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Analyze of Nursing Performance Ability Using a Simulation-Based Program

Hyeon-Cheol Jeong

Department of Nursing, Sahmyook University
love2hc@syu.ac.kr

Abstract

The study is an analysis of nursing students using high fidelity simulators to practice nursing interventions for hypoglycemia and respiratory distress. The subjects are third-year university nursing students who handled 55 teams of hypoglycemia and 70 teams of respiratory distress syndrome. The subject group (hypoglycemia and respiratory distress syndrome) had one hour of education and experienced self-education for a week. After this, their behavior in practice sessions were recorded on video and reviewed. Data was analyzed via SPSS 21.0. The subjects' nursing ability was measured with independent t-test. As a result of study, the simulation with hypoglycemia had the highest 'Intervention' scores (2.58±0.37) and the simulation with respiratory distress syndrome had the highest 'Assessment' (2.29±0.36). Also, the hypoglycemia group score was significantly higher than that of the respiratory distress syndrome group on nursing performance ability (t=-5.65, p<.001).

Keywords: *Simulation, Performance ability, Hypoglycemia, Respiratory distress syndrome*

1. Introduction

Most nursing education occurs in hospitals. However, hospitals are operated for the diagnosis and management of illness, which is why getting support and cooperation for teaching can be hard [1]. To address these limitations, students use patient simulation-based practice sessions. To supplement these limitations, students proceed simulation studies and in order to supplement the weaknesses of the simulation, the experience should be thoroughly taken in to account during the practice. Currently, the main education strategy of the clinical practice is being directly or indirectly exposed to nursing care activity. In recent years, the combination of a high-fidelity simulator that mimics real experience in the field and a Standardized Patient that feels and looks real demonstrates aspects of traditional clinical practice to students [2]. In order to address these limitations, nursing simulation education that contributes to clients' health is recommended [3].

Previous studies of simulation-based nursing education in Korea have had an overall positive effect on learners [4, 5]. In particular, those subjects who went through the simulation education improved their auto-didacticism, satisfaction, clinical performance ability, and critical thinking. Therefore, it has been proven that the use of simulation-based education has an outstanding effect on improving learners' clinical ability [6].

However, whether usage of nursing simulation-based education accomplishes specific pedagogical aims has not been proven, or, indeed, if it has a positive effect on active nursing activities. Therefore, this study deals with simulation in two scenarios: hypoglycemia and respiratory distress syndrome. Also, the study illustrates effective nursing simulation goal setting and the way to improve direction

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in nursing performance.

2. Study Method

2.1. Study Design

The study used video recordings to analyze a nursing simulation-based practice session and frequency among each episode.

2.2. Study Objectives

• Identify the degree of the aims and goals of the nursing simulation-based education.
• Understand the nursing activity during nursing simulation practice.
• Analyze the differences in nursing performance ability between hypoglycemia and respiratory distress syndrome scenarios.

2.3. Study Subject

The subjects of this study are juniors of “S” University who were studying basic medicine and fundamentals of nursing and who had no previous experience with simulation-based practice. For simulation-based education, the subjects were operated in 3 teams with 3 or 4 people in one class and simulation practice.

2.4. Simulation Scenario Creation and Use

On the basis of previous studies [6], the NLN (National League for Nursing) h ave developed a template for simulation-based education on hypoglycemia and res piratory distress syndrome, including plans for de-briefing and role-playing. While developing the simulation template, nurses who worked in the emergency departme nt at “K” hospital in Seoul went through a clinical demonstration. This became th e basis of the scenario.

A high-fidelity simulator (SimMan® 3G, Laerdal, Stavanger, Norway) was used in scenarios about hypoglycemia and respiratory distress syndrome. It was filmed in video by approvement of participants in advance <Figure 1>.

