

Literature Review: Evidence and Training Strategies for Obstetric Pharmacological Decision-Making in Nursing

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How to cite this paper: Salcedo-Sánchez, R. and Santiago-Martínez, P. (2026) Literature Review: Evidence and Training Strategies for Obstetric Pharmacological Decision-Making in Nursing. *Open Journal of Nursing*, 16, 191-210.

<https://doi.org/10.4236/ojn.2026.163013>

Received: January 23, 2026

Accepted: March 10, 2026

Published: March 13, 2026

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Abstract

Background: Clinical decision-making constitutes a cornerstone of nursing practice and is recognized as a complex process that goes beyond the application of technical knowledge. This process is particularly relevant, as decisions related to pharmacological interventions have a direct and simultaneous impact on the health of the pregnant woman and the fetus or newborn. **Methods:** A narrative literature review was conducted to identify and synthesize evidence on educational strategies aimed at strengthening obstetric pharmacological decision-making in nursing. **Findings:** The reviewed literature emphasizes the integration of analytical reasoning and experiential learning as central components in strengthening obstetric pharmacological decision-making in nursing. Analytical reasoning supports systematic clinical assessment, protocol use, and evidence-based practice, while intuitive processes emerge from accumulated experience and pattern recognition. A persistent challenge identified is the gap between theoretical knowledge and its application in real clinical settings. Pharmacological decision-making is described as a complex process involving medication selection, safe preparation, accurate administration, and ongoing monitoring of clinical responses. Educational evidence highlights the effectiveness of situated learning and deliberate practice in contextualizing pharmacological knowledge and consolidating complex skills through repetition and feedback. Clinical simulation, together with technology-mediated strategies such as virtual simulation and interactive learning environments, plays a key role in providing realistic, standardized, and adaptable scenarios that enhance safe and reflective clinical decision-making in obstetric nursing education. **Conclusion:** Educational strategies that combine contextualized learning, repeated practice, and structured feedback are essential for strengthening safe pharmacological decision-making in obstetric nursing education.

Keywords

Decision-Making, Obstetric Pharmacology, Nursing, Training Strategies, Education

1. Introduction

Clinical decision-making constitutes a cornerstone of nursing practice and is recognized as a complex process that goes beyond the application of technical knowledge. The decisions made by nursing staff in everyday clinical practice are based on the integration of scientific knowledge, clinical experience, ethical reasoning, understanding of the context, and continuous evaluation of the patient's response [1].

In everyday nursing practice, clinical decisions are made based on the integration of scientific knowledge, professional experience, ethical reasoning, understanding of the care context, and continuous assessment of the patient's response, confirming that decision-making is not an isolated activity, but a process deeply influenced by the clinical environment [2].

In the field of obstetric nursing (also referred to as maternal-newborn nursing or perinatal nursing in the international literature), this process takes on relevance, as decisions related to pharmacological interventions have a direct and simultaneous impact on the health of the pregnant woman and the fetus or newborn [3]. Maternal and neonatal care takes place in settings characterized by complex physiological changes and situations that can evolve rapidly, increasing the need for timely, informed, and safe decisions [2].

The literature on clinical judgment in nursing describes decision-making as integrating analytical and intuitive components. Analytical reasoning is associated with the systematic assessment of clinical data, the use of protocols, and the application of evidence-based knowledge, while intuition is built on accumulated experience and the recognition of clinical patterns [1]. Studies agree that more experienced nursing professionals rely more frequently on intuitive processes, while less experienced professionals rely mainly on analytical strategies; however, both approaches are complementary and necessary for confident decision-making [4].

From a conceptual and evolutionary perspective, clinical judgment and decision-making in nursing develop progressively throughout training and professional practice [4]. The model of professional competence acquisition proposed by Patricia Benner, together with the contributions of Tanner and Chesla, has been fundamental in explaining the transition from novice to expert levels and in understanding how this progression modifies the interpretation of clinical situations and decision-making [5]. This approach maintains that pharmacological decision-making cannot be taught solely as declarative knowledge but requires differentiated and contextualized educational interventions.

One of the main challenges identified in nursing practice is the gap between theoretical knowledge and decision-making in real-world clinical settings [6]. This gap is particularly evident in high-pressure, high-workload, and time-constrained contexts, which are common in obstetric services, where the risk of medication-related errors increases significantly [7] [8].

