

## Health simulation as an educational tool in pediatric nursing care: an integrative literature review

*Simulação em saúde como ferramenta educativa no cuidado de enfermagem pediátrica: uma revisão integrativa da literatura*

*La simulación en salud como herramienta educativa en el cuidado de enfermería pediátrica: una revisión integradora de la literatura*

### ABSTRACT

**Objective:** to analyze the evidence available in the literature on the use of health simulation as an educational tool in pediatric nursing care. **Method:** integrative review carried out with Health Sciences Descriptors (simulation, simulation training and pediatric nursing), in the SCOPUS, MEDLINE/PubMed, Web of Science, EMBASE and CINAHL databases. A total of 2070 studies were found, 39 full texts were evaluated, in which 30 articles made up the final analysis corpus. **Results:** most studies are international, current and developed with undergraduate nursing students. Simulations were used as an educational tool for graduation training, qualification/training, especially for nurses, and in the health education of family caregivers. Their use provided improvements in management, self-confidence, skills, efficient communication and construction of knowledge on the subject. **Conclusion:** simulations represented an educational tool with the potential to improve pediatric care.

**Keywords:** Simulation; Nursing Education; Health education; tutoring; Pediatric Nursing.

### RESUMO

**Objetivo:** analisar as evidências disponíveis na literatura sobre o uso da simulação em saúde como ferramenta educativa no cuidado de enfermagem pediátrica. **Método:** revisão integrativa realizada com Descritores em Ciências da Saúde (simulação, treinamento por simulação e enfermagem pediátrica), nas bases de dados SCOPUS, MEDLINE/PubMed, Web of Science, EMBASE e CINAHL. Foram encontrados 2070 estudos, avaliados 39 textos completos, em que 30 artigos compuseram o *corpus* de análise final. **Resultados:** a maioria dos estudos são internacionais, atuais e desenvolvidos com estudantes de graduação enfermagem. A simulação foi utilizada como ferramenta educacional para a formação na graduação, capacitação/treinamento sobretudo de enfermeiros e na educação em saúde de cuidadores familiares. Seu uso propiciou melhorias em gerenciamento, autoconfiança, habilidades, comunicação eficiente e construção do conhecimento acerca da temática. **Conclusão:** a simulação se configurou como uma ferramenta educacional com potencial para o aprimoramento do cuidado em pediatria.

**Descritores:** Simulação; Educação em Enfermagem; Educação em Saúde; Tutoria; Enfermagem Pediátrica.

### RESUMEN

**Objetivo:** analizar las evidencias disponibles en la literatura sobre el uso de la simulación de salud como herramienta educativa en el cuidado de enfermería pediátrica. **Método:** revisión integradora realizada con Descriptores de Ciencias de la Salud (simulación, simulación de entrenamiento y enfermería pediátrica), en las bases de datos SCOPUS, MEDLINE/PubMed, Web of Science, EMBASE y CINAHL. Se encontraron un total de 2070 estudios, se evaluaron 39 textos completos, en los cuales 30 artículos conformaron el corpus de análisis final. **Resultados:** la mayoría de los estudios son internacionales, vigentes y desarrollados con estudiantes de pregrado en enfermería. La simulación fue utilizada como herramienta educativa para la formación de graduación, capacitación/capacitación, especialmente para enfermeros, y en la educación en salud de los cuidadores familiares. Su uso proporcionó mejoras en la gestión, confianza en sí mismo, habilidades, comunicación eficiente y construcción de conocimiento sobre el tema. **Conclusión:** la simulación se configuró como una herramienta educativa con potencial para mejorar la atención pediátrica.

**Palabras clave:** Simulación; Educación en Enfermería; Educación en Salud; Tutoría; Enfermería Pediátrica.

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## INTRODUCTION

The use of simulations in health arose from the need to replace the human being in the training of technical and psychomotor skills in the health area<sup>(1)</sup>. According to the authors, the initial use of simulations in nursing was marked by the production of low-fidelity mannequins in the United States of America, in the 1910s. In Brazil, they point out that the Anna Nery Nursing School, created in 1923, begun its activities with practical nursing classes using simulation mannequins following American teaching influences. Since then, an improvement in the simulation and incorporation of different clinical situations has been identified, including in pediatric nursing.

A simulation is considered a practice that reproduces reality. In the health area, it is used as a proposal to reproduce clinical scenarios which are closer to reality in order to promote the development of skills in different spheres of care<sup>(2)</sup>. It can be characterized as low, medium or high fidelity and operationalized in three stages<sup>(2,3)</sup>. The first stage is the preparation, that is, the choice of the problem-situation, elaboration of the script that will guide the activity and the organization of the scenario to carry out the simulation; the second consists of executing the simulation itself, in which the facilitator may or may not opt for a previous explanation of what is involved in the activity, allocating a mean time for its development. And, finally, the stage of immediate feedback or debriefing is fed back by the participants, while the facilitator adopts the role of mediator of the discussions that will address the strengths and weaknesses of the participants in the situation experienced<sup>(3)</sup>.

