

The Effect of High-Fidelity Simulation-based Education on Nursing Students' Anxiety and Self-Efficacy who Face with the First Clinical Practice

Jeong Younghee*

Department of Nursing, Woosong College, Republic of Korea; Jeongyh@wsi.ac.kr

Abstract

This study examined the effect of high-fidelity simulation-based education on nursing students' anxiety and self-efficacy that face with the first clinical practice. An untreated control group design with pretest and posttest was used for the study. Forty-four nursing students were randomly assigned to the experimental group and control group. The high-fidelity simulation-based education was conducted to the experimental group. The data gathered were subjected to appropriate descriptive and inferential treatment using the SPSS 20.0. The findings has shown that the experimental group had lower anxiety ($t = -8.1, p < .001$) and had higher self-efficacy ($t = -6.42, p < .001$) than the control group. Results indicate that the high-fidelity simulation-based education is effective means of decreasing anxiety and increasing self-efficacy of nursing students in facing first clinical practice. Additional repeated study is required to prove positive effect of the high-fidelity simulation-based education.

Keywords: Anxiety, Component, High-fidelity, Self-efficacy, Simulation

1. Introduction

Nursing Practice is necessary for nursing students to learn problem-solving skills through integrating the process of theory and practice and getting the opportunity to increase nursing skills via nursing performance⁸.

The shortage of clinical practice organization⁶, and increased patients and families need had made nursing students more difficult to do nursing procedures in the hospital³. Increased nursing education organization is to make it harder for many nursing students to practice nursing performance at hospital environment. For above reasons, practice at clinical based education is limited and most of nursing performance is consist of observation or monitoring only³.

Recently, simulation-based education has played a major role in nursing education for a counter measure against these problems. High-fidelity simulation refers

to structured students learning experiences with the use of computer-based mannequin, the Human Patients Simulator (HPS) and can be programmed to speak, move, and have physiologic responses. In Korea, simulation-based education is gradually increased since 2006^{2,5}. According to reference³, lots of result in domestic and foreign research about simulation utilization and evaluation show positive effect of high fidelity simulation based education. The effect of education are as follows: team work, leadership and realistic training experience via communication, repeated practice, increased of self-confidence, increase of problem-solving skill and clinical performance skill, communication skill up, and knowledge up.

This is also true to nursing students who practiced physical examination with simulator before clinical practice wherein 61% of them have self-confidence about physical examination and 42% of them reported that stress or anxiety related to the first clinical practice

*Author for correspondence

was decreased¹¹. In another study, nursing students who participated in focus group interview after simulation-based education showed increase in provoking excitement, self-confidence up about problem solving, provoking motivation about self-study, clinical inference up and insight development⁷.

The effect of education is as follows; team work, leadership and realistic training experience via communication, repeated practice, increased of self-confidence, increase of problem solving skill and clinical performance skill, communication skill up, and knowledge up. Especially, among nursing students who practiced physical examination with simulator before clinical practice, 61% of them have self-confidence about physical examination and 42% of them reported that stress or anxiety related to the first clinical practice was decreased¹¹. In another study, nursing students who participated in focus group interview after simulation-based education showed increase in provoking excitement, self-confidence up about problem solving, provoking motivation about self-study, clinical inference up and insight development⁷.

Nursing students who face with the first clinical practice usually go through severe stress because their ability to be able to apply their theoretical knowledge to real clinical text is low and clinical performance skill is low. Additionally, there is not much experience for nursing students to do nursing to real person so that those situations for nursing students make more embarrassed and intimidated. If these problems are solved, nursing students will get self-confidence or feel a sense of accomplishment, and their anxiety or stress level before clinical experience will be decreased.

Thus, the high-fidelity simulation provides smooth transition to real nursing and can be used in conjunction with the clinical experience to provide nursing students with the opportunity to practice skills with decreased anxiety and further increased self-efficacy.

This paper examines the effects of high-fidelity simulation-based nursing education to nursing students' anxiety and self-efficacy, which face with the first clinical practice.

2. Materials and Methods

2.1 Research Design and Sample

This study used the untreated control group pretest-posttest design (experimental group 22, control group

22). Forty-four nursing students were allocated randomly to each group through draw straws. Both groups had pretest before treatment. The experimental group had been exposed to 4 hours high fidelity simulation and had posttest after the treatment. The control group had 2 hours lecture-based orientation and had posttest after treatment. Both group had posttest at 1 week later after treatment.

2.2 Ethical Consideration

Subject of this study participated voluntarily after signing a written informed consent. All the participants got information about the study's aim, benefits, and procedure and possibility to stop participation before getting consent form.

2.3 Components of Simulation-based Education

The control group and the experimental group had lectured-based orientation at the same time. The lecture based-orientation was made of precaution at clinical situation and hospital to practice, common disease and recording method of nursing process with simple practice to get blood pressure. The simulation-based education was applied to only control group after the lecture-based orientation. The simulation-based education was composed of admission care including communication with patient, measuring vital sign and recording it on the nursing record, applying EKG monitoring and pulse oximetry, prompt recognition and response on patient's change and communication with a doctor to inform patients' status. All nursing students in the experimental group were given mission, "Measure vital sign, get nursing history, record all information and report to doctor about patient who just admitted to ward from emergency room. Through this mission, nursing students can learn self-introduction to patient, physical examination, skill to get vital sign, and recording patient's information and reporting to doctor. According to result of reference³ those 2-3 hours for simulation education is appropriate, and one team with 4 nursing students got 2 hours simulation-based education.

