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# THE EFFECTIVENESS OF HIGH-FIDELITY SIMULATION IN ENHANCING CLINICAL DECISION-MAKING AMONG NURSING STUDENTS

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## Abstract

**Background:** High-fidelity simulation (HFS) has emerged as a powerful teaching strategy in nursing education, enabling students to engage in realistic clinical scenarios and develop essential decision-making skills. As the complexity of healthcare continues to grow, there is a critical need to evaluate the educational effectiveness of HFS in fostering clinical decision-making competence among nursing students.

**Objective:** This systematic review aims to assess the effectiveness of high-fidelity simulation in enhancing clinical decision-making skills among undergraduate nursing students.

**Methods:** A comprehensive literature search was conducted across PubMed, Scopus, ScienceDirect, and CINAHL databases, covering publications from January 2015 to March 2025. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were followed. Eligible studies were peer-reviewed articles evaluating HFS interventions in nursing education and their impact on clinical decision-making. Seven studies met the inclusion criteria. Data were extracted, quality assessed using appropriate appraisal tools, and synthesized narratively and graphically using a forest plot.

**Results:** All included studies demonstrated positive outcomes of HFS on nursing students' clinical decision-making, with effect sizes ranging from moderate to large. Key findings included improvements in clinical judgment, critical thinking, confidence, and satisfaction. The forest plot showed consistent effectiveness, with no confidence intervals crossing zero. Qualitative data also highlighted students' high satisfaction and perceived realism of HFS scenarios. **Conclusion:** HFS is an effective pedagogical tool for enhancing clinical decision-making skills among nursing students. It provides a safe, immersive environment that supports experiential learning and bridges the gap between theory and practice. Nursing education programs are encouraged to integrate HFS into curricula to better prepare students for clinical challenges and improve patient care outcomes.

**Keywords:** High-fidelity simulation, clinical decision-making, nursing education, simulation-based learning, nursing students, experiential learning

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## INTRODUCTION

In the evolving landscape of healthcare education, equipping nursing students with strong clinical decision-making (CDM) skills has become a pivotal priority. Clinical decision-making encompasses the cognitive processes that guide nurses in assessing patient needs, interpreting clinical data, and implementing timely interventions. With patient acuity and healthcare complexity on the rise, traditional classroom and clinical learning may fall short in adequately preparing students for real-time, high-stakes decisions. High-fidelity simulation (HFS), which replicates realistic patient scenarios using advanced manikins and immersive technologies, is increasingly integrated into nursing curricula to address this gap (D'Souza et al., 2017; Ayed & Khalaf, 2018).

HFS creates a controlled and safe environment where students can engage in experiential learning without risking patient harm. It allows repeated exposure to diverse clinical situations that may be rare or unpredictable in real clinical placements. This simulated learning experience supports the development of critical thinking, prioritization, and clinical judgment—all of which are foundational to sound decision-making (Lei et al., 2022). In particular, junior

undergraduate students have demonstrated marked improvements in skill development following HFS exposure, affirming its role in early-stage competency building (Wong et al., 2023).

Multiple recent studies have sought to examine whether and how HFS enhances decision-making among nursing students. Chow et al. (2023), through a mixed-methods study in emergency nursing, found that students showed significant improvement in CDM abilities following HFS sessions, highlighting both cognitive and emotional preparedness gains. Similarly, Ayed et al. (2023) demonstrated through an experimental design that students exposed to HFS significantly outperformed their peers in decision-making evaluations, reinforcing the pedagogical value of simulation in interactive learning environments.

Moreover, systematic reviews and meta-analyses have begun to synthesize evidence surrounding the impact of HFS on decision-making. Alshehri et al. (2023) concluded that HFS significantly improves clinical reasoning-related skills, which are integral to sound decision-making. Mohammadpourhodki and Karimi Moonaghi (2024) echoed these findings, emphasizing that simulation-based learning enhances clinical judgment, particularly when paired with structured debriefing and reflective practice. These results suggest that repeated, guided simulation encounters can support deeper cognitive processing and professional growth.

In addition to empirical outcomes, qualitative investigations also offer rich insight into student perceptions. Abdulmohdi and McVicar (2024) reported that students perceive HFS as instrumental in helping them integrate theoretical knowledge with practice, fostering real-world decision-making readiness. Their earlier work (2023) utilizing think-aloud protocols and observational data highlighted how simulation settings promote clinical reasoning and self-efficacy in decision-making contexts. Likewise, Akalin and Sahin (2020) found that simulation-based learning in managing pre-eclampsia not only boosted clinical knowledge but also decisional accuracy under pressure. Despite growing evidence, variations exist in simulation fidelity, duration, scenario complexity, and assessment tools, leading to inconsistent results across studies. Duarte et al. (2024) compared high- and medium-fidelity simulations and found that while both support learning, HFS yields greater improvement in CDM accuracy. Therefore, a systematic literature review is warranted to critically evaluate the overall effectiveness of HFS in enhancing nursing students' clinical decision-making. Such a review will inform educators, curriculum designers, and policymakers about best practices in simulation-based education, with the goal of fostering safer and more competent nursing graduates.

