

## DEVELOPMENT OF CLINICAL REASONING DURING NURSING GRADUATION



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### ABSTRACT

**Objective:** to investigate the process of development of the "Clinical Reasoning" competence throughout the undergraduate nursing education through teaching methodologies. **Method:** This is an integrative literature review based on studies indexed in the Virtual Health Library and *Scielo* databases, with a search in August and September 2023, resulting in the analysis of eighteen articles. **Results:** The importance of implementing different teaching methodologies for the development of clinical reasoning in nursing students was observed, such as clinical simulation and Problem-Based Learning, including methods for evaluating clinical reasoning and the impact of educational technologies on the development of this competency. **Conclusion:** It is evident that the integration of several methodologies is essential for the development of clinical reasoning, with emphasis on problem-based learning. The relevance of continuous evaluation of these methods is emphasized to ensure quality teaching and clinical practice.

**Keywords:** Nursing. Teaching. Clinical Reasoning. Health Education.

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## INTRODUCTION

The development of clinical reasoning is an essential competence in nursing practice, requiring educational strategies and practical experiences that stimulate the improvement of this complex skill. From childhood, individuals develop thinking and reasoning skills, using information to acquire knowledge and make informed decisions. This initial process of cognitive formation is shaped by factors such as physical and emotional safety, environment, individual characteristics, beliefs, values and cultural aspects (CARVALHO; OLIVEIRA-KAMAKURA; MORAIS, 2017). As these skills evolve, reasoning becomes more structured and oriented, especially in professional contexts such as nursing, where thinking critically and in an organized way is fundamental for clinical practice.

For nurses, clinical reasoning involves fundamental mental functions—conceiving, judging, and reasoning—that need to be refined for assertive and safe decision-making in complex health situations. In all stages of the nursing process, it is up to the professional to recognize clinical signs, differentiate similar conditions and build well-founded judgments that guide appropriate clinical decisions and ensure appropriate interventions. This organized reasoning process is therefore essential for safe and effective nursing practice, requiring professionals to integrate technical knowledge with cognitive and interpersonal skills to achieve positive health outcomes.

The importance of clinical reasoning in nursing is based on professional regulation based on Law No. 7,498/86, which consolidates the Professional Practice of Nursing, and establishes that direct care for patients in serious condition or at risk of life, as well as nursing care of greater technical complexity, are exclusive attributions of nurses, demanding technical-scientific knowledge and quick decision-making capacity (BRASIL, 1986). Reinforcing this guideline, Resolution No. 736/2024 specifies that Nursing Diagnosis and Prescription are the nurse's exclusive responsibilities, evidencing the need to develop robust clinical reasoning for care practice.

In this context, Bitencourt *et al.* (2023) emphasize that the quality of nursing care is directly influenced by the nurse's ability to analyze clinical data and make informed decisions, based on accurate clinical reasoning. The authors also highlight the importance of introducing the development of this competence from the first years of academic training, with the use of innovative teaching methods, such as clinical simulation, which allows future nurses to build a solid foundation for safe and qualified clinical practice.

The relevance of this study is based on the growing demand for competent nurses in terms of accurate clinical reasoning, which is essential for the safety and quality of health care. Studies such as that of Carvalho, Oliveira-Kamakura and Morais (2017) emphasize that the use of active methodologies, such as clinical simulations and problematization scenarios, are fundamental for the development of clinical reasoning, as they allow the application (and discussion) of knowledge in situations that resemble the professional reality. However, there is a gap in the implementation of these methodologies during undergraduate studies, which justifies the need to deepen the investigation on which pedagogical strategies are effective and applicable in the academic context. Thus, understanding and improving such teaching methods not only contributes to technical training, but also responds to a commitment to patient safety and excellence in the care provided.

In this context, the research aims to investigate the process of development of the "Clinical Reasoning" competence throughout the undergraduate nursing education through teaching methodologies. To this end, the following guiding question was used: How is clinical reasoning developed during undergraduate nursing studies?

## **METHODOLOGY**

This is an integrative literature review, which aims to synthesize results obtained in previous research, on a specific theme or issue, in a systematic, orderly and comprehensive manner (ERCOLE; MELO; ALCOFORADO, 2014). The elaboration of an integrative review enables the synthesis of knowledge on the delimited theme in the health area, and can provide recommendations based on research results for clinical practice. In addition, it plays a key role in identifying gaps in knowledge, guiding the development of future research (MENDES; SCOTT; GALVÃO, 2019).

