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Simulation-based Instructional Design: concepts and applicability in the formation of competencies in health professionals

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Abstract: *The training of health professionals is being transformed by the adoption of methodologies such as simulation, which creates controlled environments for realistic and integrated clinical practice of theory and practice. This approach is driven by national educational policies and international recommendations that emphasize the thorough preparation of future professionals to face dynamic and complex challenges in health care, promoting core competencies and a culture of active and reflective learning. This article aimed to map the literature on the teaching, acquisition and/or development of competencies of health professionals through simulation-based Instructional Design, examining the different forms of simulation approach employed in the educational process, the competencies taught, acquired and/or developed and the target populations of educational interventions, exploring their various applications in teaching-learning contexts of nursing professionals (nurses or technicians) and/or physiotherapists. The following guiding question emerged: How does one develop a simulation-based Instructional Design for the formation of competencies in health professionals? The study consisted of a Scoping Review that followed a protocol registered in the Open Science Framework, using PRISMA-ScR guidelines, with data collection carried out in May 2024 through searches in the SciELO and LILACS databases, using Boolean operators and the indexed terms "Health", "Clinical Competence" combined with the keywords: "simulation" and "competence". The steps included independent selection by title, abstract, and complete reading of the relevant studies, with discussion and consensus among the authors for inclusion in the final sample. It was found that Instructional Design with the use of simulation strengthens procedural, behavioral and attitudinal competencies in health professionals, preparing them for complex challenges with confidence and confidence. This method fosters a culture of continuous learning and quality in patient care by effectively aligning theory and practice.*

Keywords*: Patient Simulation; Teaching; Educational technology; Clinical Competence; Vocational training*.

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I. Introduction

The training of health professionals has undergone significant transformations, driven by the need to prepare highly qualified individuals to face complex and dynamic challenges in health care. One of the methodologies that has gained prominence in this context is simulation, which is based on the creation of controlled and safe environments that reproduce real situations of clinical practice[1–3].

This method integrates theoretical and practical aspects, being based on pedagogical principles that promote active learning and the development of essential skills for the performance of future health professionals, revolutionizing traditional teaching methodologies[3].

In the Brazilian context, the policies that induce professional education in health, fostered by the National Curriculum Guidelines (DCN) for undergraduate courses in the area of health, emphasize the importance of active teaching methodologies, including clinical simulation, as part of the training process of future professionals. The DCN highlight the need for training that includes not only technical knowledge, but also attitudinal skills, in line with the global standards for the education of health professionals established by the World Federation for Medical Education (WFME)[4–10].

The World Health Organization (WHO) also recommends the adoption of innovative educational methods, including clinical simulation, as an integral part of health professional training programs, emphasizing that simulation can contribute to improving the quality of health education, improving the competence and confidence of health professionals, and better preparing them to work in interdisciplinary teams and deal with high-pressure situations[9,11,12].

Authors such as Hayden et al. (2014)[13] and Jeffries (2012)[1] highlight that clinical simulation promotes active learning and can facilitate the development of complex clinical skills where students participate directly in decision-making and problem-solving processes, fundamental aspects for professional practice. In this sense, the replacement of up to 50% of the clinical internship hours by simulation does not compromise the students' training, as long as this simulation is well structured and of high quality.

The development of simulation in teaching contexts involves several stages, including the preparation of the simulated environment, the conduction of the scenarios, and the *debriefing*, which is the stage of critical reflection on the practice carried out. During their development, it is crucial that the scenarios are based on real clinical cases that are relevant to the curriculum, ensuring student relevance and engagement. Driving the scenarios should be facilitated by trained instructors, who can provide *real-time feedback and adjust complexity as needed. Finally, debriefing* allows students to reflect on their actions, identify areas for improvement, and consolidate learning through guided discussions[14]

Instructional Design (DI) follows, to different degrees, the ADDIE (*Analysis, Design, Development, Implementation, and Evaluation*) paradigm and, in general, the DI process is classically developed through five stages: 1. Analysis (understanding of the problem): this stage involves the identification of learning needs, the characterization of the target audience and the identification of institutional potentialities and limitations, 2. Design (designing a solution): in this phase, a comprehensive solution is conceived that is then detailed in terms of mapping and sequencing of content, learning strategies, activities, media selection, tools and evaluation methods to be developed, 3. Development (creating the solution): comprises the production and adaptation of both printed and digital teaching resources and materials, the configuration of virtual environments and the preparation of pedagogical, technological and administrative supports, 4. Implementation (execute the solution): this step represents the practical application of the DI proposal, marking the effective learning experience and 5. Evaluation (evaluate): A cross-cutting phase that occurs throughout the educational solution development process, focusing on the continuous analysis of the results obtained and the adjustment needed to improve the effectiveness of the instructional design. This systematic, integrated model provides a robust framework for developing effective educational solutions that are aligned to specific learning needs and institutional contexts[15].

Competence denotes the individual's ability to integrate attitudinal, procedural, and conceptual aspects in a cohesive way to solve challenges that emerge from practical situations, such as in professional activities directly related to patient care. Competency-based training requires the application of consistent teaching methods to face real challenges, promoting continuous personal development adapted to the particularities of each student. These competencies stand out for their relevance, the complexity of the situations in which they are applied, their dynamic nature, and the functional integration of learning elements[16].

