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Clinical simulation in nursing education in intensive therapy: an integrative review

Simulação clínica na educação de enfermagem em terapia intensiva: revisão integrativa

Simulación clínica en la educación en enfermería en terapia intensiva: revisión integradora

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ABSTRACT

Objective: to analyze the publications on clinical simulation practices for education in Nursing in Intensive Care. **Method:** an integrative review carried out through LILACS, PubMed, Cochrane Library, CINAHL and SciELO databases, of articles published from 2008 to 2017. **Results:** 29 articles were selected, of which 76% discuss the use of simulation in continuing education of nursing professionals, while the others describe their use for student education. There is a higher prevalence of studies with a level of evidence 6 (17), with 28 international publications. There was an increase in scientific production, with 16 articles published in the last three years. **Conclusion:** variables after simulation use, such as confidence, communication skills, efficiency in the identification of clinical worsening of patients, development of technical skills, teamwork and clinical decision-making, presented a significant improvement, demonstrating that this tool is effective in qualifying care for critical patients.

Descriptors: Nursing; Nursing Education; Patient Simulation; Simulation Training; Critical Care.

RESUMO

Objetivo: analisar as publicações sobre práticas de simulação clínica para a educação em Enfermagem em Terapia Intensiva. **Método:** revisão integrativa realizada através da biblioteca LILACS, PubMed, *The Cochrane Library*, CINAHL e SciELO, de artigos publicados de 2008 a 2017. **Resultados:** foram selecionados 29 artigos. 76% abordaram o uso da simulação na educação continuada de profissionais de enfermagem, enquanto os outros descrevem seu uso para a educação de estudantes. Há uma maior prevalência de estudos com nível de evidência 6 (17), sendo 28 publicações em âmbito internacional. Verificou-se uma crescente na produção científica, sendo 16 artigos publicados nos três últimos anos. **Conclusão:** as variáveis, após o uso da simulação, como confiança, habilidade de comunicação, eficiência na identificação da piora clínica de pacientes, desenvolvimento de competências técnicas, trabalho em equipe e tomada de decisão clínica, apresentaram um aperfeiçoamento significativo, demonstrando que essa ferramenta é efetiva na qualificação da assistência a pacientes críticos.

Descritores: Enfermagem; Simulação; Simulação de Paciente; Educação em Enfermagem; Cuidados Críticos.

RESUMEN

Objetivo: analizar las publicaciones sobre prácticas de simulación clínica para la educación en Enfermería en Terapia Intensiva. **Método:** revisión integradora realizada en la biblioteca LILACS, PubMed, Cochrane Library, CINAHL y SciELO, de artículos publicados de 2008 a 2017. **Resultados:** se seleccionaron 29 artículos. 76% abordaran el uso de la simulación en la educación continuada de profesionales de enfermería, mientras que los demás describen su uso para la educación de estudiantes. Hay una prevalencia más grande de estudios con nivel de evidencia 6 (17), siendo 28 publicaciones a nivel internacional. Se verificó una creciente en la producción científica, siendo 16 artículos publicados en los tres últimos años. **Conclusión:** las variables, después del uso de la simulación, como confianza, habilidad de comunicación, eficiencia en la identificación del empeoramiento clínico de pacientes, desarrollo de competencias técnicas, trabajo en equipo y toma de decisión clínica presentaron un perfeccionamiento significativo, demostrando que esa herramienta es efectiva en la calificación de la asistencia a pacientes críticos.

Descriptores: Enfermería; Simulación; Simulación de Paciente; Educación en Enfermería; Cuidados Críticos.

INTRODUCTION

Nursing care, related to safe and effective care, demands interpretation of human responses accurately, selection of appropriate interventions and evaluation of the results achieved[1], in other words, the use of clinical reasoning as a fundamental tool for the nurses' work, which must be developed from undergraduate and, permanently, in Health Education[2]. In this context, the development of clinical reasoning for an accurate practice should be intrinsically related to the use of different teaching strategies in the course of vocational training[3].

In the scope of active teaching methodologies in Health, the clinical simulation is highlighted[4]. Simulation represents a technology used to recreate real life situations, being a vehicle for generating clinical reasoning[5]. This tool has demonstrated effectiveness in the development of critical thinking[6], development of skills[7], decision-making[8], teamwork and strengthening self-confidence[9].