For the elaboration of the integrative review, the six steps indicated were adopted: (1) Identification of the theme and selection of the hypothesis or research question; (2) sampling or literature search; (3) data extraction or categorization; (4) critical analysis of the included studies; (5) interpretation of the data and (6) presentation of the integrative review (DANTAS *et al.*, 2021).

The guiding question is relevant to the construction of the search strategy – definition of descriptors and/or keywords, delimitation of inclusion/exclusion criteria and choice of databases and/or search systems, therefore, to conduct the construction of the review

question, the PICO strategy (acronym for *patient, intervention, comparison, outcomes*) was used (Dantas *et al.*, 2021; Saints; Pepper; Nobre, 2007), being: P) Nursing / Nurse, I) Clinical Reasoning, C) Not applicable, O) Development of clinical reasoning competence in academic training. For this study, the PICO strategy was adapted for IOP because it did not include the "C" element of comparison. Thus, the guiding question is: How is clinical reasoning developed during undergraduate nursing studies?

The selection of studies was based on the search for articles indexed in the Virtual Health Library (VHL) and *Scielo* databases, and was carried out in August and September 2023. In order to refine this search, we used terms available and indexed in the list of Health Sciences Descriptors (DeCS) and in the Mesh *Terms* (MeSH), namely: "Nursing", "Teaching", "Clinical Reasoning" and "Health Education", and the respective terms in English and Spanish. To cross the descriptors, the Boolean operators OR and AND were used, which were associated in different ways, in order to retrieve the largest number of articles related to the theme.

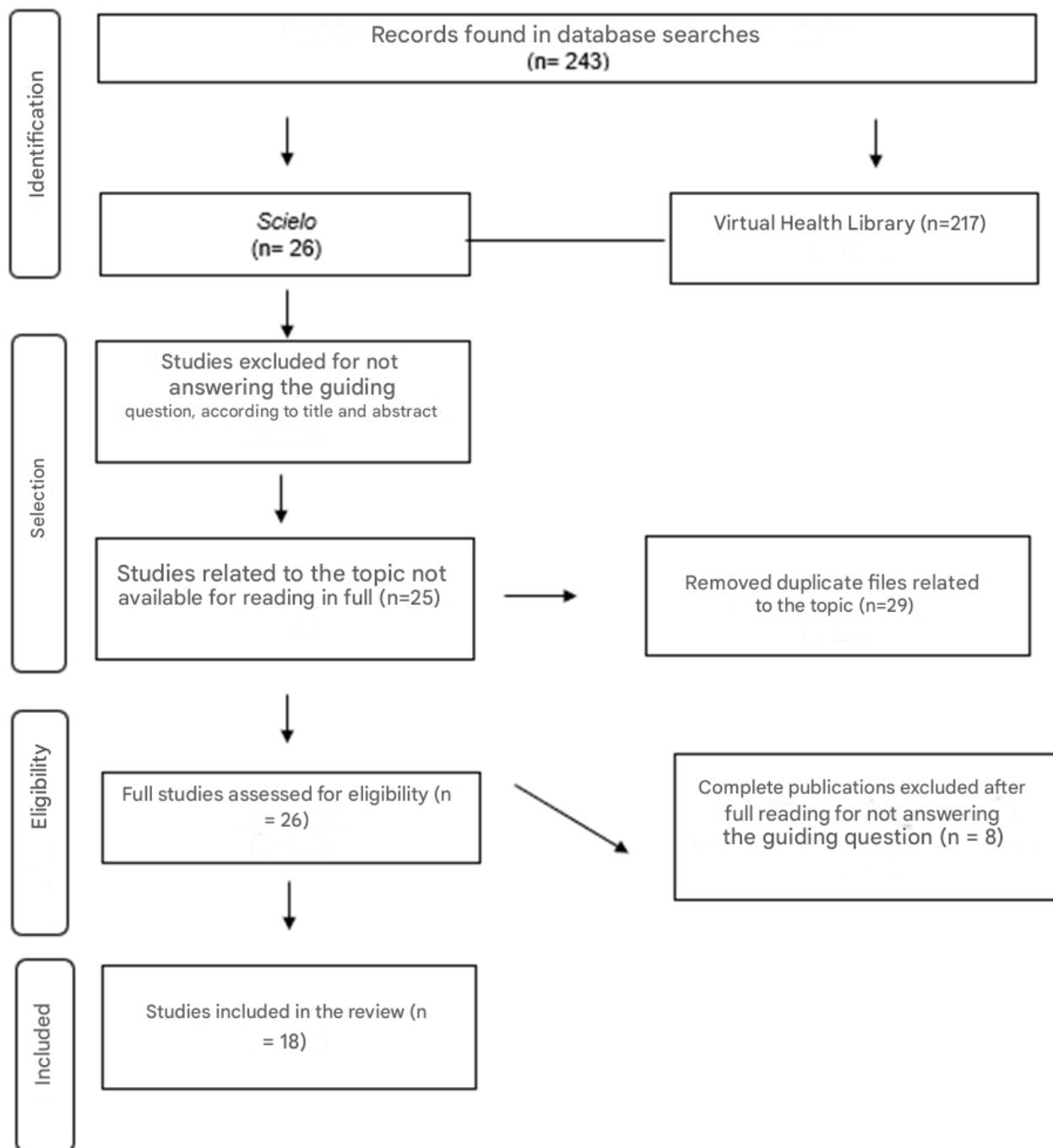
The choice of the term "health education" is justified by its wide use in the academic literature to describe secondary pedagogical processes for the development of competencies in the health area, including clinical reasoning in nursing. This term conforms to the terminology predominantly in the articles and studies developed, ensuring consistency with the methodological approach applied in the research and clearly in the context in which it was used.