The applicability of clinical simulation in higher education in health is vast and multifaceted and its foundations and applicability have been explored by a variety of national and international studies. In areas such as nursing, the simulation can range from trivial procedures, such as the safe administration of medications, to highly complex situations, such as emergency management, providing knowledge of the contents on the depth of thoracic extension, cardiopulmonary resuscitation (CPR) sequence, and the optimization-ventilation-minute ratio in CPR[17,18]. In physical therapy, the educational process mediated by simulations can include the development of clinical decision-making skills in outpatient, community, and critical care practice settings, improving students' confidence in measures of technical, behavioral, and cognitive performance in addition to high satisfaction[19,20].

In medicine, simulation has been employed from structuring educational curricula with a focus on pediatric cardiology residents to teaching advanced skills, such as improving the ability to analyze coronary angiography images[21,22]. In the area of nutrition, simulation has been used to teach about the regulation process for a frontal nutritional labeling model, identifying and problematizing the role of these professionals from the perspective of

collective health, in the fields of action of Food and Nutrition Security, food sovereignty and the Human Right to Adequate Food[23].

In the field of speech-language pathology, simulation emerges as a valuable tool to train graduate students, assisting in the development of the critical skill of clinical assessment of swallowing, essential to address issues related to this specific field[24]. In the field of psychology, simulation has been used to develop skills in managing and coping with states of anxiety[25].

In view of the above, this article aimed to map the literature on the teaching, acquisition and/or development of competencies of health professionals through simulation-based DI, examining the different forms of simulation approach employed in the educational process, the competencies taught, acquired and/or developed and the target populations of educational interventions, exploring their various applications in teaching-learning contexts of nursing professionals (nurses or technicians) and/or physiotherapists.

II. Material and Methods

The study was designed as a Scoping review, with a protocol registered in the *Open Science Framework* (DOI 10.17605/OSF. IO/XA7ZK) in accordance with Joanna *Briggs Institute guidelines*. The systematization of the writing followed the standard guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses for Scoping Reviews (PRISMA-ScR) report[26,27].

Scoping review is a method of exploratory evidence synthesis that systematically comprehensively identifies and maps the available evidence on a given topic, field, concept, or issue, often without restrictions as to the source (such as primary research, reviews, non-empirical evidence) in a number of specific contexts. This method can clarify the main concepts and definitions found in the literature and discover the fundamental characteristics or factors associated with a concept, including aspects related to the research methods used[26]. The methodological structure was based on and described in five stages: I – formulation of the research question; II – identification of relevant studies; III – selection of studies; IV – data analysis; V – summary and presentation of data[28].

For the first stage, the title, objectives, and review question were formulated following the mnemonic combination Population, Concept, and Context (PCC)[26]: P (Population) – Nurses and/or Physical Therapists; C (Concept) – Educational process based on Simulation; C (Context) – Training and/or development of skills in health professionals. The following guiding question emerged: How does a simulation-based ID be developed for the training of competencies in health professionals?

Studies originated from Interventional Research (PNI)[29] were analyzed, which used simulation as a teaching-learning method aimed at training and/or improving the competencies of nursing professionals (nurses or technicians) and/or physiotherapists, being developed, implemented and/or evaluated in classroom, outpatient and/or hospital contexts, in the face-to-face modalities. virtual or hybrid.

PNIs are those that combine research with the simultaneous implementation of actions that can take many forms. In the educational context, these research modalities are useful for generating new knowledge, exploring alternative and innovative practices, and promoting collaborative processes. In addition, they make it possible to test curricular ideas and proposals, strategies and didactic resources, and facilitate the development of training processes in which researchers and other participants work together to solve practical problems while producing systematized knowledge[29].

Data collection was carried out in May 2024 through searches in the following databases: *Scientific Electronic Library Online* (SciELO) and Latin American and Caribbean Health Sciences Literature (LILACS). All stages of the research were carried out independently: search, selection by titles, abstract and reading in full. In case of divergences, there was discussion and consensus among the authors on whether or not to include the article in the stage.

For the selection of studies and sample composition, the Boolean operators AND and OR were used, through the combination of descriptors and keywords. The descriptors were indexed and validated in the Health Sciences Descriptors Portal (DeCS) for the terms in Portuguese and in the *Medical Subject Headings* (MeSH), for the terms in English, opting for: *"Health"*, "*Clinical Competence"* and the keywords: *"simulation"* and *"competence"* and their correlates in the English language, being adapted in the databases considering their *tags* and available filters that answer the search question. The search strategies are presented and described in chart 1.

Panel 1. Presentation of databases, descriptors, keywords and search strategies.

Databases	Search strategies, descriptors, and keywords
LILACS	Descriptors/Mesh and keywords: (Simulação) OR (Simulation) AND (Saúde) OR (Health) AND (Competência Clínica) OR (Clinical Competence) OR (Competência) OR (Competence) (simulação) OR (simulation) AND (saúde) OR (health) AND (competência clínica) OR (clinical competence) OR (competência) OR (competence) AND (fulltext:("1" OR "1") AND db:("LILACS") AND type_of_study:("prognostic_studies" OR "risk_factors_studies" OR "qualitative_research" OR "guideline" OR "etiology_studies" OR "health_economic_evaluation" OR "observational_studies"

