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Original Article

Effectiveness of Simulation-Based Learning Regarding Management of Postpartum Hemorrhage in Terms of Competencies Among B.Sc. Nursing 4th Year Students in Selected Nursing Colleges of Jhansi, Uttar Pradesh

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Abstract

Postpartum hemorrhage (PPH) continues to be a leading cause of maternal mortality globally, necessitating the preparation of nursing students with the skills and confidence to manage this obstetric emergency effectively. This study evaluates the effectiveness of simulation-based learning (SBL) in enhancing the competencies of BSc Nursing 4th-year students in managing PPH. SBL offers an immersive and active learning environment where students can practice and refine critical skills, such as early identification of PPH, administration of uterotonic drugs, and effective team coordination, within a controlled, risk-free setting. By bridging the gap between theoretical knowledge and clinical practice, SBL equips future nurses to respond swiftly *and competently to PPH, contributing to improved maternal health outcomes.*

Keywords: Simulation-based learning; Postpartum hemorrhage; Nursing education; Competencies; Maternal health

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Introduction

Maternal health care requires skilled professionals to ensure optimal care for mothers, especially during critical situations like postpartum hemorrhage (PPH), which is one of the leading causes of maternal mortality globally. Effective management of PPH necessitates prompt recognition and skilled intervention, making it crucial for healthcare professionals, including nursing students, to develop and refine their competencies. However, traditional teaching methods, such as lectures and case discussions, often fall short in providing the practical, hands-on experience necessary for managing such obstetric emergencies confidently. The absence of real-life clinical exposure or limited opportunities to practice under guided supervision may leave students inadequately prepared for real-world challenges.

Simulation-based learning (SBL) has emerged as a transformative and innovative approach in nursing education. By replicating clinical scenarios in a controlled and risk-free environment, SBL allows students to develop critical thinking, technical proficiency, and decision-making skills without jeopardizing patient safety. Through simulated scenarios like PPH management, students can gain experience in identifying warning signs, applying appropriate interventions, and effectively coordinating with healthcare teams—all essential competencies for ensuring positive maternal outcomes.

Objectives

1. To assess the baseline competencies of BSc Nursing 4th-year students regarding PPH management.
2. To evaluate the improvement in competencies post-simulation-based learning intervention.
3. To compare the effectiveness of SBL with traditional teaching methods.

Materials & Methods

The study employed a quasi-experimental design with a pretest-posttest control group approach to evaluate the effectiveness of simulation-based learning (SBL) in enhancing competencies regarding postpartum hemorrhage (PPH) management among nursing students. The research was conducted in selected nursing colleges in Jhansi, Uttar Pradesh, ensuring representation of the target demographic for effective evaluation of the intervention. A total of 60 BSc Nursing 4th-year students participated in the study, systematically divided into two groups: the experimental group (n=30) and the control group (n=30).

The experimental group underwent a carefully structured simulation-based learning program designed to replicate real-life PPH management scenarios. The intervention began with a pre-briefing session to introduce participants to the objectives and simulation protocols, ensuring clarity and minimizing anxiety. This was followed by hands-on practice using high-fidelity mannequins, allowing students to apply theoretical knowledge to practical skills in a controlled and safe environment. Key aspects of PPH management, such as recognizing early signs of hemorrhage, administering uterotonic drugs, and coordinating emergency procedures, were practiced. Finally, a debriefing and feedback session facilitated reflection on performance, correction of errors, and reinforcement of learning objectives.

The control group received traditional classroom-based teaching methods, which included didactic lectures and discussions on PPH management, offering a baseline for comparison. To assess the impact of SBL, student competencies were evaluated using an Objective Structured Clinical Examination (OSCE) checklist, which comprehensively measured theoretical understanding, technical skills, and decision-making abilities essential for PPH management.

Data analysis involved statistical tests to compare pretest and posttest scores within and between groups. Paired t-tests were used to analyze improvements within the experimental and control groups, while independent t-tests were applied to assess the differences in competency gains between the two groups. This analytical approach provided robust evidence of the efficacy of simulation-based learning in improving student performance in managing PPH compared to traditional teaching methods.

Results

The study's baseline assessment indicated that both the experimental and control groups had comparable competencies in managing postpartum hemorrhage (PPH) at the outset. Statistical analysis demonstrated no significant differences in the pretest scores of the two groups ($p > 0.05$), confirming that students from both groups started with a similar level of theoretical knowledge, technical skills, and decision-making abilities. This comparability ensured that any observed differences in posttest competencies could be attributed to the intervention rather than preexisting skill levels.