In training of nurses, clinical simulation has been used as an effective and innovative teaching strategy. Through this methodology, nursing students and professionals have learning and training subsidies, having access to an extended relationship between theory and practice in a safe environment[10]. In practice, clinical simulation emerges as a profitable strategy and is capable of increasing teaching-learning technologies, making it possible to carry out important clinical studies within the framework of safe practices, in promotion of ethical attitudes and professional and interdisciplinary responsibility in care for the patient, family and community[11].

Intensive Care Unit (ICU) is a highly complex work environment and thus requires professionals with advanced skills to care for critically ill patients[12]. Nursing education in intensive care represents a great challenge for students, professors and health professionals. They deal with the complex health situation of the patients in the care setting, and must exercise the articulation of theoretical knowledge with practice, development of capacity for more accurate perception and rapid and informed decision-making[6]. Considering the specificities of this setting, it is the way in which the incorporation of clinical simulation, during the professional training, can increase quality to the care offered by professionals graduating from the undergraduate.

OBJECTIVE

To analyze publications on clinical simulation practices used in Nursing Education in Intensive Care, at national and international level, considering the use and strengthening of this innovative teaching methodology in nursing for the qualification of students and professionals of the field.

METHOD

It is an integrative review of the literature, using a research method used in evidence-based practice, which allows the incorporation of these in clinical practice[13]. This method has the purpose of gathering and synthesizing research results on a delimited topic or issue, in a systematic and orderly manner, contributing to the deepening of the knowledge of the researched topic[14-15].

The guiding question of the review, carried out through the PICO strategy[16] was: how has clinical simulation been used in nursing education directed to Intensive Care? It was considered the strategic PICO, in which the population P, in this study, corresponds to Nursing (professionals and students); I to intervention, considering the clinical simulation in Intensive Care; and CO from context.

In order to answer the research question, a selection of the controlled descriptors related to each of the components of the PICO strategy was carried out, according to the Health Sciences Descriptors (DeCs) and Medical Subject Headings (MeSH). The controlled descriptors and Boolean operators were selected: Nursing students OR Nurse practitioners OR Nursing education OR Professional Education AND Critical care OR Critical care nursing AND Patient Simulation OR Simulation training.

The data were collected through the search of articles indexed in databases and libraries referring to Latin American & Caribbean Literature in Health Sciences (LILACS), National Library of Medicine (PubMed), The Cochrane Library, Scientific Electronic Library Online (SciELO), Cumulative Index to Nursing and Allied Health Literature (CINAHL).

The studies published in national and international journals in full, with indexation in the Portuguese, English and Spanish, publications made between 2008 and 2017, identified by the Boolean descriptors and terms in the title or abstract. Those who did not respond to the question of research and publications focusing on pediatrics were excluded from the study. The flow followed to define the sample of the selected articles is shown in Figure 1.

