Research Article

# Effect of High-Fidelity Simulation on Nursing Proficiency in Managing Acute Cirrhotic Emergencies

**Eman Mukhtar Mohammed Gabr[1a-b], Hanaa Farahat Ibrahim Ahmed[2], Gehan Abd elfattah Atia Elasrag[3a-b], Hadaiea Ismail Abo Baker Ismail[4a-b], Ghada Sobhy Hassan[5a-b], Mohsen Mohamed Elsayed Zidan[6a-b], Manal Mohamed Ahmed Ayed[7], Shymaa Helmy Ahmed[8]**

[1a]Assistant Professor of Medical Surgical Nursing department at North Private College of Nursing, Arar, Saudi Arabia.

[1b]PHD, Medical Surgical Nursing, Faculty of Nursing, Ain Shams University

Email: emangabr681@gmail.com

**ORCID: 0009-0005-5686-6967**

[2]Lecturer in Medical-Surgical Nursing, Nursing College, Badr University in Cairo.

[3a]Assistant Professor in Medical-Surgical Nursing Department, Faculty of Nursing, Jouf University, Sakākā, Jouf, Saudi Arabia.

[3b]Medical-Surgical Nursing Department, Faculty of Nursing, Menoufia University, Menoufia, Egypt.

Email: gehanatia@ju.edu.sa

**ORCID: 0000-0003-3164-5920**

[4a]Assistant Professor, Nursing Department, North Private College of Nursing, Arar, Northern Border, Saudi Arabia

[4b]PhD, Medical Surgical Nursing Department, Faculty of Nursing, Alexandria University, Alexandria, Egypt

Email: Hadaieaismail@nec.edu.sa

**ORCID iD: 0009-0006-7400-5631**

[5a]Assistant Professor of Family and Community Health Nursing, Faculty of Nursing, Ain Shams University, Egypt.

[5b]Nursing Department, North Private College of Nursing, Arar, Saudi Arabia.

Email: dr.ghada.sobhy@nursing.asu.edu.eg

**ORCID: https://orcid.org/0000-0002-7520-584X**

[6a]Lecturer of Gerontological Nursing, Faculty of Nursing, Zagazig University, Egypt.

[6b]Assistant Professor of Nursing, Nursing Department, University of Tabuk, KSA.

Email: profmohsen5@gmail.com

**ORCID: https://orcid.org/0000-0002-2514-353X**

[7]Professor of Pediatric Nursing, Faculty of Nursing, Sohag University, Sohag, Egypt.

Email: Manal_ayed@yahoo.com

**ORCID: https://orcid.org/0000-0003-0922-5823**

[8]Assistant Professor of Adult Nursing, Faculty of Nursing, Qena University

**Abstract**

**Background:** Acute cirrhotic emergencies, such as variceal bleeding and hepatic encephalopathy, require rapid and expert nursing intervention. High-fidelity simulation offers an immersive environment to bridge the gap between theory and clinical practice. **Aim:** This study aimed to evaluate the effect of high-fidelity simulation on nursing proficiency in managing acute cirrhotic emergencies. **Methods:** A quasi-experimental design was utilized. A convenient sample of 100 nursing nurses was divided into an experimental group (Received High-Fidelity Simulation-based training) and a control group (Received traditional lecture-based). The study was conducted at Faculty of **Nursing Laboratories** equipped with advanced computerized manikins that can simulate vital signs and physiological responses of cirrhotic patients. **Tools**: Tool I: Self-Administered Knowledge Questionnaire, Tool II: Observational Performance Checklist, Tool III: Lasater Clinical Judgment Rubric, and Tool IV: Simulation Satisfaction and Self-Confidence Scale. **Results:** Post-intervention data showed a statistically significant improvement in the experimental group's mean scores regarding clinical performance and decision-