Pharmacological decision-making involves a set of interrelated actions that include selecting the appropriate medication, preparing it safely, administering it correctly, and continuously monitoring the clinical response [9]. These actions require not only technical skills, but also a thorough understanding of the pregnant woman's clinical condition, the fetal status, and possible adverse effects or drug interactions, as a lack of integration between knowledge, clinical judgment, and context can lead to unsafe decisions even among experienced professionals [7].

From a cognitive perspective, clinical decision-making has been described as a process influenced by uncertainty, risk, and the characteristics of the healthcare environment. The work of Thompson and Dowding has been central to explaining how nursing professionals process clinical information and make decisions in real-world contexts, especially when evidence is incomplete or patient conditions change rapidly, as is the case in obstetric care [10].

Decision-making in nursing also involves assuming professional, civil, criminal, administrative, and ethical responsibility for the actions taken. The literature on ethical decision-making emphasizes that clinical decisions should be guided by principles such as autonomy, beneficence, non-maleficence, and justice, particularly in contexts of clinical vulnerability such as obstetric care [5] [11] [12].

In nursing education, there is evidence that the development of clinical reasoning and decision-making does not occur automatically during undergraduate nursing education, which underscores the need for innovative educational strategies that allow students to practice decision-making in safe environments and receive structured feedback [13]. Without these strategies, the transition from the classroom to the clinical setting can result in difficulties in applying pharmacological knowledge safely [6].

The use of technology-mediated educational methodologies, such as clinical simulation, has been widely recognized as a key tool for strengthening decision-making in nursing [14]. In particular, Lasater's studies have been fundamental in proposing and validating the clinical judgment rubric, which allows not only teaching but also systematic evaluation of clinical judgment in simulated contexts [15] [16].

Additionally, the simulation model proposed by Pamela R. Jeffries has supported the use of clinical simulation as a structured educational intervention, with clear instructional design and measurable outcomes, which supports the viability of developing technology-mediated resources for nursing education [17]. In the case of obstetric nursing, these strategies allow for the practice of pharmacological decisions in critical situations without compromising the safety of the mother-new-

born dyad [18].

In this context, a literature review that integrates the best available evidence on educational methodologies, approaches, and strategies aimed at strengthening pharmacological decision-making in obstetric nursing is warranted. A review with this approach will identify the key elements that favor the development of clinical judgment, recognize the limitations of traditional training, and propose evidence-based lines of action for higher education in nursing.

This review analyzes the literature related to nursing education, the development of clinical judgment, decision-making, and the use of educational strategies, with special emphasis on their application to obstetric care from the specific role of nursing as directly responsible for the preparation, administration, and monitoring of pharmacological treatment. This review seeks to contribute to the improvement of professional training and, ultimately, to the safety and quality of maternal-neonatal care.

2. Methods

This study was conducted as a narrative literature review aimed at identifying and synthesizing evidence on educational strategies that support pharmacological decision-making in obstetric nursing. A literature search was performed in PubMed/MEDLINE, Scopus, CINAHL, and Google Scholar due to their relevance to nursing, health sciences, and medical education research. Publications between 2000 and 2025 were considered in order to integrate both foundational theoretical models of clinical decision-making and recent educational innovations.

The search strategy combined keywords related to clinical decision-making in nursing, clinical reasoning, obstetric pharmacology, medication safety in pregnancy, nursing education, simulation in nursing education, and pharmacological decision-making. Additional sources were identified through manual review of reference lists from relevant publications.

Studies were included if they addressed clinical decision-making or clinical reasoning in nursing, pharmacological safety during pregnancy, or educational strategies aimed at strengthening clinical judgment in nursing education. Articles focusing exclusively on medical decision-making without relevance to nursing practice or on pharmacology unrelated to pregnancy were excluded.

The selected literature was analyzed through thematic synthesis, identifying key concepts related to clinical decision-making, pharmacological safety in obstetric care, and educational strategies that promote clinical reasoning, including simulation and technology-mediated learning environments.

3. Pharmacological Decision-Making as the Cornerstone of Obstetric Care in Nursing

Clinical decision-making in nursing is widely regarded as a complex process that integrates scientific knowledge, professional experience, clinical reasoning, ethical judgment, and understanding of the context in which care is provided [1]. Rather

than being a purely technical action, decision-making is a central component of professional practice, as it guides nursing interventions that have a direct impact on people's safety and health outcomes [19].