	OR "evaluation_studies" OR "clinical_trials" OR "screening_studies" OR "diagnostic_studies" OR "prevalence_studies" OR "incidence_studies" OR "health_technology_assessment") AND la:("pt" OR "en" OR "es")) AND (year_cluster:[2014 TO 2024])
Sciello	Expression: (simulação) OR (simulation) AND (saúde) OR (health) AND (competência clínica) OR (clinical competence) OR (competência) OR (competence) Filters: (Publication Year: 2024) (Publication Year: 2023) (Publication Year: 2022) (Publication Year: 2021) (Publication Year: 2020) (Publication Year: 2019) (Publication Year: 2018) (Publication Year: 2017) (Publication Year: 2016) (Publication Year: 2015) (Publication Year: 2014) (Type of Literature: Article) (Type of Literature: Case report) (Type of Literature: Rapid communication) (Type of Literature: Other) (simulação) OR (simulation) AND (saúde) OR (health) AND (competência clínica) OR (clinical competence) OR (competência) OR (competence) AND year_cluster:("2024" OR "2023" OR "2022" OR "2021" OR "2020" OR "2019" OR "2018" OR "2017" OR "2016" OR "2015" OR "2014") AND type:("research-article" OR "case-report" OR "rapid-communication" OR "undefined") AND is_citable:("is_true")

The following inclusion criteria were defined: studies derived from PNI in the educational context, with free access to the full text, published in Portuguese, Spanish or English in the last 10 years; that addressed educational processes of professional nurses, nursing technicians and/or physiotherapists, based on simulation focused on the development and/or acquisition of competencies related to patient care. As for the exclusions: duplicate research, editorials, letter to the editor, theoretical essays, reflection studies, books, other reviews and undergraduate students at the undergraduate or bachelor's level in nursing or physiotherapy, as well as students of technical nursing courses.

The data of the articles included in the final sample were compiled according to an instrument pre-prepared by the authors, including the variables regarding the design of the study, year of publication, country of origin, language, study population, main results, context of the educational intervention and main competencies taught, acquired and/or developed based on the description of the authors of the studies selected in the sample.

The studies of the final sample were systematically organized and analyzed according to the principles of Content Analysis from the perspective of Bardin[30], seeking to explain and discover the meaning of the content of a message through inferences. The thematic axes and their corresponding categories were delineated through a three-step process[30,31].

In the pre-analysis, a detailed floating reading of the corpus of analysis was performed to identify pertinent evidence and information and formulate hypotheses. This stage was guided by the criteria of completeness, representativeness, homogeneity and relevance[30,31].

Subsequently, the exploration of the material was conducted, and the data were coded and categorized was elaborated, regrouping the information by thematic categories based on the organization of the data in registration units (RU) identified by common themes, i.e., those that are repeated throughout the text. Thus, the recurrent information related to the essential elements for the development of a simulation-based DI for the formation of competencies of nurses and/or physiotherapists related to patient care was compiled by means of excerpts from the texts in RU, allowing the classification and aggregation of information into categories[30,31].

Finally, the treatment of the results, inference and interpretation involved the validation, elucidation and description of all phases and components of simulation-based DI, as well as the associated challenges, after structuring the categories[30,31]. The results (stage V) were presented in tables and discussed with the support of the literature. There was no need for an ethical assessment, because the material used was in the public domain and did not involve human beings.

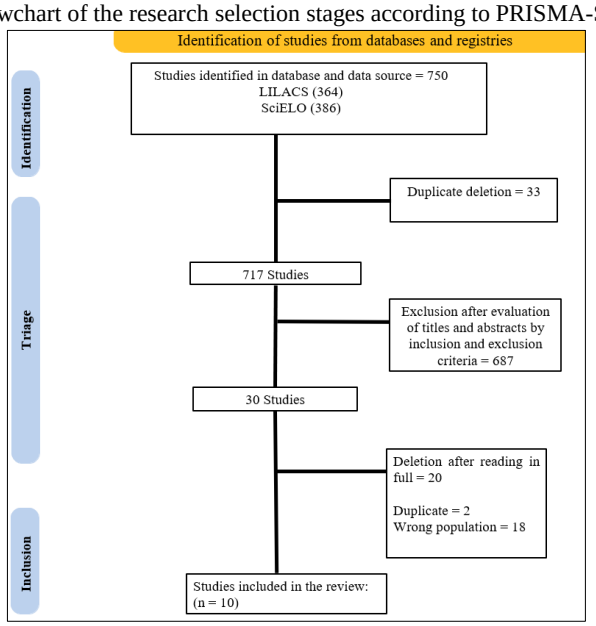
III. Results

Of the 750 studies found, after fluctuating reading of the titles and abstracts of the articles, as well as the exclusion of duplicate retrieved files in more than one database, 30 were selected because they met the established inclusion criteria. Among those selected, 2 were excluded because they were published in more than one database and 18 because they did not fully meet the previously established target population. The final sample consisted of ten selected studies. The process of searching and selecting the studies in this review is presented in the flowchart (Figure 1), according to the recommendations of the JBI, according to a checklist adapted from PRISMA-ScR[27].

The 10 included studies were conducted between 2019 and 2023. Most of them had only nurses as the target population of the educational intervention34,35,37-40, followed by groups of nurses and nursing technicians17,32,33,36. No studies were identified with an educational approach, only with physical therapists or in conjunction with nurses and/or nursing technicians.

The included studies belonged predominantly to South American countries, led by Brazil17,32,33,35-38,40 and one from Chile34. Only one article was conducted on the European continent, in Portugal39. The characterization of the 10 studies selected in the sample is presented in Table 1.

Figure 1. Flowchart of the research selection stages according to PRISMA-ScR[27]



Source: prepared by the authors, 2024.

