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INTEGRATIVE REVIEW ARTICLE

CONTRIBUTIONS OF THE SIMULATION FOR UNDERGRADUATE NURSING STUDENTS

CONTRIBUIÇÕES DA SIMULAÇÃO PARA ESTUDANTES DE GRADUAÇÃO EM ENFERMAGEM

CONTRIBUCIONES DE LA SIMULACIÓN PARA ESTUDIANTES DE ENFERMERÍA DE PREGRADO

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ABSTRACT

Objective: to identify the contributions of simulation for undergraduate students of Nursing. ***Method:*** a review of scope with the guiding question: "What are the contributions of simulation for undergraduate students of nursing?" There were consulted during the month of May 2017 the libraries: Scielo databases, Medline and LILACS databases, using the following descriptors: "learning", "education", "simulation", "simulation of patient", "training by simulation" and "Nursing", later, two independent revisers underwent reading titles, abstracts and full texts. The results were grouped agreeing with the contributions described in articles. ***Results:*** the sample consisted of 41 studies; the contributions of the simulation were the improvement of learning/knowledge and the development of psychomotor skills, addressed in 12 articles (29.3%). Other contributions were increased confidence/safety/efficacy, improving communication skills, development of critical thinking and reflective, skills, improving the attitude, integration of theory and practice. ***Conclusion:*** the simulation favors a critical and reflective learning and contributes positively in the training of graduate students in nursing, especially in the development of competences for the care coverage. ***Descriptors:*** Students; Learning; Nursing; Simulation Training; Education; Education, Nursing.

RESUMO

Objetivo: identificar as contribuições da simulação para estudantes de graduação em enfermagem. ***Método*:** revisão de escopo com a questão norteadora: "Quais as contribuições da simulação para estudantes de graduação em enfermagem?" Foram consultadas, durante o mês de maio de 2017, a biblioteca: *Scielo*, as bases de dados *Medline e LILACS*, utilizando-se os descritores: "aprendizagem", "educação", "simulação", "simulação de paciente", "treinamento por simulação" e "enfermagem", posteriormente, duas revisoras independentes realizaram a leitura dos títulos, resumos e textos completos. Os resultados foram agrupados de acordo com as contribuições descritas nos artigos. ***Resultados:*** a amostra foi de 41 estudos, as contribuições da simulação foram a melhoria da aprendizagem/conhecimento e o desenvolvimento de habilidades psicomotoras, abordadas em 12 artigos (29,3%). Outras contribuições foram aumento da confiança/segurança/autoeficácia, melhoria da habilidade de comunicação, desenvolvimento do pensamento crítico e reflexivo, de competências, melhoria da atitude, integração da teoria e prática. ***Conclusão:*** a simulação favorece uma aprendizagem crítica e reflexiva e contribui positivamente na formação dos graduandos em enfermagem, sobretudo, no desenvolvimento de competências para o cuidado seguro. ***Descritores:*** Estudantes; Aprendizagem; Enfermagem; Treinamento por Simulação; Educação; Educação em Enfermagem.

RESUMEN

Objetivo: identificar las contribuciones de simulación para estudiantes de pregrado de enfermería. ***Método:*** revisión del alcance con la pregunta orientadora: ¿Cuáles son las contribuciones de simulación para estudiantes de pregrado en enfermería? Fueron consultados durante el mes de mayo de 2017 las bibliotecas: Scielo, bases de datos Medline y Lilacs bases de datos, utilizando los siguientes descriptores: "aprender", "educación", "simulación", "simulación de paciente", "formación por simulación" y "enfermería", después, dos revisoras independientes sufrió la lectura de títulos, resúmenes y textos completos. Los resultados fueron agrupados de acuerdo a las contribuciones descritas en los artículos. ***Resultados:*** la muestra estuvo conformada por 41 estudios, de los aportes de la simulación fueron la mejora del conocimiento y el desarrollo de habilidades psicomotrices, abordado en 12 artículos (29,3%). Otras contribuciones fueron el aumento de la confianza/seguridad/eficacia, la mejora de las habilidades de comunicación, el desarrollo del pensamiento crítico y reflexivo, habilidades, la mejora de la actitud, la integración de la teoría y la práctica. ***Conclusión:*** la simulación favorece un aprendizaje reflexivo y crítico, y contribuye positivamente en la formación de estudiantes de postgrado en enfermería, especialmente en el desarrollo de competencias para el seguro del cuidado. ***Descriptores:*** Estudiantes; Aprendizaje; Enfermería; Entrenamiento Simulado; Educación, Educación en Enfermería.