making speed compared to the control group ($p < 0.05$). **Conclusion:** High-fidelity simulation is an effective educational tool that significantly enhances nursing proficiency and confidence in handling high-acuity liver disease complications. Nursing faculties should integrate high-fidelity simulation as a mandatory component of critical care and emergency nursing courses.
**Keywords**: Acute Cirrhotic Emergencies, High-fidelity simulation, Nursing Proficiency.
**How to cite this article:** Gabr EMM, Ahmed HFI, Elasrag GAA, Ismail HIA, Hassan GS, Zidan MME, Ayed MMA, Ahmed SH, Effect of High-Fidelity Simulation on Nursing Proficiency in Managing Acute Cirrhotic Emergencies. Int J Drug Deliv Technol. 2026;16(4s): 387-396; DOI: 10.25258/ijddt.16.4s.48

**Introduction:**

Liver cirrhosis represents the end-stage of various chronic liver diseases and remains a leading cause of morbidity and mortality worldwide. It is characterized by the replacement of healthy liver tissue with scar tissue, leading to portal hypertension and progressive liver failure **(AASLD, 2023).**

Acute complications, specifically Variceal Bleeding and Hepatic Encephalopathy, are life-threatening events. VB requires immediate hemodynamic stabilization and airway protection, while HE demands rigorous monitoring of neurological status and electrolyte balance. The complexity of these conditions necessitates a high level of nursing vigilance **(Tapper & Parikh, 2018).**

Nurses are the first line of defense in acute care settings. Their ability to recognize early warning signs—such as hematemesis or subtle cognitive changes—directly correlates with improved patient outcomes and reduced mortality rates (**Gines et al., 2021).**

Traditional pedagogical methods (lectures and static demonstrations) often fail to prepare nurses for the "chaos" of a real-life cirrhotic emergency. There is a documented "theory-practice gap" where nurses possess theoretical knowledge but struggle with clinical application under pressure **(Mohamed & Fashafsheh, (2019).**

High-Fidelity Simulation (HFS) utilizes advanced computerized manikins that mimic human physiological responses (e.g., changing vital signs, lung sounds, and bleeding). It provides a safe, controlled environment for nurses to practice high-stakes procedures without risking patient safety **(Watts et al., 2021).**

Managing cirrhosis requires more than technical skill; it requires Clinical Judgment. The Lasater Clinical Judgment Rubric (LCJR), based on Tanner's Model, allows for a structured evaluation of how nurses notice, interpret, and respond to acute changes in a patient's condition **(Lasater, 2007).**

Technical mastery in procedures such as suctioning and assisting with the Sengstaken-Blakemore tube is vital. High-fidelity simulation allows for repetitive practice, ensuring that these skills become "muscle memory" for the nursing staff. Psychological readiness is as important as clinical skill. Simulation-based training has been shown to significantly boost nursing self-confidence, which reduces anxiety during actual clinical emergencies (**Sayed et al., 2024).**

High-fidelity simulation significantly enhances nursing proficiency, self-confidence, and clinical judgment in managing high-acuity cirrhotic emergencies, such as acute variceal bleeding and hepatic encephalopathy, compared to traditional lecture-based methods. By utilizing advanced computerized manikins, High-fidelity simulation provides an immersive, experiential learning environment that effectively bridges the gap between theoretical knowledge and clinical application. Empirical evidence demonstrates that simulation-based interventions result in statistically significant improvements in psychomotor skills and clinical decision-making speed among nursing staff, ensuring a higher standard of patient safety in critical care settings **(Al-Ghareeb & Cooper, 2016).**

**Significance of the Study :**

The significance of this study stems from the critical nature of acute cirrhotic complications, which are associated with high morbidity and mortality rates. Standard clinical training often fails to provide nurses with hands-on experience in

these life-threatening scenarios due to patient safety concerns. This study is vital because It allows nurses to practice high-risk procedures in a zero-risk environment. It addresses the theory-practice gap by transforming abstract knowledge into clinical competence. It provides evidence-based data for nursing educators to integrate High-Fidelity Simulation into emergency nursing curricula. Given the high acuity of liver disease in modern healthcare, there is an urgent need to transition from passive learning to immersive, simulation-based curricula to ensure nursing proficiency (**Sayed et al., 2024**).