In the field of obstetric nursing, this complexity is intensified because clinical decisions, particularly those related to the use of medications, simultaneously affect the pregnant woman and the fetus or newborn. Obstetric events are characterized by rapid physiological changes, dynamic clinical conditions, and potentially critical situations that require timely and well-informed responses [20].

In this context, pharmacological decision-making constitutes a cornerstone of care grounded in the Nursing Care Process (ADPIE), understood as a systematized method that forms the basis of professional nursing practice and whose integration is extremely relevant during the teaching of pharmacology and medication administration. The incorporation of the ADPIE allows nursing staff to ensure that an interdisciplinary care process, such as pharmacological treatment, translates into safe and effective medication administration, with favorable outcomes for the people under their care. Accordingly, the ADPIE systematically integrates the stages of assessment, diagnosis, planning, intervention or execution (including care actions, patient education, and discharge planning) and evaluation of results. The central purpose of this process is to transform the way nursing is practiced from an automatic practice to a deliberate, responsible, and professional practice, capable of interpreting the immediate needs of the person, providing qualified care, and offering individualized care.

Several studies have documented that medication-related errors continue to be a significant source of adverse events in health services, and that a significant proportion of these errors occur during the preparation, administration, and monitoring of drug treatment, activities in which nursing staff play a central role. These errors are not usually attributable to a single cause, but rather to the interaction of multiple factors, including workload, patient complexity, interruptions, poor communication, and decision-making under pressure [7].

These pharmacological risks, which are further explored in Section 5, underscore the central role of nursing clinical judgment in obstetric medication safety [21]. These modifications require that pharmacological decisions be based on careful clinical assessment and up-to-date knowledge of the potential effects of medications on the mother-fetus pair [22].

At the same time, there is limited availability of concrete evidence on the safety of many drugs used during pregnancy, which increases clinical uncertainty and reinforces the need for safe decisions in each specific context [23]. In this context, obstetric nursing faces the challenge of making decisions based on scientific evidence in contexts where such evidence may be incomplete, requiring a high level of clinical judgment [5] [24].

Clinical judgment in nursing has been described as a process that develops over time and allows for the integration of information, interpretation of clinical data, anticipation of risks, and selection of appropriate interventions [4]. This process

is particularly relevant in pharmacological decision-making, as it involves not only following protocols, but also continuously evaluating clinical response, identifying early signs of adverse events, and adjusting interventions when necessary.

Decision-making in obstetrics is also influenced by the perception of risk, both by professionals and by the institutional and cultural context in which care is provided. Studies exploring risk perception in obstetrics have shown that this perception directly impacts clinical decisions, including the use of medications during labor and postpartum [20]. This finding is relevant to obstetric nursing, as it underscores the need for training that enables nurses to recognize and manage risk in a reflective and evidence-based manner.

Overall, the evidence indicates that pharmacological decision-making in obstetric nursing cannot be reduced to the execution of medical instructions, but rather constitutes a complex clinical process with direct implications for maternal and neonatal safety. This reality justifies the need to critically review the available evidence on how pharmacological decision-making is taught, learned, and strengthened in nursing education, with the aim of contributing to safer and more informed clinical practices.

4. Assessing, Planning, and Deciding in Nursing Practice: Theoretical Foundations of Decision-Making and Clinical Judgment in Nursing

Clinical decision-making in nursing has been approached from multiple theoretical perspectives that seek to explain how nursing professionals integrate information, experience, and context to act in real situations. Integrative reviews and conceptual analyses agree that there is no single explanatory model, but rather a network of approaches that reflect the complexity of clinical reasoning in nursing practice [1] [25].

From a broad perspective, decision-making has been described as a dynamic cognitive process that includes: 1) identifying the problem, 2) interpreting clinical data, 3) generating alternatives, 4) selecting an action, and 5) evaluating its results [26]. This process does not occur in a linear or standardized manner, but rather adapts to the characteristics of the clinical context, the level of experience of the professional, and the nature of the situation being addressed [19].

One of the central concepts associated with decision-making in nursing is clinical reasoning, which refers to the process by which nursing professionals collect and interpret information, recognize patterns, anticipate problems, and plan care interventions [27]. However, it should be noted that there is a lack of terminological consensus around concepts such as clinical reasoning, clinical judgment, decision-making, and critical thinking, which has led to some ambiguity in nursing research and education [5] [28].