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INTRODUCTION

Teaching based on clinical simulation has been used in Undergraduate Nursing and demonstrates steadiness with the current objectives of the course, to be a profession in which skills and also psychomotor skills should be developed, being required that the student has strategies that combine the act of caring with scientific methodologies.[1]

By clinic simulation, means a set of methodological techniques used to expand the authentic experiences through planned scenarios that evoke or replicate substantial aspects of clinical reality.[2]

When participating in the simulated experience, students have the opportunity to get in prior contact with their own actions of nursing assistance, in controlled environments, where they can train, repeat and miss before the real experience, enabling the development and improvement of these actions, which will increase the safety standards of the patient.[3]

Patient safety is an important topic and priority that compose the list of seven attributes of health care, which assist in the definition of its quality[4]. With the advancement of science, there have been changes in the process of care, what generated the need to invest with greater emphasis on patient safety, because it is known that the errors in the assistance can generate disabilities, injuries and deaths.[4-5]

The World Health Organization recommends that teaching based on simulation is used in nursing courses so that future professionals have an active training based on critical thinking and problem resolution, and that, next, be able to apply the knowledge acquired during undergraduate studies.[5]

The insertion of the student in simulation environments can contribute in other areas of education, such as: to assist in decision-making, to promote the increase of motivation, satisfaction and stress reduction of the student, impacting directly on his approach and, as a result, in the safety of the patient.[6-7]

So, considering that the simulation-based education is a method that enhances the training of undergraduates of nursing and the implementation of actions before the actual experience with the patient, in addition to its importance in the qualification of future professionals and security both in education and in assistance, developed this research.

OBJECTIVE

- To identify the contributions of simulation for undergraduate students of Nursing.

METHOD

Review of scope, a type of literature review seeking to get large and comprehensive results about a topic. Its implementation should follow rigorous methodology capable of replication.[8-9]

This methodology proposes the following steps: 1- Identification of research question; 2- Identification of relevant studies; 3- Selection of studies; 4- Data mining; 5- Separation, and Summarizing results report; 6- Communication of results (optional).[8-9]

Based on these steps, the research question was: What are the contributions of simulation for undergraduate students in nursing? For the identification of relevant studies there were consulted during the month of May 2017, the library: Scientific Electronic Library Online, U.S. and the databases of Medical Literature Analysis and Retrieval System Online, and the Latin American and Caribbean Literature in Health Sciences with the respective strategies (Figure 1):

Search sources	Search strategies
Medical Literature Analysis and Retrieval System Online(MEDLINE)	((("learning"[MeSH Terms] OR "education"[MeSH Terms]) AND "patient simulation"[MeSH Terms]) OR "simulation training"[MeSH Terms]) AND "nursing"[MeSH Terms]))
Scientific Electronic Library Online (SciELO)	(LEARNING) or EDUCATION [All indexes] and ((SIMULATION) or SIMULATION OF PATIENT) or TRAINING BY SIMULATION [All indexes] and NURSING [All indexes]
Latin American Literature and Caribbean Center on Health Sciences (LILACS)	("LEARNING") or "EDUCATION" [Subject descriptor] or (("SIMULATION") or "SIMULATION OF PATIENT") or "SIMULATION TRAINING" [Subject descriptor] and "NURSING" [Subject descriptor]

Figure 1. Search strategy articles for sources. Curitiba (PR), Brazil, 2017.

For the selection of the studies, we used the following inclusion criteria: full articles available online and in full, in Portuguese, English or Spanish, published in the period from 2012 to 2016.

The exclusion criteria were: being editorials, case reports, letters, opinion articles, research projects, reviews, abstracts in annals, testing, duplicate publications, theses, dissertations, official documents of national and international programs, books, literature reviews and articles of reflection, in addition to studies that did not include in their sample undergraduate students of Nursing, which includes graduates and that do not address the contributions of the simulation.

The reading of the titles, abstracts and full texts was performed by two revisers independently and the results were compared with the objective of verifying the adequacy of the criteria for eligibility. When there was disagreement between the revisers, publications were analyzed by a third person who decided on the inclusion or not of the study (Figure 2).