Table 1. Characterization of Included Studies, Mato Groso do Sul, Brazil, 2024

Author, Year, Country, Language	Title	Study Design	Target population of the intervention
Batista, 2022, Brazil, Portuguese[32]	Intervenção pedagógica com simulação in situ ação com equipe de enfermagem no atendimento pré hospitalar fixo	Applied pedagogical intervention research with quasi-experimental design	Nurses and nursing technicians
Cogo et al., 2019, Brazil, Portuguese[17]	Construção e desenvolvimento de cenários de simulação realística sobre a administração segura de medicamentos	Development Research	Nurses and nursing technicians
Tavares et al., 2021, Brasil, Português[33]	O cuidado da criança dependente de tecnologia na atenção primária à saúde: uso da simulação	Exploratory-descriptive study, with a qualitative approach	Nurses and nursing technicians
Valenzuela; Carvajal, 2022, Chile, Spanish[34]	Eficiencia del entrenamiento simulado del parto vaginal en estudiantes de enfermería/obstetricia	This is a quasi-experimental study based on the quantitative and qualitative evaluation of an educational intervention.	Nurses
Meszaros et al., 2023, Brazil, English[35]	Clinical simulation scenarios for the planning and management of infusion therapy by nurses	Methodological study, with a quantitative approach	Nurses
Oliveira et al., 2023, Brazil, English[36]	Compliance with central venous catheter infection prevention practices after intervention with simulation	Quasi-experimental study, pre- and post-intervention, with a single comparison group	Nurses and nursing technicians
Carvalho; Zem-Mascarenhas, 2020, Brazil, Portuguese[37]	Construção e validação de um cenário de simulação sobre sepse: estudo metodológico	Methodological study	Nurses
Morais et al., 2020, Brazil, English[38]	Mock panels as an active teaching methodology in the education of nursing doctors	Experience report on the use of active teaching methodology	Nurses
Rente et al., 2021, Portuguese, English[39]	Nurses' perception of simulation-based basic life support training in clinical practice	Quantitative, descriptive and correlational study	Nurses
Presado et al., 2019, Brazil, Portuguese[40]	Prática simulada: análise de filmes sobre a biomecânica dos estudantes na realização do parto	Qualitative and descriptive study	Nurses

Source: Prepared by the authors, 2024.

IV. Discussion

Professional training in the field of health should be structured in such a way as to emphasize a humanistic and reflective approach, anchored in robust scientific and intellectual principles, with a solid ethical basis. The purpose is to train future professionals to make informed decisions, communicate effectively, and lead confidently and serenely, aiming to benefit both patients and co-workers. To achieve these goals, it is crucial that teaching is learner-oriented, encouraging their active participation in the learning process. In this context, active methodologies play an essential role in fostering these desired skills and behaviors, facilitating the engaged participation of students in the proposed activities and in the autonomous management of their own educational development. Among these methodologies, the use of simulations stands out[38,41].

The simulation consists of a tool that supports the training of health professionals, providing a safe environment for practice and critical reflection, promoting the development of technical, behavioral and attitudinal skills, such as communication, teamwork and self-confidence[17, 32-40].

Education can be reconsidered to transcend the traditional model centered on lectures and periodic student assessments. In a study conducted with participants in practical simulations, it was observed that this approach differs substantially from the conventional teaching paradigm, as it drives pedagogical innovations that go beyond the mere transfer of knowledge and memorization of information[38].

It is noteworthy, for example, that training in basic life support based on simulations demonstrates improvements in the ability to assess victims, facilitates teamwork and increases nurses' self-confidence in skills such as interpersonal communication. Similarly, in situ simulation and theoretical-practical workshops have been beneficial for the development of cognitive, procedural and attitudinal knowledge of nursing professionals. In other words, simulations stimulate critical thinking, decision-making, confidence, and autonomy of professionals, contributing to safer and more effective care[32,33,38,39].

The relevance of critical thinking is emphasized, underlining its need for continuous development throughout training. This skill is essential to develop arguments that foster a deeper understanding of phenomena, highlighting both their potentialities and their limitations when analyzing a specific object of study. In addition, critical thinking enables individuals to cultivate cognitive competencies, including the ability to examine, question, evaluate, formulate concepts, and understand issues in a logical and appropriate manner[38].

It is also added that virtual simulations that work on motor skills can have a direct impact on educational objectives linked to the psychomotor domain. The psychomotor domain involves behaviors that require the development of neuromuscular coordination. Thus, it is associated with the acquisition of competencies that integrate muscular actions, cognition, and skills to manipulate objects or perform procedures[42].

Adopting simulation as an educational strategy provides an opportunity to reflect on educational practices, allowing the integration of knowledge and experiences through an innovative approach to teaching[17]. It is also observed that through this pedagogical practice there is a reduction in the levels of stress experienced in real contexts, thus this training has a greater impact on clinical practice than conventional training[39].

Likewise, the importance of this methodology for patient safety and the continuous qualification of professionals is highlighted[17, 33, 36, 37]. Simulation improves adherence to infection prevention practices and promotes systematization and safety in care, while allowing professionals to know their knowledge gaps and develop new skills[36].

In a study that investigated the efficacy of the simulation of vaginal delivery in nursing students, it was found that, as well as the performance of the simulations, its repetition increases the students' competence, in this case, with most reaching the minimum proficiency after three attempts[34]. Simulation creates a safe and controlled environment to review and improve care practices, especially in critical areas such as medication administration, directly promoting patient safety[17].