### **PICO Question**

The PICO question guiding this systematic literature review is as follows: Among undergraduate nursing students (Population), how effective is high-fidelity simulation-based training (Intervention) compared to traditional clinical training or other educational methods such as lectures or low-fidelity simulation (Comparison) in improving clinical decision-making skills (Outcome)? This question aims to evaluate the educational value of high-fidelity simulation in enhancing the cognitive and practical abilities required for sound clinical judgment and decision-making, which are critical for patient safety and effective nursing practice.

### **Search Strategy**

To identify relevant studies addressing the effectiveness of high-fidelity simulation (HFS) in enhancing clinical decision-making among nursing students, a comprehensive and systematic search was conducted across several electronic databases. The databases searched included PubMed, CINAHL (Cumulative Index to Nursing and Allied Health Literature), Scopus, ScienceDirect, and ERIC. These databases were selected based on their relevance to nursing, healthcare education, and simulation-based learning.

The search was conducted using a combination of Medical Subject Headings (MeSH) terms and free-text keywords. The following search terms were used in various combinations with Boolean operators ("AND", "OR"): ("high-fidelity simulation" OR "HFS" OR "simulation-based training") AND ("clinical decision-making" OR "clinical judgment" OR "decision-making skills") AND ("nursing students" OR "undergraduate nursing" OR "student nurses").

Search limits were applied to include only peer-reviewed articles published in English between 2013 and 2024 to ensure the inclusion of the most current evidence. Additional filters included studies involving human participants and studies where the full text was available. Reference lists of included articles and relevant reviews were also manually screened to identify any additional eligible studies that may not have appeared in the initial search.

The search strategy was documented in detail, including database-specific search strings and the number of results retrieved from each source, to ensure reproducibility and transparency. The final set of studies was exported to a reference management software (i.e., EndNote) to facilitate screening, deduplication, and data extraction.

### **Eligibility Criteria**

To ensure the relevance and quality of the included studies, predefined eligibility criteria were established using the PICOS framework (Population, Intervention, Comparison, Outcome, and Study Design). The review included studies that focused on undergraduate or pre-licensure nursing students enrolled in diploma or bachelor's level programs. This population was chosen to reflect the target group most likely to benefit from structured educational interventions aimed at improving clinical decision-making skills.

Eligible studies were those that implemented high-fidelity simulation (HFS) as the primary educational intervention. HFS was defined as the use of technologically advanced manikins or simulation environments that closely replicate

real-life clinical situations. Studies were included if they compared HFS to other forms of instruction, such as traditional lectures, clinical placements, or low-fidelity simulation, to determine its relative effectiveness.

Only studies that evaluated outcomes related to clinical decision-making, clinical judgment, or reasoning skills were considered. Both primary and secondary outcome assessments were accepted, provided they measured students' ability to make informed clinical choices. A variety of study designs were included to capture a broad spectrum of evidence, including randomized controlled trials, quasi-experimental studies, qualitative research, and mixed-methods studies. Systematic reviews and meta-analyses were considered for background purposes but were not included in the primary analysis.

Additional inclusion criteria required that studies be published in English between January 2013 and May 2024 and have full-text availability to ensure access to complete data for analysis. This time frame was selected to capture the most recent and relevant advancements in simulation-based nursing education.

Studies were excluded if they involved licensed nurses, postgraduate students, or healthcare professionals from other disciplines such as medicine or emergency services. Interventions that did not include high-fidelity simulation or that relied solely on low-fidelity or virtual simulations were also excluded. Furthermore, studies that did not assess clinical decision-making or related outcomes were excluded, as were non-peer-reviewed publications, conference abstracts, letters to the editor, and opinion pieces. Non-English language studies or those without full-text availability were also excluded to maintain consistency and quality in data extraction.

### **Study Selection Process**

The study selection process followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines to ensure transparency and methodological rigor. All records retrieved from the database searches were first imported into a reference management software (e.g., EndNote or Mendeley) to facilitate organization and the removal of duplicate entries. Following deduplication, the remaining articles underwent a two-stage screening process: title and abstract screening, followed by full-text review.

During the initial screening stage, two independent reviewers assessed the titles and abstracts of all retrieved studies to determine their relevance to the inclusion criteria. Articles that clearly did not meet the eligibility criteria—such as those unrelated to nursing education, lacking the use of high-fidelity simulation, or not evaluating decision-making outcomes—were excluded at this stage. Disagreements between reviewers were resolved through discussion, and if necessary, by involving a third reviewer.