The literature highlights the use of simulation in different care contexts, with emphasis on training during graduation and training of professionals working in health care<sup>(4)</sup>. Currently, authors also cite the use of simulation in health education as an effective teaching and learning strategy<sup>(5)</sup>. For them, simulation is considered a gold standard resource in the development of various competences, clinical reasoning, skills and reflections regarding health care. In addition, it is still considered a learning methodology that facilitates the construction of knowledge, since it is more satisfactory in relation to traditional teaching<sup>(6)</sup>. It favors the dialogue between the theory and the practice of the participants, because during the process, recognition and reflection on their failures is allowed, which generates greater confidence from

the lived experience, with the security of a practice carried out in the laboratory<sup>(3)</sup>.

The care performed in pediatrics, whether by students, nursing staff or family caregivers, is often circumscribed by the presence of fear and anxiety. This is because the care aimed at this public is complex and requires attention in management, due to the diversity of age groups, stages of development and unique and specific behaviors for each situation<sup>(7)</sup>. With this in mind, authors emphasize that the use of simulation in pediatrics has been recognized as an important educational tool in the context of health care<sup>(4)</sup>.

In view of the specific demands of pediatric care and the benefits recognized in the literature of the use of simulations in the health area to guarantee nursing care based on scientific evidence, the present study may contribute to the advancement of science in health and nursing. This study collaborates to the dissemination of the use of simulation in health as an educational resource in pediatric nursing care. Thus, the present study aimed to answer the following question: what is the evidence available in the literature on the use of health simulation as an educational tool in pediatric nursing care? The objective was to analyze the evidence available in the literature on the use of health simulation as an educational tool in pediatric nursing care.

## METHOD

This is an integrative literature review, which aims to review, criticize and synthesize the scientific literature on a subject, with a view to generating new approaches on the reviewed topic<sup>(8)</sup>. To operationalize the study, the six stages were followed: 1. identification of the theme and selection of the hypothesis or research question for the elaboration of the integrative review; 2. establishment of criteria for inclusion and exclusion of studies/sampling or literature search; 3. definition of the information to be extracted from the selected studies/categorization of the studies; 4. evaluation of studies included in the integrative review; 5. interpretation of results; and 6. presentation of the review/synthesis of knowledge<sup>(9)</sup>. The recommendations proposed in the equator checklist (PRISMA) were followed to guide the report of the findings.

The research question that guided the study was elaborated using the PICo strategy, which includes the mnemonic: P (Population), I (Interest) and Co (Context). They were defined for P (Nursing Professionals and Caregivers), I (Health Simulation)

and Co (Pediatric Nursing). From this, the research question was elaborated: what is the evidence available in the literature on the use of health simulation as an educational tool in pediatric nursing care?

For the selection of studies included in this review, the following inclusion criteria were considered: empirical studies, with a quantitative, qualitative or mixed method approach, in Portuguese, English, Spanish, available in full and published in the last ten years. A temporal delimitation was chosen due to the intention to investigate the use of simulation in health as an educational tool in the last decade. And as

exclusion criteria: studies that were not related to the object of study as well as duplicates.

Data collection was carried out in September 2020. The search was carried out in the SCOPUS, MEDLINE/PubMed, Web of Science, EMBASE and CINAHL databases. To identify the studies, the Descriptors in Health Sciences (DeCS) were used: simulation (Simulation Technique; *Simulación*), training by simulation (Simulation Training; *Entrenamiento Simulado*) and pediatric nursing (Pediatric Nursing; *Enfermería Pediátrica*). These descriptors were crossed using the Boolean operators AND and OR, as shown in Box 1.

Box 1. Search strategy and number of articles identified in the different databases, Cuiabá, Mato Grosso, Brazil, 2020.