Thus, it corroborates the idea that simulation-based ID is an effective strategy for the formation of competencies and improvement of clinical practice. It has been shown that simulation facilitates theoretical-practical learning and promotes a culture of safety and quality in patient care, thus being beneficial in health education[17, 32-40]. In addition, there is a plurality of application, since it extends to both students and professionals who have already graduated[37].

For its structuring, all stages of the simulation process should be considered, such as planning, validation, implementation and evaluation, with the support of organized and systematic methods, to clarify the desired objectives and the expected educational results[37].

It is emphasized that a diagnosis of educational needs should be carried out *in loco* and the appropriate selection of the target audience[32,35]. In addition, it is important to construct scenarios that guarantee fidelity and realism with the purpose of building an effective educational experience[35], as well as to seek the qualification of facilitators and their continuous validation aiming at the success of this methodology[32,35,37] and the satisfaction and desire for continuity of pedagogical interventions[32]. The importance of continuous training that is integrated with the real needs of health professionals and services is emphasized, as recommended in the Brazilian context by the National Policy for Permanent Education[33].

It is also suggested the use of pre-simulation texts and videos to increase the effectiveness of the teaching-learning process, as it provides an understanding of the application of the principles necessary to meet the practical demands. This allows educators to incorporate strategies to improve the use of techniques during clinical procedures[40].

In this initial phase, the importance of detailed planning and the application of theoretical models in the construction of simulation scenarios is also highlighted[32,35,37], using, for example, theoretical models such as VHP (creation of simulation scenarios through a structured process that considers the validation of the scenario by experts and the use of specific criteria to ensure fidelity and relevance) and Jeffries' theory (proposes an integrated approach which includes the preparation phase, i.e. the briefing; the execution of the scenario and the reflection phase, called debriefing, in the construction of scenarios)[35]. Considering that, when well planned, this educational practice increases the confidence[35, 37] and self-efficacy of the participants, in addition to improving care, communication and critical thinking skills[37].

This organization requires significant investment of time, dedication, effort and collaboration, with the aim of ensuring a structured implementation based on scientific methodologies. Such an approach is essential to achieve favorable results[32]. In addition, it is crucial that the facilitator is familiar with the group's profile, allowing the content to be adapted according to the participants' understanding and previous experiences[37].

A common misconception found in simulation is to limit the scenario to the simple description of a clinical case, without properly considering the elements in the planning and construction of the scenario. The absence of theoretical and methodological foundations to guide the elaboration of the scenario, the definition of learning objectives and other criteria identified in this investigation has an adverse impact on the learning outcomes of both students and professionals, compromising the development of competencies for nursing practice[43].

It is necessary to consider that unlike university students, professionals already have a background that shapes their interaction with practical simulations. These previous experiences need to be considered in this process of improving clinical skills, as professionals are expected to use these experiences as a basis for dealing with challenges and unforeseen events that may arise in the exercise of their functions[33].

To enrich the educational process, the importance of interdisciplinarity is raised, with the integration of different health professionals, as this reflects the collaborative and multidisciplinary reality of health environments. This improves the collective understanding of the simulated scenarios and promotes a more integrated and effective clinical practice, better preparing participants for real teamwork situations[17,36].

Another crucial aspect to be analyzed is the degree of realism of the simulation activities. By faithfully replicating the challenges and complexities of the hospital environment, it provides a deeper understanding for students and professionals. By facing scenarios that mimic reality, they can develop practical skills more efficiently, improve their ability to make decisions under pressure, and strengthen core competencies such as teamwork, preparing them to face the daily demands of the hospital environment competently and safely. Exposure to simulations that reproduce real clinical contexts not only increases learners' interest and motivation, but also facilitates deeper and more lasting learning, promoting the internalization of essential skills for professional practice. Likewise, it is essential to adapt educational strategies to the specific context of Brazilian health professionals, considering the guidelines and principles of the Unified Health System, in order to qualify the health team and effectively integrate theory with practical experiences in daily care[32,35, 38, 39].

The importance of the fidelity of the simulation scenario and the integration of the practices of the profession in the educational process are emphasized[17, 35, 40]. In the case, for example, of the context of obstetric practices, with a focus on biomechanics and prevention of musculoskeletal injuries, such knowledge should be incorporated into the training curriculum, also providing an adequate and well-organized infrastructure to maximize the benefits of simulation[40].

The need for a meticulous and realistic design, combined with the competence of the facilitators, emerges as decisive elements to ensure the effectiveness of this educational approach, as it facilitates the practical application of theoretical knowledge and also strengthens the preparation of health professionals for complex situations and clinical challenges, reinforcing the quality and safety of the care provided[17].

According to the international guidelines incorporated in research, the conduct of the simulations should be organized with an initial briefing of short duration, followed by the implementation of the scenario that occupies approximately a quarter of an hour, and finally, a period of discussion and detailed analysis, the debriefing, with about twenty minutes[17].

The literature extensively discusses this duration and its relationship with the objectives, format and characteristics of the scenario, as well as the level of fidelity and the feedback or debriefing method used. It is suggested that the simulated practice be terminated when the facilitator perceives a positive performance, avoiding limiting himself to a predetermined time that could be exhausted without bringing significant benefits to the participants[44].