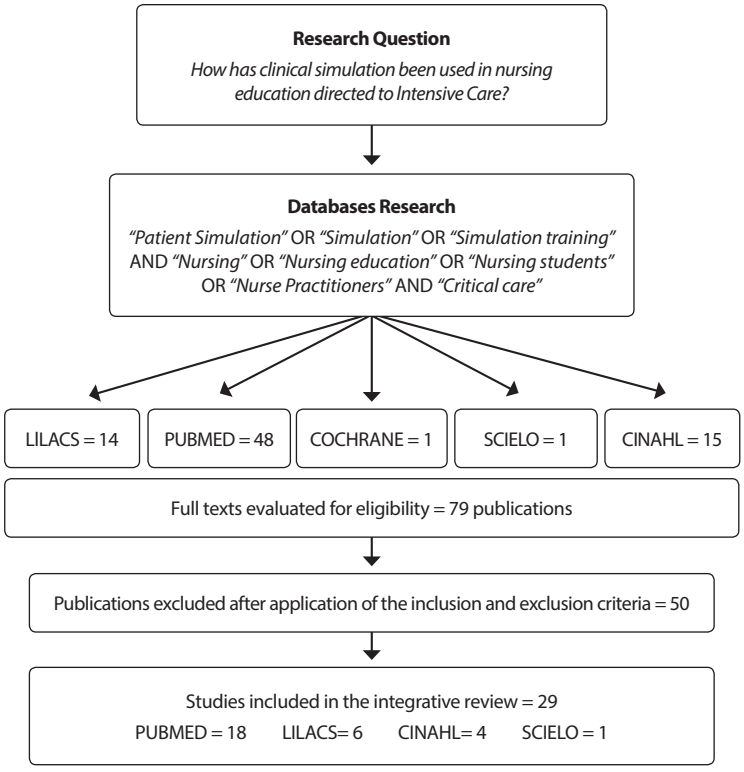

Figure 1– Sample's flow

In the data collection, a detailed tool was used containing: title, journal, authors, publication year, objectives, methodology, results and conclusions. After that, the analysis and synthesis of the articles obtained in a descriptive way. For the evaluation of level of evidence of the studies, the Rating System for the Hierarchy of Evidence for Intervention/Treatment Questions scale, provided in Figure 2[17].

Figure 2 – Rating System for the Hierarchy of Evidence for Intervention/Treatment Questions Scale

Level I	Evidence from systematic reviews or meta-analysis of randomized controlled trials
Level II	Evidence from randomized clinical trials
Level III	Evidence from clinical trials without randomization
Level IV	Evidence from case-control and cohort studies
Level V	Evidence from systematic reviews of descriptive and qualitative studies
Level VI	Evidence from descriptive or qualitative studies
Level VII	Evidence from authority opinions / expert reports

RESULTS

Twenty-nine publications were selected, predominantly English (28), with 11 publications originating in the United States, six in Finland, three in England, two in Canada, two in Norway, two in Australia, one in Spain, one in Spain in Japan and one in Brazil.

Chart 1 shows the profile of the sample studies and Chart 2, the respective objectives and the conclusions of the studies analyzed.

There was a higher prevalence of evidence-based studies 6 (17), followed by level 2 (05), level 3 (04), level 7 (02) and level 1 (01). There is a growing number of scientific production related to the topic, with 16 articles published in the last three years[18-33], making up 55% of the searches found in the selected period.

It can be observed in Chart 2 that 34.5% of the studies are referenced to the use of simulation in education on care techniques of nursing activities, such as mechanical ventilation and invasive airway acquisition, cardiopulmonary resuscitation, oral hygiene and airway aspiration, hand hygiene and delirium identification in ICU patients[21-26,29-31,36].

About training, 76% of the articles[18,21-26,28-39,43-46] discuss the use of simulation in continuing education of nursing professionals, while the other studies describe the use of simulation for the education of nursing students[19-20,25,27,40-42].

A study deals with the professional qualification for air transportation of critical patients through simulation[31] and another study presents simulation setting for evaluating the effectiveness of nursing care and the time spent in each critical care task[35].

