

Nursing and the use of realistic simulation during the pandemic period: an integrative review*Enfermería y el uso de simulación realista durante el período de pandemia: una revisión integradora**A enfermagem e o uso da simulação realística durante o período pandêmico: uma revisão integrativa***Abstract**

This study aims to analyze the evidence available in the literature about the use of realistic simulation by nursing during the pandemic period, through the observation of its contributions and how it was applied, answering the following question: "What is the scientific evidence about the contributions the use of realistic simulation during the pandemic period for the training of nursing professionals?". This is an integrative review prepared in accordance with the regulations of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses of the year 2020 based on searches in the databases: Online System for Search and Analysis of Medical Literature, Nursing Database, Latin American and Caribbean Literature on Health Sciences and Spanish Bibliographic Index on Ciencias de La Salud. The screening of studies was carried out by 4 researchers, according to the eligibility criteria, selecting 11 articles that underwent complete reading for data extraction. Studies have shown that the use of this methodology results in the development of necessary skills for nurses, such as critical thinking and technical skills, which makes a great contribution to professional training during the pandemic period.

Descriptors: Simulation Training; Nursing Education; Nursing Care; COVID-19; Pandemic.

Resumen

Este estudio tiene como objetivo analizar la evidencia disponible en la literatura sobre el uso de la simulación realista por parte de enfermería durante el período de pandemia, a través de la observación de sus aportes y cómo se aplicó, respondiendo a la siguiente pregunta: "¿Cuál es la evidencia científica sobre los aportes el uso de simulación realista durante el período de pandemia para la formación de profesionales de enfermería?". Esta es una revisión integradora elaborada de acuerdo con la normativa de Preferred Reporting Items for Systematic Reviews and Meta-Analyses del año 2020 con base en búsquedas en las bases de datos: Sistema en Línea para la Búsqueda y Análisis de Literatura Médica, Base de Datos de Enfermería, Latinoamericana y Literatura Caribeña en Ciencias de la Salud e Índice Bibliográfico Español de Ciencias de La Salud. La selección de estudios fue realizada por 4 investigadores, de acuerdo con los criterios de elegibilidad, seleccionando 11 artículos que pasaron por lectura completa para la extracción de datos. Los estudios han demostrado que el uso de esta metodología resulta en el desarrollo de habilidades necesarias para los enfermeros, como el pensamiento crítico y las habilidades técnicas, lo que hace una gran contribución para la formación profesional durante el período de pandemia.

Descriptorios: Entrenamiento de Simulación; Educación en Enfermería; Cuidado de Enfermería; COVID-19; Pandemia.

Resumo

Este estudo tem por finalidade analisar as evidências disponíveis na literatura acerca do uso da simulação realística pela enfermagem, durante o período pandêmico, por meio da observação de suas contribuições e como foi aplicada, respondendo a seguinte pergunta: "Quais as evidências científicas acerca das contribuições do uso da simulação realística durante o período pandêmico para a capacitação dos profissionais de enfermagem?". Trata-se de uma revisão integrativa elaborada conforme as normativas do Preferred Reporting Items for Systematic Reviews and Meta-Analyses do ano de 2020 a partir de buscas nas bases de dados: Sistema Online de Busca e Análise de Literatura Médica, Base de Dados de Enfermagem, Literatura Latino-Americana e do Caribe em Ciências da Saúde e Índice Bibliográfico Español em Ciencias de La Salud. A triagem dos estudos foi realizada por 4 pesquisadores, de acordo com os critérios de elegibilidade, selecionando 11 artigos que passaram por leitura completa para extração de dados. Os estudos demonstraram que o uso desta metodologia resulta no desenvolvimento de competências necessárias ao enfermeiro, como o pensamento crítico e habilidades técnicas, a qual apresenta grande contribuição em treinamentos profissionais durante o período pandêmico.

Descritores: Treinamento por Simulação; Educação em Enfermagem; Cuidados de Enfermagem; COVID-19; Pandemias.

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Introduction

The declaration of a pandemic caused by the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), led to the adoption of various protective measures, which changed the ways of acting and behaving globally. In health systems, “frontline” professionals, such as the nursing team, needed updates in a new area of knowledge, while care, at all levels of care, was adapted according to norms. Adding the limitations of the new reality to the urgency of training, technology and new methodologies have become the main educational instruments¹.