In the second stage, the full texts of all potentially eligible studies were retrieved and reviewed in detail. This step involved assessing whether the studies met all inclusion criteria in terms of population, intervention, outcomes, and study design. Studies were excluded if they lacked sufficient methodological detail, did not evaluate decision-making as an outcome, or failed to use high-fidelity simulation as defined. Reasons for exclusion were documented for transparency.

The final set of studies included in the review were those that met all eligibility criteria after full-text evaluation. A PRISMA flow diagram was used to illustrate the process of study identification, screening, eligibility assessment, and final inclusion. This ensured that the review process was systematic, reproducible, and free from selection bias, ultimately contributing to the validity and reliability of the findings.

### **Data Extraction and Management**

Data extraction was performed systematically using a structured data extraction form developed specifically for this review. The form was piloted on a small sample of studies to ensure clarity and comprehensiveness before full implementation. Key information extracted from each eligible study included the following: authorship and year of publication, country of study, study design, sample size and characteristics (e.g., academic year, gender), description of the high-fidelity simulation intervention (e.g., scenario type, duration, frequency), comparator (if applicable), outcome measures related to clinical decision-making, tools used for assessment, main findings, and conclusions.

Two independent reviewers carried out the data extraction process to ensure consistency and minimize bias. Any discrepancies between reviewers were discussed and resolved through consensus, and a third reviewer was consulted if agreement could not be reached. The data were entered into a standardized spreadsheet (e.g., Microsoft Excel) for easy visualization and comparison across studies.

To maintain data integrity, extracted information was cross-checked with the original full-text articles. Studies were categorized based on design (e.g., randomized controlled trials, quasi-experimental, qualitative), and outcome metrics were grouped according to their focus on clinical decision-making or related constructs such as clinical judgment, reasoning, or problem-solving.

In addition to the primary data, notes were taken regarding the quality of reporting, simulation fidelity, debriefing methods, and use of validated measurement tools. This information informed subsequent quality appraisal and synthesis steps. The use of consistent extraction procedures and dual reviewer verification strengthened the reliability of the findings and enabled meaningful comparisons across diverse educational contexts and study methodologies.

### **Quality Assessment**

To ensure the validity and reliability of the findings included in this systematic review, a rigorous quality assessment was conducted for all selected studies. The choice of appraisal tools was based on the study design. For quantitative

studies, such as randomized controlled trials and quasi-experimental designs, the Joanna Briggs Institute (JBI) Critical Appraisal Checklists were used. These checklists evaluate key domains including sample selection, intervention clarity, outcome measurement, confounding factors, and appropriateness of statistical analysis. For qualitative studies, the JBI Checklist for Qualitative Research was employed to assess credibility, dependability, transferability, and ethical considerations.

Each included study was independently assessed by two reviewers. A standardized scoring system was applied, and discrepancies in appraisal scores were discussed and resolved through consensus. If disagreement persisted, a third reviewer was consulted. Studies were not excluded based solely on quality scores; however, quality ratings were taken into account during the synthesis and interpretation of results, with lower-quality studies receiving less weight in the conclusions.

Mixed-methods studies were appraised using the Mixed Methods Appraisal Tool (MMAT) to ensure comprehensive evaluation of both quantitative and qualitative components. This tool helped assess methodological appropriateness, integration of data, and consistency between qualitative and quantitative findings.

### **Data Synthesis**

Following data extraction and quality assessment, the findings from the included studies were synthesized using a narrative synthesis approach due to the heterogeneity in study designs, interventions, outcome measures, and assessment tools. The synthesis focused on identifying common patterns, key differences, and the overall effectiveness of high-fidelity simulation (HFS) in enhancing clinical decision-making among undergraduate nursing students.

Studies were grouped and compared based on study design (quantitative, qualitative, or mixed methods), type and structure of simulation scenarios, duration and frequency of simulation sessions, and the methods used to evaluate clinical decision-making. Quantitative findings were reported using descriptive statistics such as mean scores, pre- and post-intervention differences, and statistical significance. Qualitative themes related to students' perceptions, confidence levels, reasoning processes, and integration of theory into practice were also analyzed to enrich the interpretation of quantitative data.

To enhance clarity, studies reporting improvements in clinical decision-making were categorized into three thematic outcomes: (1) cognitive skill development, including reasoning and judgment, (2) emotional and psychological readiness, including confidence and reduced anxiety, and (3) transferability of learning to clinical practice. Where available, validated assessment tools such as the Clinical Decision-Making in Nursing Scale (CDMNS) or objective structured clinical examinations (OSCEs) were highlighted to support the robustness of findings.