Within this structure, the debriefing process is also highlighted as an instrument to integrate knowledge, skills and attitudes to the participants, and in which it is necessary that the instructors are adequately trained to plan and conduct this stage. Without the necessary preparation, those involved are unable to make the most of their capabilities[45]. Research indicated that during the in-situ simulation, participants were able to effectively apply the cognitive, procedural and behavioral knowledge acquired in the workshops[32].

After the simulation, it is recommended to apply an instrument with validated translation to assess the adequacy of the proposed design. This instrument will make it possible to verify the effectiveness of the simulation model developed, capturing data on the participants' perception of their preparation for real work situations[17].

In this context, training with virtual simulations is also highlighted, which offers advantages by reducing costs and supporting visual and tactile aspects. One of the main distinctions of the training mediated by these simulators is the flexibility of use at any time, without the need for direct supervision, providing accurate and immediate feedback on the user's performance, also promoting increased accessibility to training and allowing quick and effective adjustments during the learning process[42,46].

These studies suggest that in order to develop an effective simulation-based DI, it is essential to consider the specificity of the content, the needs of the target audience, the proper structuring of the scenarios, and the integration of detailed feedbacks and debriefings. The combination of these practices can lead to a more robust development of competencies in health professionals, better preparing them to face real challenges in their clinical practices[17, 32-40].

Finally, there is a positive evaluation of students regarding simulation-based learning, however, it is also noted that professionals' perception of the impact of simulation-based training decreases with increasing age and professional experience, so it is important to rethink training models to meet different phases of the career[39].

V. Conclusion

The implementation of simulation-based ID emerges as an effective response for the development of competencies in health professionals. By examining the literature, it is evident that simulation promotes technical skills and strengthens non-technical competencies such as communication, teamwork and decision-making.

The simulation is not restricted only to the hospital environment, but also extends to Primary Health Care, adapting to the specific needs of each educational context. By providing a safe environment for practice and critical reflection, this pedagogical practice prepares practitioners to face complex challenges with confidence and competence. This method also improves adherence to safety and infection prevention practices, as well as contributes to a culture of quality patient care. Through virtual simulations and repeated practices, healthcare professionals can develop competencies continuously and adaptively, aligning with the dynamic demands of the healthcare environment.

In this context, interdisciplinarity also emerges as an important component, integrating different professionals to simulate collaborative scenarios that reflect the multidisciplinary reality of health services.

To maximize the effectiveness of simulation-based DI, it is necessary to carry out detailed planning that considers the fidelity of the scenarios, the continuous qualification of the facilitators, and the integration of structured debriefings, aiming to strengthen the clinical skills of the professionals and prepare them to face complex situations with confidence and confidence.

Therefore, the strategic use of simulation in the training of competencies in health professionals provides a basis for a safe, effective and humanized clinical practice. By integrating theory and practice in an innovative way, this methodology strengthens the skills necessary for professional practice and promotes a culture of continuous learning and quality in patient care.

References

[1]. Jeffries PR. Simulation in Nursing Education: From Conceptualization to Evaluation. 2ª. New York: National League for Nursing; 2012. 288 p.

[2]. ABEM. Simulação em saúde para ensino e avaliação: conceitos e práticas [Internet]. Editora Cubo; 2021 [citado 27 de junho de 2024]. Disponível em: http://doi.editoracubo.com.br/10.4322/978-65-86819-11-3

[3]. COREN-SP. Manual de simulação clínica para profissionais de enfermagem [Internet]. São Paulo, SP: Conselho Regional de Enfermagem de São Paulo; 2020 [citado 27 de junho de 2024]. 142 p. Disponível em: https://portal.coren-sp.gov.br/wp-content/uploads/2020/12/Manual-de-Simula%C3%A7%C3%A3o-Cl%C3%ADnica-para-Profissionais-de-Enfermagem.pdf

[4]. Brasil ME. Institui Diretrizes Curriculares Nacionais do Curso de Graduação em Enfermagem [Internet]. Seç. 1, RESOLUÇÃO CNE/CES Nº 3 nov. 9, 2001 p. 37. Disponível em: http://portal.mec.gov.br/cne/arquivos/pdf/CES03.pdf

[5]. Brasil MS. Institui a Política Nacional de Educação Permanente em Saúde como estratégia do Sistema Único de Saúde para a formação e o desenvolvimento de trabalhadores para o setor e dá outras providências [Internet]. Seç. 1, Portaria nº 198, de 13 de fevereiro de 2004 fev 14, 2004. Disponível em: https://bvsms.saude.gov.br/bvs/publicacoes/07_0323_M.pdf

[6]. Brasil MS. Programa Nacional de Reorientação da Formação Profissional em Saúde PRÓ-SAÚDE [Internet]. 1ª. Brasília: Editora do Ministério da Saúde; 2007 [citado 27 de junho de 2024]. 78 p. Disponível em: https://bvsms.saude.gov.br/bvs/publicacoes/07_0323_M.pdf

[7]. WFME. Postraduate Medical Education WFME Global Standards For Quality Improvement [Internet]. Copenhagen: WFME; 2023 [citado 27 de junho de 2024]. 48 p. Disponível em: https://wfme.org/wp-content/uploads/2023/03/WFME-STANDARDS-FOR-POSTGRADUATE-MEDICAL-EDUCATION_2023.pdf

[8]. WHO. Global standards for the initial education of professional nurses and midwives [Internet]. Geneva: World Health Organization; 2009 [citado 27 de junho de 2024]. 36 p. Disponível em: https://iris.who.int/handle/10665/44100

[9]. WHO. WHO Simulation Exercise Manual [Internet]. Geneva: World Health Organization; 2017 [citado 27 de junho de 2024]. Disponível em: https://iris.who.int/bitstream/handle/10665/254741/WHO-WHE-CPI-2017.10-eng.pdf?sequence=1&isAllowed=y

[10]. Schwill S, Kadmon M, Hahn EG, Kunisch R, Berberat PO, Fehr F, et al. The WFME global standards for quality improvement of postgraduate medical education: Which standards are also applicable in Germany? Recommendations for physicians with a license for postgraduate training and training agents. GMS J Med Educ. 15 de setembro de 2022;39(4):Doc42.