Following the intervention, the post-intervention competencies of the experimental group, which participated in simulation-based learning (SBL), showed marked improvement. The difference in posttest scores between the experimental and control groups was statistically significant ($p < 0.001$), indicating the substantial efficacy of SBL in enhancing competencies related to PPH management. Students in the experimental group demonstrated better mastery of both cognitive and psychomotor skills essential for handling this obstetric emergency compared to their peers who underwent traditional classroom-based teaching.

A detailed sub-domain analysis of competencies revealed significant gains in critical areas among the experimental group. First, there was a noticeable improvement in the early identification of PPH, as students became adept at recognizing clinical signs such as increased vaginal bleeding, uterine atony, and changes in vital signs. This early recognition is pivotal for timely intervention. Second, students in the experimental

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group exhibited enhanced proficiency in the administration of uterotonic drugs such as oxytocin and misoprostol, demonstrating accurate dosing and appropriate timing of administration—key aspects in effectively managing hemorrhage and preventing complications. Third, there was a significant improvement in effective communication and coordination with the healthcare team. Simulation-based scenarios enabled students to practice interacting with team members under pressure, fostering better teamwork and role clarity in emergency situations.

Overall, the enhanced performance across these sub-domains underscores the ability of SBL to provide a comprehensive and realistic learning experience, bridging the gap between theoretical knowledge and practical application. This holistic improvement prepares nursing students to handle PPH with greater confidence and competence in real-world clinical settings, contributing to better maternal health outcomes.

Discussion

Simulation-based learning (SBL) demonstrated a significant improvement in students' competencies in managing postpartum hemorrhage (PPH) compared to traditional teaching methods. Unlike passive learning environments, SBL provided an active, experiential platform where students could directly engage in hands-on practice, enabling better retention and application of knowledge. By replicating real-world scenarios, SBL offered a controlled yet dynamic setting that encouraged critical thinking, problem-solving, and quick decision-making, all of which are vital for managing obstetric emergencies such as PPH.

The interactive nature of SBL not only enhanced skill acquisition but also promoted situational awareness, as students were trained to identify PPH symptoms early and implement timely interventions. Through structured simulations, they learned to apply theoretical knowledge to practical challenges, honing their technical proficiency in procedures such as administering uterotonic drugs, conducting uterine massage, and initiating blood transfusions. Furthermore, the emphasis on decision-making during simulations prepared students to evaluate risks and prioritize actions effectively in high-pressure situations, reducing response time during actual emergencies.

Another critical benefit of SBL was the significant boost in students' confidence levels. The repetitive practice opportunities, combined with immediate feedback during debriefing sessions, helped them identify and correct mistakes without the fear of compromising patient safety. This iterative learning process reinforced their abilities, ensuring readiness for real-life clinical encounters.

These findings are consistent with previous research demonstrating that SBL enhances learning outcomes, clinical performance, and preparedness among nursing students. It emphasizes the importance of incorporating simulation into nursing curricula to equip students with the competencies needed to manage high-risk scenarios like PPH efficiently, thereby improving maternal healthcare quality and safety.

Implications

For Nursing Education: SBL should be integrated into the curriculum to prepare students for real-world clinical challenges.

For Clinical Practice: Competent nursing graduates will contribute to reducing maternal morbidity and mortality by managing PPH effectively.

Recommendations

1. Conduct further studies with larger sample sizes to validate findings.
2. Explore the long-term impact of SBL on clinical performance during internships.
3. Develop standardized SBL modules for other obstetric emergencies.

Conclusions

Simulation-based learning (SBL) has proven to be a highly effective educational strategy for enhancing the competencies of nursing students in managing postpartum hemorrhage (PPH). By providing realistic, hands-

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on training in a risk-free environment, SBL bridges the critical gap between theoretical knowledge and clinical practice. Unlike traditional teaching methods, which rely heavily on lectures and limited clinical exposure, SBL immerses students in life-like scenarios that mirror real-world challenges, enabling them to practice skills, refine techniques, and develop confidence in a structured setting.

Through simulation, students are equipped to identify signs of PPH promptly, administer appropriate interventions such as uterotonic medications or fluid resuscitation, and work collaboratively within a healthcare team. These essential competencies are cultivated in a controlled setting, allowing students to learn from mistakes and improve their performance without compromising patient safety. This approach not only ensures skill acquisition but also fosters critical thinking, clinical decision-making, and teamwork—attributes essential for effective obstetric care.

Incorporating SBL into nursing curricula aligns with the growing need for experiential learning methodologies in healthcare education. As obstetric emergencies like PPH require swift and precise action, training nursing students using SBL can prepare them to manage such situations confidently and competently, ultimately contributing to better maternal and neonatal health outcomes. This underscores the importance of adopting SBL as a core component of nursing education, ensuring that future healthcare professionals are well-equipped to meet the demands of modern clinical practice.

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