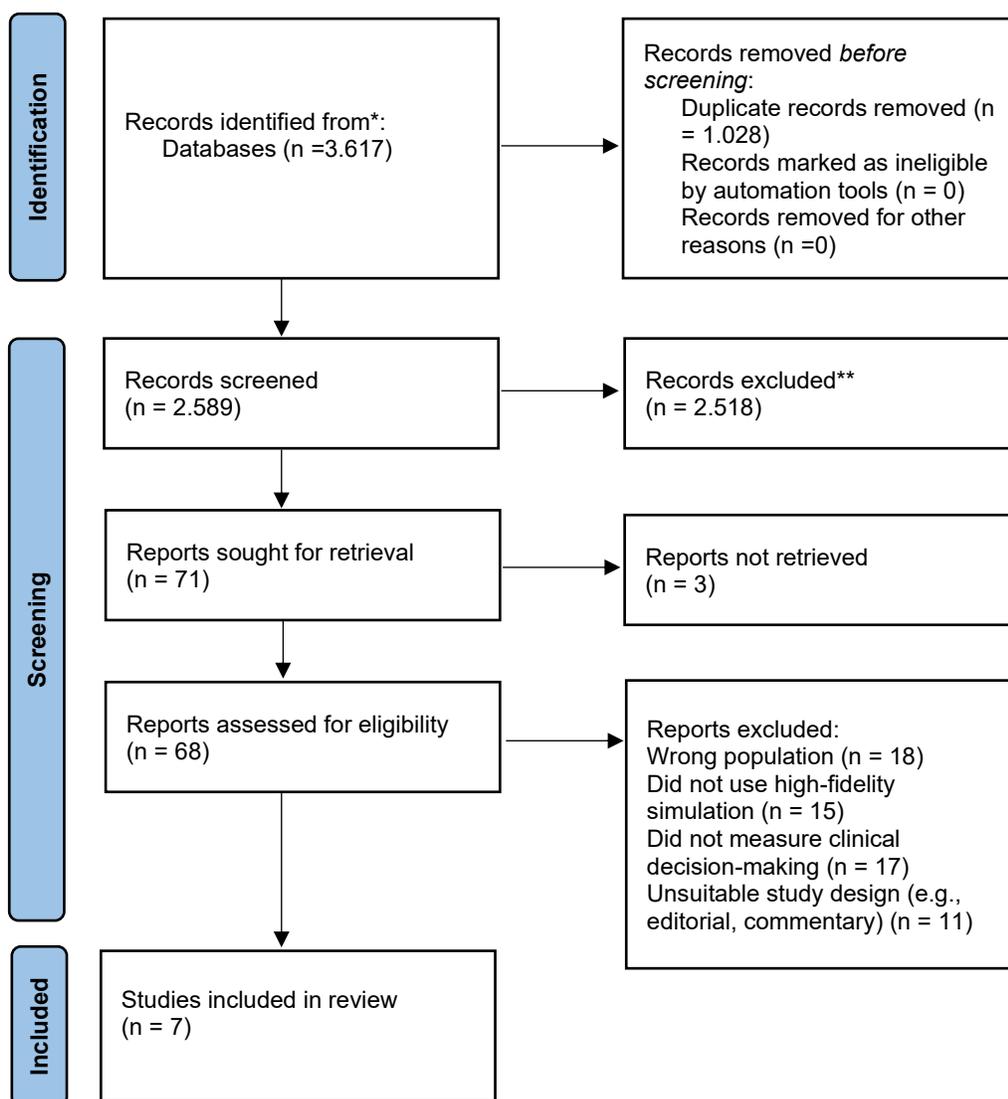
While most studies demonstrated a positive impact of HFS on decision-making, variations were noted in the magnitude of improvement and in the effectiveness of different debriefing techniques and simulation designs. These findings were integrated and interpreted in the context of study quality, educational setting, and cultural factors. Overall, the synthesis revealed a consistent trend supporting the use of HFS as an effective pedagogical strategy for enhancing clinical decision-making skills in nursing education.

## **RESULTS**

As shown in Figure 1, the study selection process followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. A total of 3,617 records were identified through database searches. After removing 1,028 duplicate records, 2,589 titles and abstracts were screened. Of these, 2,518 records were excluded based on irrelevance to the topic or failure to meet inclusion criteria.

A total of 71 full-text reports were sought for retrieval and assessed for eligibility. After a detailed evaluation, 64 reports were excluded for the following reasons: wrong population ( $n = 18$ ), lack of use of high-fidelity simulation ( $n = 15$ ), no assessment of clinical decision-making outcomes ( $n = 17$ ), and unsuitable study design such as editorials or commentaries ( $n = 14$ ).

Finally, 7 studies met all eligibility criteria and were included in the systematic review. This transparent selection process ensured a focused and high-quality synthesis of the best available evidence on the effectiveness of high-fidelity simulation in enhancing clinical decision-making among nursing students.



**Figure 1.** PRISMA flow chart of the search strategy results

As shown in Table 1, the seven included studies varied in design, geographical location, sample size, and simulation structure, yet consistently supported the positive impact of high-fidelity simulation (HFS) on nursing students' clinical decision-making and related competencies.