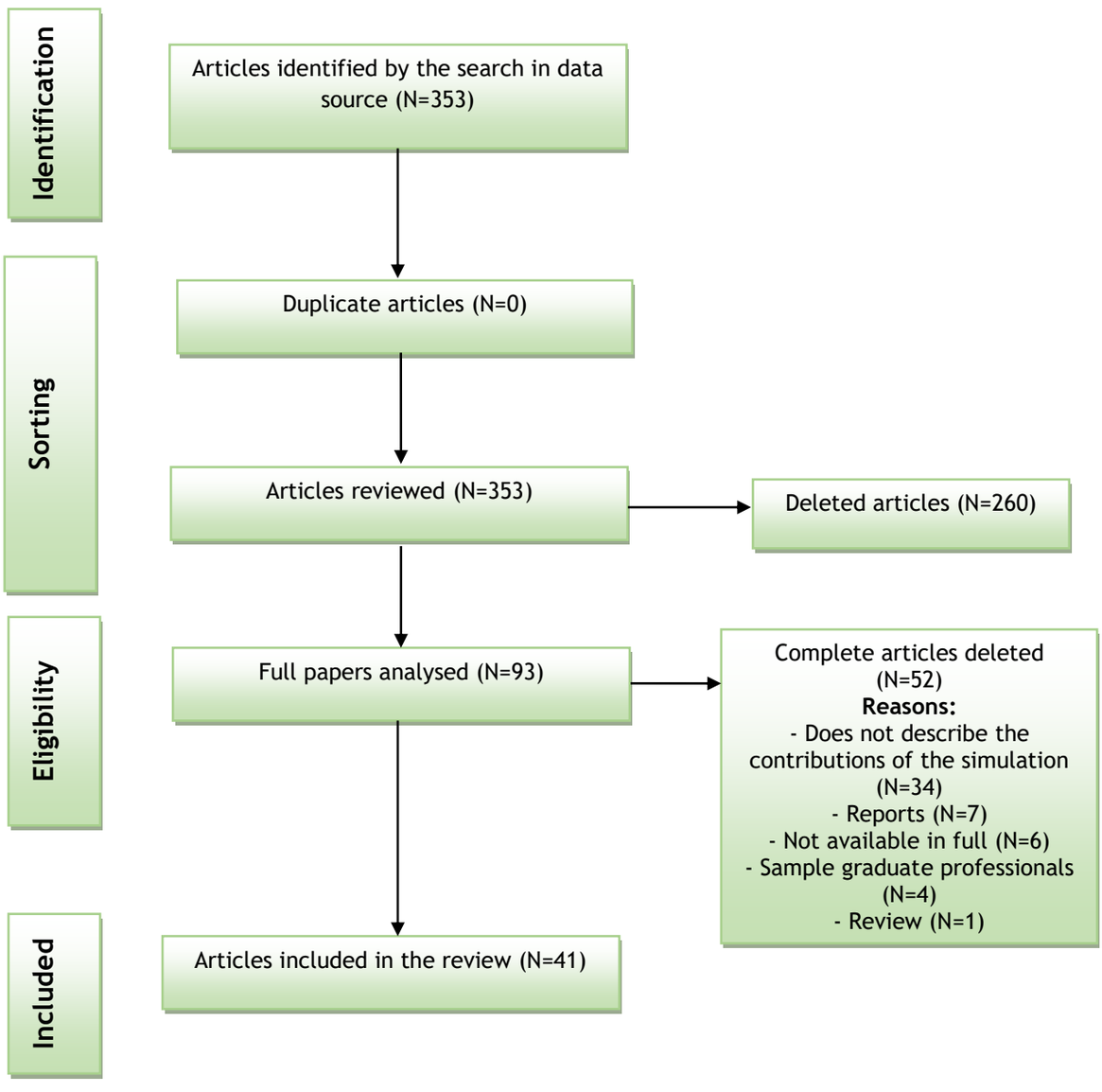

Figure 2. Analysis flow of articles according to the steps of identification, sorting, eligibility and inclusion. Curitiba (PR), Brazil, 2017.

Source: adapted from Flow Diagram.[10]

To step five, separation, and summarizing results report, an instrument developed by the authors was used. This contained the following items: search sources, title, and year of publication, periodic, location, purpose, and type of study, level of evidence sample, strategy and contributions of the simulation.