In this context, some studies have proposed differentiating clinical reasoning as the cognitive process that leads to a decision, while clinical judgment is understood as the result of that process, that is, the interpretation or conclusion reached that

guides clinical action [4] [5] [28]. This distinction is useful for analyzing pharmacological decision-making, as it allows for the identification of both the mental processes involved and the specific decisions that translate into nursing interventions for patients.

The concept of clinical judgment indicates that it develops progressively throughout training and professional practice, integrating theoretical knowledge, clinical experience, and reflection on practice [4]. In the early stages of training, clinical judgment is often based on explicit rules and algorithms, while with increasing experience, intuitive processes and the recognition of clinical patterns are incorporated. However, intuition should not be understood as an unthinking action, but rather as a form of reasoning based on accumulated experience and repeated exposure to similar situations [27].

The specificity of reasoning in nursing has been the subject of comparative analysis with other health disciplines. An integrative review contrasting “doctor-like” and “nurse-like” reasoning highlights that nursing reasoning is characterized by a holistic orientation, focused on the person, the context, and the human response to health problems, rather than on isolated biomedical diagnosis [29]. This particularity is especially relevant in obstetrics, where pharmacological decisions must consider not only the clinical condition, but also the emotional, social, and cultural well-being of the woman.

Decision-making in nursing has also been analyzed from a philosophical perspective, emphasizing that it is a situated practice, influenced by values, professional standards, and ethical responsibilities [19]. From this approach, clinical decisions cannot be separated from moral and ethical judgment, as they involve taking responsibility for the consequences of the actions taken. In the case of pharmacological decision-making in obstetrics, this ethical dimension takes on special relevance due to the vulnerability of the mother-newborn dyad and the need to balance benefits and risks.

From the perspective of nursing students, clinical decision-making is perceived as one of the most challenging skills to develop during training. Studies exploring student experience show that the lack of opportunities to apply knowledge in realistic scenarios and the lack of feedback on decisions made hinder the transition from theoretical learning to clinical practice [30]. This difficulty is particularly evident in the pharmacological field, where the consequences of an incorrect decision can be immediate and serious.

The development of clinical reasoning and clinical judgment does not occur automatically but requires intentional educational strategies that allow students to practice decision-making in controlled contexts, reflect on their actions, and understand the consequences of their choices [31]. This approach is key to obstetric nursing education, where pharmacological decision-making requires the integration of knowledge, technical and non-technical skills, clinical judgment, and ethical responsibility.

In summary, decision-making in nursing is a complex, multidimensional, and

contextualized process closely linked to reasoning and clinical judgment. Understanding these fundamentals is essential for analyzing how educational strategies can be designed and implemented to strengthen pharmacological decision-making in obstetric nursing.

5. Obstetric Pharmacotherapy and Clinical Judgment

Pharmacological decision-making in obstetric nursing is based on specific knowledge of pharmacology applied to the gestational period, which differs significantly from pharmacotherapy in non-pregnant women. Pregnancy is a dynamic physiological state that modifies the pharmacokinetic stages of absorption, distribution, metabolism, and excretion of multiple drugs, which warrants a rethinking of the interpretation of doses, intervals, and therapeutic effects [21].

The physiological changes inherent to pregnancy, such as increased plasma volume, altered protein binding, changes in hepatic enzyme activity, and increased renal flow, can significantly alter the plasma concentration of administered drugs and, therefore, the clinical response of pregnant women [22]. These changes are not always explicitly reflected in clinical guidelines or technical data sheets, which increases the complexity of pharmacological decision-making in obstetric practice.

From a safety perspective, a considerable proportion of the drugs used during pregnancy lack concrete evidence regarding their maternal-fetal safety, due to the historical exclusion of pregnant women from clinical trials, mainly for ethical reasons [23]. This limitation of evidence creates an environment of uncertainty in which pharmacological decisions must be based on the best available evidence, clinical judgment, and continuous assessment of risk and benefit.

The use of medications during pregnancy is not restricted to those prescribed by professionals. Recent studies indicate that 36% of pregnant women worldwide consume non-prescription medications, with analgesics being the most common group at 25% [32]. This highlights the essential role of nursing and midwifery professionals in education, risk identification, and guidance for informed decision-making about self-medication during pregnancy, as they provide evidence-based guidance that can reduce risky practices during gestation [33].

Reviews focusing on the safety of medication use during pregnancy emphasize that pharmacological decision-making must simultaneously consider: 1) the clinical condition of the pregnant woman, 2) the gestational status, 3) possible teratogenic effects, and 4) the consequences of not adequately treating a medical condition [24]. From this perspective, failure to administer or delay in administering a necessary medication also constitutes a clinical risk that must be assessed in the decision-making process.

