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## The Effect of Transient Tachypnea Newborn Care Simulation Learning on Nursing Students' Critical Thinking Disposition, Clinical Performance ability, and Self- confidence

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### Abstract

The purpose of this study is to understand the effects of simulation-based practice education on critical thinking disposition, clinical performance ability, and self-confidence. Using the method of one-group pretest-posttest experimental research, this study selected total 70 nursing students (3<sup>rd</sup> year) as research subjects. The final research subjects were total 63 students excluding seven people with insufficient responses. From March to April 2023, total eight sessions of simulation practice education (4 hours per session) were conducted once a week. In the effects of the program, the critical thinking disposition, clinical performance ability, and self-confidence were measured. Using the SPSS Window Version 25.0, the critical thinking disposition, clinical performance ability, and self-confidence were analyzed through the mean, standard deviation, and paired t-test.

In the results of this study, the critical thinking disposition ( $t=-10.61$ ,  $p<.001$ ), clinical performance ability ( $t=-3.06$ ,  $p=.003$ ), and self-confidence ( $t=-15.97$ ,  $p<.001$ ) were statistically significant. In the results of analyzing the correlations of clinical performance ability, and self-confidence after the simulation practice education, the learning satisfaction showed significantly positive correlation with immersion ( $r=.647$ ,  $p<.001$ ).

The results of this study verified the improvement of critical thinking disposition, clinical performance ability, and self-confidence of nursing students after the simulation-based practice education. Thus, it would be necessary to develop the educational contents for various subjects, and also to expansively apply the simulation practice education.

**Keywords:** Clinical Performance ability, Critical Thinking Disposition, Self-confidence, Simulation

## 1. INTRODUCTION

As the primary goal of nursing education is to train, through theoretical and practical education, professional nurses who can provide qualitative nursing [1], effective theoretical and practical education is

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crucial [2]. However, with the recently increasing awareness of human rights among patients, there is a growing tendency for patients to express that they do not want to be attended to by inexperienced and unskilled student nurses. Therefore, the conventional clinical practice education that provides nursing students with opportunities to perform direct nursing care in clinical settings is being reduced, whereas observation-based practice education accounts for the majority of practice education [3]

Simulation education composed of various and unpredictable clinical situations suitable for the learning purpose provides opportunities for learners to experience the process of directly participating in situations, performing roles, and solving problems, which could improve the problem-solving ability, self-efficacy, and critical thinking ability[4,5] For this reason, the simulation education is used as a method of replacing the clinical practice. The Korea Accreditation Board of Nursing Education allows that 12% of total clinical practice hours could be replaced with simulation learning[6].

Various education methods are developed and applied in order to accomplish the high academic achievement through learners' active participation in learning. Especially, in the complex and unpredictable clinical field after graduation, the nursing students should have integrated thinking to quickly find a problem in subjects and to efficiently solve it, so the College of Nursing should put multilateral efforts to produce competent nurses required by the future society by educating them to be equipped with the problem-solving ability essentially needed in nursing site [7]. Thus, the Department of Nursing is providing practice through various simulation scenarios, and especially, it is very urgently needed to have the intramural simulation practice that could replace the practice of Child Health Nursing that is hard to be experienced in a clinical practice situation. The strengths of simulation-based education could be mentioned as the students become active learners; they can learn and think in situations instead of acquiring memorization-centered knowledge or finding a fact-centered answer[8]. they can variously learn complex techniques in safe environment; and they can also learn how to manage mistakes without any serious problems. Thus, the professors should study effective simulation education methods. For the effects of simulation, the high academic achievement could be accomplished only when the learners actively participate in learning.

Until now, domestic studies have verified the effectiveness of simulation-based education using single groups [9,10]. When comparing with traditional methods, simulation education showed higher levels in knowledge [11], critical thinking disposition [12], confidence [13], problem-solving ability [11], clinical or procedural performance, and satisfaction [14]. However, some studies showed contradictory results with no significant difference in knowledge [14], critical thinking disposition [15], confidence, clinical performance [12]. Each study had different variables to measure the effectiveness of simulation education, leading to various outcomes. Significant design elements like active learning [14] or debriefing [16] were missing in some experimental groups. In the control groups of traditional education, only lectures without hands-on practice were provided [16], and the training time for the experimental group was twice as long [17] or even 4-5 times longer [16] than the control group. Therefore, it was challenging to determine the effects of simulation education due to these limitations. This study was based on Jeffries [8]' simulation model and aimed to develop a simulation education program that can be applied within a limited regular education time, focusing on transient tachypnea newborn care, not only to achieve educational outcomes but also to increase nursing students' adaptability in the clinical field.