With the objective to assist in the selection of the best evidence, held the hierarchical characterization of articles according to the level of evidence: level I - meta-analysis of multiple controlled studies; level II - individual study with experimental design; Level III - study with Experimental and quasi-experimental study without randomization with single group pre and post-test, temporal series or case-control study; level IV - non-experimental randomized as descriptive correlational and qualitative research, or case studies; level V- report of cases or data obtained in a systematic way, quality verifiable data or evaluation of programs and level VI - opinion of reputable authorities based on clinical competence or opinion of committees of experts, including interpretations of information is not based on research.[11]

The results were grouped according to the contributions described in articles.

RESULTS

There were included 41 studies, of whom 37 (90.2%) were published in English and four (9.8%) in Portuguese. Regarding the place of publication, 14 studies (31.1%) were published in the journal Nurse Education Today, eight (19.5%) in Nurse Educator, four (9.8%) in Nurse Education Perspectives, three (7.3%) in Nurse Education in practice, two (4.9%) in the Journal Nurse Scholarship and two (4.9%) in the Acta Paulista of Nursing. The others were published in various magazines in the area of health.

In relation to the geographical location of the studies, 20 (48.8%) were performed in the Americas, eight (19.5%) in Asia, six (14.6%) in Europe, four (9.8%) in Oceania and three (7.3%) in countries with euro-Asian. As to the level of evidence, 24 (58.5%) are at level IV, nine (22%) level III and eight (19.5%) in the level II (Figure 3).

N/ type	Title (year)	Authors	País	Evidence level
1	Computer simulation and laboratory in the neonatal nursing education: innovations and the impact on learning. (2016)	Fonseca LMM et al.[12]	Portugal	II
2	Evaluation of nursing students about learning with the clinical simulation. (2015)	Teixeira CRS et al.[13]	Brazil	IV
3	Nursing students' opinion about the realistic simulation and the curricular internship in a hospital setting. (2014)	Valadares AFM, Magro MCS.[1]	Brazil	IV
4	Simulation for development of clinical competence of evaluation of risk for pressure ulcer. (2013)	Moura EC, Caliri MHL.[14]	Brazil	IV
5	Assessment of a learning intervention in palliative care based on clinical simulations for nursing students. (2016)	Sarabia-Cobo CM et al.[15]	Spain	IV
6	Virtual versus face-to-face clinical simulation in relation to student knowledge, anxiety, and self-confidence in maternal-newborn nursing: A randomized controlled trial. (2016)	Cobbett S, Snelgrove-Clarke E.[16]	Canada	II
7	Using standardized patients in enhancing undergraduate students'learning experience in mental health nursing. (2016)	Goh YS et al.[17]	Singapure	III
8	Towards an understanding of the attributes of simulation that enablelearning in undergraduate nurse education: A grounded theory study. (2016)	Bland AJ, Tobbell J.[18]	United Kingdom	IV
9	Simulation and Its Effect on Anxiety in Baccalaureate Nursing Students. (2016)	Hollenbach PM.[19]	United States	IV
10	Online intravenous pump emulator: As effective as face-to-face simulation for training nursing students. (2016)	Terry VR et al.[20]	Australia	III
11	Virtual patient simulation in psychiatric care - A pilot study of digital support for collaborate learning. (2016)	Sunnqvist C et al.[21]	Sweden	III
12	Clinical Education In psychiatric mental health nursing: Overcoming current challenges. (2016)	Choi H et al.[22]	South Korea	IV
13	A new strategy in nursing education: From hybrid simulation to clinical practice. (2016)	Terzioğlu F et al.[23]	Turkey	IV
14	The Empathy Enigma: Does It Still Exist? Comparison of Empathy Using Students and Standardized Actors. (2016)	Ward J.[24]	United States	IV
15	Simulation workshops with first year midwifery students.	Catling C et	Australia	IV

