 [‡]	0.566 [‡]	0.523 [‡]	0.941 [‡]	0.633 [‡]
Debriefing/ Preparation	<i>r</i>		1	0.717 [‡]	0.644 [‡]	0.680 [‡]	0.625 [‡]	0.701 [‡]	0.750 [‡]
Clinical Skills	<i>r</i>			1	0.710 [‡]	0.721 [‡]	0.599 [‡]	0.677 [‡]	0.851 [‡]
Confidence	<i>r</i>				1	0.795 [‡]	0.691 [‡]	0.592 [‡]	0.902 [‡]
Problem Solving	<i>r</i>					1	0.767 [‡]	0.621 [‡]	0.941 [‡]
Collaboration	<i>r</i>						1	0.578 [‡]	0.847 [‡]
Preparation	<i>r</i>							1	0.694 [‡]
Result	<i>r</i>								1

‡ Significant correlation for $p<0.001$

The different dimensions were found to mutually influence the effectiveness of learning using simulation.

4. DISCUSSION

Students' learning in nursing (undergraduate courses, intensive and emergency care postgraduate courses and postgraduate specializations in medical and surgical nursing) using simulation is effective with average levels of agreement in all dimensions of the learning effectiveness inventory. There is a higher average in the clinical skills and collaboration dimensions. In this sense, the participants see an effective opportunity in simulation for the development of clinical skills, centred on the ability to solve problems based on realistic clinical cases, which prepare them for caring for people who will be the target of their care. Simulation is an important resource in the

development of skills and competencies related to the affective and emotional domains, reinforcing self-confidence and supporting the participants' decision-making process (Salgado, Souza, Júnior, Balbino, Ribeiro, Paiva & Brombine, 2018). The collaborative practice emerges as an effective result of the simulation, which comes from the strategies that are used to promote teamwork, namely communication, interaction and management of the workload in the team. Collaboration allows the development of communication and cooperation with the rest of the team, which is essential for a quality nursing practice. According to Ribeiro, Garbuio, Zamariolli, Eduardo & Carvalho (2018) simulation contributes effectively to the teaching of nursing practices, allowing students to work on their clinical conscience, perfecting leadership and teamwork skills, so useful in the professional world they already confront or may confront in the future.

The course and resource dimensions have lower mean values, thus demonstrating that there is a need for greater investment in the preparation of simulation scenarios and in presenting them to participants. It is essential to have a clear definition of the objectives, evaluation strategies, selection and adequacy of the resources to the scenario and a previous interaction of the participants with the equipment in order to anticipate difficulties in interacting with them.

When comparing the effectiveness of learning using the simulation of undergraduate students with graduate students, it appears that graduate students have significantly higher averages for course, debriefing, confidence, problem solving and results. Therefore, graduate students (all of whom have professional experience) consider that the simulation methodology was a facilitator of learning, due to the way the course dimension (contents, learning objectives, evaluation and the activities provided) were organized in the simulation methodology. We also verified the importance of the debriefing associated with the various exercises performed during the simulation activity, including the feedback provided by the teacher, which promoted the formulation of new learning objectives as well as correcting the students' mistakes. The debriefing is a moment of reflection during simulated practices that allows students to reflect on learning and define how they can improve their performance (Coutinho, Martins & Pereira, 2014). According to Mota, Maia, Soares, Marreiros, Silva & Freitas (2019) debriefing in simulated practices is fundamental in the acquisition of skills towards academic success. These premises align the standards of good practice in the design of the simulation scenarios recommended by Lioce, Meakim, Fey, Chmil, Mariani & Alinier (2015). The use of low/medium/high-fidelity mannequins allows participants to improve their actions, training and to perfect techniques, starting from experiences based on real life situations, which allows the patient to be less exposed to errors that may compromise their well-being (Jesus, Ramos, Silva, Gomes & Silva, 2017).

The development of confidence is seen by the participants as something positive and extremely important, since the simulation allows them to be encouraged when confronting future clinical challenges, boosting their clinical skills, controlling anxiety and fear of acting. Studies confirm that investment in simulation-based education allows nurses to improve planning and quality of care, patient safety and their self-confidence in emergency situations (Almeida, Duarte & Magro, 2019). For graduate students, simulation allows them to effectively develop problem-solving skills through a better understanding of the implications of each solution for the problems of the people under their care in new, never previously experienced scenarios. This factor is fundamental for the development of the capacity to adapt to new circumstances in an effective and even predictive way to meet the needs of the people they are caring for. This will be reflected positively in their results and, therefore, in the quality of care provided.

As a result of the study, it appears that all the dimensions of the inventory are related to each other, which demonstrates that the effectiveness of learning using simulation depends on all of the dimensions and the behaviour of one dimension influences another. Thus, it is fundamental to implement the standards of good practice in the simulation according to Lioce et al. (2015) in terms of effective learning.

A limitation of this study is the fact that the instrument has not been validated for the Portuguese population as of yet, to which this study contributes. Moreover, there is the fact that there is heterogeneity in the sample with regard to their level of graduation and professional experience.

CONCLUSION

The use of simulated practices proved to be effective in nursing students' learning (undergraduate and postgraduate courses and postgraduate specialization) representing a facilitating teaching methodology with regard to the acquisition of the most varied competencies. This is a study with special relevance in the area of nursing education, since it allowed us to understand the extent to which it is feasible to use this methodology, as well as the impact on skills development. With regard to future developments, it is interesting to emphasise the importance of increasing the use of simulation in the academic path of undergraduate nursing students, who have access to this methodology at an early stage of their course, allowing basic skills to be developed. These skills can then be improved - over time. For graduate students, simulation should be incorporated into nurses' lifelong learning to foster continuous improvement of care practice based on the best scientific evidence.

It is essential that simulation be accompanied by good practices guidelines to foster quality assurance, which will translate into greater effectiveness in learning. These results are an excellent contribution for teachers to improve their teaching methods. From a research point of view, it was important to develop studies that would verify the impact of student learning in simulated scenarios in patient care practice. Educational institutions should also invest in equipment and spaces dedicated to the implementation of simulation, in order to respond to their students' main needs in a closer and more realistic way based on good practice guidelines for simulation.

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