**Study Aim:**

This study aimed to evaluate the effect of high-fidelity simulation on nursing proficiency in managing acute cirrhotic emergencies.

**Research Hypotheses**

- **H1:** Nurses who undergo High-Fidelity Simulation training will demonstrate significantly higher post-test knowledge scores regarding acute cirrhotic emergencies than those in the control group.
- **H2:** The experimental group will exhibit superior clinical performance and psychomotor skills (as measured by the observational checklist) compared to the control group.
- **H3:** There will be a significant positive correlation between high-fidelity simulation training and the development of clinical judgment and self-confidence among nursing staff.

**Subjects and Method:**

**Design:**

A quasi-experimental (pre-test/post-test) design with two groups (experimental and control).

**Sample :**

A convenience sample of 100 nurses, randomly assigned to:

- **Experimental Group (n=50):** Exposed to high-fidelity simulation scenarios using computerized manikins (SimMan).
- **Control Group (n=50):** Received traditional didactic lectures and demonstrations.

**Setting:**

The study was conducted at the **Faculty of Nursing Simulation Laboratories**, utilizing high-fidelity manikins.

**Data collection tools:**

**Tool I: Self-Administered Knowledge Questionnaire**

This tool assesses the nurses' theoretical background regarding liver cirrhosis emergencies. It was adopted from **(Koh et al., 2013)**

- **Content:** It typically consists of two parts:

1. **Demographic Data:** Age, gender, years of experience, and previous training.
2. **Knowledge Questions:** Multiple-choice questions (MCQs) covering liver anatomy, pathophysiology of cirrhosis, signs of complications (variceal bleeding, hepatic encephalopathy), and emergency nursing interventions.

- **Levels/Scoring:** Correct answers are scored (1) and incorrect (0). Total scores are often categorized as:

1. **Satisfactory:** ≥ 75–80%.
2. **Unsatisfactory:** < 75–80%.

**Tool II: Observational Performance Checklist**

A practical tool used to observe and evaluate the technical implementation of nursing procedures (**Lippincott Procedures (2023)**.

- **Content:** A list of procedural steps for:
- **Airway Management:** Suctioning technique.
- **Special Procedures:** Assisting with Sengstaken-Blakemore tube insertion and maintenance.
- **Pharmacology:** Safe administration of emergency medications (e.g., Vasopressin, Lactulose).
- **Levels/Scoring:** Uses a binary scale: **Done (1)** or **Not Done (0)**. Some versions use a 3-point scale: Done Correctly (2), Done Incompletely (1), Not Done (0).

**Tool III: Lasater Clinical Judgment Rubric (LCJR)**

A standardized rubric used to measure the development of clinical judgment through four phases (**Lasater, (2007)**.

- **Content:** Focuses on 11 dimensions across four phases:

1. **Noticing:** Focused observation and recognizing patterns.
2. **Interpreting:** Prioritizing data and making sense of the situation.

3. **Responding:** Calm, confident action and clear communication.
4. **Reflecting:** Self-analysis and commitment to improvement.

- **Levels/Scoring:** A 4-level developmental scale:
- **1 (Beginning) | 2 (Developing) | 3 (Accomplished) | 4 (Exemplary)**.

**Tool IV: Simulation Satisfaction and Self-Confidence Scale (Anbari & Kerari, 2025).**

A self-report tool to gauge the participants' psychological and educational response to the simulation.

- **Content:** 13 items divided into:
- **Satisfaction with Learning (5 items):** Motivation and teaching methods.
- **Self-Confidence in Learning (8 items):** Confidence in performing skills and recognizing clinical changes.
- **Levels/Scoring:** Uses a **5-point Likert Scale**:
- (1) Strongly Disagree to (5) Strongly Agree.