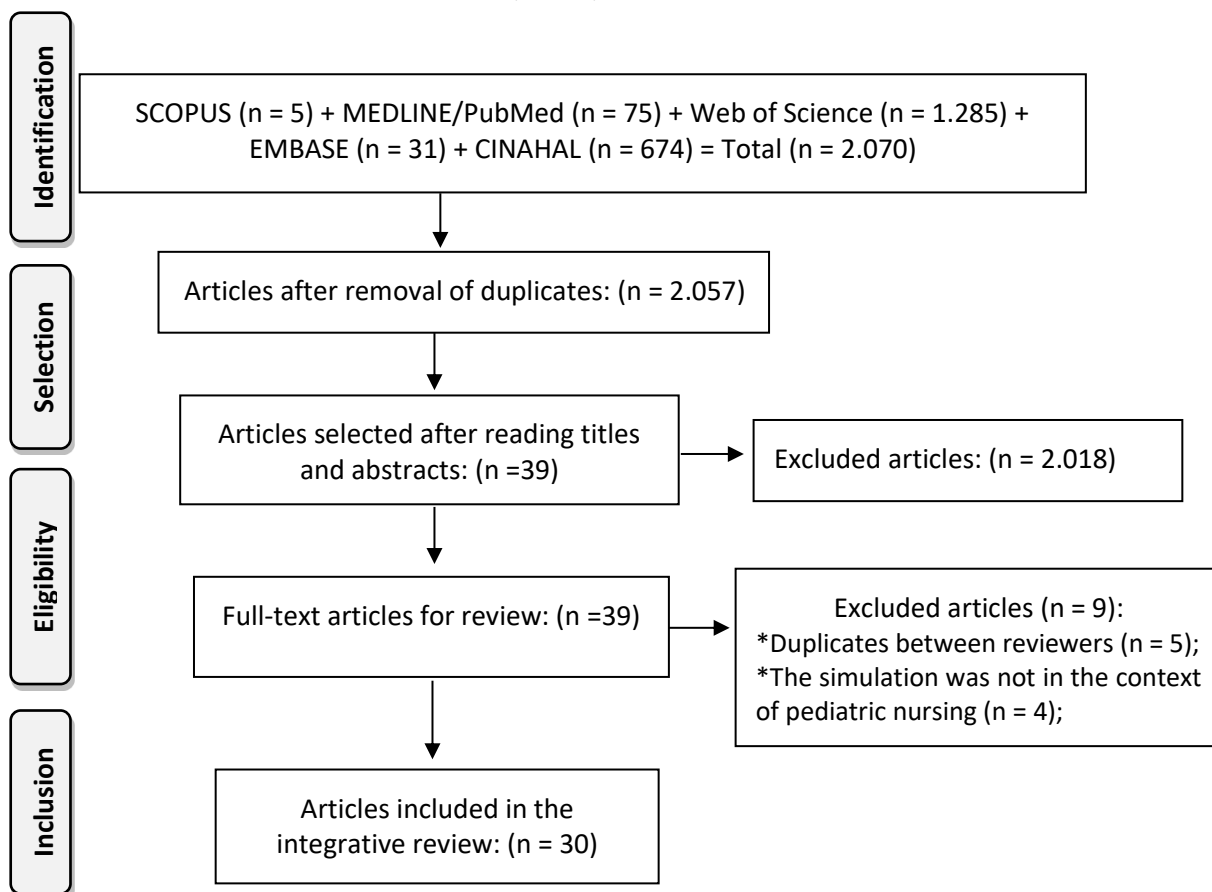
Database	Search strategy	Total
SCOPUS	"Simulation Technique" OR "Simulation Training" OR "High Fidelity Simulation Training" AND "Pediatric Nursing"	5
MEDLINE/PubMed	"Simulation Technique" OR "Simulation Training" OR "High Fidelity Simulation Training" AND "Pediatric Nursing"	75
Web of Science	"Simulation Technique" OR "Simulation Training" OR "High Fidelity Simulation Training" AND "Pediatric Nursing"	1285
EMBASE	Simulation Technique OR Simulation Training OR High Fidelity Simulation Training AND Pediatric Nursing	31
CINAHL	Simulation Technique OR Simulation Training OR High Fidelity Simulation Training AND Pediatric Nursing	674
Total		2070

Source: From the authors.

The identification, selection, eligibility and inclusion process followed the recommendations of the PRISMA statement for Reporting Systematic Reviews and Meta-Analyses of Studies. The search in the databases resulted in a total of 2057 studies, after exclusion of duplicates. After application of inclusion and exclusion criteria and after reading the title and abstract, 39 articles were selected for

full text reading. At this time of critical analysis, 9 scientific articles were excluded, 5 for being duplicated between the two independent reviewers and 4 for not addressing health simulations in the context of pediatric nursing. Thus, the final sample consisted of 30 scientific articles, as shown in Figure 1.

Figure 1. PRISMA flowchart, with the process of identification, selection, eligibility and inclusion, Cuiabá, Mato Grosso, Brazil, 2020.



Source: From the authors.

For data analysis, we used a descriptive instrument organized in Microsoft Excel® with the following elements: authors and year of publication, country, type of study, participants, place where the simulation was carried out, topic addressed, fidelity, stages fulfilled, competences or skills developed and the educational objective. After that, the results obtained were grouped and synthesized, with the aim of presenting a critical synthesis of knowledge, pointing out gaps and suggesting future research. The information extracted about the competences and abilities developed by the participants in the studies were grouped in terms related to the competences “to do”, “to know” and “to be”, and also to the skills and/or knowledge acquired, which, later, were inserted into the Word Clouds website for synthesis and construction of the word cloud.