	(2016)	al.[25]		
16	Improving Attitudes and Perceived Competence in Caring for Dying Patients: An End-of-Life Simulation. (2015)	Lippe MP, Becker H.[26]	United States	IV
17	Integrating Simulation into a Reflection-Centered Graduate Psychiatric/Mental Health Nursing Curriculum. (2015)	Schwindt R, McNelis A.[27]	United States	IV
18	Impact of Interprofessional Education Among Nursing and Paramedic Students. (2016)	Furseth PA, Taylor B, Kim SC.[28]	United States	IV
19	Voice Simulation in Nursing Education. (2016)	Kepler BB et al.[29]	United States	IV
20	Impact of Simulation and Clinical Experience on Self-efficacy in Nursing Students: Intervention Study. (2016)	Kimhi E et al.[30]	Israel	II
21	Nurse interrupted: Development of a realistic medication administration simulation for undergraduate nurses. (2015)	Hayes C et al.[31]	Australia	IV
22	Implementation and evaluation of an interprofessional simulation-based education program for undergraduate nursing students in operating. room nursing education: a randomized controlled trial. (2015)	Wang R et al.[32]	China	II
23	Using Standardized Patients in Nursing Education: Effects on Students' Psychomotor Skill Development. (2016)	Sarmasoglu S, Dinç L, Elçin M.[33]	Turkey	III
24	A comparative assessment of nursing students' cognitive knowledge of blood transfusion using lecture and simulation. (2016)	Flood LS, Higbie J.[34]	United States	III
25	The influence of teaching method on performance of suicide assessment in baccalaureate nursing students. (2015)	Luebbert R, Popkess A.[35]	United States	IV
26	Evaluation of a filmed clinical scenario as a teaching resource for an introductory pharmacology unit for undergraduate health students: A pilot study. (2015)	East L, Hutchinson M.[36]	Australia	IV
27	Undergraduate nursing students' experiences when examining nursing skills in clinical simulation laboratories with high-fidelity patient simulators: A phenomenological research study. (2015)	Sundler AJ, Pettersson A, Berglund M.[37]	Sweden	IV
28	Effects of an Experiential Learning Simulation Design on Clinical Nursing Judgment Development. (2015)	Chmil JV et al.[38]	United States	III
29	Using high-fidelity simulation as a learning strategy in an undergraduate intensive care course. (2015)	Badir A et al.[39]	Turkey	IV
30	Mindful teaching practice: lessons learned through a hearing voices simulation. (2015)	Kidd LI et al.[40]	United States	IV
31	The effect of simulation on skill performance: a need for change in pediatric nursing education. (2015)	Bowling AM.[41]	United States	II
32	The effect of simulation courseware on critical thinking in undergraduate nursing students: multi-site pre-post study. (2015)	Shin H et al.[42]	South Korea	IV
33	Comparison of meaningful learning characteristcs in simulatad nursing practice after traditional versus cumputer-based simulation method: a qualitative videography study. (2015)	Poikela P, Ruokamo H, Teras M.[43]	United States	III
34	Case-based learning and simulation: useful tools to enhance nurses' education? Nonrandomized controlled trial. (2015)	Raurell-Torredà M et al.[44]	Spain	II
35	Comparison of virtual patient simulation with mannequin-based simulation for improving clinical performances in assessing and managing clinical deterioration: randomized controlled trial. (2014)	Liaw SY et al.[45]	Singapure	II
36	An evaluation of mental health simulation with standardized patients. (2014)	Doolen J et al.[46]	United States	IV
37	Effect of simulation on knowledge of advanced cardiac life support, knowledge retention, and confidence of nursing students in Jordan. (2014)	Tawalbeh LI, Tubaishat A.[47]	Jordan	II
38	High fidelity simulation effectiveness in nursing students' transfer of learning. (2013)	Kirkman TR.[48]	United States	IV
39	Effect of simulation on the development of critical thinking in associate degree nursing students. (2013)	Goodstone L et al.[49]	United States	III
40	Using high-fidelity simulation to bridge clinical and classroom learning in undergraduate pediatric nursing. (2013)	Darcy Mahoney AE et al.[50]	United States	IV
41	Assessment for simulation learning outcomes: a	Liaw SY et	Singapure	II

	comparison of knowledge and self-reported confidence with observed clinical performance. (2012)	al.[51]		

Legend: (simulation type = X: mixed methods; M: mannequin; Q: standardized patient; V: virtual; S: sound; A: role-play; A: animal simulation; A: role-play; N: not specified).

Figure 3. Characterization of the articles as simulation type employed, title, year of publication, authors, country of origin and level of evidence. Curitiba (PR), Brazil, 2017.