## **2. MATERIALS AND METHODS**

## 2.1 Research Design

This is an one-group pretest-posttest design experimental research for evaluating the effects of simulation-based practice education on critical thinking disposition, clinical performance ability, and self-confidence [Table 1].

**Table 1. Research design**

Group	Pre-test	Intervention	Posttest
Experimental group	Ye1*	X**	Ye2***

\*Ye1: General characteristics, Critical thinking disposition, Clinical performance ability, Self-confidence

\*\*X: Simulation learning.

\*\*\*Ye2: Critical thinking disposition, Clinical performance ability, Self-confidence

## 2.2 Research Subjects

Using the convenience sampling method, from March 2 to April 23, 2023, this study selected total 63 people who agreed to participate in this study from the third-year students without any experiences in simulation education in a college of nursing located in K province. The number of subjects was calculated by using the G\* Power Program 3.1.9.2. Even though total 70 people were selected as research subjects by considering the drop-out rate, the final research subjects were total 63 people excluding seven people with insufficient responses.

## 2.3. Research Tools

The questionnaire consisted of 6 questions about general characteristics, 27 questions about critical thinking disposition, 45 questions about clinical performance ability, and 10 questions about self-confidence. To measure critical thinking disposition, a tool developed by yoon [18] was used, and each item was composed of a 5-point Likert scale (1point for 'Not at all', 5points for 'Very much so'), with higher scores indicating higher scores. The higher the score, the higher the critical thinking disposition. The Cronbach's  $\alpha$  of this study was .89. The clinical performance ability scale refers to the ability to demonstrate appropriate knowledge, judgment, and skills and to function competently in clinical situations [19]. clinical performance ability measurement tool developed based on Schwrian [19]'s Six-Demension Scale was used, modified and supplemented by Cho i[20]. each item is rated on a 5-point Likert scale, from 1 'very poor' to 5 'very good.' a higher score indicates a higher level of clinical performance ability. Cronbach's  $\alpha$  in this study was .92. The self-confidence measurement tool was modified and supplemented by Chae [21] based on the Advanced Cardiovascular Life Support Manual [22]. This tool consists of 10 questions, and the level of self-confidence in performance is indicated by the numbers indicated as not at all (0 points) and very much (10 points). A higher total score means higher self-confidence in performance. do. Cronbach's  $\alpha$  in this study was .88.

## 2.4. Research Procedures

The research procedure is as follows: Third-year nursing students from a university were informed of the study's objectives and methods before the simulation education. Participation wasn't mandatory, and responses would remain anonymous and be used solely for research purposes without affecting their course

grades. Written informed consent was obtained from those who agreed to participate. The simulation-based practical education was conducted as a 1-credit, 2-hour course for third-year students in the first semester. It ran every week for 4 hours from March 2, 2023, to April 23, 2023, for 8 weeks. Each class consisted of 20 students, and one team comprised 3 students, with a total of 63 participants. The practical module was based on pediatric nursing, focusing on transient tachypnea newborn care. The scenario utilized the SBAR (Situation-Background-Assessment-Recommendation) for handovers, ambiguous prescriptions, notifying about unsafe situations, and verbal prescriptions. This module was reviewed and revised by three nursing professors, two doctors, and two nurses for accuracy and validity. A pre-survey was conducted before applying the module, followed by a 1-hour orientation, 1-hour simulator introduction and usage, 2 hours of theory lectures related to SBAR, ambiguous prescriptions, unsafe situations, and verbal prescriptions. Before starting each module, the essential basic nursing skills were practiced and evaluated. The subsequent steps included team assignments, scenario analysis, pre-debriefing, simulation activation, post-debriefing, followed by a complete debriefing using the recorded videos, and presentation of the nursing process. When other teams operated their simulations, the remaining students were asked to submit assignments like practice diaries, debriefing reflection diaries, and reports applying the nursing process. A post-survey was conducted during the 9th week, using the same questions as the pre-survey.

