Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 3, 2977-2981
2025
Publisher: Learning Gate
DOI: 10.55214/25768484.v9i3.5896

Development and effectiveness of a normal newborn care simulation education program for nursing students

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Abstract: This study was conducted to develop and apply simulation-based normal neonatal nursing education and to verify the effects on class satisfaction, learner confidence, and clinical performance ability. The subjects were 65 third-year nursing students in Y City, participating in a single-group pre- and post-test experimental study. Data were collected from March 4 to April 26, 2024, using a self-report questionnaire administered only to students who understood the purpose of the study and provided written consent to participate. Simulation-based normal neonatal nursing education was applied for a total of 8 hours in three stages: preparation for scenario implementation, scenario implementation, and debriefing, with three students in each group. The results of the study showed that there were significant differences in learning satisfaction (t=-7.548, p=0.001), learning confidence (t=-9.163, p=0.001), and clinical performance ability (t=-6.733, p=0.001) before and after simulation-based normal neonatal nursing education. The results of this study confirmed that simulation-based education in the field of pediatric nursing can be an effective teaching and learning method that can supplement observation-based pediatric nursing clinical practice.

Keywords: *Clinical performance ability, Learning confidence, Learning satisfaction, Normal newborns, Nursing students, Simulation.*

1. Introduction

As patient safety and rights become more important, it has become virtually impossible to practice nursing skills on patients in clinical practice [1]. Therefore, opportunities for direct nursing practice by nursing students in clinical practice are gradually decreasing, and most of the practice is mainly based on observation [2]. In particular, pediatric nursing practice targets vulnerable children, so the rights and safety of children must be considered, and due to the sensitive response of guardians, it is becoming increasingly difficult to assign nursing students to special departments such as pediatric general wards and pediatric intensive care units [3]. Neonatal wards are also units where the safety of patients and the risk of infection are exposed, making it even more difficult for nursing students to practice [1]. Therefore, simulation education is being evaluated as a more positive learning method to overcome the limitations of nursing practice education, which has been weakened due to the limitations of such field practice environments and the safety of subjects [4].

Simulation classes are a learning method that improves clinical performance ability by artificially reproducing situations based on virtual scenarios similar to situations that can occur in clinical settings in a laboratory and directly applying knowledge and skills to students by using human-like simulators or standardized patients Cooper and Taqueti [5]. Kim [6] reported that clinical judgment ability, clinical performance ability, and problem-solving ability were the variables with the highest effect sizes in a meta-analysis study on the effectiveness of simulation-based education.

In particular, due to the recent decrease in the number of newborns in the hospital due to the declining birth rate, neonatal practice has become more limited, and thus neonatal-related practice has

History: Received: 20 January 2025; Revised: 17 March 2025; Accepted: 21 March 2025; Published: 29 March 2025
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no choice but to be replaced by simulation practice. While the educational demand for general neonatal assessment and neonatal nursing is high, the conditions for practice are insufficient, and thus an educational method that can develop students' pediatric nursing capabilities is required. Accordingly, this study developed a normal neonatal nursing simulation scenario and applied it to real situations that cannot be experienced in clinical practice to verify the effects on nursing students' class satisfaction, learning confidence, and clinical performance ability, thereby providing basic data for developing an effective simulation program that can develop pediatric nursing capabilities.

2. Materials and Methods

2.1. Research Design and Research Subjects

In this study, a normal newborn nursing scenario was developed based on the ADDIE model (analysis, design, development, implementation, and evaluation) using a single-group pre- and post-experimental design, and the effects on nursing students' learning satisfaction, learning confidence, and clinical performance were investigated.

The subjects of the study were third-year nursing students at a university in Y city, South Korea, who completed a pediatric nursing theory course and agreed to participate in the study. The sample size was calculated to be at least 54 when the significance level (α) was .05, the effect size (d) was .5, and the power ($1-\beta$) was .95 using the G*Power 3.1 analysis program. The subjects of this study satisfied the minimum sample size, with a final number of 65 out of 68 who gave written consent after excluding 3 inappropriate respondents after education. The research procedure consisted of a pre-survey, development of a neonatal nursing education module, experimental treatment, and debriefing, followed by a post-survey measurement.

2.2. Research Procedure

2.2.1. Development Development and Application of a Newborn Care Education Module

The primary learning objective of the simulation practice for newborn care is to enhance students' ability to identify nursing problems based on priority at the time of a newborn's birth and to plan and implement appropriate nursing interventions. To achieve this, the educational program was structured to enable clinical reasoning based on critical thinking, using both specialized and related knowledge in nursing situations.

The overall scenario begins with the newborn's arrival at the nursery after initial post-delivery care in the delivery room. Students assess the newborn's condition, identify nursing issues, and perform clinical actions according to priority. The scenario was developed and managed by a researcher specializing in pediatric nursing, who has over 13 years of clinical experience and more than 10 years of experience in clinical practice guidance and simulation education. A panel of experts—including two professors specializing in pediatric nursing and one nurse with over 10 years of experience in a neonatal intensive care unit—validated the content for its relevance and accuracy.

The simulation-based newborn care education was organized as an 8-hour program, including:

- Orientation for practice (1 hour).
- Pre-learning and additional education on newborn care (1 hour).
- Team-based scenario development and practice (2 hours).
- Evaluation of clinical performance in simulation-based newborn care (3 hours).
- Debriefing on scenario implementation (1 hour).

The simulation practice and assessment were composed of pre-learning presentations, evaluations of clinical performance in simulation, assessments of core basic nursing skills, debriefing sessions, and self-evaluation. Nursing students were grouped into small teams of three, ensuring that all stages from pre-learning to debriefing were completed collaboratively.