As part of the search strategy in the selection of articles, the following inclusion criteria were adopted: articles published in the last 5 years (January 2018 to August 2023) and articles in English, Portuguese, and Spanish. The exclusion criteria were: publications with abstracts and/or texts not available in full and that were not articulated with the research theme. Consecutively, the titles and abstracts were read for screening and subsequent reading in full.

A total of 243 publications were identified, of which 26 (10.6%) were available in the *Scielo* database and 217 (89.3%) were publications belonging to journals indexed in the Virtual Health Library (VHL) search system. After reading the titles and abstracts, 225 (92.5%) studies were excluded, of which: 163 (67%) publications were unrelated to the proposed theme, 25 (10.2%) studies were unavailable for full reading, and 29 (11.9%) were redundant. Thus, 26 publications were published for full reading, excluding 8 (30.7%) studies that did not answer the guiding question, leaving a total of 18 articles that were part

of the review, 4 (22.2) available in *Scielo* and 14 (77.7%) in the VHL. The description of the search and selection of studies is represented by the *Preferred Reporting Items for Systematic Review and Meta-Analysis* (PRISMA) (Figure 1).

Figure 1. Flowchart of the selection of studies.



Source: Adapted from the Preferred Reporting Items for Systematic Reviews and MetaAnalyses model (Prisma, 2009).

## RESULTS

18 articles that answered the research question were analyzed and discussed. With the intention of presenting an overview of the selected studies, data such as Title, Author, Year of Publication, Language, Indexing, Study Design and Objective(s) were extracted. The studies evaluated are distributed in the following databases: Nursing Database (BDENF) (11.1%); Latin American and Caribbean Literature on Health Sciences (LILACS) (5.5%); simultaneously in LILACS and BDENF (44.4%); and in the periodicals *Medical Literature Analysis and Retrieval System Online* (MEDLINE) (16.6%) e *Scientific Electronic Library Online (Scielo)* (22.2%). Regarding language, 61.1% of the publications are in Portuguese, 33.3% in English and 5.5% in Spanish.

The year 2022 (38.8%) with the highest number of published studies stands out, on the other hand, 2023 proved to be the year with the lowest number of publications, being 11.1% of the total, however, it should be taken into account that the search was carried out with articles published up to August 2023. (Table 1).

Table 1. Synthesis for Collection and Organization of data from publications selected for analysis. Curitiba, PR, Brazil, 2024.