### 2.5. Data Analysis Methods

The collected data were analyzed with SPSS version 25.0, and the analysis methods used were descriptive statistics, independent t-test, Cronbach's  $\alpha$ , Pearson's correlation coefficients, and ANOVA.

## 3. RESULTS

### 3.1. General Characteristics of Research Subjects

As a result of analyzing the general characteristics of the subjects, the average age was 23.65 Y. There were female students (N=54, 85.7%) and male students (N=9, 14.3%). The most common motivation for choosing nursing was "considering aptitude" (N=29, 46.0%), "considering employment" at 39.7% (N=25), and "parents' recommendation" at 14.3% (N=9). It was. Regarding satisfaction with the nursing major, 63.5% (N=40) answered "satisfied," 15.9% (N=10) said "very satisfied," and 19.0% (N=12) said "average." It was found that more than half of the students were satisfied, with 1.6% (N=1) being dissatisfied. The most common grade in the previous semester was "4.0 or higher" at 42.9% (N=27), "3.5 to less than 4.0" was 30.2% (N=18), and "3.0 to less than 3.5" was 27.0% (N=17) [ Table 2].

**Table 2. General characteristics of the subjects (N=63)**

Characteristics	Divisi on	n (%) or M $\pm$ SD	n(%)
Age		22.65 $\pm$ 6.42	
Gender	Male	9	14.3
	Female	54	85.7
Admission	Consideration of employment	25	39.7

motivation	Encouragement by parents	9	14.3
	Consideration of aptitude	29	46.0
Satisfaction with nursing major	Very satisfied	10	15.9
	Satisfied	40	63.5
	Moderate	12	19.0
	Dissatisfied	1	1.6
	Very dissatisfied	0	0.0
Grade in the previous semester	Lower than 3.0	0	0.0
	3.0~3.5	17	27.0
	3.5~4.0	19	30.2
	4.0 or up	27	42.9

### 3.2. Critical Thinking Disposition, Clinical Performance ability, and Self-confidence Before/After the Simulation Practice

Table 3 shows the critical thinking disposition, clinical performance ability, and self-confidence of nursing students related to transient tachypnea neonatal care before and after simulation practice. The critical thinking disposition after simulation-based education ( $4.46 \pm 0.54$ ) was higher than the critical thinking disposition before simulation-based education ( $3.76 \pm 0.50$ ), showing a statistically significant difference ( $p < .001$ ).

The clinical performance ability before simulation-based education was ( $4.41 \pm 0.44$ ) compared to the clinical performance ability after simulation-based education. Power ( $4.56 \pm 0.40$ ) was found to be high, and there was a statistically significant difference ( $p = .003$ ). self-confidence in performance after simulation-based training ( $7.25 \pm 0.89$ ) was higher than confidence ( $5.46 \pm 0.45$ ), showing a statistically significant difference ( $p < .001$ ) [Table 3].

**Table 3. Critical Thinking Disposition, Clinical Performance ability, and Self-confidence before/after the simulation practice (N=63)**

Variable	Before Simulation	After Simulation	t	p
	Mean (SD)	Mean (SD)		
Critical Thinking Disposition	3.76(0.50)	4.46(0.54)	-10.61	<0.001
Clinical Performance ability	4.41(0.44)	4.56(0.40)	-3.06	.003
Self-confidence	5.46(0.45)	7.25(0.89)	-15.97	<0.001

### 3.3. Critical Thinking Disposition, Clinical Performance ability, and Self-confidence After the Simulation Practice

Table 3 shows the relationship between critical thinking disposition, clinical performance ability, and self-confidence of nursing students after simulation-based education. Clinical performance ability had a significant positive correlation with confidence ( $r = .647$ ,  $p < .001$ ). Critical thinking tendency had a significant positive correlation with clinical performance ability ( $r = .438$ ,  $p < .001$ ) [Table 3].