The simulation-based newborn care education was divided into three stages: Preparation for Scenario Implementation, Scenario Execution, and Debriefing. In the preparation stage, clear

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 3: 2977-2981, 2025
DOI: 10.55214/25768484.v9i3.5896

educational objectives were set, and the scenario was introduced to students during the orientation. The instructor explained the clinical situation presented in the scenario, including medical orders to be carried out, and provided demonstrations. Based on this, students practiced appropriate nursing procedures as a team.

The necessary theoretical knowledge for scenario implementation was covered during pre-learning sessions, where students presented assigned topics, followed by supplemental instruction from the instructor. The instructor also assigned 3-4 roles related to newborn care performance within the scenario, ensuring that each team member could participate actively in all roles.

During the scenario execution phase, students familiarized themselves with the simulation lab setup, equipment locations, and device operations. A pre-simulation Q&A session was held to promote the learning process, and students were given time to plan their nursing activities as a team. Just before the simulation, roles were assigned randomly through a draw, and the clinical performance assessment began.

Each team conducted a 10–15-minute simulation using a high-fidelity patient simulator to perform clinical nursing tasks according to established priorities. Performance was evaluated using rubrics specific to each domain. After completing the simulation, students prepared nursing records and a care process report on the newborn care they performed

2.2.2. Research Tools

As the assessment tool, this study used the structured questionnaire

3. Results

3.1. General Characteristics of Subjects

The subjects of this study were 65 in total, 58 female students (89.2%) and 7 male students (10.8%). The average age was 21.07 years (±0.66). 56 students (86.2%) were above average in self-expression and 60 students (92.4%) were above average in interpersonal relationships. 54 students (83%) had a grade point average of 3.5 or higher in school (Table 1).

3.2. Change In Learning Satisfaction, Learning Confidence and Clinical Performance Ability at Pre-Post Test

The results of the study showed that there were significant differences in learning satisfaction (t=-7.548, p=0.001), learning confidence (t=-9.163, p=.001), and clinical performance ability (t=-6.733, p=0.001) before and after simulation-based normal neonatal nursing education

Table 1.
General Characteristics of Subjects (N=65).

Characteristics	Categories	n (%) or M±SD
Age+		21.07(0.66)
Gender	Male	7(10.8)
	Female	58(89.2)
Self-expression	Good	24(36.9)
	Average	32(49.3)
	Poor	9(13.8)
Personal relationship	Good	26(40.0)
	Average	34(52.4)
	Poor	5(7.6)
GPA	Under 3.0	4(6.3)
	3.0~below 3.5	7(10.7)
	3.5~below 4.0	38(58.4)
	Over 4.0	16(24.6)

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Table 2.
Change in learning satisfaction, learning confidence and clinical performance ability at Pre-Post test (N=65).

Variables	Pre test	Post test		
	M (SD	M(SD)	t	*p*
Learning satisfaction	3.29(0.66)	4.05(0.28)	-7.548	0.001
learning confidence	3.74(0.78)	4.32(0.65)	-9.163	0.001
clinical performance ability	3.54 (0.25)	4.10 (0.23)	-6.733	0.001

4. Discussion

This study was conducted to determine the effects of simulation-based normal neonatal nursing practice education on learning satisfaction, learning confidence, and clinical performance ability of nursing college students. The results of this study confirmed that simulation-based practice education could statistically significantly improve learning satisfaction (t=-7.548, p=0.001), learning confidence (t=-9.163, p=0.001), and clinical performance ability (t=-6.733, p=0.001).

After the practical training, the learning satisfaction was 4.05 points, which was higher than 3.29 points before the training, and it was statistically significantly improved. Although it is difficult to make a direct comparison because the previous study was not a simulation training based on a normal newborn nursing scenario, it was consistent with the results of Kim, et al. [7] and Kim and Kang [8] who found that overall satisfaction, learning satisfaction, and cognitive satisfaction all significantly increased in the simulation training [9]. It is thought that the learning satisfaction could have been improved because the professor interacted with the students through the simulation operation and debriefing and guided the students to achieve their learning goals on their own.

The learner confidence was higher at 4.32 points than before the education, which was 3.74 points. This is similar to the result of increasing learner confidence from 2.77 points to 4.40 points after conducting evidence-based nursing simulation on symptom management of cancer patients for nursing students [10]. It is thought that learner confidence was improved through practical application of nursing knowledge through problem-solving approach using repetitive learning and utilization of available resources [11, 12].

The clinical performance ability showed a higher result of 4.10 points than 3.54 points before the education, and there was a statistically significant difference. This result is similar to the result of Kim, et al. [7]; Kim [6]; Park and Hong [13] and Kim and Kim [14] who showed improvement in clinical performance ability in a simulation-based clinical performance ability evaluation on the topic of nursing situations for patients with febrile seizures. It can be interpreted that a high improvement was shown through simulation-based practical education that allows for review and repetitive practice. In this study, clinical performance ability was measured using a self-report questionnaire, which has the limitation that it may differ from the result of direct evaluation through actual observation of clinical performance ability. Therefore, in addition to subjective cognition-based performance ability evaluation, research should be conducted in which two or more observers objectively evaluate performance ability simultaneously.

Through the results of this study, we hope that these educational programs will be spread and actively utilized. Furthermore, we suggest that research be conducted to confirm that they can replace some of the existing clinical practice in the current limited pediatric nursing clinical practice field and become a more effective educational method, and that research be conducted to develop scenario modules based on a wider range of topics in the field of pediatric nursing education and verify their effectiveness.

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DOI: 10.55214/25768484.v9i3.5896

Funding:
This study was supported by the Program funded by Kyungdong University in 2024.

Transparency:
The author confirms that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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