AG EDITOR

REVIEW

Clinical simulation in nursing, challenges, strategies and opportunities for competency development

Simulación clínica en enfermería, desafíos, estrategias y oportunidades para el desarrollo de competencia

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ABSTRACT

Introduction: clinical simulation has been highlighted as a key strategy in the training of professionals, since practical learning and skills improvement are fundamental for a safe and effective practice; therefore, this study seeks to describe how this methodology allows the development of competencies in nursing professionals during their undergraduate academic training.
Method: a literature review was conducted under a qualitative approach with a descriptive design in databases such as Medline, Scielo, Pubmed and Google Scholar; with a sample of 30 articles using search terms such as clinical simulation, nursing, opportunities, strategies with AND and OR operators. The selection of articles was based on inclusion and exclusion criteria, as well as inductive analysis.
Results: clinical simulation has established itself as an essential methodology in academic and professional training, backed by ample evidence that demonstrates its effectiveness in the development of both generic and specific competencies. Health students are the main beneficiaries of the services offered by clinical simulation.
Conclusions: clinical simulation significantly enhances education, training and management in the healthcare sector. These digital solutions enable accessible and flexible continuing education, optimizing the teaching-learning process. It also expands opportunities to customize and diversify educational scenarios, promoting a more inclusive education aligned with the demands of the health system.

Keywords: Patient Simulation; Nursing Students; Clinical Practice; Teaching Through High Fidelity Simulation; Learning.

RESUMEN

Introducción: la simulación clínica se ha destacado como una estrategia clave en la formación de profesionales, ya que el aprendizaje práctico y el perfeccionamiento de habilidades son fundamentales para una práctica segura y efectiva; por lo que, el estudio busco describir como esta metodología permite el desarrollo de competencias en los profesionales de enfermería durante su formación académica de grado.
Método: se realizó una revisión bibliográfica bajo un enfoque cualitativo con un diseño descriptivo en bases de datos como Medline, Scielo, Pubmed y Scopus; con una muestra de 30 artículos utilizando términos de búsqueda como simulación clínica, enfermería, oportunidades, estrategias con operadores boléanos AND y OR. La selección de artículos fue en base a criterios de inclusión y exclusión, así como el análisis inductivo.
Resultados: la simulación clínica se ha consolidado como una metodología esencial en la formación

académica y profesional, respaldada por una amplia evidencia que demuestra su eficacia en el desarrollo de competencia tanto genéricas como específicas, los estudiantes del área de la salud son los principales beneficiarios de los servicios que ofrece la simulación clínica.

Conclusiones: la simulación clínica fomento de manera significativa la educación, capacitación y gestión en el sector de la salud. Estas soluciones digitales permiten una educación continua accesible y flexible, optimizando el proceso de enseñanza-aprendizaje. Asimismo, amplía las oportunidades para personalizar y diversificar los escenarios educativos, promoviendo una educación más inclusiva y alineada con las demandas del sistema de salud.

Palabras clave: Simulación de Paciente; Estudiantes de Enfermería; Prácticas Clínicas; Enseñanza Mediante Simulación de Alta Fidelidad; Aprendizaje.

INTRODUCTION

In higher education institutions with health sciences faculties, academic preparation in nursing faces the challenge of developing competent professionals to address the complexity and diversity of health needs in an increasingly dynamic and demanding environment. This is why simulation has emerged as an innovative tool to improve nursing training, allowing students to practice and develop clinical skills in a controlled and safe environment. In higher education, it is increasingly common for students to face highly demanding and stressful contexts, which generate adverse emotions that can hinder their performance and well-being, progressively affecting their mental health.[1]

Clinical simulation has established itself as a valuable tool that allows students to acquire technical and theoretical skills, thus developing critical abilities as teaching-learning methods to promote skills in various educational centers that offer health-related academic degrees.[2]

In particular, clinical simulation has stood out as a key strategy in training professionals since practical learning and improving skills are fundamental for safe and effective practice. This methodology reduces errors, increases students' satisfaction with the learning process, and improves their confidence and comfort in performing their skills.[3]

According to Sánchez and Guzmán[4], clinical simulation can be established as an innovative model for developing general and specific professional competencies. On the other hand, it is important to emphasize that it constitutes an essential tool in students' training process in this area since it contributes to personal development and more analytical thinking, fostering interprofessional collaboration. Furthermore, it focuses on managing anxiety and fear in real situations.[5,6]

This approach generates high satisfaction levels in students and teachers, promoting effective learning and greater understanding. Likewise, the effectiveness of simulation in developing skills, tools, and teamwork is highlighted, which ensures preparation for possible future challenges and facilitates experience in personal and patient care.[7] Therefore, this article aims to describe how clinical simulation allows the development of competencies in nursing professionals during their academic training.