Still, with regard to nursing, in addition to changing the dynamics of learning, the adoption of distance education (DE) for undergraduate courses presented new obstacles to the educational process. The veiled obligation of access to the internet and technologies, external influences, work overload and insufficient technical training for the new teaching model result in low quality and student dissatisfaction². In this sense, meeting the need for professional improvement and serving as support for the remote training system, by developing the attributions required of nurses (ethical skills, theoretical, practical and scientific knowledge) and adapting knowledge to new technological complexities, work systems and social health-disease profiles, health complexes and nursing education institutions have adhered to new active education strategies, such as simulation^{3,4}.

Clinical simulation, as an active methodology, is capable of developing cognitive, psychomotor and affective experiences. According to the Society for Simulation in Healthcare⁵, this method aims at education, evaluation, research and improvement of patient safety and is based on the reproduction of clinical scenarios that lead to reflection and safe development of the nursing process in simple or complex cases. To establish a scenario, the simulation uses technologies (hard, light and light-hard), in laboratories with a structure similar to that presented in clinical reality, with computerized elements and representation of patients by people or mannequins of low, medium and high fidelity, the last type being the one that completely resembles the human being in physical form and presents physiological responsiveness as a consequence of the care provided, which favors immersion in clinical thinking⁶⁻⁸.

Among some results of the simulation, the development of analysis and critical thinking, security arising from previous experience, technical skills and decision-making capacity stand out. Therefore, the methodology needs to be well planned by the teacher.

In this context, to provide better practices in simulation, the International Nursing Association for Clinical Simulation and Learning⁹ postulated standards for the activity, structuring the simulation into: simulation design, results and objectives, facilitation with briefing, debriefing, participant assessment, professional integrity, simulation-enhanced interprofessional education, and simulation glossary, which facilitates interaction between participants during the action^{7,10}.

Therefore, justifying itself in the elaboration of a survey on the use of realistic simulation in the current

period, the present review seeks to answer the question: “What is the scientific evidence about the contributions of the use of realistic simulation during the pandemic period for the training of professionals of nursing?”, aiming to analyze the evidence available in the literature about the use of realistic simulation by nursing, during the pandemic period, through the observation of its contributions and how it was applied.

Methodology

This is a systematically integrative review of the literature, carried out in accordance with the rules and recommendations of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)¹¹. To meet the proposed objective, the following research question was elaborated, according to the acronym PICO: “What is the scientific evidence about the contributions of the use of realistic simulation during the pandemic period, for the training of nursing professionals?”. In which: P (Population) = Nursing students or nurses; I (Intervention) = Use of realistic simulation as a teaching methodology; Co (Context) = Influence on nursing learning with standard teaching methods.

The collection of studies was carried out between March and April 2022, through searches in the databases of the Online System for Searching and Analyzing Medical Literature (MEDLINE), Nursing Database (BDNF), Latin American Literature, American and Caribbean Health Sciences (LILACS) and Spanish Bibliographic Index in Health Sciences (IBECS-Bireme). In different combinations and together with the Boolean operators “OR” and “AND”, as shown in Figure 1, the following health descriptors were used: Simulation Training, Realistic Simulation, Teaching, Nursing, Nursing Education, COVID-19 and Distance Education according to Health Sciences Descriptors (DeCS), considering its linguistic variables and alternative terms. For better results, additional filters from the search platform itself were applied.

This review included clinical studies and observational studies available in full in English, Portuguese or Spanish, published between 2020 and 2022; who use realistic simulation as a teaching or training methodology for nursing. Therefore, those not available in full or with unavailable online access and that did not have relevant approaches for this review were excluded.

Screening was carried out individually by the researchers, starting with the reading of titles and abstracts, applying the eligibility criteria. The selected studies were compared and were read in full by all research participants for data extraction. The selection process was evidenced in a flowchart in accordance with PRISMA rules and the results will be presented in a summarized form in tables.