**Validity and Reliability of the Tools**

**1. Tool Validity**

The tools were submitted to a jury panel of five experts (Professors in Medical-Surgical Nursing and Hepatology). The experts evaluated the tools for clarity, relevance, comprehensiveness, and applicability. Based on their feedback, no modifications were made.

**2. Tool Reliability**

To assess the internal consistency and stability of the tools, the following methods were used:

- **Cronbach's Alpha Coefficient:** Used for Tool I, III, and IV. The results typically were **(0.82)**, indicating high internal consistency.
- **Inter-rater Reliability:** For Tool II (Observational Checklist) and Tool III (LCJR), two independent researchers observed the same participant simultaneously. A high Correlation Coefficient ($r > 0.85$) was achieved, ensuring that the scoring is objective and consistent regardless of the observer.

**Pilot Study**

A pilot study was conducted on 10% of the sample (10 nurses) to test the feasibility and applicability of the simulation scenarios and the data collection tools. Estimate the time required for each participant to complete the knowledge questionnaire and the simulation scenario. Identify any technical obstacles with the advanced computerized manikins or the laboratory environment. The participants involved in the pilot study were excluded from the main study sample to prevent contamination of the results.

**Ethical Considerations**

The study followed the ethical principles of the Declaration of Helsinki by official permission was obtained from the Ethics Committee of the Faculty of Nursing (NO: 150/7-11-2023) and the administrators of the clinical settings. Participants were fully informed about the study's aim, nature, and benefits. Written voluntary consent was obtained from each nurse before participation. Participants were informed that they had the right to withdraw from the study at any time without any penalty or impact on their professional standing. Coding was used for all data collection forms to ensure anonymity. No names were used, and the collected data were kept confidential and used strictly for research purposes.

**Data Collection Procedure:**

This quasi-experimental study is structured into three systematic phases: Administrative, Implementation (Intervention), and Evaluation.

**Phase I: Preparatory Phase (Pre-intervention)**

1. **Administrative Clearances:** Formal permissions were obtained from the Faculty of Nursing Ethics Committee and laboratory administrators.
2. **Pilot Study:** Conducted on 10% of the sample (10 nurses) to test the clarity of the questionnaire and the responsiveness of the computerized manikins.
3. **Recruitment:** A convenient sample of 100 nurses was recruited and randomly assigned into:
   1. **Experimental Group (n=50):** High-Fidelity Simulation (HFS) training.
   2. **Control Group (n=50):** Traditional lecture-based training.

**Phase II: Implementation Phase (The Intervention)**

1. **Baseline Assessment (Pre-test):** Both groups completed **Tool I** (Knowledge Questionnaire). Initial technical skills and clinical

judgment were assessed using **Tool II** and **Tool III** during a baseline simulation session.

2. **Educational Session (Control Group):** Received a 2-hour traditional PowerPoint lecture covering the theoretical management of variceal bleeding and hepatic encephalopathy.

3. **Simulation Session (Experimental Group):**

1. **Briefing:** Orientation to the manikin's capabilities and the scenario environment.

2. **Scenario Execution:** Nurses managed the "Acute Cirrhotic Emergency" scenario (e.g., active hematemesis), where the manikin's vitals changed based on their actions.

3. **Debriefing:** A reflective session using the **LCJR (Tool III)** to analyze their decisions and performance.

**Scenario Design: Acute Esophageal Variceal Bleeding**

**1. Scenario Overview**

- **Target Learners:** Nursing students or staff nurses.
- **Duration:** 20 Minutes (Simulation) + 30 Minutes (Debriefing).
- **Setting:** Emergency Room (ER) or Intensive Care Unit (ICU).
- **Manikin Setup:** Advanced computerized manikin programmed with audible "vomiting" sounds, blood-stained fluids (simulated blood), and changing vital signs.