Furthermore, in obstetric practice, pharmacological decisions often involve groups of medications considered critical, such as uterotonics, antihypertensives, anticonvulsants, antibiotics, and analgesics. These drug groups have varying risk profiles depending on the trimester of pregnancy and the specific clinical condi-

tion, which requires an individualized assessment in each case [22]. For obstetric nursing professionals and future professionals, this implies not only knowing institutional protocols but also understanding the pharmacological principles that underpin them.

Pharmacological decision-making is also influenced by risk perception and the clinical culture of the obstetric environment. Studies exploring risk perception in professionals who attend labor and birth have shown that this perception conditions the use of pharmacological interventions and tolerance to clinical uncertainty [20].

From a public health perspective, research on the effects of medications in pregnancy and early childhood has emphasized the need to strengthen informed decision-making regarding pharmacological interventions, considering both immediate risks and possible long-term effects [34]. This evidence reinforces the importance of nursing staff, perinatal nurses, and obstetricians actively participating in clinical monitoring, follow-up, and communication of possible adverse effects related to pharmacological treatment.

The complexity of obstetric pharmacology highlights that decision-making in this field cannot be based solely on lists of permitted or contraindicated drugs. Instead, it requires integrating up-to-date pharmacological knowledge, continuous clinical assessment, and professional judgment to respond to situations that can evolve rapidly [21] [22] [24]. This integration is especially critical in obstetric emergency scenarios, where decisions must be made under time pressure and with limited information.

In this regard, the reviewed literature suggests that training in obstetric pharmacology should go beyond the transmission of theoretical content and focus on the development of skills for safe and thoughtful clinical decision-making [24]. Understanding the pharmacological fundamentals of pregnancy is an essential requirement for strengthening pharmacological decision-making and reducing the risks associated with the use of medications.

6. Educational Strategies for Safe Decisions

Evidence in nursing education indicates that clinical decision-making is a complex skill that requires intentional educational strategies designed to promote the integration of disciplinary knowledge with clinical reasoning and reflection on practice [35]. In the field of obstetric pharmacology, this need is intensified due to the uncertainty inherent in the use of medications during pregnancy and the potential consequences of inappropriate decisions for maternal and neonatal safety [24].

Competency-based education has been identified as an appropriate framework for the development of pharmacological decision-making, as it focuses on observable actions that are transferable to actual clinical practice, also known as transferability [36]. From this perspective, pharmacological decision-making is an integrative competency that includes pharmacological knowledge, clinical assess-

ment, professional judgment, and ethical responsibility, all of which are key aspects of obstetric nursing practice.

Educational interventions aimed at critical thinking and clinical reasoning have shown positive effects on the clinical decision-making ability of nursing students and professionals, particularly when they are intentionally structured and oriented toward the active analysis of complex clinical situations [37]. Evidence indicates that these interventions include strategies such as guided analysis of clinical cases, problem-based learning, clinical simulation with reflective debriefing, the use of scenarios that require prioritization of actions, and structured feedback on decisions made [35] [36]. Together, these strategies encourage participants to express their thinking patterns, compare alternative courses of action, and reflect on the clinical consequences of their decisions, which contributes to more systematic and informed reasoning. In the field of obstetric pharmacology, this type of intervention is particularly relevant, as it promotes critical assessment of the risk-benefit ratio of pharmacological interventions, anticipation of possible adverse events, and post-administration clinical monitoring, all of which are essential for the safety of both mother and child [24].

Situated learning allows pharmacological knowledge to be contextualized in realistic clinical scenarios, facilitating its application to situations specific to obstetric care [30]. By facing cases that simulate real practice, participants can integrate information about the maternal condition, gestational status, and characteristics of the medication, strengthening pharmacological decision-making in complex contexts.

Structured clinical case resolution has been widely used as a strategy to develop decision-making in nursing. This methodology promotes the integration of theoretical knowledge with practice, while stimulating critical reflection and clinical reasoning [31]. Deliberate training or deliberate practice has been proposed as an effective strategy for consolidating complex skills through repeated practice and feedback aimed at improving performance. This approach facilitates the automation of safe processes such as medication verification, preparation, and administration without losing sight of the need for clinical judgment in non-routine situations [5] [36].