To analyze the risk of bias in the selected studies, the Downs and Black checklist was used¹² which evaluates, through 27 questions, four variables: information description, external validity, internal validity and study power. Each question is assigned a “yes” or “no” answer, adding one point in case of a positive answer. The final score of the articles was reviewed by the researchers.



#1 ("Simulação Realística") AND ("COVID-19") AND (enfermagem) OR (nursing) OR (enfermería) AND ("Treinamento por Simulação") OR ("Simulation Training") OR ("Entrenamiento Simulado")

#2 ("Simulação Realística") OR ("Treinamento por Simulação") OR ("Simulation Training") OR ("Entrenamiento Simulado") AND (ensino) OR (teaching) OR (enseñanza) AND ("Educação em Enfermagem") OR ("Education, Nursing") OR ("Educación Enfermería") AND ("Educação à Distância") OR ("Education, Distance") OR ("Educación a Distancia")

#3 ("Simulação Realística") OR ("Treinamento por Simulação") OR ("Simulation Training") OR ("Entrenamiento Simulado") AND (ensino) OR (teaching) OR (enseñanza) AND ("Educação em Enfermagem") OR ("Education, Nursing") OR ("Educación Enfermería") AND ("COVID-19") OR ("SARS-CoV-2")

Chart 1. Risk of bias analysis of included studies. Rio de Janeiro, RJ, Brazil, 2022

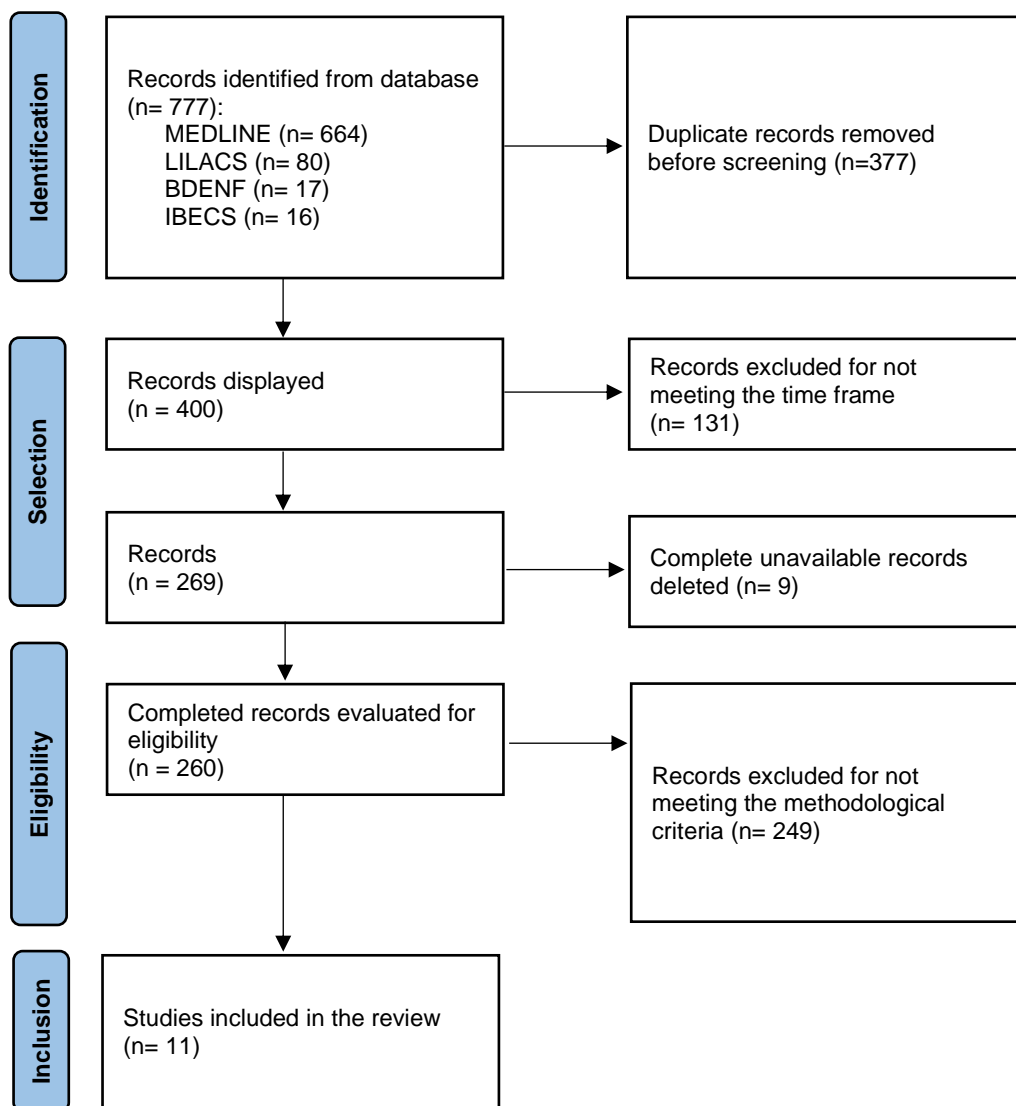
Study	Domains					Total
	Report	External Validity	Internal Validity	Selection Bias	Power	
Beneria A, Arnedo M, Contreras S, Pérez-Carrasco M, Garcia-Ruiz I, Rodríguez-Carballeira M, et al; 2020 ¹³	8/11	1/3	4/7	3/6	1/1	17/28
Luo Y, Geng C, Chen X, Zhang Y, Zou Z, Bai J; 2021 ¹⁴	8/11	2/3	4/7	3/6	1/1	18/28
Miledler LP, Bereiter M, Wegscheider T; 2021 ¹⁵	6/11	2/3	3/7	4/6	1/1	15/28
Blanié A, Amorim MA, Benhamou D; 2020 ¹⁶	8/11	1/3	6/7	4/6	1/1	20/28
Lin MH, Lin SC, Lee YH, Wang PY, Wu HY, Hsu HC; 2021 ¹⁷	9/11	2/3	5/7	2/6	1/1	19/28
Holland AE, Tiffany J, Blazovich L, Bambini D, Schug V; 2020 ¹⁸	7/11	2/3	5/7	4/6	1/1	19/28
Son HK; 2021 ¹⁹	8/11	2/3	4/7	3/6	1/1	18/28
Yang SY; 2021 ²⁰	6/11	2/3	4/7	3/6	1/1	16/28
Mark ME, LoSavio P, Husain I, Papagiannopoulos P, Batra PS, Tajudeen BA; 2020 ²¹	6/11	3/3	3/7	2/6	1/1	15/28
Sanko JS, Mckay M; 2020 ²²	7/11	2/3	3/7	2/6	1/1	15/28
Yeo CL, Ho SKY, Tagamolila VC, Arunachalam S, Bharadwaj SS, Poon WB, et al; 2020 ²³	8/11	2/3	4/7	3/5	1/1	18/28