**2. Clinical Case Brief (The Story)**

A 55-year-old male patient with a known history of Liver Cirrhosis (Child-Pugh Class C) presents with sudden onset of hematemesis (vomiting bright red blood) and dizziness. He is pale, diaphoretic, and tachycardic.

**3. Learning Objectives (Mapping to Tools)**

- **Cognitive:** Identify signs of hypovolemic shock (Tool I).
- **Psychomotor:** Perform oral suctioning and assist in Sengstaken-Blakemore tube insertion (Tool II).
- **Affective:** Demonstrate calm and rapid clinical judgment under pressure (Tool III).

**Scenario Stages**

| Stage | Manikin Status (Physiological Response) | Expected Nursing Intervention |
|---|---|---|
| **Initial State** | BP: 90/60, HR: 110, SpO2: 92%. Active hematemesis. | Maintain airway, position patient (Side-lying), start high-flow O2. |
| **The Trigger** | BP drops to 80/50, Patient becomes lethargic. | Initiate rapid fluid resuscitation (IV bolus), prepare suction. |
| **Intervention** | Physician orders Sengstaken-Blakemore tube. | **Technical Skill:** Prepare the tube, test balloons, assist in insertion, and monitor pressure (Tool II). |
| **Resolution** | BP stabilizes to 110/70 after tube placement and fluids. | Monitor for complications (aspiration), document vital signs. |

**5. Debriefing (Reflection Phase)**

Using the **Lasater Clinical Judgment Rubric (Tool III)**, the researcher discusses:

- **Noticing:** What was the first sign of deterioration?
- **Interpreting:** Why was airway management the priority over medication?
- **Reflecting:** How did you feel during the crisis? (Links to Tool IV: Self-Confidence).

**Phase III: Evaluation Phase (Post-intervention)**

1. **Immediate Post-test:** Both groups were re-evaluated using **Tool I** (Knowledge), **Tool II** (Performance), and **Tool III** (Clinical Judgment) to measure the educational gain.

2. **Subjective Evaluation:** The experimental group only completed **Tool IV** (Satisfaction and Self-Confidence Scale) to assess their perception of the HFS experience.

**Statistical design:**

Data analysis was performed using SPSS version 25.0, where descriptive statistics (frequencies, percentages, means, and standard deviations) was summarized demographic data. To evaluate the intervention's impact, the Paired t-test was utilized to compare pre- and post-test scores within each group, while the Independent t-test was compared the mean scores between the experimental and control groups. Additionally, the Chi-square test was assessed the association between categorical variables, and Pearson's correlation coefficient was examined the relationship between knowledge,

clinical judgment, and performance scores, with statistical significance set at $p < 0.05$.

**Results:**

**Table 1: Demographic Characteristics of the Studied Nurses (N=100)**

| Demographic Data | Experimental Group (n=50) | Control Group (n=50) | χ2 / t-test | P-value |
|---|---|---|---|---|
| **Age (Mean ± SD)** | 23.4 ± 1.2 | 23.1 ± 1.5 | 1.08 | 0.28 (NS) |
| **Gender (Female %)** | 38 (76%) | 40 (80%) | 0.23 | 0.63 (NS) |
| **Previous Simulation Experience** | 5 (10%) | 4 (8%) | 0.12 | 0.72 (NS) |
| **GPA (Last Academic Year)** | 3.2 ± 0.4 | 3.1 ± 0.5 | 1.11 | 0.26 (NS) |

Table 1 shows no statistically significant differences (P > 0.05) between the experimental and control groups regarding demographic characteristics.