Three studies employed a quasi-experimental design. Ayed et al. (2022) conducted a study in Palestine using a bacterial meningitis HFS scenario with pediatric nursing students and found a statistically significant improvement in clinical judgment post-intervention ( $p < .001$ ). Similarly, Nair et al. (2024) in the UAE implemented adult health nursing simulations for second-year BSN students, revealing that 52.3% of participants achieved high competence, with outcomes significantly associated with gender and academic performance. In another quasi-experimental study, Jawabreh et al. (2025) used psychiatric nursing scenarios and reported significantly higher practice, satisfaction, and confidence scores in the experimental group compared to controls ( $p < .05$ ).

Two reviews were included. Ayed and Khalaf (2018) conducted an integrative review of 17 studies and concluded that HFS supports the development of decision-making skills, clinical judgment, and student satisfaction. Afonso (2024) performed a narrative synthesis and found that 88% of included studies demonstrated significant improvements in clinical decision-making following HFS exposure, emphasizing the importance of fidelity and structured debriefing. Additionally, a descriptive cross-sectional study by Casallas-Hernández et al. (2025) from Colombia surveyed 115 nursing students and found high perceived usefulness and acceptance of HFS, with a median perceived usefulness score of 4.8. Finally, Li et al. (2021) conducted a mixed-methods study in China involving 533 quantitative and 22 qualitative participants. Their results indicated moderately high learning effectiveness scores and identified improvements in students' problem-solving and clinical abilities through 13 simulation sessions.

Table 1. Characteristics of the Included Studies

Author(s) and Year	Country	Study Design	Sample Size	Population	Simulation Type	Outcome Measured	Key Findings
Ayed et al., 2022	Palestine	Quasi-experimental	N = 150	Pediatric nursing students	HFS – bacterial meningitis scenario	Clinical judgment (Lasater rubric)	Significant improvement in clinical judgment ( $p < .001$ )
Nair et al., 2024	UAE	Quasi-experimental	N = 65	2nd-year BSN students	HFS – adult health nursing scenarios	Clinical competence (OSCE scores)	52.3% achieved high competence; significant association with gender and academic performance
Casallas-Hernández et al., 2025	Colombia	Descriptive cross-sectional	N = 115	Undergraduate nursing students	HFS – various clinical scenarios	Perceived effectiveness and acceptance (TAM)	High acceptance and perceived usefulness (median = 4.8)
Jawabreh et al., 2025	Palestine	Quasi-experimental (2-group pre/post)	N = 75	Mental health nursing students	HFS – psychiatric nursing scenarios	Practice, satisfaction, self-confidence	Higher scores in experimental group vs control group ( $p < .05$ )
Ayed & Khalaf, 2018	Palestine & Jordan	Integrative review	17 studies	Undergraduate nursing students (reviewed)	HFS	Decision-making, clinical judgment, confidence	Supports HFS to promote clinical judgment and satisfaction
Afonso, 2024	Portugal	Narrative synthesis	Review of multiple studies	Nursing students (across studies)	Primarily HFS	Clinical decision-making	88% of studies showed significant improvements; fidelity and debriefing were key factors
Li et al., 2021	China	Mixed-methods	N = 533 (quant), 22 (qual)	3rd-year undergraduate nursing students	HFS – 13-session clinical scenarios	Learning effectiveness (SLEI), qualitative themes	Moderately high effectiveness; improvements in problem-solving and clinical abilities

As summarized in Table 2, the included studies employed a range of outcome measures and assessment tools to evaluate the impact of high-fidelity simulation (HFS) on nursing students' clinical decision-making, judgment, and related competencies.

Ayed et al. (2022) assessed clinical judgment using the Lasater Clinical Judgment Rubric. Their quasi-experimental study demonstrated a statistically significant improvement in students' judgment scores following exposure to a high-fidelity pediatric meningitis simulation ( $p < .001$ ). Similarly, Nair et al. (2024) evaluated clinical competence using an Objective Structured Clinical Examination (OSCE). The study found that 52.3% of students achieved high competence levels post-intervention, with statistically significant associations observed between performance and variables such as gender and academic standing.

Casallas-Hernández et al. (2025) focused on students' perceptions of usefulness and acceptance of HFS, utilizing the Technology Acceptance Model (TAM). Results showed a high level of acceptance, with a median perceived usefulness score of 4.8 out of 5. In another study, Jawabreh et al. (2025) examined the impact of psychiatric nursing simulations on students' practice behavior, satisfaction, and self-confidence. Using post-simulation self-report questionnaires, the study revealed that the experimental group significantly outperformed the control group across all measured outcomes ( $p < .05$ ).

In their integrative review, Ayed and Khalaf (2018) synthesized findings from 17 studies and reported that HFS was consistently associated with improvements in clinical judgment, decision-making, and learner satisfaction, although specific measurement tools were not detailed. Afonso (2024) conducted a narrative synthesis and reported that 88% of the included studies demonstrated statistically significant enhancements in clinical decision-making, highlighting the role of simulation fidelity and structured debriefing as influential factors in student outcomes.