The search in the databases showed 777 studies. Of these, 377 duplicates were excluded before screening, 131 studies were excluded because they did not meet the time frame and 9 were not available in full. Title and abstract

analysis occurred with 260 records, excluding 249 and selecting 11 for full reading. Considering pre-agreed criteria, all 11 studies were included in this review, as indicated in Figure 2.



Figure 2. Identification of studies. Rio de Janeiro, RJ, Brazil, 2022



Results

All records included are clinical surveys or cross-sectional studies, dated between 2020 and 2021; $\cong 91\%$ (n=10) were published in English and $\cong 9.1\%$ (n=1) were published in Portuguese. Related to methods, $\cong 36\%$ (n=4) are quasi-experimental studies, $\cong 27\%$ (n=3) are controlled

studies, and $\cong 36\%$ (n=4) are prospective studies. As for the content, $\cong 18\%$ (n=2) records report the use of simulation for the education of nursing students, while $\cong 72\%$ (n=9) indicate its use for training professionals. Chart 2 presents a complete overview of the studies to be discussed in this review.

Chart 2. Data extracted from articles included in the review. Rio de Janeiro, RJ, Brazil, 2022

Author/publication year	Country of origin	Objectives	Method	Main results
Beneria A, Arnedo M, Contreras S, Pérez-Carrasco M, Garcia-Ruiz I, Rodríguez-Carballeira M, et al; 2020 ¹³	Spain	Analyze the role of non-technical skills in the emotional response of health professionals to the COVID-19 pandemic.	Prospective cohort study	Professionals trained in non-technical skills through realistic simulation tended to have higher levels of anxiety and depression, yet lower levels of stress, during the COVID-19 pandemic.
Luo Y, Geng C, Chen X, Zhang Y, Zou Z, Bai J; 2021 ¹⁴	China	Compare the impact of three types of learning modalities on newly graduated nurses on their clinical judgment, perceptions of self-confidence, and assessments of design features of learning modalities.	Quasi-experimental study	The virtual simulation group showed a higher level of clinical judgment. Both the high-fidelity simulation group and the virtual simulation group reported higher scores in the fidelity domain.
Miledler LP, Bereiter M, Wegscheider T; 2021 ¹⁵	Austria	Investigate the feasibility of telesimulation for neonatal resuscitation training.	Observational prospective study	Neonatal resuscitation knowledge scores had a significant increase from a median of 16/20 to 20/20 correct answers after the educational intervention.



Blanié A, Amorim MA, Benhamou D; 2020 ¹⁶	France	Compare the respective value of teaching simulation games (SG) and a Traditional Teaching (TE) method to improve clinical reasoning (CR) skills needed to detect patient deterioration.	Multicenter prospective study	No immediate significant educational difference. However, satisfaction and motivation were greater with the use of Simulation by Games.
Lin MH, Lin SC, Lee YH, Wang PY, Wu HY, Hsu HC; 2021 ¹⁷	Taiwan	Evaluate the effectiveness of an education program, using a palliative care simulation, on attitudes and Shared Decisions among nurses, using an objective structured clinical examination (OSCE).	Quasi-experimental study	The average score of the experimental group was higher than that of the control group in the dimensions “empathic communication” and “mastery learning”, but these differences were not significant. The Shared Decisions score is significantly positively related to the overall Shared Decisions score, standardized patient survey score, and overall score.
Holland AE, Tiffany J, Blazovich L, Bambini D, Schug V; 2020 ¹⁸	United States	Evaluate the effectiveness of a training intervention in achieving reliability among faculty raters conducting a high-stakes assessment of clinical performance in the simulation.	Experimental, randomized, controlled study	Participants who completed intervention training achieved greater inter- and intra-rater reliability than the control group.
Son HK; 2020 ¹⁹	South Korea	Investigate the effects of problem-based simulation teaching (S-PBL), as part of a clinical nursing internship at a maternity hospital, on learning attitude, metacognition and critical thinking in nursing students.	Quasi-experimental study	Compared with the control group, the pre/post difference in learning attitude and critical thinking increased significantly ($p < 0.01$) in the experimental group.
Yang SY; 2021 ²⁰	South Korea	Examine the effects of neonatal simulation by applying the flipped learning method based on the Tanner Clinical Judgment Model to the pre-simulation briefing for nursing students.	Quasi-experimental study	Compared to the control group, the experimental group showed improvements in critical thinking, self-confidence, and clinical judgment. However, knowledge, satisfaction and anxiety did not differ between groups.
Mark ME, LoSavio P, Husain I, Papagiannopoulos P, Batra PS, Tajudeen BA; 2020 ²¹	United States	Determine whether implementing simulation training for the nasopharyngeal swab procedure can increase provider confidence in the efficiency of the procedure.	Prospective cohort study	The self-assessment scores, representing a large effect on the intervention. In addition, the study also showed an improvement in the knowledge assessment, performed by a multiple-choice test on key points of swab performance.
Sanko JS, Mckay M; 2020 ²²	United States	Exploring the belief that realistic simulation experience to improve systems thinking would affect adverse event reporting patterns.	Control-intervention study	The results demonstrated differences in the proportions of reported adverse events. The intervention group reported more medication-related events, while the control group reported more rescue failures and airway-related events. Systems thinking was measured in the intervention group before and after the simulation, and showed a large effect.
Yeo CL, Ho SKY, Tagamolila VC, Arunachalam S, Bharadwaj SS, Poon WB, et al; 2020 ²³	Singapore	Investigate the effectiveness of a neonatal resuscitation game in retaining resuscitation knowledge and skills.	Control-intervention study	There were no differences regarding age, professional group, gender, workplace, length of service, number of procedures performed or involvement in video games.