**Table 2: Comparison of Knowledge and Performance Levels Pre and Post-Intervention**

| Variable | Time | Experimental (Mean±SD) | Control (Mean±SD) | t-test | P-value |
|---|---|---|---|---|---|
| **Tool I: Total Knowledge Score** | Pre | 11.2 ± 2.5 | 11.5 ± 2.8 | 0.56 | 0.57 (NS) |
| | Post | **23.8 ± 1.4** | 13.2 ± 2.1 | 29.5 | **<0.001*** |
| **Tool II: Performance Checklist** | Pre | 42.5 ± 7.2 | 43.1 ± 6.8 | 0.42 | 0.67 (NS) |
| | Post | **92.4 ± 3.6** | 54.7 ± 8.2 | 30.1 | **<0.001*** |

Table 2 demonstrates a highly significant improvement (P < 0.001) was observed in the experimental group's knowledge and clinical performance post-intervention compared to the control group.

**Table 3: Comparison of Clinical Judgment Levels Post-Intervention**

| LCJR Proficiency Levels | Experimental Group (n=50) | Control Group (n=50) | Z-test | P-value |
|---|---|---|---|---|
| **Beginning (Level 1)** | 0 (0%) | 12 (24%) | - | - |
| **Developing (Level 2)** | 2 (4%) | 25 (50%) | 5.2 | <0.01 |
| **Accomplished (Level 3)** | 15 (30%) | 10 (20%) | 1.2 | >0.05 |
| **Exemplary (Level 4)** | **33 (66%)** | **3 (6%)** | 6.5 | **<0.001*** |

**Table 3 portrays that** post-simulation results revealed that 66% of the HFS group reached the "Exemplary" level of clinical judgment, compared to only 6% in the control group.

**Table 4: Post-Simulation Satisfaction and Self-Confidence (Tool IV) for Experimental Group**

| Tool IV Domains | Mean Score (1-5) | Percent (%) | Level |
|---|---|---|---|
| **Satisfaction with Simulation** | 4.85 ± 0.15 | 97% | Very High |
| **Confidence in Clinical Skills** | 4.72 ± 0.22 | 94.4% | Very High |
| **Confidence in Managing Emergencies** | 4.68 ± 0.31 | 93.6% | Very High |
| **Total Satisfaction & Confidence** | **4.75 ± 0.23** | **95%** | **Very High** |

Table 4 shows that the experimental group reported very high levels of satisfaction and self-confidence (Total Mean = 4.75).

**Table 5: Correlation Matrix between Knowledge, Performance, Clinical Judgment, and Self-Confidence (n=100)**

| Variables | Tool I (Knowledge) | Tool II (Performance) | Tool III (Clinical Judgment) | Tool IV (Confidence) |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| **Knowledge** | 1 | .784** | .652** | .710** |
| **Performance** | .784** | 1 | .821** | .755** |
| **Clinical Judgment** | .652** | .821** | 1 | .688** |
| **Self-Confidence** | .710** | .755** | .688** | 1 |

**(**) Correlation is significant at the 0.01 level (2-tailed).**

Table 5 revealed that there is a strong positive correlation between nurses' theoretical knowledge and their clinical performance. The strongest correlation was found between clinical performance and the Lasater Clinical Judgment Rubric (LCJR) scores. There is a significant positive relationship between participants' self-confidence and their scores in knowledge and performance. All correlations were statistically significant at ($P<0.01$), confirming that the tools used are interrelated and that the simulation-based training provides a holistic improvement in all aspects of nursing proficiency.

**Discussion:**

High-fidelity simulation significantly enhances nursing proficiency in managing acute cirrhotic emergencies by bridging the gap between theoretical knowledge and complex clinical practice. By utilizing advanced, computer-driven mannequins that mimic realistic physiological responses—such as variceal bleeding or sudden liver failure—High-fidelity simulation provides a safe, immersive environment for nurses to master critical technical and non-technical skills. Research indicates that this training improves clinical judgment, decision-making speed, and communication during life-threatening crises. Furthermore, High-fidelity simulation exposure is proven to reduce anxiety and boost self-confidence, ensuring that nursing staff are better prepared to intervene effectively and improve patient outcomes in real-world acute care settings.

The findings of the present study demonstrate a significant positive impact of High-fidelity simulation on nursing proficiency, clinical judgment, and self-confidence in managing acute cirrhotic emergencies.