Chart 1 – Characterization of articles on clinical simulation in Nursing Education in Intensive Care, published in the period between 2008 and 2017

Author(s), Title	Year	Journal	Method	Level of Evidence
Crowe S, Ewart L, Derman S[18] The impact of simulation based education on nursing confidence, knowledge and patient outcomes on general medicine units.	2017	Nurse Education in Practice	Descriptive developmental	L6
Sánchez-Expósito J, Costa CL, Agea JLD, Izquierdo MDC, Rodríguez DJ[19] Ensuring relational competency in critical care: Importance of nursing students' communication skills.	2017	Intensive and Critical Care Nursing	Cross-sectional cohort study	L3
Karlsen MW, Gabrielsen AK, Falch AL, Stubberud DG[20] Intensive care nursing students' perceptions of simulation for learning confirming communication skills: a descriptive qualitative study.	2017	Intensive and Critical Care Nursing	Qualitative, exploratory and descriptive	L6
McRae ME, Chan A, Hulett R, Lee AJ, Coleman B[21] The effectiveness of and satisfaction with high-fidelity simulation to teach cardiac surgical resuscitation skills to nurses.	2017	Intensive and Critical Care Nursing	Descriptive study	L6
Smith JM, Van Aman MN, Schneiderhahn ME, Edelman R, Ercole PM[22] Assessment of delirium in Intensive Care Unit patients: educational strategies.	2017	The Journal of Continuing Education in Nursing	Descriptive developmental	L6
Jansson MM, Syrjala HP, Ohtonen PP, Merilainen MH, Kyngas HA, Ala-Kokko TI[23] Effects of simulation education on oral care practices: a randomized controlled Trial.	2017	Nursing Critical Care	Randomized clinical trial	L2
Jansson MM, Syrjala HP, Ohtonen PP, Merilainen MH, Kyngas HA, Ala-Kokko TI[24] Longitudinal effects of single-dose simulation education with structured debriefing and verbal feedback on endotracheal suctioning knowledge and skills: A randomized controlled Trial.	2017	American Journal of Infection Control	Randomized clinical trial	L2
Gordon CJ, Jorm C, Shulruf B, Weller J, Currie J, Lim R, Osomanski A[25] Development of a self-assessment teamwork tool for use by medical and nursing students.	2016	BMC Medical Education	Descriptive quantitative (unclear methodology)	L6
Jansson MM, Syrjala HP, Ohtonen PP, Merilainen MH, Kyngas HA, Ala-Kokko TI[26] Simulation education as a single intervention does not improve hand hygiene practices: a randomized controlled follow-up study.	2016	American Journal of Infection Control	Randomized clinical trial	L2