METHOD

The study has a qualitative focus, which allows for a comprehensive review based on the extraction of information from various scientific articles related to the topic under analysis. The qualitative study provides depth to the data, dispersion, richness, interpretation, and contextualization of the problem.[8] Similarly, it is descriptive design, according to Guevara et al., who point out that it aims to discover the dominant circumstances, habits, and trends by precisely examining activities, objects, processes, and people.[9]

Likewise, it is a bibliographic review that allows us to contextualize the study, ground it, and identify the main contributions to the subject, as well as to define key concepts and organize and understand the visions of the studies on the phenomenon.[10]

On the other hand, the population is the set of elements or phenomena with a common characteristic and is the object of analysis.[11] For this reason, it comprised a total of 230 articles, which, through convenience sampling using exclusion and inclusion criteria, resulted in a sample of 30 articles. For Hernández et al., this represents a segment of the population of interest for data collection. In addition to being representative of the population, the aim is for the findings obtained in the sample to be propagated or extended to the population.[8]

Inclusion criteria
- Original articles related to the subject of study.
- Articles published in the last 5 years.
- Using articles published in Spanish, English or Portuguese.

Exclusion criteria
- Bibliographic review articles, literary texts.
- Thesis-type works, whether master's, specializations, or doctorates.
- Gray literature or incomplete articles.

In this context, a search was carried out in the following databases: MEDLINE, SCIELO, PUBMED, and GOOGLE ACADEMICO, among others. Keywords were used to guide the search for information, which were clinical simulation in nursing, development, undergraduate training, opportunities, skills development, challenges, strategies, and undergraduate education. Boolean operators such as AND and OR were used to implement the advanced search.

The information from the articles found was compiled in an Excel database matrix, which was used to group and keep the acceptable sources in order. This matrix is structured in data such as the author(s), year, title of publication, translation of the title into Spanish, summary, results, findings, link, bibliographic reference, and the database from which the article was found.

Similarly, the inductive method was used to analyze the information collected through critical interpretation, thus generating new perspectives on the research topic, According to Urzola. The inductive method allows research to be carried out from the specific to the general, therefore strengthening disciplines and the dissemination of knowledge as components that contribute to the formation of knowledge and new hypotheses based on antecedents, thus achieving the truth.[12]

DEVELOPMENT
Challenges presented in the implementation of clinical simulation as an active learning methodology in nursing training

Clinical simulation has emerged as an effective educational strategy for developing clinical, communicative, and collaborative skills, all in a controlled, realistic, and ethically safe environment. However, the curricular integration of simulation and its adaptation to the nursing curriculum present challenges in logistical, technical, cultural, and financial terms; according to Duarte et al., there are difficulties in meticulously aligning the simulated scenarios with the expected learning outcomes in having adequate resources, as well as in training teachers as expert facilitators to guarantee the quality of the experience and evaluate its transfer to actual practice.[13]

Similarly, Santos et al. emphasize that active methodologies such as clinical simulation enrich learning by valuing students' previous experiences and connecting them to real-life situations. These methodologies motivate students and promote using digital resources to design more dynamic and challenging educational scenarios. This connection between technology and pedagogy is essential to adapt nursing education to current social demands, guaranteeing autonomous and meaningful learning.[14]

However, Rodríguez et al. identify that funding is one of the biggest obstacles to implementing clinical simulations. This problem limits the acquisition of high-fidelity simulators and the development of realistic scenarios, which are essential to maximize the impact of this methodology.[15] Therefore, collaboration between teachers and students is crucial to overcome these barriers, considering the lack of advanced pedagogical preparation among teachers that would enable them to effectively guide the learning process, making the most of resources.[16]

On the other hand, Jusef et al. emphasize that the sustainability of clinical simulation depends on a constant commitment to human and technological resources. This implies having advanced mannequins and spaces designed exclusively for simulations, which can be a significant challenge for institutions with restricted budgets. In addition, long-term implementation requires strategic planning to guarantee the continuity of these educational activities, ensuring their effectiveness with trained teaching staff.[17]