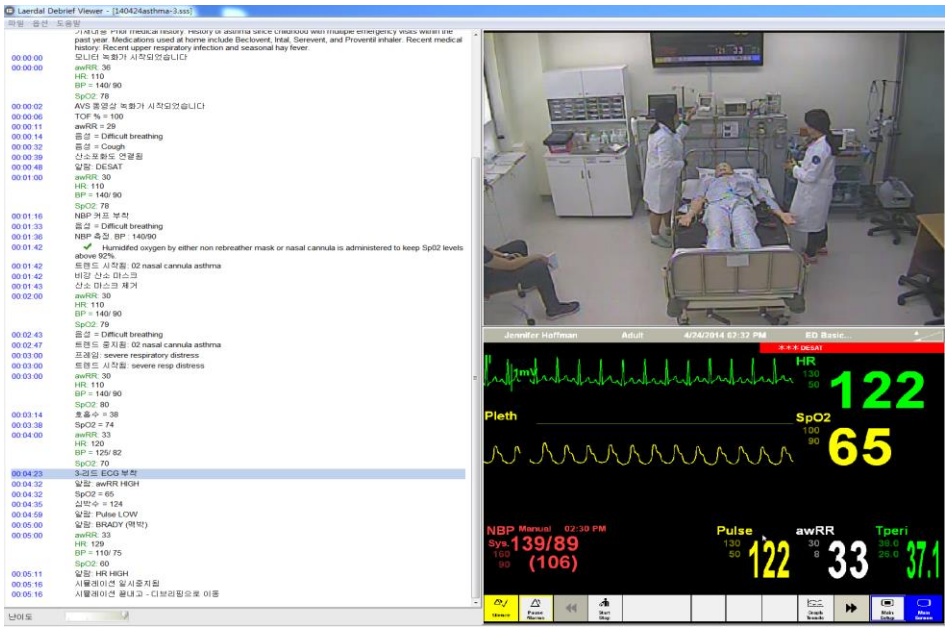

Figure 1. High-Fidelity Simulator

2.5. Performance Ability Evaluation

The study is focused on hypoglycemia and respiratory distress syndrome which were divided into three categories, which had a total of eighteen evaluation items. The video was reviewed and participants were given one point for each evaluation item they did not perform, two points for each that they performed incorrectly, and three points for those that they performed appropriately. Higher points were associated with better nursing performance.

2.6. Procedure

This study analyzed 55 teams of hypoglycemia and 70 teams of respiratory distress syndrome between April 2013 and May 2015. The experimenters held two hours of education for subjects on nursing interventions on hypoglycemia and respiratory distress syndrome. The next day, the experimenter distributed learning materials to three subjects among three teams. Each team was given ten minutes for orientation and fifteen minutes for completing scenarios. After the simulation was over, an appraiser evaluated subjects via a video recording <Figure 2>.