It should be noted that the entire process of identification, selection, eligibility and inclusion was carried out by two researchers independently, and a third was called to resolve differences. Furthermore, according to the adopted methodology, the methodological quality

assessment of the included studies is waived. However, it is noteworthy that the reliability and fidelity of the information contained in the selected publications were guaranteed, aspects that were ensured through adequate referencing and rigor in the treatment and presentation of data.

## RESULTS

This integrative review analyzed 30 scientific articles<sup>(10-39)</sup> that met the objective of the research. The results indicated that the majority (n=27; 90%) of the studies were international<sup>(13-39)</sup> and published in the last 5 years (n=20; 66.7%)<sup>(10-29)</sup>. Regarding the type of study analyzed, eleven (n=11; 36.7%) used methodologies aimed at interventional, experimental<sup>(23,31,32,37)</sup> or quasi-experimental proposals<sup>(11,12,15,17,30,34,36)</sup>. This finding shows that, in general, the studies were not undertaken with the purpose of testing or verifying the effect of simulation as an intervention strategy and/or tool. As for the participants, seventeen (n=17; 56.7%) were performed with

undergraduate students<sup>(10-13,15-18,20,21,23,30-32,34,35,37)</sup>(Box 2).

Box 2. Characteristics of the analyzed studies according to authorship, year of publication, country of origin, type of study and participants, Cuiabá, Mato Grosso, Brazil, 2020.

Authorship	Country of origin	Study type	Participants
Aebersold and Schoville, 2020 <sup>(13)</sup>	USA	Qualitative	Undergraduate student
Karageorge et al., 2020 <sup>(14)</sup>	USA	Descriptive	Nurses
Teles et al., 2020 <sup>(10)</sup>	Brazil	Qualitative	Undergraduate student
Ding et al., 2020 <sup>(15)</sup>	China	Quasi-experimental	Undergraduate student
Raman et al., 2020 <sup>(16)</sup>	Oman	Qualitative	Undergraduate student
Janicas and Narchi, 2019 <sup>(11)</sup>	Brazil	Quasi-experimental	Undergraduate student
Kahraman et al., 2019 <sup>(17)</sup>	Turkey	Quasi-experimental	Undergraduate student
Wyllie and Bathey, 2019 <sup>(18)</sup>	United Kingdom	Qualitative	Undergraduate student
Costa et al., 2019 <sup>(12)</sup>	Brazil	Quasi-experimental	Undergraduate student
Byra et al., 2018 <sup>(19)</sup>	USA	Qualitative	Children
Cole and Foito, 2018 <sup>(20)</sup>	USA	Quantitative	Undergraduate student
Mendoza-Maldonado and Pailaquilén, 2018 <sup>(21)</sup>	Chile	Qualitative	Undergraduate student
Ryan et al., 2018 <sup>(22)</sup>	USA	Quantitative	Nurses
Sari et al., 2018 <sup>(23)</sup>	Turkey	Experimental	Undergraduate student
Tofil et al., 2018 <sup>(24)</sup>	England	Qualitative	Family caregivers
Vail et al., 2018 <sup>(25)</sup>	Turkey	Mixed method	Nurses
Singleton et al., 2018 <sup>(27)</sup>	USA	Intervention	Nurses
Morgaonkar et al., 2017 <sup>(28)</sup>	India	Quantitative	Nurses
Thrasher et al., 2017 <sup>(29)</sup>	USA	NS	Family caregivers
Vail et al., 2017 <sup>(26)</sup>	USA	Cross-sectional	Nurses
Fonseca et al., 2016 <sup>(30)</sup>	Portugal	Quasi-experimental	Undergraduate student
Kang et al., 2015 <sup>(31)</sup>	South Korea	Experimental	Undergraduate student
Bowling, 2015 <sup>(32)</sup>	USA	Experimental	Undergraduate student
Campbell, 2015 <sup>(33)</sup>	USA	Qualitative	Nurses
Shin et al., 2015 <sup>(34)</sup>	South Korea	Quasi-experimental	Undergraduate student
Kim et al., 2014 <sup>(35)</sup>	South Korea	Methodological	Undergraduate student
Dowson et al., 2013 <sup>(36)</sup>	England	Quasi-experimental	Nurses
Valizadeh et al., 2013 <sup>(37)</sup>	Iran	Experimental	Undergraduate student
Kane et al., 2011 <sup>(38)</sup>	USA	NS	Nursing team
Pye et al., 2010 <sup>(39)</sup>	USA	Quantitative	Nurses

Legend: USA = United States of America | NS = Not specified.

Source: The authors.