2.4 Materials

Kim & Sin's⁹ anxiety scale was used to measure students' anxiety. This scale consisted of 20 items and was based on translated Spielberg's STAI (State-Trait Anxiety Inventory)¹⁰. The reliability of this scale was Cronbach's

$\alpha = 0.87$. Range of score is from 20 to 80. The higher score means that anxiety level is high. VAS-A (Visual Analog Scale-Anxiety) was also used to measure anxiety. Let nursing students point their subjective anxiety level on the line with 100 mm length. This tool is very effective to measure subjective recognition, feeling or symptom¹². To measure self-efficacy, Oh's scale was used. This scale consisted of 17 items and was based on the translated Sher's (1982) general self-efficacy scale.

2.5 Data Analysis

Data were analyzed using SPSS version 20.0. Descriptive analysis was used for getting general characteristics, each group's anxiety level and self-efficacy level. Two-tailed chi-square test was used for homogeneity test between the control group and experimental group. Comparison of anxiety and self-efficacy between the control and experimental groups were assessed by independent t-test.

3. Results

3.1 Homogeneity between the Experimental and Control Groups at the Base Line

There were no significant differences in socio-demographic characteristics including age, gender, G.P.A. of last semester, experience of part-time job related to hospital exposure ($p > 0.5$). Between experimental and control groups prior to the intervention (Table 1). Between the two groups, there is no significant difference in the hospital exposure ($p > 0.5$).

3.2 Homogeneity for Variable between the Experimental and Control Groups between Experimental Group and Control Group before Treatment

There were no significant differences in anxiety level and self-efficacy between the experimental and control group ($p > 0.5$) before giving high-fidelity simulation-based education (Table 2).

3.3 Comparison of Anxiety and Self-efficacy among Experimental Group at Pretest and Posttest

To verify effect of simulation-based education in experimental group, variables measurement at pretest

Table 1. Homogeneity test for general characteristics between experimental and control group

Variables	Experimental group (n = 22)	Control group (n = 22)	χ^2 or t	p
	Mean (SD) or n (%)	Mean (SD) or n (%)		
Age	20.86(± 3.2)	22.86(± 5.8)	-1.419	.165
Gender				
–Male	5(11.4)	4(9.1)	.14	.71
–Female	17(38.6)	18(40.9)		
Satisfaction level with nursing practicum			1.07	.58
–High	7(15.9)	6(13.6)		
–Moderate	15(34.1)	15(34.1)	3.125	.373
–Low	0	1(2.3)		
G.P.A. last semester				.632
–2.5	1(2.3)	2(4.5)		
–2.5 $\leq$ and <3.0	6(13.6)	4(9.1)		
–3.0 $\leq$ and <4.0	13(29.5)	10(22.7)		
– ≥ 4.0	2(4.5)	6(13.6)		
Experience of part time job related to hospital				
–Yes	6(13.6)	6(13.6)		
–No	16(36.4)	16(36.4)		

Table 2. Homogeneity test for anxiety, VAS, self-efficacy between experimental group and control group

Variables	Experimental group (n = 22)	Control group (n = 22)	χ^2 or t	p
	Mean (SD) or n (%)	Mean (SD) or n (%)		
STAI	41.68(±9.36)	44.18(±7.56)	-.975	.335
VAS-A	4.9(±2.77)	5.1(±2.24)	-.281	.780
Self-efficacy	62.18(±10.34)	63.86(±7.98)	-.604	.549

Table 3. Comparison of dependent variables among experimental group after treatment

	Pre-treatment (n = 22)	Post-treatment (n = 22)	t	p
	Mean(SD)	Mean(SD)		
STAI	41.68(±9.36)	34.36(±7.42)	-5.564	.000
VAS-A	4.9(±2.77)	4.10(±2.61)	3.272	.004
Self-efficacy	62.18(±10.34)	70.32(±7.85)	-12.9	.000

and posttest was compared (Table 3). Anxiety level was significantly decreased in STAI and VAS-A after simulation based education ($t = -5.564$, $t = -3.272$). Self-efficacy was significantly increased after treatment ($t = -12.9$). Therefore, it can be interpreted that high-fidelity simulation based education has affected to nursing student to have clinical practice ahead their anxiety level to be decreased and their self-efficacy level to be increased.

3.4 Comparison of Variable between Experimental Group and Control Group after Treatment

To verify effect of simulation-based education to nursing students' anxiety level and self-efficacy, pretest and posttest was conducted (Table 4). The anxiety of the experimental group was statistically significant lower than the control

Table 4. Comparison of dependent variables between experimental group and control group after treatment

	Experiment group (n = 22)	Control group (n = 22)	t	p
	Mean(SD)	Mean(SD)		
STAI	34.36(±7.42)	51.41(±6.5)	-8.1	.000
VAS-A	4.1(±2.61)	5.4(±2.04)	-1.904	.064
Self-efficacy	70.32(±7.85)	54.82(±8.16)	6.42	.000

group ($t = -8.1$, $p < 0.1$). VAS-A of the experimental group was not statistically significant between two groups ($t = -1.904$, $p > 0.5$). The self-efficacy of the experimental group was statistically significant higher than the control group ($t = 6.42$, $p < .01$).

4. Discussion

In this study, the effect of simulation-based education was positive to decrease anxiety and increase self-efficacy among nursing students who face the first clinical practice. Although, the time of treatment is short, the timing of the treatment is right before clinical practice so that it is assumed to bring direct effect to nursing students.

To have positive effect on clinical performance skill, 2-6 hours short education is adequate, but at least 4 weeks education is required to have positive effects on problem-solving skill¹. This indicates that a long, continuous, and systematic simulation-based education is required to attain its goal.

The use of high-fidelity simulation in the colleges of nursing has been increasing because of the positive effects to nursing students, thus, meeting the needs and contexts of nursing education for clinical practice. More evidence-based research is required to show the effectiveness of simulation in nursing education.

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