Title	Author Year of publication, Language Indexing	Study Design	Objective(s)
Problem-based learning in undergraduate nursing: students' and graduates' perceptions	RODRIGUES, Paula Sales <i>et al.</i> (2022) Portuguese Scielo	Qualitative based on the comprehensive and interpretative modality	To understand the perception of students and graduates about the use of PBL in undergraduate nursing courses.
Learning students' nursing diagnostic reasoning through educational technologies: an integrative review	SOUTO, Jaqueline da Silva Soares <i>et al.</i> (2022) Portuguese LILACS/BDENF	Integrative review	To analyze the skills and experiences developed from the use of educational technologies in the nursing diagnostic reasoning of undergraduate students.
Evaluation of anxiety and clinical judgment of nursing undergraduate students submitted to clinical simulation	BOOSTEL, Radamés. (2021) Portuguese LILACS/BDENF	Randomized controlled trial	OBJECTIVE: To evaluate the effect of repeating the same high-fidelity clinical simulation scenario on anxiety and clinical judgment of nursing undergraduates.
<i>A cross-sectional study: what contributes to nursing students' clinical reasoning competence</i>	HONG, Soomin <i>et al.</i> (2021) English MEDLINE	Cross-sectional study	To determine the factors associated with the development of clinical reasoning competence

			among undergraduate nursing students.
<i>Clinical judgment and diagnostic reasoning of nursing students in clinical simulation</i>	NUNES, Janaina Gomes Perbone <i>et al.</i> (2020) English Scielo	Correlational study with a quantitative approach	To know the degree of association between clinical judgment and diagnostic reasoning of nursing students in clinical simulation.
<i>Clinical simulation in nursing teaching: student experience in Chile</i>	CABRERA, Thania Andrea Aballay; KEMPFER, Silvana Silveira. (2020) English LILACS/BDENF	Qualitative, exploratory, descriptive	OBJECTIVE: To describe the experiences lived in clinical simulation by nursing students from the Universidad de Magallanes, Punta Arenas, Chile, in relation to the use of clinical simulation as a learning methodology to achieve competencies for nursing care.
Development of clinical reasoning of nurses in an emergency hospital service	MENEGON, Fernando Henrique Antunes <i>et al.</i> (2019) Spanish LILACS/BDENF	Qualitative research, with a methodological framework of Grounded Theory	To understand the development of clinical reasoning of nurses in an emergency hospital service.
<i>Development and effects of leukemia nursing simulation based on clinical reasoning</i>	JANG, Aeri; SONG, Miok; KIM, Suhyun. (2021) English MEDLINE	Mixed research	Develop the simulation program based on clinical reasoning for AML; Identify the level and differences in self-confidence, theoretical knowledge and clinical performance of nursing students in learning after the application of the simulation; and describe the learning experience of the simulation program of the nursing students after the application of the simulation.
Effectiveness of virtual simulation in nursing education to learn clinical reasoning: an integrative review	MENDES, Rogério Cruz <i>et al.</i> (2023) Portuguese LILACS	Integrative review	To analyze the effectiveness of virtual simulation in nursing education in the scientific literature.
Guiding effect for clinical reasoning on the diagnostic accuracy of nursing students: a clinical trial	MAURÍCIO, Aline Batista <i>et al.</i> (2022) Portuguese LILACS/BDENF	Randomized controlled trial	To evaluate the effect of a self-instructional guide to clinical reasoning on the diagnostic accuracy of nursing bachelor's degree students during the resolution of clinical case studies.
Teaching-learning strategies for clinical	BITENCOURT, Julia Valeria de Oliveira Vargas <i>et al.</i>	Integrative review	Teaching-Learning Strategies for Clinical

nursing education: an integrative review	(2023) Portuguese BDENF		Education in Nursing: An Integrative Review
<i>Evaluating the Clinical Reasoning of Student Health Professionals in Placement and Simulation Settings: A Systematic Review.</i>	Brentnal, Jenny; Thackeray, Devi; Jude, Belinda. (2022) English MEDLINE	Systematic review	Systematically identify the tools available for health professional educators to assess students' attainment of clinical reasoning skills in clinical internship and simulation scenarios.
Nurses' facilities and limitations in the clinical reasoning process	ARAÚJO, Marcos Antônio Nunes de <i>et al.</i> (2019) Portuguese LILACS/BDENF	This is a quantitative, descriptive, cross-sectional study.	To know the facilities and limitations of nurses to develop clinical reasoning.
Investigation of the accuracy of nursing diagnostic reasoning by students in simulated clinical cases	SOUTO, Jaqueline da Silva Soares. (2020) Portuguese LILACS/BDENF	Randomized, single-center, randomized, blinded controlled clinical trial	To evaluate the accuracy of the diagnostic reasoning of nursing students in the application of an educational technology based on double processing.
Nurses' clinical reasoning: an approach according to the dual process theory	QUARESMA, Adrieli; XAVIER, Daiani Modernal; CEZAR-VAZ, Marta Regina. (2019) Portuguese LILACS/BDENF	This is a theoretical-reflective study based on the critical reading of the Dual Process Theory and scientific articles on clinical reasoning in nursing	To reflect on the clinical reasoning of nurses from the perspective of the Dual Process Theory.
Educational technologies in the teaching of diagnostic reasoning in nursing: a literature review	CRUZ, Maria de Lourdes Alves da <i>et al.</i> (2022) Portuguese BDENF	Integrative literature review	The present study aimed to synthesize the knowledge produced in the literature about the instruments used to measure diagnostic reasoning in nursing.
Technologies for nurses' clinical reasoning: an integrative review	ADAMY, Edlamar Kátia <i>et al.</i> (2022) Portuguese Scielo	Integrative literature review	To identify technologies that contribute to the development of clinical reasoning in the elaboration of nursing diagnoses in national and international publications.
<i>The importance of logical thinking for clinical nursing care</i>	NEGREIROS, Francisca Diana da Silva <i>et al.</i> (2022) English Scielo	Reflection study	To present a reflection on the importance of logical thinking for clinical nursing care.