According to Box 3, it is possible to identify that in fifteen studies (n=15; 50%) the simulation was carried out in universities<sup>(10,12,16-18,21,23,30,31,34,35,37)</sup> or university hospitals<sup>(11,14,15)</sup>. Such places corroborate the study participants, most of them undergraduate students. As for the topics addressed, these included topics such as bullying<sup>(13)</sup>, pediatric care<sup>(16,21,23,31,32,34)</sup>, immunization<sup>(11,12)</sup>, among others. However, most (n=11; 36.7%)<sup>(22,25-28,36,39,14,38,20)</sup> dealt with aspects related to emergency and intensive care.

Regarding the classification of simulation fidelity, that is, how close it is to reality, it is important to emphasize that among the analyzed studies, the majority (n=19; 63.3%) did not present this information and seven (n =7; 23.3%) defined it as high fidelity<sup>(14,20,26,31,33-35)</sup>. Nevertheless, 83% (n=25) of the studies performed the simulation respecting the three recommended stages of preparation, simulation and debriefing<sup>(10-17,19-23,27-35,37-39)</sup>.

Box 3. Distribution of studies according to location, topic addressed, fidelity and stages performed in the health simulation, Cuiabá, Mato Grosso, Brazil, 2020.

Study Identification	Place	Topic addressed	Fidelity	Stages
Aebersold and Schoville <sup>(13)</sup>	CLC	Bullying	NS	Preparation-Simulation-Debriefing
Karageorge et al., <sup>(14)</sup>	University hospital	Low-frequency, high-impact events in a PICU	High fidelity	Preparation-Simulation-Debriefing
Teles et al., <sup>(10)</sup>	University	Pediatric and family care	NS	Preparation-Simulation--Debriefing
Ding et al., <sup>(15)</sup>	University hospital	Empathy	NS	Preparation-Simulation--Debriefing
Raman et al., <sup>(16)</sup>	University	Pediatric care	NS	Preparation-Simulation--Debriefing
Janicas and Narchi, <sup>(11)</sup>	University hospital	Immunization	NS	Preparation-Simulation--Debriefing
Kahraman et al., <sup>(17)</sup>	University	Childhood epilepsy	NS	Preparation-Simulation--Debriefing
Wyllie and Bathey, <sup>(18)</sup>	University	Ability to observe, interpret, document and communication.	NS	Simulation-Debriefing
Costa et al., <sup>(12)</sup>	University	Immunization	Low fidelity	Preparation-Simulation-Debriefing
Byra et al., <sup>(19)</sup>	Hospital	Sanitation	NS	Preparation-Simulation-Debriefing
Cole and Foito, <sup>(20)</sup>	NS	Palliative care in pediatrics	High fidelity	Preparation-Simulation-Debriefing
Mendoza-Maldonado and Pailaquilén, <sup>(21)</sup>	University	Pediatric care	NS	Preparation-Simulation-Debriefing
Ryan et al., <sup>(22)</sup>	ESC	cardiopulmonary resuscitation	NS	Preparation-Simulation-Debriefing
Sari et al., <sup>(23)</sup>	University	Pediatric care	NS	Preparation-Simulation-Debriefing
Tofil et al., <sup>(24)</sup>	Hospital	Airway care	NS	Simulation-Debriefing
Vail et al., <sup>(25)</sup>	Hospital	Neonatal resuscitation	NS	Simulation-Debriefing
Singleton et al., <sup>(27)</sup>	Hospital	Emergency service	NS	Preparation-Simulation-Debriefing
Morgaonkar et al., <sup>(28)</sup>	Hospital	Emergency service	NS	Preparation-Simulation-Debriefing
Thrasher et al., <sup>(29)</sup>	Hospital	Preparation for hospital discharge	NS	Preparation-Simulation-Debriefing
Vail et al., <sup>(26)</sup>	Hospital	Neonatal resuscitation	High fidelity	Simulation
Fonseca et al., <sup>(30)</sup>	University	Neonatal clinical evaluation	NS	Preparation-Simulation-Debriefing
Kang et al., <sup>(31)</sup>	University	Pediatric care	High fidelity	Preparation-Simulation-Debriefing
Bowling, <sup>(32)</sup>	NS	Pediatric care	Medium fidelity	Preparation-Simulation-Debriefing
Campbell, <sup>(33)</sup>	Hospital	Open heart surgery	High fidelity	Preparation-Simulation-Debriefing
Shin et al., <sup>(34)</sup>	University	Pediatric care	High fidelity	Preparation-Simulation-Debriefing
Kim et al., <sup>(35)</sup>	University	Febrile convulsion	High fidelity	Preparation-Simulation-Debriefing
Dowson et al., <sup>(36)</sup>	Hospital	Emergency service	Medium fidelity	NS
Valizadeh et al., <sup>(37)</sup>	University	Peripheral venous catheterization	NS	Preparation-Simulation-Debriefing
Kane et al., <sup>(38)</sup>	Simulation Center	Cardiac ICU care	NS	Preparation-Simulation-Debriefing
Pye et al., <sup>(39)</sup>	Training Center	Cardiopulmonary resuscitation	NS	Preparation-Simulation-Debriefing