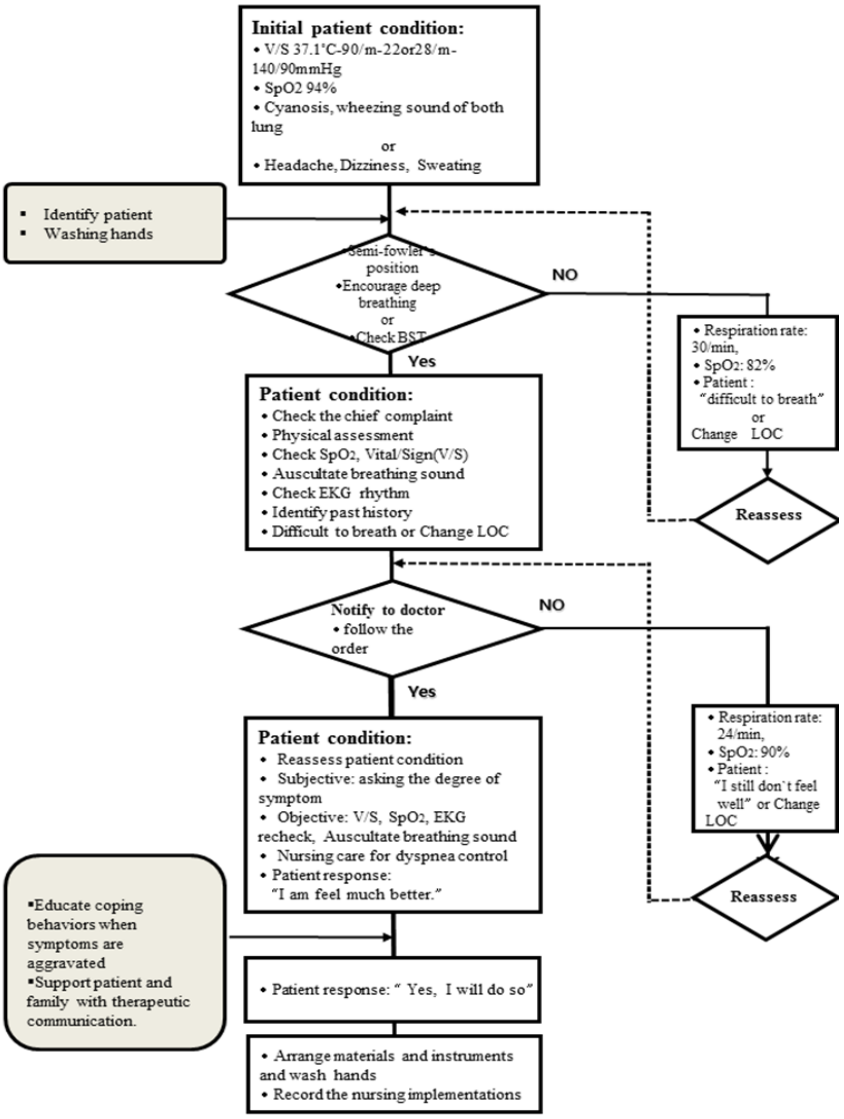

Figure 2. Procedure of Simulation-Based Program

2.7. Data Analysis

The study utilized the SPSS 21.0 program (Chicago, IL, USA) to analyze the differences in the two scenarios through independent t-tests.

3. Results

Analyzing the differences in achievement among the two patient conditions, we found that hypoglycemia had a higher degree of respiratory distress syndrome <Table 1>. This condition had the highest score in the 'Intervention' category of scoring, and the other condition (respiratory distress syndrome) had the highest score in the Focus section of scoring. The overall aim of the learning aspect degree were attained with much greater efficacy in the hypoglycemia module than in the exercises on respiratory distress syndrome (t=-5.65, p<.001).

Table 1. Comparison of Hypoglycemia and Respiratory Distress Syndrome Aims of Learning

Category	Aims of learning	Hypoglycemia (n=55)	Respiratory distress syndrome (n=70)	t	*p*
		M±SD	M±SD		
Preparation	Able to prepare nursing practice	2.08±0.55	1.83±0.38	-2.88	.005
Assessment	Able to assessment subjects	2.51±0.28	2.29±0.36	-3.83	<.001
Intervention	Able to perform nursing	2.58±0.37	2.18±0.30	-6.74	<.001
	Total	2.39±0.29	2.10±0.28	-5.65	<.001

Comparing hypoglycemia group and respiratory distress syndrome group show slight difference in nursing performance ability according to different items selected Table 2.

Among the item, 'Confirm patients' name' via written recordings and questions had the highest scores in both groups.

Table 2. Comparison Between Two Groups of 'Preparation' in Nursing Performance Ability

Items	Hypoglycemia (n=55)	Respiratory distress syndrome (n=70)	t	*p*
	M±SD	M±SD		
1. Introducing self to the patient & his/her parent(s)	1.60±0.91	1.63±0.76	0.19	.853
2. Confirm patients' name	2.62±0.73	2.11±0.50	-4.37	<.001
3. Washing hands	2.02±1.01	1.74±0.63	-1.77	.080

In the hypoglycemia group, 'Identify vital signs (2.93±0.26)' was the most, fo llowed by 'Check EKG monitoring equipment (2.80±0.40)', 'Check respiratory sounds or blood sugar test (2.78±0.46)' in order <Table 3>.

In the respiratory distress syndrome, 'Identify vital signs (2.60±0.49)' was the most, followed by 'Check SpO_2 & LOC (2.51±0.50)', 'Check the chief com plaint (2.35±0.56)' in order.