**Table 4. Critical Thinking Disposition, Clinical Performance ability, and Self-confidence after the simulation practice (N=63)**

Variable	Self-confidence	Clinical ability	Performance	Critical Thinking Disposition
	<i>r</i> ( <i>p</i> )			
Self-confidence	1			
Clinical Performance ability	.647 **		1	
Critical Thinking Disposition	.438 **		.229	1
			(.071)	

\*\**p*<0.001

#### 4. DISCUSSION

In the rapidly changing medical field, it is essential to enhance the clinical adaptability of nursing students by applying various educational methods to provide high-quality nursing to patients with diverse nursing issues. This study attempted to develop and efficiently operate a simulation-based educational program to enhance the clinical adaptability of nursing students by verifying the effect of simulation-based education on nursing students' critical thinking inclination, clinical performance ability, and confidence. The simulation-based education was conducted over 8 weeks using three modules, and the results showed that it had a positive impact on nursing students' critical thinking disposition, clinical performance ability, and self-confidence.

In this study, the score for critical thinking inclination increased from an average of 3.76 (out of 5) before the simulation-based education to 4.46 after. This result is consistent with the research by Oh & Kang [23], which applied simulation education to the same fourth-year students. It is speculated that the enhancement in critical thinking inclination might have been due to the active interactions among team members and debriefing sessions during the 8-week simulation-based educational program. Based on these findings, educational strategies inducing critical thinking in students through simulation education will be effective.

The clinical performance ability increased from an average score of 4.41 (out of 5) before the simulation class to 4.56 after, indicating a positive impact on students' learning performance. High course satisfaction and positive learning attitudes are essential elements for enhancing clinical performance, as claimed in another study [24]. Simulation-based practical education is believed to be a necessary instructional method for aspiring medical professionals who will provide nursing to diverse patients in clinical settings. After the simulation practice education centered on pediatric nursing scenarios, there was a significant positive correlation between critical thinking inclination and clinical performance ability. It is believed that students' engagement and confidence in learning are improved by their immersion and reflections on their learning experiences. Based on these results, it is imperative to encourage students' active participation in simulation education, give positive feedback, and engage in discussions through various clinical cases to enhance confidence, ultimately producing nurses fully adapted to the clinical field.

Confidence increased from an average score of 5.46 to 7.26, which was higher than the results of Kim &

Park [24]. The study by Kim and Park [24] measured at the beginning of the semester before applying the simulation program, while this study measured after students had learned all basic nursing techniques in the basic nursing practical class. Given the continuity of the courses, it's believed that confidence might have increased. As nurses with higher confidence are likely to form better relationships with patients and adapt well in clinical settings, simulation education helps nursing students boost their confidence and form better therapeutic relationships with patients. Therefore, a systematic simulation educational program is essential in nursing education to enhance nursing students' confidence.

In this study, simulation-based practice had a statistically significant impact on participants' critical thinking inclination, clinical performance ability, and confidence. Teaching methods that apply simulation were found to be effective, and group activities, scenario creation, utilization of simulation, and debriefing sessions allowed students to immerse more deeply into their learning. Furthermore, by collecting data, group discussions, and autonomous group learning, it's believed that clinical performance ability and confidence have both increased. These findings align with the research by Oh & Kang [23], which indicated that problem-solving skills were enhanced in student-centered teaching methods in nursing simulation learning. In this study, there was a statistically positive correlation between critical thinking inclination, clinical performance ability, and confidence. There was a positive relationship between clinical performance ability and critical thinking inclination, indicating higher confidence. Current observation-focused clinical practical experiences alone are not sufficient for nursing students to acquire direct nursing performance ability, knowledge, skills, and attitudes. As per Kwon & Kim [25], opportunities to experience a similar clinical environment are required to enhance problem-solving processes and boost self-efficacy. Continuous efforts are required from educators to systematically structure simulation-based education. However, this study has limitations as it was conducted as a pre-post design with a single group of nursing students from a single university without control or randomization, which could affect the interpretation of experimental treatment effects. Therefore, further research that establishes control groups or uses randomization to confirm the operational effects of simulation-based education is deemed necessary.

## ACKNOWLEDGEMENT

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