Furthermore, incorporating this into the curriculum challenges the paradigmatic transformation of education. According to Dima et al., many teachers lack the technological skills to use simulators in line with the new teaching model, as well as students' resistance to change to new learning models. It should be noted that this also implies a change in both governmental and institutional educational policies to achieve a correct integration of theoretical and practical subjects.[18]

In this sense, this innovative methodology is crucial for fostering critical and analytical thinking in nursing students. However, the traditional trajectory of education makes it impossible to promote autonomy in students and reflective and creative thinking, fundamental elements to ensure meaningful learning that positively impacts professional practice and the development of competencies.[19] Likewise, the effective implementation of clinical simulation requires economic and technological resources and a paradigm shift in nursing education. This method challenges traditional practices by introducing more dynamic learning environments, where error becomes an opportunity to grow and reflect; this is by Dima et al., who recognize that integrating these strategies into the curriculum encourages a more student-centered education, promoting active and

participatory learning; this raises not only the level of technical competence of future professionals but also their ability to adapt to diverse clinical contexts.[18]

Chero et al. recognize that the clinical simulation environment becomes a space to share challenges and emotions without fear of negative consequences. However, the high-stress atmosphere of simulated clinical scenarios can lead to insecurity among students due to the lack of preparation for the elements and the handling of feedback by the teacher.[20]

Therefore, clinical simulation, despite its multiple challenges and difficulties when implemented as an active teaching method in higher education institutions, has become an essential methodology in academic and professional training. Extensive evidence demonstrates its effectiveness in developing generic and specific competencies.

Strategies implemented by higher education institutions to guarantee the development of clinical simulation in nursing skills training

In the opinion of Colindres. He states that one of the strategies for implementing clinical simulation was the incorporation of simulation practices in the curriculum. This was fundamental for developing the competencies that are essential in the field of nursing, given that these practices allowed students to experience clinical situations in a controlled environment, which helped them acquire technical skills and develop their clinical reasoning.[21]

From the point of view of Guevara et al., a very effective strategy was the implementation of active methodologies that promote reflection and creativity in nursing students.[22] This change was fundamental to train And finally Colindes. Proposes A key strategy implemented in designing relevant curricula integrating theoretical knowledge and practice through teacher training.[21] Nursing schools must ensure that their programs align with the health system's needs and the social determinants of health. This not only improves knowledge acquisition but also promotes the development of interpersonal and teamwork skills, which are essential in the health field.

According to Macías et al., clinical simulation has established itself worldwide as one of the leading and most effective methodological tools for training in healthcare degrees.[23] Although initially designed for face-to-face environments, it can be adapted to a virtual format, allowing for innovation in education and promoting meaningful learning in students. This is complemented by the resources available in nursing clinical skills laboratories, such as mannequins, electro-medical equipment, and specific clinical cases for each learning unit.

Furthermore, simulation-based learning should be integrated systematically and continuously throughout the training program for future professionals, starting with basic levels of simulation, progressing to medium complexity levels, and finally reaching the most difficult levels. This approach facilitates the acquisition of the theoretical knowledge and practical skills necessary for students to face the clinical environment with adequate competence to provide care to patients.

As mentioned, simulation allows students to make mistakes and learn from them, and they can train and repeat the practices as often as they need to, which helps to reduce their fear of facing the patient. It also reduces the margin for human error, which directly impacts patient safety and is closely related to the ethical principle of non-maleficence.[24]

For Sánchez et al., simulation offers an environment where students can face real situations in a controlled way, allowing them to reflect on their decisions and improve their performance.[25] This type of teaching not only strengthens their technical skills but also promotes the acquisition of critical skills such as analytical thinking, problem-solving, and teamwork, which are essential for their future professional practice in healthcare.

However, memory processes do not follow a straight line and are reflected in the learning curve, directly impacting nursing care and patient safety. The learning curve graphically illustrates the relationship between the effort invested in learning and the result obtained. Studies have indicated that simulation is a learning strategy that favors more excellent knowledge retention than traditional classroom education.[26]

As a learning strategy, clinical simulation scenarios have proven to be highly effective in acquiring skills, allowing students to approach an authentic clinical practice where they can develop the knowledge they have acquired in the workplace. In addition, it promotes the learning and development of cognitive, social, technical, and personal skills.[27]

As Perdomo et al. mentions, clinical simulation, as a didactic strategy, is part of the constructivist approach, as it facilitates the participation of students in the process of knowledge acquisition and the use of simulators, allowing nursing students to interact closely with an environment that reflects reality; this not only allows them to gain experience in the workplace but also contributes to the development of their management skills in conflict situations that may compromise the patient's health.[28]