[11]. WHO. Framework for Action on Interprofessional Education & Collaborative Practice [Internet]. Geneva: World Health Organization; 2010 [citado 27 de junho de 2024]. Disponível em: https://iris.who.int/bitstream/handle/10665/70185/WHO_HRH_HPN_10.3_eng.pdf?sequence=1

[12]. Wong BL, Khurana MP, Acharya N, Drejza M, Martins D. World Health Organization simulations: an increasingly popular learning tool for the development of future global health practitioners. J Glob Health. 10(1):010305.

[13]. Hayden JK, Smiley RA, Alexander M, Kardong-Edgren S, Jeffries PR. The NCSBN National Simulation Study: A Longitudinal, Randomized, Controlled Study Replacing Clinical Hours with Simulation in Prelicensure Nursing Education. Journal of Nursing Regulation. 1º de julho de 2014;5(2):S3–40.

[14]. Kaneko RMU, Lopes MHB de M. Realistic health care simulation scenario: what is relevant for its design? Rev Esc Enferm USP. 2019;53:e03453–e03453.

[15]. Filatro A, Cavalcanti CC. DI 4.0: Inovação na educação corporativa. 1ª. São Paulo, SP: Saraiva Uni; 2019.

[16]. Zabala VA, Arnau L. Cómo aprender y enseñar competencias: 11 ideas clave. 1. ed., 7. reimpr. Barcelona: Graó; 2010. 226 p.

[17]. Cogo ALP, Lopes E de F da S, Perdomini FRI, Flores GE, Santos MRR dos. Construção e desenvolvimento de cenários de simulação realística sobre a administração segura de medicamentos. Rev gaúch enferm. 2019;40(spe):e20180175–e20180175.

[18]. Reis RK, Melo ES, Costa CRB. Simulación de la capacitación en emergencias para estudiantes de enfermería. Revista Cuidarte [Internet]. 1º de maio de 2020 [citado 27 de junho de 2024];11(2). Disponível em: https://revistas.udes.edu.co/cuidarte/article/view/853

[19]. Bizama F, Alameri M, Demers KJ, Campbell DF. Physical therapy students' perception of their ability of clinical and clinical decision-making skills enhanced after simulation-based learning courses in the United States: a repeated measures design. J Educ Eval Health Prof. 19 de dezembro de 2022;19:34.

[20]. Ohtake PJ, Lazarus M, Schillo R, Rosen M. Simulation Experience Enhances Physical Therapist Student Confidence in Managing a Patient in the Critical Care Environment. Physical Therapy. 1º de fevereiro de 2013;93(2):216–28.

[21]. Yang Y, Tang LF, Hua CZ, Mao JH, Hong YX. Evaluation of a Novel Simulation Curriculum With the Segmented Model in Pediatric Cardiovascular Education. Front Public Health [Internet]. 20 de maio de 2022 [citado 27 de junho de 2024];10. Disponível em: https://www.frontiersin.org/journals/public-health/articles/10.3389/fpubh.2022.887405/full

[22]. Lee KS, Natarajan B, Wong WX, Yousman W, Koester S, Nyotowidjojo I, et al. A randomized controlled trial of simulation training in teaching coronary angiographic views. BMC Med Educ. 26 de agosto de 2022;22:644.

[23]. Castro MRP, Biberg JK, Gomes PC, Veiros MB. Qual modelo de rotulagem nutricional frontal deve ser adotado no Brasil?: uma simulação de debate para alunos de nutrição. Em: Anais do IV Encontro Nacional de Pesquisa em Soberania e Segurança Alimentar [Internet]. Goiânia (GO), Brasil: Campinas: Galoá; 2019 [citado 27 de junho de 2024]. Disponível em: https://proceedings.science/enpssan-2019/trabalhos/qual-modelo-de-rotulagem-nutricional-frontal-deve-ser-adotado-no-brasil-uma-simu?lang=pt-br

[24]. Bartlett RS, Bruecker S, Eccleston B. High-Fidelity Simulation Improves Long-Term Knowledge of Clinical Swallow Evaluation. Am J Speech Lang Pathol. março de 2021;30(2):673–86.

[25]. Sampaio CRC, Neves CRP. Estados de ansiedade em ambiente de simulação: um estudo com psicólogas em formação. Brazilian Journal of Development. 9 de dezembro de 2020;6(12):96040–54.

[26]. Peters M, Godfrey C, McInerney P, Munn Z, Tricco A, Khalil H. Scoping reviews (2020). Em: JBI Manual for Evidence Synthesis [Internet]. Adelaide: Aromataris E, Lockwood C, Porritt K, Pilla B, Jordan Z; 2024 [citado 27 de junho de 2024]. Disponível em: https://synthesismanual.jbi.global/

[27]. Tricco AC, Lillie E, Zarin W, O'Brien K, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. Annals of Internal Medicine [Internet]. 4 de setembro de 2018 [citado 27 de junho de 2024];169(7). Disponível em: https://www.acpjournals.org/doi/10.7326/M18-0850

[28]. Arksey H, O'Malley L. Scoping studies: towards a methodological framework. International Journal of Social Research Methodology. 1º de fevereiro de 2005;8(1):19–32.