In contrast, clinical simulation is one of the educational strategies most strongly supported by the literature for the development of decision-making. Integrative reviews and experimental studies show that high- and medium-fidelity simulation contributes to the strengthening of clinical reasoning and decision-making in nursing students [17] [38] [39]. It should be noted that the effectiveness of simulation depends largely on its pedagogical design. Elements such as prebriefing, which establishes expectations and objectives, and debriefing, which promotes guided reflection on the decisions made and exploration of the participant's mental models, have been identified as essential components of meaningful learning [18]. These teaching-learning strategies, which lead to analysis and reflection on learning, are particularly relevant for reviewing pharmacological decision-mak-

ing, exploring alternatives, and understanding the clinical consequences of each choice.

For example, simulation-based educational strategies have been effectively applied to high-risk obstetric pharmacological interventions such as oxytocin titration during labor induction and magnesium sulfate administration for the management of preeclampsia. These simulation scenarios allow nursing students to practice dose calculation, infusion adjustment, continuous maternal-fetal monitoring, and the timely identification of adverse effects, thereby reinforcing safe pharmacological decision-making in realistic clinical contexts. Evidence from simulation-based obstetric emergency training supports the effectiveness of these approaches in strengthening clinical judgment and medication safety [18] [38] [40].

With recent technological advances, various technology-mediated strategies have been designed, including virtual simulation, virtual reality, and interactive environments. These strategies expand the options for training safe clinical decision-making as they can promote the development of clinical judgment when integrated coherently into the curriculum and accompanied by structured feedback [41] [42]. In the obstetric context, these modalities allow for the testing of pharmacological decisions in rare or high-risk scenarios.

Various approaches have also been explored, such as flipped learning supported by digital games, which have shown improvements in the decision-making performance of nursing students by combining independent study with practical application in simulated contexts. Evidence suggests that these approaches increase motivation, encourage reflection prior to practice, and allow knowledge to be applied with immediate feedback [43].

Regardless of the specific technology-mediated strategy, from the students' perspective, structured, clear, and timely feedback is identified as a key element for learning decision-making [44]. Feedback allows students to identify errors, understand their causes, and adjust their clinical reasoning, which are fundamental aspects for the development of safe pharmacological decisions.

A relevant aspect is the need for intentional educational progression in the development of decision-making. Studies suggest that educational strategies should be organized gradually, starting with guided clinical cases and low-complexity simulations, and advancing to more complex scenarios and immersive technologies as participants' clinical reasoning consolidates [36] [45]. This progression is essential for training in obstetric pharmacology, where clinical complexity and risk increase as maternal-fetal variables are incorporated.

Overall, the reviewed evidence indicates that strengthening pharmacological decision-making in obstetric nursing requires an integrated training approach that combines competency-based education, situated learning, case resolution, deliberate practice, and clinical simulation, supported by educational technologies when available. These strategies, although not always designed specifically for the area of pharmacology, offer a transferable framework for developing safe and reflective

pharmacological decisions in maternal-neonatal care.

7. Technological Innovation in Nursing Education

The use of educational technology in nursing education has evolved significantly in recent decades, moving from tools that support traditional teaching to complex learning environments capable of promoting clinical reasoning and decision-making in simulated contexts [14]. In the field of obstetric pharmacology, these technologies offer relevant opportunities to practice clinical decisions in high-risk scenarios without compromising the safety and integrity of the mother and child.

Technological environments can promote the development of safe clinical decision-making in nursing when they are designed with clear pedagogical objectives and aligned with specific competencies [41]. Digital tools allow the recreation of dynamic clinical situations that require interpreting information, prioritizing interventions, and evaluating consequences, which are central processes for pharmacological decision-making.

Digital simulation (also called screen or monitor simulation) has been widely studied as a modality that complements face-to-face simulation. Reviews of the topic show that virtual environments facilitate access to standardized, repeatable clinical scenarios that can be adjusted to the student's level, which is useful for practicing decision-making in rare or highly complex situations [42].

Virtual reality (VR) represents an evolution of digital simulation by offering immersive experiences that increase the sense of presence and realism. An integrative review of the impact of virtual reality on clinical decision-making notes that these technologies can promote the integration of clinical reasoning with psychomotor skills and stress management in complex situations [46].

In addition to digital simulation and virtual reality, the use of interactive platforms and digital learning environments geared toward decision-making has been explored. Studies analyzing interactive virtual cases highlight that these tools promote active student participation and the explicitation of the reasoning behind each decision [46] [47]. These environments allow decisions to be analyzed step by step, facilitating understanding of the factors that influence the decision-making process.