Table 3. Comparison Between Two Groups of 'Assessment' in Nursing Performance Ability

Items	Hypoglycemia (n=55)	Respiratory distress syndrome (n=70)	t	*p*
	M±SD	M±SD		
1. Check the chief complaint	2.45±0.72	2.35±0.56	-0.90	.368
2. Identify past history	2.36±0.68	2.11±0.55	-2.21	.029
3. Identify symptoms related to chief complaint	1.98±0.73	2.30±0.46	2.96	.004
4. Check SpO_2 & LOC	2.29±0.69	2.51±0.50	2.03	.046
5. Identify vital signs	2.93±0.26	2.60±0.49	-4.76	<.001
6. Check respiratory sounds or blood sugar test	2.78±0.46	1.89±0.65	-8.56	<.001
7. Check EKG monitoring equipment	2.80±0.40	2.30±0.46	-6.45	<.001

SpO_2 : Saturation of Peripheral Oxygen
LOC: Loss of consciousness
EKG: Electrocardiography

In the 'Interventions and Evaluations' categories, the hypoglycemia group scored 2.91 points in 'Educate on coping for aggravated symptoms' and the respiratory distress syndrome group scored 2.55 points (its highest score) on 'Recording nursing implementations' <Table 4>.

Table 4. Comparison Between Two Groups of 'Interventions and Evaluations' in Nursing Performance Ability

Items	Hypoglycemia (n=55)	Respiratory distress syndrome (n=70)	t	*p*
	M±SD	M±SD		
1. Take emergency care (high fowler's position, abdominal breathing, suction, drainage of sputum with coughing, giving juice or candy)	1.98±0.73	2.27±0.72	2.21	.029
2. Notify doctor and receive treatment order if needed	2.81±0.48	2.50±0.50	-3.55	.001
3. Administer oxygen therapy or medications	2.30±0.67	2.27±0.59	-0.27	.789
4. Reassess patient's condition	2.68±0.55	2.06±0.59	-5.99	<.001
5. Educate on coping for aggravated symptoms	2.91±0.29	1.84±0.65	-11.60	<.001

6. Support patients and family with therapeutic communication	2.82±0.46	2.09±0.41	-8.30	<.001
7. Arrange materials and instruments and wash hands	2.85±0.50	1.84±0.56	-8.98	<.001
8. Record nursing implementations	2.88±0.48	2.55±0.50	-3.26	.002

4. Discussion and Conclusion

The study analyzes how nursing students accomplish the learning goals and perform interventions through simulation-based practice.

The overall scores were 2.39 points for hypoglycemia and 2.10 points for respiratory distress syndrome. Of these, the hypoglycemia was significantly higher (t=-5.65, p<.001). The reasons why respiratory distress syndrome was rated much less was because the cause of respiratory distress syndrome are upper and low respiratory system, and circulatory system which are much more complex than hypoglycemia. The rapid manifestation of symptoms in this scenario made it harder for students to manage.

Simulation-based education is intended to enhance students' ability to manage these sudden situations. But when experiencing simulation-based education, students dealing with unexpected problems may experience losses of confidence if they are given insufficient information on how to handle these situations [7, 8]. Therefore, the study proposes that prior learning is required because students who have never participated in simulation-based education are not familiar with learning through simulation-based education [9].

According to previous research [10, 11], differences existed in technological and communication aspects of the clinical performance ability section, depending on whether it was conducted by using high-fidelity or multi-mode simulation. It had similar results of significantly higher in technical areas such as assessment and intervention in this study.

Therefore, in this study, students were given safe environments, such as using similar models of a patient to reduce psychological pressure. This helped students improve their confidence by allowing them to apply what they learned in real situations similar to practice rounds.

In order to successfully perform the simulation, the mannequin should be adjustable to various practice scenarios. Additionally, scenarios need support from educators through a three-step simulation process (Briefing, Practice, and De-briefing), and repetitions are necessary [12]. A previous study on repetitive simulation-based education using a SimMan simulation involved six practice repetitions and resulted in 2.94 points [13]. However, the current study resulted in 2.39 points for a hypoglycemia session and 2.10 points for a session on respiratory distress syndrome, which were a little less than expected. This was because students were exposed to the actual scenario only once, although the education period of their scenario was sufficient. These results demonstrated that students have difficulty in dealing with unexpected situations, so repetitive simulation-based practice is necessary.

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