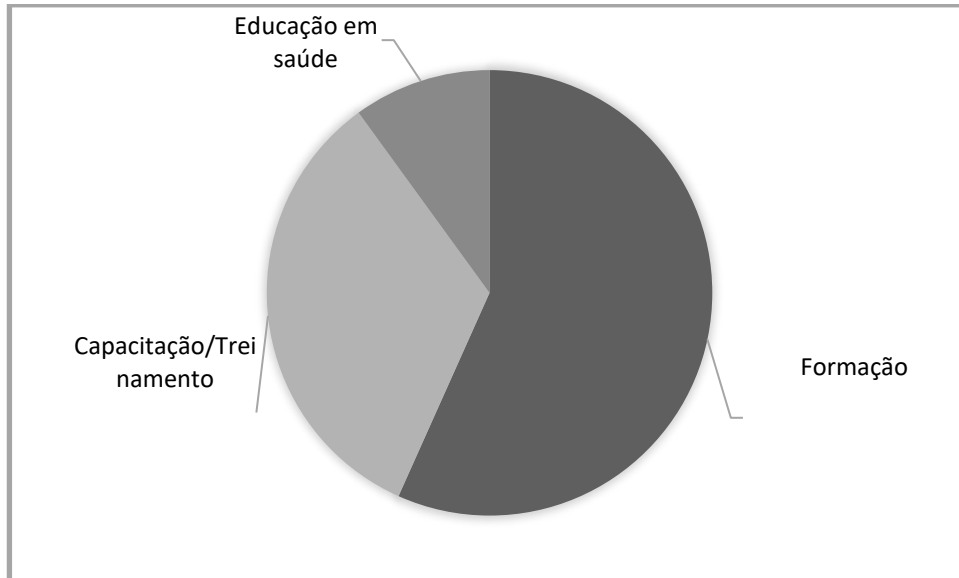
Legend: CLC = Clinical Learning Center | NS = Not specified | ESC = External Simulation Center | PICU = Pediatric Intensive Care Unit | ICU = Intensive Care Unit.

Source: The authors.

Figure 2 presents the simulation distribution according to its educational objectives. It was observed that in most situations (n=17; 57%) the simulation was used as a pedagogical strategy for the training of undergraduate nursing students<sup>(10-</sup>

13,15-18,20,21,23, 30-32,34,35,37), followed by qualification and/or training of nurses and/or nursing staff (n=10; 33%)<sup>(14,22,25,26,28,33,36)</sup> and for health education for children and/or family caregivers (n=3; 10%)<sup>(19,24,29)</sup>.

Figure 2. Distribution of the simulation according to its educational objective, Cuiabá, Mato Grosso, Brazil, 2020.



Source: The authors.

Figure 3 presents a cloud of words built from what the analyzed studies addressed as competencies, skills and/or knowledge acquired by the participants after the health simulation. Thus, the terms that stood out evidenced the potential

of this educational tool to improve the role of management, self-confidence, skills, efficient communication and, mainly, the construction of knowledge about pediatric care.

Figure 3. Word cloud built from competencies, skills and/or knowledge acquired after the health simulation, Cuiabá, Mato Grosso, Brazil, 2020.



Source: The authors.

## DISCUSSION

The use of simulation in health is highlighted in developed countries, especially in the United States of America<sup>(40,41)</sup>. The results of the present integrative review showed that only four studies were developed in South America<sup>(10–12,21)</sup>, with emphasis on Brazil<sup>(10–12)</sup>. The scientific literature points out that the specificities imposed for the use of simulation, which requires adequate resources to achieve the established pedagogical objectives, influence its use less frequently in developing countries<sup>(41)</sup>. One possibility for this to be overcome is scientific collaboration with developed countries aimed at the development of health simulation centers, so that they can be incorporated into the curriculum of Nursing courses. In this perspective, Snowden et al<sup>(41)</sup> highlight the experience of collaboration between teaching nurses from the United States of America and Jamaica, in which American instructors presented a workshop on simulation for the training of instructors. After the completion of this workshop, which included theory and practice, the teaching nurses at the Jamaica School of Nursing were able to develop simulation scenarios, carry out the debriefing stage and develop plans for the integration of simulation throughout the nursing course.