More recently, studies have explored the potential of artificial intelligence (AI) specifically within educational training contexts in nursing. AI-driven simulation and adaptive learning systems have been shown to enhance students' clinical reasoning by providing personalized feedback, scenario variation, and decision-consequence visualization, thereby strengthening pharmacological decision-making competencies in a safe learning environment [48] [49].

Although artificial intelligence represents a powerful tool for addressing the challenges of the clinical context, professional competencies such as clinical reasoning and reflective, evidence-based decision-making remain irreplaceable. From an educational perspective, artificial intelligence-based virtual simulation significantly improves therapeutic communication, empathy in emotionally challenging scenar-

ios, and decision-making [49].

The transfer of learning acquired through educational technologies to actual clinical practice has been a central topic of research. A scoping review on the transfer of learning outcomes related to decision-making indicates that simulation- and technology-mediated educational experiences can positively influence clinical performance, especially when accompanied by structured reflection and feedback [45]. This aspect is crucial to justify the use of technology as a complement to traditional educational strategies in nursing and midwifery training in pharmacology.

However, it should be noted that the use of technology in education has limitations. These include the risk of focusing excessively on the technological component to the detriment of the pedagogical objective, barriers to access, and the need for teacher training for its effective implementation [41]. These factors must be considered, especially in Latin American contexts, where the availability of resources can be variable.

In summary, the evidence reviewed shows that the use of educational technology, including virtual simulation, virtual reality, interactive platforms, and artificial intelligence-based tools, offers significant opportunities to strengthen clinical decision-making in nursing and obstetrics. In the context of obstetric pharmacology, these technologies allow complex decisions to be made in safe environments, promote reflection on clinical reasoning, and encourage the transfer of learning to real professional clinical practice. Their effectiveness, however, depends on intentional pedagogical design and consistent integration into educational programs.

8. Assessment of Clinical Reasoning and Decision-Making

The assessment of clinical judgment and decision-making in nursing is a significant challenge in higher education due to the complex, contextual, and dynamic nature of these processes [1]. Unlike the assessment of declarative knowledge or isolated technical skills, assessing decision-making involves analyzing how the nursing student or professional integrates information, interprets clinical data, prioritizes actions, and reflects on the consequences of their choices in real or simulated situations.

Consequently, the assessment of clinical judgment must be aligned with the pedagogical objectives and teaching strategies implemented. Studies on the development of critical thinking and decision-making indicate that traditional assessment methods, such as written exams, are insufficient to capture the complexity of clinical reasoning [35].

In this regard, the use of assessment strategies that allow for the observation of student performance in clinical or simulated contexts has been described [15] [16]. Competency-based assessment is presented as an appropriate framework for evaluating clinical decision-making, as it focuses on observable performance and the ability to apply knowledge in specific situations [36]. With this approach, evaluating

pharmacological decision-making in obstetric nursing involves assessing not only the final outcome of the decision, but also the process followed to reach it, including the identification of risks, the selection of the medication, and subsequent monitoring.

For its part, face-to-face clinical simulation has been implemented as an environment for assessing clinical judgment, where high-fidelity simulation allows for the evaluation of decision-making in real time, under conditions of pressure similar to those in clinical practice, providing valuable information about the participant's reasoning [38]. In addition, both high-fidelity and medium-fidelity simulations can be useful for evaluating decision-making, provided that the simulation scenario design and evaluation criteria are clearly defined [50]. This finding is relevant for educational contexts with limited resources.

A central aspect of clinical judgment assessment is the use of structured instruments that allow for objective performance evaluation. The use of rubrics, checklists, and scales designed to assess components of clinical reasoning, prioritization of interventions, and decision-making in simulated scenarios has been reported [15] [16] [45]. These instruments, provided they are validated, facilitate systematic evaluation and comparison of performance between different training moments.

The transfer of learning is another key aspect of assessment. A comprehensive review of the transfer of learning outcomes related to decision-making indicates that assessing immediate performance in simulation alone is not sufficient, and that it is necessary to analyze whether the skills developed are maintained and applied in actual clinical practice [45].

In this context, it is also important to highlight the relationship between clinical decision-making and other care processes in the field of nursing. A study analyzing the correlation between critical thinking, decision-making, and quality of shift handover suggests that greater decision-making capacity is associated with safer and more consistent care practices [51]. These findings support the importance of evaluating decision-making as a cross-cutting component of professional performance.