Source: The authors (2024).

## DISCUSSION

After analyzing the articles in full, they were grouped according to the theme addressed, and three categories emerged for discussion (Chart 2).

Chart 2 – Emerging Categories of the study theme and referenced authors. Curitiba/PR, 2024.

CATEGORIES	AUTHORS
1. TEACHING-LEARNING STRATEGIES FOR THE DEVELOPMENT OF CLINICAL REASONING	Souto (2020), Cabrera e Kempfer (2020), Rodrigues <i>et al.</i> (2022), Bitencourt <i>et al.</i> (2023), Mauricio <i>et al.</i> (2022), Negreiros <i>et al.</i> (2022), Jang, Song e Kim (2021), Boostel (2021), Nunes <i>et al.</i> (2020)
2. APPLICABILITY OF EDUCATIONAL TECHNOLOGIES IN THE DEVELOPMENT OF CLINICAL REASONING IN NURSING	Mendes <i>et al.</i> (2023), Souto <i>et al.</i> (2022), Cabrera e Kempfer (2020), Boostel (2021), Nunes <i>et al.</i> (2020), Jang, Song e Kim (2021), Menegon <i>et al.</i> (2019), Nunes <i>et al.</i> (2020)
3. CHALLENGES AND STRATEGIES FOR THE ASSESSMENT AND DEVELOPMENT OF CLINICAL REASONING	Brentnall, Thackray e Judd (2022), Cruz <i>et al.</i> (2022), Brentnall, Thackray e Judd (2022), Hong <i>et al.</i> (2021), Quaresma, Xavier e Cezar-Vaz (2019), Adamy, Poltronieri e Zanatta (2022), Araujo <i>et al.</i> (2019),

Source: Study data (2024).

### TEACHING-LEARNING STRATEGIES FOR THE DEVELOPMENT OF CLINICAL REASONING

The discussion about teaching-learning strategies for the development of clinical reasoning in undergraduate nursing reveals the interconnection between several approaches that complement each other to build this essential competence. The basis of clinical reasoning, according to Negreiros *et al.* (2022), is in logical thinking, which allows for safe and well-structured clinical practice. They point out that this type of thinking is the starting point for more complex skills in patient care.

Following this idea of logical structure, Jang, Song, and Kim (2021) advocate clinical simulation as a dynamic way to apply this thinking in a realistic and organized manner. His observations underscore that simulation not only reinforces knowledge, but also brings students closer to the conditions of real practice. In this sense, Boostel (2021) complements the perspective by stating that the repetition of simulated scenarios increases students' confidence and accuracy, while Nunes *et al.* (2020) emphasizes how consistent practice enhances the relationship between clinical judgment and diagnostic reasoning, strengthening gradual learning.

To deepen this practical approach, Souto (2020) proposes the use of the double processing theory in simulated cases, highlighting it as an incentive for students to identify essential clinical clues, such as signs and symptoms, which are crucial for an accurate

diagnosis. In addition, the integration of NANDA-I Taxonomy II in this context promotes clear diagnostic language, which facilitates communication between health professionals.