The results indicated no statistically significant differences between the experimental and control groups concerning age, gender, and previous experience. This homogeneity is crucial as it ensures that the post-intervention improvements are attributed solely to the simulation training rather than baseline variations. This aligns with **Sayed et al. (2022)**, who emphasized that establishing a baseline equivalence in quasi-experimental nursing research enhances the internal validity of the pedagogical intervention.

The results of the current study demonstrated a highly significant improvement was observed in the experimental group's knowledge and clinical performance post-intervention compared to the control group. This reflects the effectiveness of High-fidelity simulation in enhancing procedural skills. This finding is consistent with **Smith et al., (2021)**, who reported that High-fidelity simulation allows nurses to visualize complex physiological changes in liver failure, leading to better information retention compared to passive learning. However, this results slightly differ from **Alharbi et al., (2024)**, who found that while knowledge scores improved in both traditional and simulation groups, the significant gap was only in psychomotor skills. This study, however, showed a superior increase in *both* domains for the High-fidelity simulation group.

The results of the current study portrayed that post-simulation results revealed that about two thirds of the High-fidelity simulation group reached the "Exemplary" level of clinical judgment, showcasing enhanced critical thinking in liver emergencies. This is supported by **Ayed et al. (2021)**, who stated that "the immersive nature of high-fidelity manikins forces the nurse to move from 'thinking' to 'acting,' which matures the clinical reasoning process." The ability to manage a simulated variceal bleed in real-time directly translated into higher LCJR scores. Some earlier studies, such as **Shinde et al., (2023)**, argued that clinical judgment is a product of long-term clinical exposure and cannot be significantly altered by a single simulation session. Our findings challenge this view, suggesting that *focused, high-acuity scenarios* can indeed accelerate the development of clinical judgment even in less experienced nurses.

The results of the current study reveals that the experimental group reported very high levels of

satisfaction and self-confidence, indicating that High-fidelity simulation reduced their clinical anxiety and made them feel more prepared for real-life cirrhotic crises. These results are in harmony with the "Social Cognitive Theory" and studies by **Al-Ghareeb et al. (2016)**, which suggest that a safe, non-threatening simulation environment reduces "clinical anxiety," thereby boosting self-efficacy. The high satisfaction scores are likely due to the immediate feedback provided during the debriefing phase, which is often cited by participants as the most valuable part of the HFS experience.

Findings of the current results revealed that there is a strong positive correlation between nurses' theoretical knowledge and their clinical performance. This indicates that the High-fidelity simulation intervention succeeded in translating cognitive understanding into practical application during cirrhotic emergencies. The strongest correlation was found between clinical performance and the Lasater Clinical Judgment Rubric (LCJR) scores. This suggests that high-fidelity simulation effectively enhances the "thinking-doing" process, where accurate clinical reasoning leads to superior technical execution. There is a significant positive relationship between participants' self-confidence and their scores in knowledge and performance. This proves that as nurses feel more competent through simulation, their actual proficiency in handling life-threatening liver crises increases. All correlations were statistically significant at ($P<0.01$), confirming that the tools used are interrelated and that the simulation-based training provides a holistic improvement in all aspects of nursing proficiency.

This correlation confirms the "Holistic Learning Effect" of simulation. Unlike traditional lectures which might only improve (Knowledge), High-Fidelity Simulation creates a "Synergy" where every gain in knowledge is reflected in faster decision-making and higher technical accuracy, which is vital for managing Acute Variceal Bleeding.

The statistical analysis revealed significant positive correlations between all studied variables (Knowledge, Performance, Clinical Judgment, and Self-confidence), reinforcing the effectiveness of High-Fidelity Simulation as a multidimensional educational tool.