Discussion

The development of new technologies has brought new possibilities to the clinical area to improve the application of health care, in addition to this, with the pandemic scenario, it is clear how important it is for the population that health professionals are prepared for various situations, either to deal with these new technologies or with their absence in their professional routine¹³.

The need to train nursing professionals encourages the development and use of new learning tools in health education. The use of realistic simulation has been paramount as a teaching tool in teaching institutions and universities in the health area. The findings of this review show that the application of this teaching methodology proves to be beneficial for several factors, such as the development of clinical reasoning, behavioral and emotional maturation and the improvement of technical skills¹⁴.

The necessary social distance during the period of the COVID-19 pandemic has become an impasse for educational institutions, since practical training is usually carried out inside closed rooms or laboratories. The students' need to implement theoretical knowledge in practice resulted in the promotion of other mechanisms by educational institutions to carry out realistic simulation, adapting according to the public health scenario and recommendations from reference authorities. With this, the mastery of contemporary technologies such as computers and cameras, through the Internet, allowed the creation and dissemination of educational videos^{15,16}.

Such tools allowed the dissemination of numerous protocols and guidelines developed by different health institutions and public bodies, composing a dynamic range of activities performed in daily practice in health. Among them, the importance of training is evident so that attire is carried out properly, in the fight against infections. With the



requirement for the correct use of Personal Protective Equipment (PPE) by health professionals, the importance of instructing not only these, but nursing students who will enter unhealthy environments in the future, became visible²⁴.

In addition, the proper hand washing technique was highlighted as a fundamental measure to be practiced by all health professionals and students, as it is an essential action in controlling the transmission of pathogens, resulting in an effective measure in the prevention and infection control. Therefore, in order to expand the necessary knowledge in the current context, many units had to rethink ways of disseminating this knowledge²⁴.

Realistic simulation and its different modalities, such as high-fidelity simulation, virtual simulation, proved to be an important ally in nursing education, being used both for training in everyday practices and for emergency scenarios, such as preparing and carrying out the routine nasopharyngeal swab exam²¹.

After reading the studies, it was observed that some made a comparison between the use of realistic simulation and alternative methodologies to this one, making it possible to identify differences in the behavior and conduct of students in carrying out practical activities. Students who did not have simulation training as a teaching method were more likely to develop psychological crises, such as stress and anxiety, while students who underwent this methodology showed behavioral and emotional maturity, making them more prepared to deal with situations adverse^{18,19}.

The learner's exposure to different situations used in the simulation sessions stimulates critical thinking, collaborating to create a harmonious work environment in the future, thus ensuring the patient's health. The development of critical thinking becomes essential in resolving impasses in daily contact with work partners, when dealing with patients living with different health conditions, in addition to speeding up delegating functions in case of leadership^{20,21}.

Furthermore, some of the studies also indicated that the student's active participation in simulation training allows the improvement of their technical skills. The fact that students can put into practice the theoretical contents applied in the classroom, associated with carrying out the procedures several times, allows a greater fixation of the concepts, in addition to learning and understanding how the procedures must be performed correctly²¹⁻²³.

Conclusion

It is evident how much realistic simulation impacts the training of a nursing professional. The experience obtained through this tool can be applied throughout their trajectory within their work sectors, since its use has a strong influence on the ability of nurses to carry out clinical judgment.

The use of this teaching methodology is essential not only for improving the quality of care provided, but also for improving the self-perception and self-confidence of students and professionals. In addition, it contributes to the development of clinical judgment in different scenarios.

Thus, it is evident that the use of simulation scenarios as a teaching methodology can contribute to the enrichment of professional training, since it directly influences the capacity for clinical judgment, the development of technical and non-technical skills, in addition to visibly favoring the decision-making.

However, the reduced number of studies related to the use of realistic simulation in the pandemic period by nursing, the limited access to some articles, both due to insufficient funds to purchase them, as well as the online unavailability, were limiting factors for the research, making the possibility of a larger number of studies able to base this review is unfeasible. Therefore, it is important that more works are produced in this area that consider the various influencing aspects, such as the time period and the adaptations made during the pandemic period. It is suggested as a future study the follow-up of students and trained and newly graduated nurses during this period.

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