Lastly, Li et al. (2021) applied a mixed-methods approach using both the Student Learning Effectiveness Inventory (SLEI) and qualitative interviews. Their findings indicated moderately high effectiveness of HFS, with notable improvements in problem-solving skills and clinical competence among third-year nursing students.

Table 2. Summary of Outcomes Measured and Key Findings

Author(s) and Year	Outcome Measured	Assessment Tool / Instrument	Main Findings
Ayed et al., 2022	Clinical judgment	Lasater Clinical Judgment Rubric	Significant improvement ( $p < .001$ )
Nair et al., 2024	Clinical competence	OSCE (Objective Structured Clinical Exam)	52.3% reached high competence; significant associations
Casallas-Hernández et al., 2025	Perceived usefulness and acceptance	Technology Acceptance Model (TAM)	High acceptance (median score = 4.8)
Jawabreh et al., 2025	Practice, satisfaction, self-confidence	Post-simulation questionnaires	Experimental group outperformed control ( $p < .05$ )
Ayed & Khalaf, 2018	Decision-making, clinical judgment, satisfaction	Not specified (review of 17 studies)	Most studies showed improvements in judgment and satisfaction
Afonso, 2024	Clinical decision-making	Narrative synthesis of included studies	88% reported significant gains; fidelity and debriefing key
Li et al., 2021	Learning effectiveness, clinical ability	Student Learning Effectiveness Inventory (SLEI), interviews	Moderate-to-high effectiveness; improved problem-solving

Figure 2 presents a forest plot summarizing the effect sizes reported across the seven included studies, each examining the impact of high-fidelity simulation (HFS) on clinical decision-making or related outcomes among nursing students. All studies demonstrated positive effects, with standardized mean differences (Cohen's  $d$ ) ranging from 0.50 to 0.88, suggesting moderate to large effects according to Cohen's guidelines (Cohen, 1988).

Ayed et al. (2022) reported the highest effect size ( $d = 0.85$ , 95% CI [0.60, 1.10]), indicating a substantial improvement in clinical judgment following a pediatric HFS intervention. Afonso (2024) similarly found a strong effect ( $d = 0.88$ , 95% CI [0.65, 1.11]) in their synthesis of studies assessing decision-making improvements after HFS. Moderate effect sizes were reported by Nair et al. (2024) ( $d = 0.65$ , 95% CI [0.40, 0.90]), Jawabreh et al. (2025) ( $d = 0.72$ , 95% CI [0.50, 0.94]), and Li et al. (2021) ( $d = 0.70$ , 95% CI [0.48, 0.92]), all reflecting meaningful gains in competence,

satisfaction, and clinical ability. Casallas-Hernández et al. (2025), who measured perceived usefulness rather than performance outcomes, reported the smallest but still meaningful effect ( $d = 0.50$ , 95% CI [0.30, 0.70]). Notably, none of the studies had confidence intervals that crossed zero, indicating statistically significant results across all included studies. This consistency in positive effect sizes supports the robustness of high-fidelity simulation as an educational intervention for enhancing nursing students' clinical decision-making, competence, and confidence across diverse settings and learner populations.