As for the methodology of the studies included in this review, it was observed that only 12 corresponded to intervention methods, experimental or quasi-experimental<sup>(11,12,15,17,23,30–32,34,36,37)</sup>. Accordingly, we can infer that studies that investigate the use of simulation in the context of pediatric nursing still do not focus on its effectiveness as an educational strategy for education, qualification/training and/or health education. Recently, a systematic review developed by Lindhard et al<sup>(40)</sup> highlighted that the evidence on the use of simulation for health professionals (physicians, nurses, midwives and respiratory therapists) focusing on neonatal clinical emergencies included 24 studies, of which fifteen were quasi-experimental and with significant methodological limitations. This result raises the discussion about the methodological robustness of studies that have as their object the simulation in health, making it necessary to encourage more research that explores the potential of this educational tool with results of the outcome and/or effect of the intervention, after the use of the simulation.

With regard to the participants, most of the studies included in this review were carried out

with undergraduate nursing students, which allow us to infer that simulation was more used as an educational tool still in training, than in qualification/training or health education. In this regard, a study carried out in Spain with 393 undergraduate nursing students showed the satisfaction of these students with the teaching and learning experience through medium and high-fidelity health simulation<sup>(42)</sup>. Also according to these authors, with the use of simulation, undergraduate nursing students are subject to the acquisition of competences, and, with this in mind, they recommend its applicability in the process of training new nursing professionals.

In the present review, we observed that most studies, in addition to implementing health simulation with undergraduate nursing students, used universities or university hospitals as places to simulate different clinical scenarios. This datum evidences an increase in the use of simulation as an educational tool in higher education institutions, especially in health courses, such as undergraduate nursing. The inclusion of new educational strategies and technologies in health education is essential for the teaching and learning process of future professionals who commit clinical practice in their context of work. In this regard, Boostel et al<sup>(6)</sup> point out that the use of simulation favors the construction and improvement of abilities in nursing care, in addition to promoting clinical judgment, critical thinking, self-confidence and student satisfaction. The authors carried out a study with the objective of comparing the perception of undergraduate nursing students and the contributions of teaching with clinical simulation or conventional practical classes in a skills laboratory, in the first clinical hospital experience. According to the study, the results showed that, although the two strategies contributed positively to the first clinical hospital experience, the health simulation provided a critical-reflexive view of competences, deficiencies and greater self-confidence in relation to conventional practice.

Other authors corroborate and highlight that traditional teaching methodologies do not provide the necessary support for the construction of nurses' competences<sup>(43)</sup>. In this context, they point out that simulation represents an important tool in the development of knowledge, especially with regard to the clinical assessment of the patient. In a study carried out with undergraduate nursing students in the last year of the course, it was found that health simulation represents an



instrument for the translation of knowledge in the clinical assessment of critically ill patients. These authors also emphasize that the simulation requires planning and recognition of the students in their singularities and experiences, but represents an important tool in the qualification of nurses for health care.

Gomes et al.<sup>(43)</sup> undertook their study in a clinical simulation laboratory at the university. They mention that the place provided an adequate structure, with an organization similar to a critical care unit, with specific equipment, such as a simulated multiparameter monitor, infusion pump, emergency car with automatic external defibrillator, in addition to the spy mirror and mannequin of high fidelity. It is evident that suitable scenarios and structures provide a quality simulation and support greater reliability to the strategy. In this regard, it should be noted that in the present integrative review, although most studies were carried out in laboratories or university hospitals, few cited the high fidelity characteristic.

The fidelity of a simulation is linked to the level of reality or realism of the scenario used. Thus, Portuguese authors emphasize that a high-fidelity simulation gives rise to learning in a realistic context of a clinical environment<sup>(44)</sup>. They indicate that the use of high-fidelity simulation benefits the improvement of clinical competence, as the scenario replicates a real situation that provides greater confidence and autonomy to students, as well as the development of different skills aimed at nursing care. In an international study, with an experimental approach, other researchers examined the effect of high-fidelity simulation intervention on clinical decision-making for undergraduate nursing students at the Arab American University in Palestine<sup>(45)</sup>. They found that high-fidelity simulation improved students' thinking and emotional capabilities, as well as decision making in the context of pediatric care.

With regard to carrying out the simulation contemplating its execution stages, Brazilian researchers reported the teaching-learning experience on patient safety with students of an undergraduate nursing course, through the use of simulation<sup>(3)</sup>. They suggest the practice of simulation in three stages: planning, implementation and evaluation. Thus, for the implementation of the simulation, they cite certain actions, such as the choice of theme, definition of the objectives to be achieved, elaboration of clinical cases, execution script, monitoring and

evaluation checklist, organization of the scenario and the simulation, as well as the method of discussion carried out by debriefing and/or feedback. They emphasize that performing the simulation, in all its stages, can help students to understand the importance of prior knowledge and attention in care, while the simulation in practice, in laboratories, promotes the development of skills with safety and recognition of flaws in care practice. Debriefing, on the other hand, enables students to self-reflect, through the measurement of weaknesses and limitations, as well as the emergence of doubts and suggestions/readjustments.