To be continued

Chart 1 (concluded)

Author(s), Title	Year	Journal	Method	Level of Evidence
Lavoie P, Cossette S, Pepin J[27] Testing nursing students' clinical judgment in a patient deterioration simulation scenario: development of a situation awareness instrument.	2016	Nurse Education Today	Quantitative, exploratory and descriptive	L6
Boling B, Pierce MH[28] The effect of high-fidelity simulation on knowledge and confidence in critical care training: An integrative review.	2016	Nurse Education in Practice	Integrative review	L6
Jansson MM, Syrjala HP, Ohtonen PP, Merilainen MH, Kyngas HA, Ala-Kokko TI[29] Randomized, controlled trial of the effectiveness of simulation education: A 24-month follow-up study in a clinical setting.	2015	American Journal of Infection Control	Randomized clinical trial	L2
Tsai AC, Krisciunas GP, Brook C, Gonzalez M, Crimlisk J, Silva J, Grillone GA[30] Comprehensive emergency airway response team (EART) training and education: impact on team effectiveness, personnel confidence, and protocol knowledge.	2015	Annals of Otology, Rhinology & Laryngology	Quantitative descriptive	L6
Alfes CM, Steiner SL, Manacci CF[31] Critical care transport training: new strides in simulating the austere environment.	2015	Air Medical Journal	Case report	L7
Landsperger JS, Williams KJ, Hellervik SM, Chassan CB, Flemmons LN, Davidson SR, et al.[32] Implementation of a medical intensive care unit acute-care nurse practitioner service.	2015	Hospital Practice	Quantitative descriptive	L6
Baid H, Hargreaves J[33] Quality and safety: reflection on the implications for critical care nursing education.	2015	British Association of Critical Care Nurses	Reflective analysis	L7
Gundrosen S, Solligard E, Aadahl P[34] Team competence among nurses in an intensive care unit: the feasibility of in situ simulation and assessing non-technical skills.	2014	Intensive and Critical Care Nursing	Case-control study	L3
Calhoun AW, Boone MC, Dauer AK, Campbell DR, Montgomery VL[35] Using simulation to investigate the impact of hours worked on task performance in an Intensive Care Unit.	2014	American Journal of Critical Care	Prospective observational study	L3
Jansson MM, Ala-Kokko TI, Ohtonen PP, Meriläinen MH, Syrjälä HP, Kyngäs HA[36] Human patient simulation education in the nursing management of patients requiring mechanical ventilation: a randomized, controlled trial.	2014	American Journal of Infection Control	Randomized clinical trial	L2
Alinier G, Platt A[37] International overview of high-level simulation education initiatives in relation to critical care.	2013	British Association of Critical Care Nurses	Literature review	L6
Abe Y, Kawahara C, Yamashina A, Tsuboi R[38] Repeated scenario simulation to improve competency in critical care: a new approach for nursing education.	2013	American Journal of Critical Care	Prospective observational study	L3
Jansson M, Kääriäinen M, Kyngäs H[39] Effectiveness of simulation-based education in critical care nurses' continuing education: a systematic review.	2013	Clinical Simulation in Nursing	Systematic review	L1
Mistry V[40] Critical care training: using Twitter as a teaching tool.	2011	British Journal of Nursing	Descriptive study	L6
Mould J, White H, Gallagher R[41] Evaluation of a critical care simulation series for undergraduate nursing students.	2011	Contemporary Nurse	Descriptive developmental	L6
Ruth-Sahd LA, Schneider MA, Strouse A[42] Fostering cultural and interdisciplinary awareness with "low-tech" simulation in a fundamentals nursing course to prepare student nurses for critical care clinical rotations.	2011	Dimensions of Critical Care Nursing	Quantitative descriptive	L6
Shannon SE, Long-Sutehall T, Coombs M[43] Conversations in end-of-life care: communication tools for critical care practitioners.	2011	Nursing in Critical Care	Quantitative descriptive	L6
Cato D, Murray M[44] Use of simulation training in the Intensive Care Unit.	2010	Critical Care Nursing	Literature review	L6
Barbosa SFF, Marin HF[45] *Simulação baseada na* web*: uma ferramenta para o ensino de enfermagem em terapia intensiva*.	2009	*Revista Latino-Americana de Enfermagem*	Descriptive study	L6
Bahouth MN, Esposito-Herr MB[46] Orientation program for hospital-based nurse practitioners.	2009	AACN Advanced Critical Care	Qualitative descriptive	L6