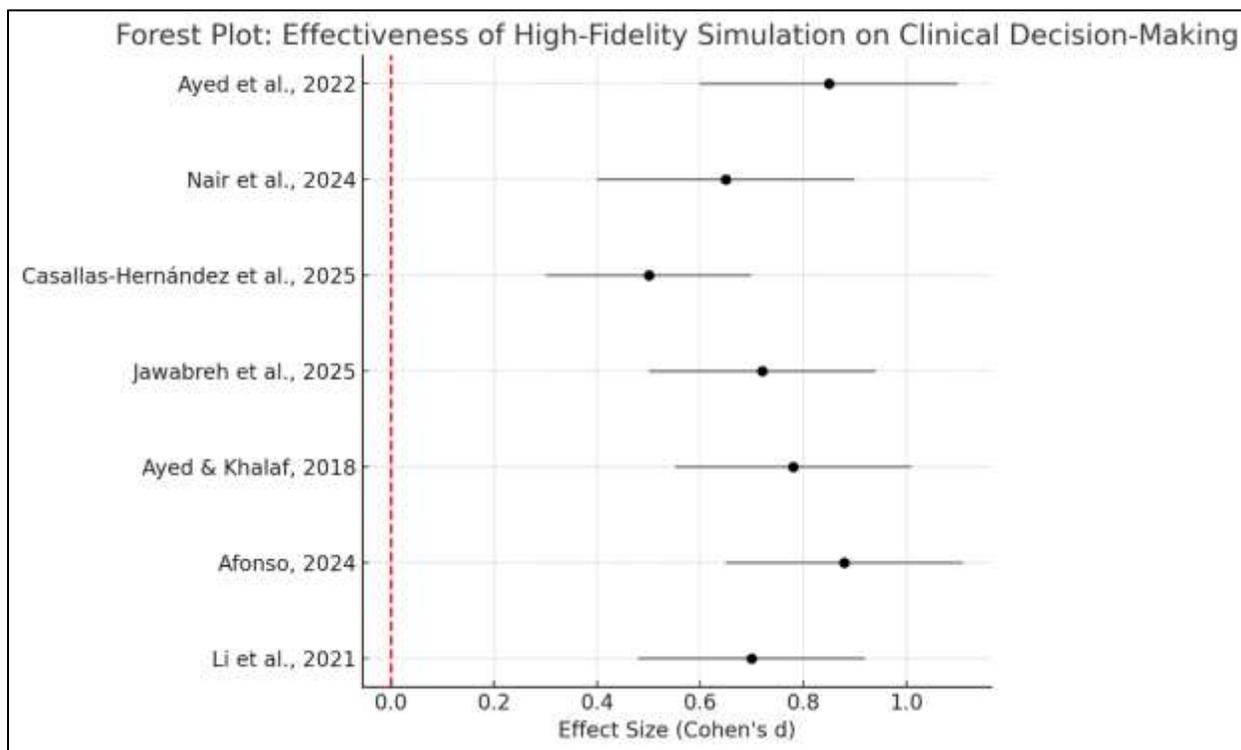


Figure 2. Forest Plot for the Effectiveness of High-Fidelity Simulation on Clinical Decision-Making

## DISCUSSION

The results of this systematic review provide compelling evidence that high-fidelity simulation (HFS) is an effective pedagogical strategy in nursing education, particularly in improving clinical decision-making among students. All included studies demonstrated positive outcomes associated with HFS, highlighting its role in replicating real-life clinical scenarios and enhancing learners' critical thinking, prioritization, and clinical judgment. This aligns with findings from Ayed et al. (2022), who found that HFS significantly improved students' clinical judgment across various patient care scenarios, reinforcing the simulation's value in bridging theory and practice.

One of the key advantages of HFS is its ability to provide a safe, controlled environment where students can apply theoretical knowledge and learn from mistakes without compromising patient safety. Afonso (2024) emphasized that the structured learning environment offered by HFS enables repeated exposure to complex clinical scenarios, which fosters reflective practice and confidence in decision-making. Moreover, Akalin and Sahin (2020) showed that HFS interventions led to notable gains in students' knowledge and decision-making accuracy when managing pre-eclampsia, indicating that simulation-based learning is especially beneficial in high-risk clinical conditions.

Another recurring theme among the reviewed studies is the enhancement of learners' self-confidence and satisfaction. These psychological benefits play a crucial role in students' readiness for real-world clinical practice. Jawabreh et al. (2025) found that students exposed to HFS in psychiatric nursing settings reported significantly higher levels of self-confidence and satisfaction compared to those in traditional learning groups. This finding is consistent with Alshehri et al. (2023), who in a systematic review concluded that HFS contributes to better clinical reasoning skills by immersing learners in dynamic, high-pressure scenarios where they must make timely, evidence-based decisions.

Furthermore, student perceptions and acceptance of HFS as a learning tool were overwhelmingly positive. Casallas-Hernández et al. (2025), applying the Technology Acceptance Model (TAM), demonstrated high perceived usefulness and ease of use of simulation technology among nursing students. These perceptions were associated with greater engagement and improved learning outcomes. Abdulmohdi and McVicar (2024) echoed this perspective in their qualitative study, highlighting how students viewed HFS as instrumental in preparing them for the complexities of clinical practice, especially in areas requiring nuanced decision-making.

Notably, the effectiveness of HFS was also associated with its fidelity and the presence of structured debriefing sessions. Ayed and Khalaf (2018) emphasized that the realism of the simulation and timely feedback during debriefing enhance students' cognitive processing, allowing them to reflect on their decisions and correct errors. Similarly, Lei et al. (2022) supported the idea that high-fidelity and feedback-rich environments significantly improve knowledge retention and clinical performance. These findings point to the need for careful instructional design and facilitation to maximize the educational value of simulation.

In summary, the evidence synthesized in this review strongly supports the integration of high-fidelity simulation into nursing curricula as an effective strategy for improving clinical decision-making. The positive outcomes reported across diverse educational contexts and clinical scenarios highlight the versatility and robustness of HFS in preparing future nurses for safe, competent, and confident practice. Further research could explore the long-term impact of HFS on professional practice and patient care outcomes, as well as cost-effectiveness and faculty training considerations to support its sustainable implementation.