Regarding the year of publication, 2016 counted with the largest number of articles found, with 17 studies (41.5%), followed by 2015 with 15 articles (36.6%). (Figure 4)

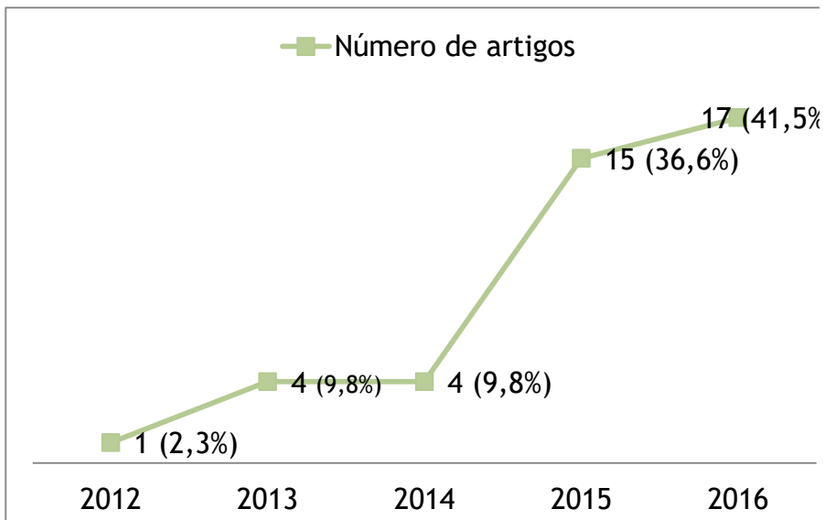

Figure 4. Number of articles according to the year of publication. Curitiba (PR), Brazil, 2017.

The participants totaled 3543 undergraduate students, with an average of 86 per study. Simulation of types of employees, 14 (34.1%) used dummies, of these, eight were of high fidelity, three on average, a low, and two studies did not specify the fidelity. Nine studies (21.9%) used mixed methods, i.e., more than one type of simulation, eight (19.5%) used standardized patients, three (7.3%), two (4.9%) sound simulators, two (4.9%) role-play, one (2.4%) simulation with animals and two (4.9%) did not specify the kind of simulation used.

The contributions of the simulation for nursing students that predominated were the improvement of learning/knowledge and the development of psychomotor skills, addressed by 12 (29.3%) articles, as described in Figure 5.

Contributions	Number of articles
Learning/knowledge improvement	1, 3, 4, 11, 22, 24, 25, 27, 29, 33, 37, 41
Development of psychomotor skills	3, 4, 10, 13, 23, 27, 29, 31, 33, 34, 35, 41
Increased confidence/security/self-efficacy	6, 7, 12, 15, 20, 25, 29, 31, 36, 37
Improving communication skills	5, 6, 13, 15, 24, 36
Development of critical thinking and reflective	2, 3, 11, 26, 39, 40
Skills development	4, 16, 17, 27, 28, 32
Improvement of the attitude	4, 8, 16, 18, 19
Integration of theory with practice	27, 29, 38, 40
Approach with the assistance reality	2, 3, 21
Anxiety reduction	9, 13, 36
Improves customer satisfaction	12, 13, 25
Increased empathy/understanding in relation to the patient	12, 14, 30
Improvement of clinical reasoning	21, 28
Development of interpersonal relationship	29

Figure 5. Contributions of the simulation for graduate students of Nursing. Curitiba (PR), Brazil, 2017.

DISCUSSION

The simulation as a teaching strategy has been investigated in all continents; however, it is observed that most studies were developed in the United States of America (USA). As a result of this review, we found that in South America, Brazil was the only country with studies published on the theme, with three articles (7.3%), as well as in Turkey and in Singapore.

Corroborating these findings, an integrative review performed in Santa Catarina State, Brazil, with studies published between 2008 and 2012, and had as objective to know how the simulation is being used in nursing education, found that 63% of the articles were produced in the USA.[52]

As to the classification of studies in accordance with the methodological approach, 17 (41.5%) have evidence level II or III, with experimental or quasi-experimental, a fact that reinforces the results found in this review, with a view to the quality of studies that composed.

In relation to the period of publication there is a gradual increase in the number of articles in 17 times since the year 2012, and to analyze the Brazilian publications, it was noted that all conducted searches conducted in partnership with educational institutions. These findings indicate a growing academic interest in the subject, bearing in mind that the simulation is the fruit of the need to break with traditional teaching models, the difficulty to offer clinical experiences equal for all students and the concern with the safety of the patient.[7]

In addition, with a focus on training professionals critics, resolutory, ethical and scientifically based, educational institutions have invested in the use of active methodologies that are able to achieve these goals and the simulation favors this formation,[12] is realistic or virtual, low or high fidelity.