Expanding on the view on simulation, Cabrera and Kempfer (2020) explore its role not only in technical development, but also in strengthening students' social skills. They point out that simulation practice is an environment that, despite being able to generate feelings of anxiety, prepares them to interact in teams and develop resilience and self-confidence, which are fundamental for professional practice. Rodrigues *et al.* (2022) bring a differentiated perspective with Problem-Based Learning (PBL), which promotes the systematization of clinical reasoning while stimulating critical thinking and ethical preparation of students. For these authors, the integration between theory and practice from the beginning of the course enables contact with the real dilemmas of the profession, directly impacting the quality of care offered to patients.

The discussion expands even further with Bitencourt *et al.* (2023), which advocate problem-solving strategies as a way to challenge students to reflect and find solutions. However, Mauricio *et al.* (2022) suggest a counterpoint when discussing the application of the Self-Instructional Guide, whose results showed limited efficacy in improving diagnostic accuracy, suggesting that the development of clinical reasoning may require more than instructional materials.

Thus, by bringing together these perspectives, it is clear that the development of clinical reasoning in nursing is enriched when multiple approaches are interconnected, with a focus on the application of realistic simulation. The combination of these strategies not only facilitates learning but also empowers students for the complex and varied challenges of professional practice, preparing them to provide high-quality care in the healthcare setting.

## APPLICABILITY OF EDUCATIONAL TECHNOLOGIES IN THE DEVELOPMENT OF CLINICAL REASONING IN NURSING

The use of educational technologies has been consolidating itself as essential for the development of clinical reasoning in nursing, offering students a dynamic and immersive learning experience that complements traditional methods. Virtual simulation (VS), as highlighted by Mendes *et al.* (2023), evidences this evolution. The authors point out that VS improves students' decision-making, communication, and confidence, and that this method

is particularly effective in the transition from theory to practice by minimizing clinical errors and reinforcing clinical judgment.

By corroborating the efficacy of VS, the review by Mendes *et al.* (2023) highlights that this technology offers superior knowledge retention, both in the short and long term, creating a participatory environment that goes beyond traditional observation. Similarly, Souto *et al.* (2022) reinforce the positive impact of technologies, both face-to-face and virtual, on the development of clinical reasoning, identifying that while face-to-face technologies promote cognitive and metacognitive skills, virtual technologies strengthen affective and motivational aspects. This distinction highlights the diversity of effects that these tools offer, reflecting the growing interest in their use in nursing education.

Returning to the theme of realistic simulation, related to the use of educational technologies and in addition to the previous category, Cabrera and Kempfer (2020), through a qualitative study with students from the *Universidad de Magallanes*, explore the experience of clinical simulation, revealing that this practice confers fundamental tools, such as professional identity and empowerment in the professional role. They observed that the repetition of these practices generates greater self-confidence, although feelings of anxiety also arise, suggesting the need for additional emotional support during the process.

Affirming the importance of repetition, Boostel (2021) evaluated its impact on high-fidelity simulated scenarios, showing that this practice significantly reduces students' anxiety and improves clinical judgment, which suggests that repetition can be a potent strategy to improve practical learning. Similarly, Souto (2020) applied the double processing theory in simulations, highlighting how this theory helps in the identification of clinical signs and improves the diagnostic accuracy of students, promoting more accurate and impactful learning.

In a more specific focus, Jang, Song, and Kim (2021) developed a simulation focused on the care of patients with acute myelocytic leukemia, demonstrating the relevance of the strategy in increasing knowledge and clinical performance. Analysis of the participants' diaries revealed a greater awareness of clinical reasoning, showing that standardized scenarios help consolidate student engagement.

Nunes *et al.* (2020) also observed a correlation between clinical judgment and diagnostic reasoning in high-fidelity simulated contexts, reinforcing that practice in this type of environment directly contributes to the formation of more accurate clinical reasoning. Menegon *et al.* (2019), in turn, complement this view by indicating that the development of

clinical reasoning is a gradual process, strongly influenced by practical experience and collaborative work, paying attention to a continuous learning environment.

On the other hand, Adamy, Poltronieri, and Zanatta (2022) expand the discussion by examining information technologies, such as diagnostic decision support systems and educational software, which also promote the development of clinical reasoning, proving to be valuable tools for nursing teaching and practice.

In summary, educational technologies – especially clinical simulation, whether in a face-to-face or virtual format – play a key role in the formation of clinical skills, creating a safe and controlled environment for practice and learning. The inclusion of these tools in the nursing curriculum is fundamental for the training of future professionals, equipping them with the confidence and skills necessary to meet the demands and challenges of the modern health environment.