In the context of pediatric nursing, health simulation has been notoriously adopted as an educational tool for training in undergraduate nursing, with topics related to nursing care for children, adolescents and families<sup>(10-13,15-18,20,21,23,30-32,34,35,37)</sup>. Still in this context, simulation has also been used as a tool for qualification/training, especially for nurses who work directly in neonatal and pediatric care<sup>(14,22,25,26,28,33,36)</sup>. However, scientific evidence has indicated the benefits of using simulation to improve teamwork, as occurred in the experience of training nurses and technicians through its use for pediatric medical-surgical care in the United States of America<sup>(46)</sup>.

However, health simulation, even if to a lesser extent, was used as a tool for health education for family caregivers of children who require continuous care<sup>(19,29)</sup>. In this sense, a study involving family caregivers showed that the simulation made it possible to determine the difficulties faced with the care required by children who need parenteral nutrition at home<sup>(4)</sup>. This factor draws attention to the use of simulation as an educational tool with potential for health education, especially in the guidance of family caregivers of children who require some type of special health care.

The results revealed that the use of health simulation as an educational tool enabled the development of different abilities, as well as the acquisition of knowledge about pediatric care. International authors corroborate the findings of the present review. In a study carried out in Spain that analyzed the perception of undergraduate nursing students, the high levels of satisfaction of these students when participating in clinical scenarios during the simulation were highlighted, as this experience improved the students' communication skills<sup>(42)</sup>. For nurses who participated in the qualification/training with this

educational tool in the United States of America, there was an increase in scores related to knowledge and confidence for assistance in clinical events in the Pediatric Intensive Care Unit<sup>(14)</sup>.

Another important result, identified in the present review, was the use of simulation specifically as an educational tool in health education. In this sense, in a study carried out in England, twenty-nine (n=29) parents participated in the simulation with clinical scenarios on the adequate maintenance and management of emergencies in the face of tracheostomy and expressed that the preparation for hospital discharge with this strategy increased confidence for decision-making and also recommended the use of this tool with other parents before discharge<sup>(24)</sup>. It should be noted that in pediatric nursing, care is focused on the family and child dyad, therefore, looking at families of children who demand critical health care and recognizing them as capable of building skills to undertake the care of their loved ones becomes a unique opportunity to ensure comprehensive nursing care for children's health. Thus, further research is suggested to analyze the effect of simulation on health education in the field of pediatric nursing.

In this scenario, the present integrative literature review points to health simulation as an important educational tool for pediatric care, whether in the training of new nursing professionals, in the qualification/training of nurses and nursing staff or in the health education of caregivers relatives. It represents a tool that allows the construction of skills necessary for pediatric care, as it favors autonomy, critical thinking, clinical judgment, dialogue between theory and practice, in addition to promoting self-reflection, identification of failures and/or difficulties and safety of the participating subjects.

## CONCLUSION

The present literature review points to results that fill important gaps regarding the use of health simulation in pediatric care. With it, it was possible to characterize the studies that used the simulation, in addition to presenting how it can be used and its contributions to the care performed in pediatrics. Based on its findings, Brazil, as well as other developing and Latin American countries, may be subsidized to promote and encourage the use of simulation in the context of pediatric nursing. In addition, the international experiences presented contribute to the construction of knowledge on the subject and portray the benefits

of its use in different scenarios and countries, worldwide.

In short, the present study represents an advance for science in health and nursing. Since it spreads the use of simulation in health as an educational tool. In this regard, its contribution to pediatric patients' safety stands out, since its use provides opportunities for the practice and/or improvement of specific skills and aptitudes for pediatric care, carried out in laboratories. However, it is necessary to advance in scientific cooperation partnerships to implement health simulation as a teaching and care strategy, as well as in studies that evaluate its effect in different educational contexts. In addition, it is noteworthy that the studies analyzed did not include the participation of mid-level nursing professionals in the simulations performed, characterizing themselves as an identified gap. Thus, further studies are recommended to expand its use, including mid-level professionals who also make up the nursing team in the country. In addition, it was recognized as a strategy capable of collaborating with the construction of skills and knowledge, as well as the acquisition of essential skills for health care, whether performed by undergraduate nursing students, nurses or family caregivers.

A possible limitation of the study was the absence, in most of the articles, of information on the classification of fidelity adopted in the health simulation. Since, this information could broaden the interpretation of the findings in the present review. In addition, the integrative review is characterized as a method that does not aim to analyze the methodological rigor of the studies; therefore, it does not intend to indicate the best scientific evidence for decision making. Nevertheless, the reliability and fidelity of the information contained in the selected publications were guaranteed, ensured through adequate referencing and rigor in the treatment and presentation of data.

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