Chart 2 – Characterization of objectives and conclusions of articles on clinical simulation in Nursing Education in Intensive Care, published from 2008 to 2017

Author(s), Year	Objective	Conclusions
Crowe S, Ewart L, Derman S[18] 2017	To evaluate the impact of the use of simulation in nursing education to increase the confidence and knowledge of nurses, as well as improvement of the outcome of patients in medical units of a hospital in Canada.	Simulation provided an environment that allowed nurses the opportunity to explore and develop critical thinking in clinical worsening situations, resulting in increased knowledge and confidence to assist patients in clinical worsening.
Sánchez-Expósito J, Costa CL, Agea JLD, Izquierdo MDC, Rodríguez DJ[19] 2017	To analyze students' communication skills in interaction with simulated critical patients.	It has been shown that in settings with critically ill patients, students tend to focus more on clinical skills and advanced technology than on emotional or communicative aspects when dealing with patients.
Karlsen MW, Gabrielsen AK, Falch AL, Stubberud DG[20] 2017	To explore the experiences of intensive care nursing students with communication skills training in a simulated environment.	After the simulation course, students reported better communication skills. The challenge is to transfer the skills found in the setting to actual patient care.
McRae ME, Chan A, Hulett R, Lee AJ, Coleman B[21] 2017	To test the effect of simulation on resuscitation in cardiac surgery on the self-confidence of nurses and their satisfaction with the simulation experience.	The self-confidence scores for performing cardiac and surgical resuscitation procedures were higher after simulation. Nurses were highly satisfied after simulation.
Smith JM, Van Aman MN, Schneiderhahn ME, Edelman R, Ercole PM[22] 2017	To evaluate the effectiveness of education for intensive care nurses in the application of a tool to assess delirium through clinical simulation.	A multimodal educational strategy that included simulation and significantly increased confidence in the performance of the intensive care nurse in the application of the delirium assessment scale in ICU.
Jansson MM, Syrjala HP, Ohtonen PP, Merilainen MH, Kyngas HA, Ala-Kokko TI[23] 2017	To evaluate the longitudinal effects of simulation education with structured debriefing and verbal feedback on the knowledge and skills of intensive care nurses in complying with current recommendations on oral care.	Single simulation education had only a minimal effect on the knowledge and skills of intensive care nurses to compliance with current oral care recommendations. Despite greater awareness, there was no significant difference in oral care practices between study groups after simulation education.
Jansson MM, Syrjala HP, Ohtonen PP, Merilainen MH, Kyngas HA, Ala-Kokko TI[24] 2017	To evaluate the longitudinal effects of simulation education with structured debriefing and verbal feedback on the knowledge and skills of endotracheal suctioning of intensive care nurses.	The unique simulation with structured debriefing and verbal feedback was insufficient to change the knowledge of intensive care nurses and their abilities related to the care directive with endotracheal aspiration.
Gordon CJ, Jorm C, Shulruf B, Weller J, Currie J, Lim R, Osomanski A[25] 2016	To develop and evaluate a teamwork tool for health students for their use in the context of emergency response in a mass accident.	These data provide evidence to support the validity and reliability of the teamwork tool for nursing students by helping them to identify the effective attributes of teamwork.
Jansson MM, Syrjala HP, Ohtonen PP, Merilainen MH, Kyngas HA, Ala-Kokko TI[26] 2016	To evaluate the knowledge and compliance of intensive care nurses on hand hygiene through an intervention and control group for simulation education.	After a single education session, with the use of simulation, the knowledge and compliance of intensive care nurses on current hand hygiene guidelines remained below expectations.
Lavoie P, Cossette S, Pepin J[27] 2016	To develop and test a tool to measure the awareness of the clinical worsening situation of nursing students in a simulation setting.	The tool appeared as a promising research tool, although it still needs to be tested with other populations and other simulation settings of clinical worsening of patients.
Boling B, Pierce MH[28] 2016	To identify in the literature the effect of simulation training on knowledge and confidence of the intensive care professionals.	High fidelity simulation is a useful tool to improve knowledge and confidence among intensive care professionals, as well as care programs training.
Jansson MM, Syrjala HP, Ohtonen PP, Merilainen MH, Kyngas HA, Ala-Kokko TI[29] 2015	To identify the effectiveness of simulation for the education of nurses regarding the practice of the guidelines to avoid complications associated with intubation and mechanical ventilation.	The skills of intensive care nurses to compliance with evidence-based guidelines have improved in both groups over time, but the improvements between the study groups were significantly different only at 6 months and were no longer evident after two years.
Tsai AC, Krisciunas GP, Brook C, Gonzalez M, Crimlisk J, Silva J, Grillone GA[30] 2015	To evaluate the effectiveness and usefulness of simulation for the Airway Emergency Response Team at a tertiary hospital to improve team dynamics, confidence and knowledge in obtaining an emergency airway.	It highlights the effectiveness and usefulness of simulation in the evaluation of the team dynamics and the confidence and levels of knowledge in the settings of emergency airways. The professionals benefited from simulation training.
Alfes CM, Steiner SL, Manacci CF[31] 2015	To evaluate the use of high fidelity simulation as a tool in the formation of interprofessional flight teams to improve their skills and quality and to promote a safe care for the patient during medical air transport.	During simulation, flight students learned how to manage critical conditions with available clinical resources and perform advanced procedures on the go.