[29]. Teixeira PMM, Megid J. Uma proposta de tipologia para pesquisas de natureza interventiva. Ciênc educ (Bauru). dezembro de 2017;23(4):1055–76.

[30]. Bardin L. Análise de Conteúdo. 1ª. São Paulo: Edições 70; 2016. 277 p.

[31]. Gaspi S de, Maron LHP, Júnior CA de OM. Análise de conteúdo numa perspectiva de Bardin. Em: Júnior CA de OM, Batista MC, organizadores. Metodologiada Pesquisa em Educação e Ensino de Ciências [Internet]. 1ª. Maringá, PR: Gráfica e Editora Massoni; 2021 [citado 20 de junho de 2024]. Disponível em: https://www.researchgate.net/publication/358190047_ANALISE_DE_CONTEUDO_NUMA_PERSPECTIVA_DE_BARDIN

[32]. Batista VAF. Intervenção pedagógica com simulação in situ ação com equipe de enfermagem no atendimento pré hospitalar fixo. 2022;110-110.

[33]. Tavares KS, Pina JC, Souza AIJ de, Machado RR, Brehmer LC de F, Lima MM de. O cuidado da criança dependente de tecnologia na atenção primária à saúde: uso da simulação. Rev eletrônica enferm. 2021; 23:1–7.

[34]. Valenzuela MT, Carvajal JA. Eficiencia del entrenamiento simulado del parto vaginal en estudiantes de enfermería/obstetricia. ARS med (Santiago, En línea). dezembro de 2022;47(4):25–31.

[35]. Meszaros M de J, Almeida AO de, Silva RLF da, Eduardo AHA, Lima MH de M, Oliveira-Kumakura AR de S. Clinical simulation scenarios for the planning and management of infusion therapy by nurses. Rev Bras Enferm [Internet]. 2023;76(6). Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0034-71672023001000214&lang=em

[36]. Oliveira TGP de, Marcatto J de O, Corrêa A dos R, Santos LM dos, Rocha PK, Simão DA da S, et al. Compliance with central venous catheter infection prevention practices after intervention with simulation. Rev Bras Enferm [Internet]. 2023;76(4). Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0034-71672023000800212&lang=em

[37]. Carvalho LR de, Zem-Mascarenhas SH. Construção e validação de um cenário de simulação sobre sepse: estudo metodológico. Rev Esc Enferm USP. 2020;54:e03638–e03638.

[38]. Morais IF de, Cassiano A do N, Medeiros SM de, Menezes RMP de, Dantas RAN, Dantas DV, et al. Mock panels as an active teaching methodology in the education of nursing doctors. Revista Brasileira de Enfermagem [Internet]. 2020;73(6). Disponível em: /scielo.php?script=sci_arttext&pid=S0034-71672020000600500&lang=em

[39]. Rente M, Costa M, Pontes M, Príncipe F, Mota L. Nurses' perception of simulation-based basic life support training in clinical practice. Millenium - Journal of Education, Technologies, and Health. 30 de outubro de 2021;(16):65–72.

[40]. Presado MH, Cardoso M, Marques M de FM, Baixinho CL. Prática simulada: análise de filmes sobre a biomecânica dos estudantes na realização do parto. Revista da Escola de Enfermagem da USP [Internet]. dezembro de 2019;53. Disponível em: /scielo.php?script=sci_arttext&pid=S0080-62342019000100486&lang=en

[41]. Crescêncio PEDS, Conceição VMD, Alves RA, Costa RRDO, Almeida RGDS, Mazzo A. (2020). Percepção dos estudantes que desempenharam papéis de pacientes simulados (role play) em atividades clínicas simuladas. Enfermagem em Foco, 11(6), 143-50.

[42]. Andrade JRDB, Machado LDS, Lopes LW, Moraes RMD. (2022). Simulações virtuais para educação em saúde: como são avaliadas as habilidades do usuário?. Revista Brasileira de Educação Médica, 46, e130.

[43]. Nascimento JDSG, Pires FC, Nascimento KGD, Regino DDSG, Siqueira TV, Dalri MCB. (2021). Qualidade metodológica da validação de estudos sobre cenários simulados em enfermagem.

[44]. Silva CCRD, Fernandes MID, Baptista RCN, Silva RMDO, Malfussi LBHD, Silva GTRD. (2021). Simulação móvel: contributos científicos para a área da saúde. Texto & Contexto-Enfermagem, 30, e20200111.

[45]. Nascimento JDSG, Pires FC, Castro JPR, Nascimento KGD, Oliveira JLGD, Dalri MCB. (2021). Técnica de debriefing oral orientado por instrutor na simulação clínica em enfermagem: revisão integrativa. Revista Brasileira de Enfermagem, 74, e20190750.

[46]. Assis MDSD, Nascimento JDSG, Nascimento KGD, Torres GAS, Pedersoli CE, Dalri MCB. (2021). Simulação em enfermagem: produção do conhecimento da pós-graduação no Brasil de 2011 a 2020. Texto & Contexto-Enfermagem, 30, e20200090.