The level of fidelity of a simulator is related with the degree of approximation with the patient, thus the low fidelity simulators are those static mannequins without interaction; the average fidelity have intermediate technology, pulmonary and cardiac sounds and high-fidelity include computerized human patient simulators, interactive, with spontaneous breathing and pathophysiological responses coming to the real.[53]

The level of fidelity of simulated teaching is defined according to the learning objectives.[3] The scenarios can include from a unique type of simulation or the use of hybrid simulation (with use of one or more types of simulation in the same experience simulated).

In the present research found that 34.1% of the studies cited the exclusive use of dummies with varying levels of loyalty. In this sense, a systematic review that sought to summarize the best evidence for the use of simulation training to improve the clinical skills, knowledge and confidence among students of health, we found 30 articles included in the sample that the simulation of low or high fidelity has contributed to the development of knowledge, skills, confidence and satisfaction, moreover, the results demonstrated a reduction in the levels of anxiety and inhibition of students.[54]

A meta-analysis carried out in South Korea with the objective of determining the size of the effect of the nursing educational interventions based on simulation and compare them according to the level of fidelity has identified that the use of high fidelity simulators or standardized patients, compared to those of low fidelity, are better for the development of affective and cognitive domains. On the other hand, the acquisition of psychomotor domain was improved with the use of simulators of average fidelity.[7]

Still, the results of this study suggest that the use of simulation of high or low fidelity,[49] and even virtual,[21] are capable of promoting the development of clinical reasoning and critical thinking.

With respect to the development of critical thinking as a contribution of the simulation, the results found in the literature are discrepant. A systematic review published in 2017 suggests that the development of critical thinking skills related to the use of simulation was corroborated in half of the studies analyzed, however, for the other half, this relationship is not proven. The authors highlight that the inconsistent results may be related to the heterogeneity of the scenarios and the instruments used to measure the critical thinking of students.[55]

In addition to the contributions referred to above, the articles also underline the improvement of learning/ knowledge, the development of psychomotor skills and others that fit in the training of skills.

The term competence is multifaceted and with conceptual distinctions, however, a systematic review which had as objective to illustrate and compare the different conceptions of competence provided by educators in Health found that this is a combination of components and there is concordance between several studies that are essential in this combination the knowledge, skills and attitudes.[56]

In this sense, the simulation clinic is a teaching methodology that can assist the nursing student in skills development, because it allows the immersion in clinical care and favors the teacher promote reflective thinking about their knowledge, skills and attitudes.[2, 57-58]

By enabling the creation of realistic clinical scenarios, the simulation is considered a strategy that assists in the training of students and favors the association of theoretical knowledge with the practice, [37,39,48,50] beyond

the training to care for clinical situations that are rarely found in the hospital context.[7]

The simulation provides the development of communication skill that is essential since the initial training of future nurses, therefore, can facilitate the development of a better relationship between patients, families and professionals, in addition to providing a quality service.[15]

The studies also underline that, while practicing in a safe environment and close to the actual, the confidence and safety of student increases, reflecting directly on your professional performance, since this can work in advance and more precisely its insecurity and major difficulties.[37, 39]

The simulation, when well planned, has the potential to expose students to clinical cases which often are not tested in practice. In this way it can facilitate the development of psychomotor skills, critical thinking and clinical reasoning,[31] preparing them for a safe practice in front of the patient.1 There is an increase in the use of explicit teaching practice in the training of nurses, positive fact, bearing in mind that it promotes the development of skills related to patient safety59 and it is known that people trained reduces the chance of errors.

The selected studies in this review allowed recognizing the potential of simulation for teaching undergraduate nursing courses, with opportunities to offer students practical and theoretical knowledge in a controlled environment and close to real, with minimizing risks to patients.

CONCLUSION

Map the literature that deals with the knowledge produced about the use of simulation in nursing education allowed to know the main types employees and the contributions of this strategy in the education of future nurses, as well as show their use in different countries and the increase in publications in the last two years.

According to the studies, simulation favors a critical and reflective learning, and therefore contributes positively in the training of graduate students in nursing, especially regarding the development of competences.

However, to ensure that the contributions are effective, the learning objectives and the kind of simulation must be previously defined. To do this, it is necessary that the teachers are trained in the use of this teaching strategy and plan scenarios in accordance with the level of students' knowledge and skills required.

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