To be continued

Chart 2 (concluded)

Author(s), Year	Objective	Conclusions
Landsperger JS, Williams KJ, Hellervik SM, Chassan CB, Flemmons LN, Davidson SR, et al.[32] 2015	To describe the development of a service of nursing professionals in a University Hospital in the Intensive Care sector, designed to improve the reach and quality of care.	Not enough data were found to date to evaluate cost savings. However, rigorous selection and continuous training seem to qualify the Intensive Care service.
Baid H, Hargreaves J[33] 2015	To reflect on how an intensive care nursing course has enabled nurses to offer high quality and safety nursing care for critically ill patients and their families.	Intensive nursing education can incorporate simulation as a way to promote safe and high quality clinical practices in the intensive care setting, further enhancing patient care quality and safety.
Gundrosen S, Solligard E, Aadahl P[34] 2014	To evaluate the feasibility of using an *in situ* simulation model to explore the competence of the nursing team in an ICU	*In situ* simulation may be feasible to assess the competence of intensive care practitioners, appearing to be a promising tool for such use.
Calhoun AW, Boone MC, Dauer AK, Campbell DR, Montgomery VL[35] 2014	To explore the use of in situ simulation as an investigative method, using it to examine the precision and time used to perform tasks in intensive care nursing.	Simulation can be effective to evaluate the time of the nursing tasks and the training to perform these tasks in intensive care.
Jansson MM, Ala-Kokko TI, Ohtonen PP, Meriläinen MH, Syrjälä HP, Kyngäs HA[36] 2014	To evaluate the efficacy of simulation education of human patients in the nursing management of patients requiring mechanical ventilation.	There was a significant transfer of skills learned to clinical practice after simulation education, but without influence on the participants' current level of knowledge.
Alinier G, Platt A[37] 2013	To identify the emerging prevalence of the use of simulation for education in order to improve patient safety and the quality of nursing care in Intensive Care.	The implementation of simulation in education should be considered to ensure better educational practices.
Abe Y, Kawahara C, Yamashina A, Tsuboi R[38] 2013	To evaluate the effectiveness of simulation-based education in improving nursing care for critical cardiovascular patients.	The simulations approach seemed to not only enhance technical skills of intensive care nurses, but also their non-technical skills.
Jansson M, Kääriäinen M, Kyngäs H[39 2013	To evaluate the state of the art on the effectiveness of simulation-based education in the continuing education of intensive care nurses with a focus on knowledge and skills.	The effect of simulation-based education on the knowledge and skills of intensive care nurses is still questionable for lack of published studies and solid evidence.
Mistry V[40] 2011	To explore the use of Twitter for simulation videos as a teaching tool for nursing students, aimed at improving reflection and clinical decision-making.	The use of Twitter as an education tool is a possibility, but it is little accepted and has inherent limitations to its application in the context of Intensive Care Education.
Mould J, White H, Gallagher R[41] 2011	To evaluate the self-reported confidence and competence of nursing students about the use of critical patient simulation settings.	Multi-setting simulations related to intensive care practice are effective in improving student confidence and competence.
Ruth-Sahd LA, Schneider MA, Strouse A[42] 2011	To evaluate the effectiveness of nursing education through the implementation of "low technology" simulation to prepare nursing students to work in an intensive care unit.	The benefits of low-technology simulation for nursing students are highlighted, preparing them to work in an intensive care unit.
Shannon SE, Long-Sutehall T, Coombs M[43] 2011	To evaluate the effectiveness of the training of nurses for the use of three communication tools, which can be used in end-of-life care talks.	The communication tools initially applied in simulation are useful for nursing professionals, improving communication and the skills inherent to it.
Cato D, Murray M[44] 2010	To identify the use of high fidelity simulation for clinical education and the development of skills of the ICU.	Simulation provides a safe environment for making mistakes, enabling the creation of settings for rare or complex patients, ensuring the basic competence required for intensive care nurses.
Barbosa SFF, Marin HF[45] 2009	To develop and analyze the application of a clinical simulation environment of nursing in Intensive Care, via the internet, aiming to offer subsidies to improve the quality of teaching in this field, helping students to rescue critical thinking and question their own practice.	It has been demonstrated the feasibility of developing a simulation primarily focused on web-based nursing undergraduate education and that can present itself as a gateway to other educational perspectives.
Bahouth MN, Esposito-Herr MB[46] 2009	To describe the implementation of the Nursing Professionals Orientation Program at the University of Maryland's Medical Center in ICU, which aims to facilitate the placement of new nurses in this sector of work.	The consistent institution-wide guidance approach, through the use of methodologies such as clinical simulation, supports the successful transition to care practice so that it is effective and safe.

DISCUSSION

The use of clinical simulation for training and qualification in Nursing related to care for critical patients has been of international interest; however, it is little studied in Brazil. This active teaching methodology has been shown to be effective for the qualification of ICU care in several countries[18,32-33,37-38,42,44], training professionals and students in technical and non-technical skills, being a considerable tool for the qualification of care. It should be noted that most publications present a setting of exclusive training of professional nurses, not nursing staff. However, the evaluated abilities of the nurses cover the practices of the nursing

team in care in Brazil, with this methodology being able to be considered for the improvement not only of the professional nurse, but also of the team in which it is integrated, being applicable to this heterogeneous group.

Among the skills required for nurses working in ICU, effective communication with staff and families has been an educational challenge. A study[19] revealed through simulation setting that the communication skills of nursing students working together with critical patients are deficient, since these patients demonstrate interest in technologies and clinical complexities. On the other hand, when working in isolation, student communication improved after a specific course using the simulation methodology[20]. For nursing professionals, the training for the mobilization of communication skills was also effective, ensuring nurses the security to communicate adequately in their care routine, reducing harm to patients and increasing the satisfaction of family and staff[43].

Another variable evaluated and improved through ICU simulation was the development of critical thinking for accurate and efficient clinical decision-making. Simulation provides an environment that allows intensive care nurses the opportunity to explore and develop critical thinking in situations of patient worsening in a controlled and safe environment, increasing their knowledge and confidence[18]. In this context, simulation is more effective for learning than the first contact with the real critical situation, because it allows for the error and application of positive and negative feedback, giving nurses experience, security and ease of decision-making in real assistance situations, as well as improving ICU outcomes[28]. Thus, simulation becomes an indicated methodology to reach the increase in the quality of care and safety of critical patients[33], in the sense of better preparing the professional to use his skills in the management of critical patients.