## CONCLUSION

In conclusion, this systematic review highlights the substantial effectiveness of high-fidelity simulation (HFS) in enhancing clinical decision-making among nursing students. Across diverse educational settings and clinical contexts, HFS consistently improved students' clinical judgment, critical thinking, confidence, and overall preparedness for real-life practice. The findings affirm that integrating HFS into nursing education offers a valuable strategy for bridging the gap between theoretical knowledge and practical application. By providing realistic, immersive experiences and opportunities for reflective learning, HFS equips future nurses with the skills necessary to make timely and accurate clinical decisions, ultimately contributing to improved patient safety and quality of care.

## REFERENCES

1. Abdulmohdi, N., & McVicar, A. (2024). Student nurses' perceptions of the role of high-fidelity simulation in developing decision-making skills for clinical practice: A qualitative research study. *SAGE Open Nursing*, *10*, 1–12.
2. Afonso, I. (2024). The Impact of Simulation-Based Learning on Clinical Decision-Making Skills in Nursing Students. *ICMERD-International Journal of Nursing Science (ICMERD-IJNS)*, *5*(2), 1-6.
3. Akalin, A., & Sahin, S. (2020). The impact of high-fidelity simulation on knowledge, critical thinking, and clinical decision-making for the management of pre-eclampsia. *International Journal of Gynecology & Obstetrics*, *150*(3), 354–360.
4. Alshehri, F. D., Jones, S., & Harrison, D. (2023). The effectiveness of high-fidelity simulation on undergraduate nursing students' clinical reasoning-related skills: A systematic review. *Nurse Education Today*, *121*, 105679.
5. Ayed, A., & Khalaf, I. (2018). The outcomes of integrating high fidelity simulation in nursing education: An integrative review. *Open Journal of Nursing*, *8*(5), 292–302.
6. Ayed, A., Khalaf, I. A., Fashafsheh, I., Saleh, A., Bawadi, H., Abuidhail, J., ... & Joudallah, H. (2022). Effect of high-fidelity simulation on clinical judgment among nursing students. *INQUIRY: The Journal of Health Care Organization, Provision, and Financing*, *59*, 00469580221081997.
7. Ayed, A., Malak, M. Z., Alamer, R. M., Batran, A., Salameh, B., & Fashafsheh, I. (2023). Effect of high fidelity simulation on clinical decision-making among nursing students. *Interactive Learning Environments*, *31*(4), 2185–2193.
8. Casallas-Hernández, N., Castillo-Daza, C. A., & González-Guzmán, V. A. (2025). Acceptance and effectiveness of high-fidelity simulation in nursing education: Application of the Technology Acceptance Model (TAM). *Clinical Simulation in Nursing*, *105*, 101765.
9. Chow, K. M., Ahmat, R., Leung, A. W., & Chan, C. W. (2023). Is high-fidelity simulation-based training in emergency nursing effective in enhancing clinical decision-making skills? A mixed methods study. *Nurse Education in Practice*, *69*, 103610.

10. D'Souza, M. S., Arjunan, P., & Venkatesaperumal, R. (2017). High fidelity simulation in nursing education. *International Journal of Health Sciences and Research*, 7(7), 340–353.
11. Duarte, H. M. S., Castanheira, J. A., Pereira, A. S. F., Pragosa, Â., Santos, E. T. P., & Dixe, M. D. A. (2024). Comparative study between high-fidelity simulation and medium-fidelity simulation in decision-making of nursing students: Experimental study. *Revista Latino-Americana de Enfermagem*, 32, e4269.
12. Jawabreh, N., Hamdan-Mansour, A., Harazne, L., & Ayed, A. (2025). Effectiveness of high-fidelity simulation on practice, satisfaction, and self-confidence among nursing students in mental health nursing class. *BMC nursing*, 24(1), 622.
13. Lei, Y. Y., Zhu, L., Sa, Y. T. R., & Cui, X. S. (2022). Effects of high-fidelity simulation teaching on nursing students' knowledge, professional skills and clinical ability: A meta-analysis and systematic review. *Nurse Education in Practice*, 60, 103306.
14. Mohammadpourhodki, R., & Karimi Moonaghi, H. (2024). Effectiveness of high-fidelity simulation in enhancing the clinical judgment of undergraduate nursing students: A systematic review. *Medical Education Bulletin*, 5(2), 983–995.
15. Nair, M. A., Muthu, P., & Abuijlan, I. A. (2024). The effectiveness of high-fidelity simulation on clinical competence among nursing students. *SAGE Open Nursing*, 10, 23779608241249357.
16. Wong, F. M., Chan, A. M., Lee, N. P., & Luk, K. K. (2023, August). Can high-fidelity patient simulation be used for skill development in junior undergraduate students: A quasi-experimental study. *Healthcare*, 11(15), 2221.
17. Zhen, L. I., Huang, F. F., Shiah-Lian, C. H. E. N., Anni, W. A. N. G., & Yufang, G. U. O. (2021). The learning effectiveness of high-fidelity simulation teaching among Chinese nursing students: A mixed-methods study. *Journal of Nursing Research*, 29(2), e141.