Therefore, university students in the health field are the primary beneficiaries of the services offered by clinical simulation. This widely valued methodology provides a positive experience that reinforces strategies for meaningful learning and thus fosters the continuous improvement of educational programs.[29] However, simulation acts as a technique that creates specific situations or environments, allowing people to have

experiences similar to actual events, the purpose of which is to facilitate the practice, learning, evaluation, and understanding of the actions of a given group.[30]

Opportunities for the development of professional nursing skills

The development of professional nursing skills is crucial to improving the quality of care and patient safety. Continuing education is an opportunity that favors the development of competencies and the implementation of continuing education programs, and specialized training allows nursing professionals to update their knowledge and skills, adapting to advances in clinical practice and technology.[31]

Therefore, clinical simulation is a tool that has enhanced theoretical knowledge by integrating it into practice. According to Arancibia et al., the development of professional competencies in nursing through this methodology offers various opportunities, such as improved patient safety during care, which contributes to reducing risks and adverse effects in genuine care, as well as the integration of procedural, theoretical and attitudinal knowledge in the face of highly demanding and complex clinical scenarios.[32]

On the other hand, Garza et al. point out that developing nursing skills through clinical simulation presents several significant opportunities, such as problem-solving, which is crucial for decision-making in clinical situations, and autonomy in complex procedures, allowing for more excellent development during their pre-professional practices.[33]

In turn, promoting professional nursing skills through high-precision clinical simulation (SCAF) offers multiple possibilities due to the increased realism of incorporating simulated patients and the enhancement of communication skills.

Fundamental to education, the variety of scenarios, which introduces students to different clinical circumstances, improves their preparation for actual practice; the increase in these previous experiences encourages reflective critical thinking, enhances skills, confidence, and autonomy in decision-making, emphasizing the importance of clinical simulation in nursing education and its beneficial effect on the quality of education.[34]

It is essential to point out that communication guarantees that healthcare is provided clearly and precisely, which helps reduce medical errors and improve safety in healthcare settings. Several studies have shown that healthcare professionals with advanced communication skills, particularly students and nurses, tend to develop greater empathy towards patients. This benefits the relationship between patient and professional and increases efficiency in the performance of clinical tasks.[35]

Furthermore, integrating innovative technologies and simulations in the educational process allows nurses to hone their skills in controlled scenarios. On the other hand, access to refresher programs and participation in clinical research boost professional growth and specialization, allowing them to play a more proactive role in decision-making within healthcare teams.[36] Telesimulation, an educational methodology that uses the resources of a simulation center and telecommunication technologies such as artificial intelligence and virtual reality to offer learning and assessment environments in remote locations, has also been developed, enabling a more inclusive education; this fosters technical skills as well as teamwork.[37]

Similarly, Ortiz et al. recognize that clinical simulation is a highly effective teaching method for fostering a culture of safety among nursing professionals, and in turn, harmoniously integrates theory and practice in their training process for the future, which has the necessary elements to evaluate the cognitive and procedural variables of interest, including the hospital ward, simulators, nursing care supplies, and didactic support material.[38]

Similarly, clinical simulation promotes active learning, promoting a transformation of education towards a proactive role of the student in their academic training, facilitating the transition from theory to practice, as well as autonomy in dealing with clinical cases in high-fidelity simulated scenarios.[39]

As Sánchez et al. mention, it is essential to consider the standards of good practice in simulation since these establish that the design of a simulation does not determine its level of fidelity; on the other hand, the degree of realism sought to be achieved in this area seems to be a key factor in favoring the achievement of the expected learning outcomes.[40] For this reason, it is crucial that institutions that train health professionals carefully consider updating their training programs when reformulating educational strategies.

CONCLUSIONS

Clinical simulation is a fundamental resource in the education of nursing students to develop technical skills and promote critical reasoning, team collaboration, and independence in complicated circumstances. The benefits of using this methodology encourage meaningful learning in nursing students, which reduces errors in professional practice and strengthens the confidence and safety of the student body. Likewise, the integration of advanced technologies, such as artificial intelligence and virtual reality, expands the opportunities to personalize and diversify educational scenarios, promoting a more inclusive education aligned with the health system's demands. Therefore, the implementation of virtual management platforms in the academic field

for health personnel helped in the teaching-learning process during the years of the COVID-19 pandemic. This significantly promoted education, and there was also an innovative approach to improve training and management in the health sector. These digital solutions allow for accessible and flexible continuing education, optimizing the teaching-learning process.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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