Formative feedback emerges as an indispensable element of the evaluation process. Studies on nursing education show that structured post-evaluation feedback allows students to identify strengths, recognize areas of opportunity, and adjust their clinical reasoning [44].

However, the literature warns that the evaluation of clinical judgment has limitations and methodological challenges. These include the potential subjectivity of evaluators, the variability of clinical scenarios, and the difficulty of standardizing evaluation criteria [1]. These challenges underscore the need for validated instruments, faculty training, and consistency between teaching and evaluation.

Finally, from a nursing ethics perspective, the assessment of clinical judgment must consider professional responsibility and decision-making in challenging situations. Assessing decision-making also involves evaluating the ability to recognize ethical conflicts and justify actions based on professional principles [5] [11].

In summary, the evidence indicates that the assessment of clinical judgment and decision-making in nursing must be consistent with training approaches and supported by strategies that allow performance to be observed in authentic contexts. In obstetric pharmacology training, simulation-based assessment, the use of structured instruments, and formative feedback are key tools for assessing the development of safe and thoughtful pharmacological decisions and for ensuring the transfer of learning to actual clinical practice in nursing.

9. Gaps and Opportunities in Obstetric Pharmacology Training for Nurses

The evidence reviewed shows significant advances in the understanding of clinical decision-making in nursing and in the design of educational strategies aimed at developing reasoning and clinical judgment for decision-making. However, it also highlights significant gaps when specifically analyzing pharmacological decision-making in obstetric nursing, a field characterized by high clinical complexity and significant risks to maternal and neonatal safety.

One of the main findings of this review is that much of the literature addresses decision-making from a general clinical perspective, without explicitly delving into the decision-making processes related to the use of medications during pregnancy. Although there are solid studies on pharmacology in pregnancy and others on clinical reasoning and professional judgment, there is insufficient research that systematically integrates both components, particularly from the specific role of nursing.

Likewise, evidence on the best educational strategies (such as clinical simulation, situated learning, and the use of educational technologies) demonstrates positive effects on the development of clinical reasoning. However, there is still limited exploration of the transfer of these skills to actual clinical practice, especially with regard to pharmacological decisions and their impact on patient safety. This gap suggests the need for longitudinal studies to evaluate the sustained application of learning.

Another relevant gap identified in the literature is the limited incorporation of interprofessional education strategies in obstetric pharmacology training. Obstetric medication safety relies on collaborative decision-making among nurses, midwives, and obstetricians, and differences in risk perception and professional roles can influence pharmacological decisions [20] [26]. Despite this, educational interventions addressing pharmacological decision-making are frequently designed within single disciplines, representing a missed opportunity. Interprofessional educational strategies, particularly those incorporating shared simulation scenarios, have the potential to strengthen communication, role clarity, and patient safety in obstetric care, as recommended in international frameworks for collaborative practice [18] [52].

In relation to assessment, the literature reports the use of various instruments to evaluate clinical judgment and decision-making, mainly in simulated contexts.

Consensus remains limited regarding specific indicators for evaluating pharmacological decisions in obstetrics, which limits the comparison between studies and the standardization of evaluation processes.

From a contextual perspective, studies examining pharmacological decision-making in obstetric nursing within Latin American settings remain limited. Factors such as resource availability, institutional conditions, and sociocultural characteristics have been insufficiently explored, despite their potential influence on clinical practice and educational processes.

Despite these gaps, evidence brings an encouraging outlook. The integration of evidence-based educational strategies, supported by simulation and digital technologies, represents an opportunity to strengthen training in pharmacological decision-making. Likewise, the development of more specific and contextualized evaluation approaches for nursing can contribute to improving the quality and safety of obstetric care.

10. Conclusion

Pharmacological decision-making in obstetric nursing requires the integration of pharmacological knowledge, clinical judgment, and intentional pedagogical training. Although the literature shows significant advances in educational strategies, there are still gaps in specific research on pharmacological decisions and their evaluation in real obstetric contexts in Latin America and other continents in the teaching and learning of obstetric pharmacology focused on nursing training. Addressing these areas of opportunity will strengthen professional training and contribute to safer, evidence-based maternal and neonatal care.

Acknowledgements

The authors would like to acknowledge the academic support provided by the Faculty of Nursing and Obstetrics, National Autonomous University of Mexico, during the development of this literature review.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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