On the development of technical skills, such as knowledge, self-confidence and application of the technique itself, can be evaluated and improved through clinical simulation. Studies were performed considering the assistance of nurses in cardiac surgery resuscitation[21], application of a tool to assess delirium in ICU[22], knowledge and application of oral care[23], endotracheal suctioning skills[24], hands hygiene[26], prevention of complications associated with endotracheal intubation and mechanical ventilation[29] and assessment of teamwork in emergency response of the airways[30]. The simulation tool was observed as effective for the development of such technical skills and improvement of the professional's self-confidence[21-22,30,36] as it promotes to the nurses the application of the technique in a safe environment and as close as possible to the real work environment, allowing the feedback to improve the skill to be used in care. However, even though it is effective for the improvement of technical skills, studies have identified the need for repetition of the simulation activity, since when performed in a single dose it was not effective[23-24,26] and, if not sequential, lost its effect on care after six months[29].

In health education, the use of clinical simulation with debriefing is recognized as an essential methodology for the training of health professionals, however, reinforcing the findings of the studies included in the review, the need for continuous use of simulation is present. The practice in a simulation setting, followed by debriefing, promotes learning effectively and the improvement of technical skills, leadership and teamwork, and the debriefing is the closing of the simulation activity from discussion on positive points and points to be improved in the care given for the simulated patient[47].

Another applicability of the simulation methodology is focused on the reproduction of critical settings, such as mass service[25] and air transport of critical patients[31]. These situations require the aggregation of theoretical and practical knowledge, with traditional education insufficient to enable the development of skills for this assistance. The feasibility of reproduction of these events through clinical simulation promotes professional training, and it is also possible to use them to elaborate and validate protocols of these services[25].

As for the process of professional evaluation and quality of care, simulation has been used for this purpose. Studies show that it is possible to select professionals for the ICU and to train them through clinical simulation[32,34], guaranteeing quality to the services of intensive therapy. This tool is considered of great value for the selection and training of ICU professionals, for the provision of qualified and safe health care, and can be inserted in professional training programs of institutions and in the implementation of teams and new professionals in this sector[46]. In addition, it has been used to evaluate the accuracy and time spent on specific nursing tasks[35], allowing managers to assess the professional competence, technologies used, conformation of care environments, as well as the review of the applied nursing process.

Studies have shown that the use of the Internet to subsidize students and nursing professionals has been used in association with the clinical simulation methodology, with the dissemination of simulation videos on the web[40,45]. The technological limitation of some institutions, remission time or the need for distance training can be supplied, thus, offering to students who will act in Intensive Therapy settings and video simulation practices, in which it becomes possible to carry out the evaluation of the setting and feedbacks of the conducts carried out, providing a discussion in the classroom and the development of critical thinking, being a gateway to other educational perspectives.

Study limitations

It is highlighted as a limitation of the study not to approach the technological and resource limitations for clinical simulation practices, which would still be a reality in Brazil. Even with the presence of randomized clinical trials, it is necessary to further investigate evidence of this issue in the international and, mainly, national territory.

Contributions to the field of Nursing

The contribution of the present study comes from the compilation of researches already done that demonstrate and evidence the use of clinical simulation in nursing education as an effective teaching methodology, considering it a tool for the qualification of care for critical patients.

CONCLUSIONS

The use of clinical simulation directed at critically ill patients has been used both for the continuing education of nursing teams and in undergraduate nursing education. It was considered

an efficient tool for the improvement of the student and the nursing professional. There is a need for this methodology to be applied in a continuous, rather than unique way, so that its results. Variables that were analyzed after the use of simulation, such as confidence, communication skills, efficiency in identifying clinical worsening of patients, development of technical skills, teamwork and clinical decision-making, presented a significant improvement, demonstrating that the tool is effective in qualifying care for critical patients.

It is recommended to apply and expand in the national territory, since universities and health institutions have the subsidies to use this tool. Future research is stimulated in Brazil, evidencing the effectiveness of clinical simulation for the qualification of care for critical patients, increasing the national and international repository.

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