## CHALLENGES AND STRATEGIES FOR THE ASSESSMENT AND DEVELOPMENT OF CLINICAL REASONING

Strengthening the development of clinical reasoning in nursing students involves the use of various assessment tools and strategies, although challenges to effective development remain. Brentnall, Thackray, and Judd (2022) conducted a systematic review to map the most commonly used assessment tools. They identified the Script Agreement Test and the Lasater Clinical Judgment Rubric as the most common instruments. However, they observed that most of the tools privilege diagnostic reasoning to the detriment of managerial reasoning, pointing to gaps in the approach to essential cognitive competencies.

Cruz *et al.* (2022), when reviewing instruments for assessing diagnostic reasoning in nursing, corroborated the findings of Brentnall *et al.* (2022), highlighting the importance of producing new tools that meet the requirements of current education. They stressed the need for continuous validation of the instruments so that they can cover cognitive and clinical judgment skills more fully.

The research by Hong *et al.* (2021) explored factors that influence the development of clinical reasoning, identifying problem-solving and academic self-efficacy as determining aspects. Students with more developed problem-solving skills and greater academic confidence demonstrated greater competence in clinical reasoning, reinforcing the relevance of strategies that promote self-learning and autonomy in the educational process.

Quaresma, Xavier, and Cezar-Vaz (2019) analyzed clinical reasoning from the perspective of the Dual Process Theory, which differentiates intuitive and analytical information processing systems. They emphasize the value of a deep understanding of these two systems to improve clinical practice, suggesting that nursing education needs to balance the stimulation of both processes.

Araujo *et al.* (2019), when investigating the challenges for the development of clinical reasoning in care practice, highlighted continuing education as a facilitator and lack of time as the main barrier. This was associated with the difficulty of professionals to update themselves while working, which generates dissatisfaction and limits professional growth.

The studies show the complexity of the development of clinical reasoning in nursing. There is a predominance of tools aimed at diagnostic reasoning, although balanced approaches are needed to strengthen both cognitive skills and self-efficacy. Educational technologies emerge as promising allies, while continuing education and practical experience are indispensable in the consolidation of clinical reasoning.

## CONCLUSION

The comparison between different strategies, such as double processing theory, clinical simulation, and Problem-Based Learning (PBL), demonstrated that each approach has distinct and complementary advantages. The theory of double processing highlighted the detection of clinical clues as crucial for accurate diagnostic reasoning, while clinical simulation was pointed out as a methodology that, in addition to applying theoretical knowledge, enables the improvement of technical and social skills. In turn, PBL was recognized for promoting critical thinking and preparing students for ethical and practical challenges of the profession.

The evaluation and comparison of tools to measure clinical reasoning indicated the predominance of instruments focused on diagnostic reasoning, such as the Script Agreement Test and the Clinical Judgment Rubric of Lasater. Studies show that problem-solving and academic self-efficacy are essential factors in the development of clinical reasoning, reinforcing the importance of educational strategies that promote self-regulated learning.

In addition, the applicability of educational technologies, such as virtual simulation, was widely recognized as positive. These technologies provide an innovative learning environment that complements and, in many cases, surpasses traditional methods. Virtual

simulation helps improve clinical judgment, communication, decision-making, and student confidence, and facilitates the transition from theory to practice. Repeating simulation scenarios has also been shown to reduce anxiety and improve students' clinical judgment.

In the future, investigations into the use of emerging technologies, including artificial intelligence (AI), may hold promise for the development of clinical reasoning. AI could, for example, provide real-time feedback during clinical simulations, allowing students to identify gaps and adjust reasoning. Longitudinal studies are also recommended to evaluate the practical impact of teaching methodologies and assessment tools on the development of clinical reasoning, contributing to the adaptation of teaching strategies according to the demands and evolutions in the health field.

Still, it is important to recognize the limitations of this integrative review. The exclusion of articles not available in full and the possible methodological variations among the included studies may restrict the generalization of the findings. For future studies, an approach that includes a wider range of sources, including articles in other languages and international databases, is recommended to broaden the perspective on the topic.

In conclusion, it is inferred that the integration of these diverse approaches and technologies into the nursing curriculum is essential to prepare future professionals for the challenges of the contemporary healthcare environment. The continuous development and evaluation of teaching-learning strategies and assessment tools are crucial to ensure that nursing students acquire robust clinical reasoning and high-quality professional practice.

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