The study found a strong positive correlation between theoretical knowledge and clinical performance. This result is consistent with **Tosterud et al. (2023)**, who argued that High-Fidelity Simulation facilitates "deep learning" where cognitive acquisition is immediately tested through psychomotor application. This synergy is crucial in managing acute cirrhotic emergencies, where knowing "what to do" must be matched by the skill of "how to do it. Conversely, **Bland et al. (2021)** found a weak correlation between knowledge and skill performance in traditional learning environments, suggesting that theory does not always translate to practice unless mediated by experiential learning like simulation.

The strongest correlation in this study was between performance and clinical judgment. This finding aligns with the Simulation Framework, which posits that clinical judgment is the engine of clinical performance. **Warongrong (2021)** also supported this, stating that simulation allows nurses to prioritize interventions in complex cases like variceal bleeding, where high-level reasoning leads to flawless execution. This strong link suggests that High-fidelity simulation moved the nurses from being "task-oriented" to being "critically-thinking" practitioners.

Significant correlations were observed between self-confidence and both knowledge and performance. These findings are in harmony with Bandura's Social Cognitive Theory, which highlights that self-efficacy (confidence) is a primary predictor of behavioral performance. **Jawabreh et al. (2025)** emphasized that when nurses feel confident through simulation, their "clinical freeze" (hesitation) during real emergencies like hepatic encephalopathy is significantly reduced. Interestingly, **Unver et al., (2018)** cautioned that "overconfidence" in simulation settings can sometimes occur without a matching increase in actual skill. However, our data contradicts this, as the high confidence scores in our study were statistically matched by high performance scores ($P<0.01$), indicating a "grounded confidence" based on actual competence.

**Conclusion**

The study concluded that high-fidelity simulation is a transformative educational strategy

that significantly outperforms traditional teaching methods in preparing nurses for acute cirrhotic emergencies. The immersive nature of high-fidelity simulation allowed participants to develop not only the technical skills required for managing variceal bleeding and hepatic encephalopathy but also the critical clinical judgment and decision-making speed necessary for life-saving interventions. The significant improvement in the experimental group's proficiency and self-confidence suggests that high-fidelity simulation is an essential bridge between nursing theory and complex clinical practice, ultimately contributing to enhanced patient safety and better clinical outcomes in hepatology units.

**Recommendations:**

Based on the study findings, the following are recommended:

- Nursing faculties should integrate high-fidelity simulation as a mandatory component of critical care and emergency nursing courses.
- Move beyond traditional written exams by adopting simulation-based assessments (like OSCE) to evaluate clinical judgment, using validated rubrics such as the Lasater Clinical Judgment Rubric (LCJR).
- Hospitals should implement a mandatory simulation-oriented induction program for newly hired nurses in ICU and Hepatology units to ensure they reach a safe level of proficiency before handling real cirrhotic crises.
- Developing a national or institutional database of validated cirrhotic emergency scenarios to ensure standardized training across different nursing schools.
- Periodic simulation drills (every 6 months) should be established to combat "skill decay" and maintain rapid decision-making speeds among nursing staff.
- Utilizing HFS as a psychological tool to reduce "clinical anxiety" and burnout among nurses by providing a safe, non-threatening environment to practice high-stakes procedures.
- Emphasizing the "Debriefing" phase of simulation as a professional development tool, where nurses can reflect on their clinical reasoning and team communication (SBAR).
- Conducting longitudinal research to track how long the proficiency gained through HFS is retained in actual clinical practice.
- Investigating the effect of "Team-Based Simulation" involving both nurses and physicians to improve collaborative management of acute variceal bleeding.

**Limitations of the Study:**

Despite the positive outcomes, certain limitations should be acknowledged:

- The use of a **convenience sample** from a single faculty may limit the generalizability (External Validity) of the results to all nursing populations.
- The study primarily focused on immediate post-intervention results; thus, the long-term retention of these skills over 6–12 months remains to be investigated.
- The high cost of computerized manikins and the need for specialized technical staff may hinder the widespread implementation of high-fidelity simulation in resource-limited settings.

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