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Suggestion and Application of Emergency Simulation Educatin using Real-time Video Observation for Inactive Nurses

[1]Jung-Ha Park, [2]Yun-Bok Lee

[1,2]Prof., Dept. of Nursing, Dongseo Univ., Korea
suha2002@gdsu.dongseo.ac.kr, caggg@gdsu.dongseo.ac.kr

Abstract

This study is a pilot study to confirm the effectiveness of training after applying emergency simulation training for inactive nurses and to present a new model of simulation training operation method. In this study, the control group is a group that directly participates in the simulation activity, and the experimental group is the group that observes the control group's simulation activity. Experimental group and control group were matched 1:1 to experience all the roles of the resuscitation team. The study participants were 5 inactive nurses in the experimental group and 5 inactive nurses in the control group, and the total training time was 5 hours. The emergency simulation operation composition consists of theory education, skill education, and simulation. The interview was conducted. The educational satisfaction of the participants was 4.65 points for theory education and 4.70 points for practical education based on 5 points. Participants' performance confidence improved from 3.60 points before operation to 7.20 points after operation. Emergency simulation operation consisted of pre-test, theory education, skill education, simulation implementation, debriefing, and post-test. Participants expressed that the choice of group greatly reduced the burden and anxiety about performing the role of the resuscitation team. However, difficulties and inexperience in the operation of the defibrillator were reported in the experimental group. The control group reported that the simulation activity of the experimental group was not significantly different from theirs. Through the results of this study, it was confirmed that emergency simulation education not only reduced the burden and anxiety of inactive nurses, but also had an effect of education. Based on the research results, it is proposed to expand the participants and verify the effectiveness of education through specific variables such as learning commitment, learner confidence, simulation satisfaction, and team effectiveness.

Keywords: *Emergency Simulation, Education, Inactive Nurse, Team Debriefing, Video Observation*

1. INTRODUCTION

1.1 Bacground and Purpose

Inactive nurses refer to nurses who are away from clinical practice and not currently engaged in nursing, although they obtained a license from the Ministry of Health and Welfare and are qualified healthcare professionals. According to a survey conducted by the Korean Nursing Policy Research Institute on re-employment and re-training needs among inactive nurses, 68% of inactive nurses wanted to find employment, 84.6% of whom responded that they needed re-training to do so[1].

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Corresponding Author: suha2002@gdsu.dongseo.ac.kr
Tel: +82-32-1698, Fax: +82-51-320-2720
Associate Professor, Dept. of Nursing, Dongseo Univ., Korea

Currently, re-training for inactive nurses in the Nursing Workforce Training Support Center consists of eleven hours of practice training and eight hours of theoretical training; three hours of practice training include basic CPR training for nursing in emergency patients[2].

CPR is divided into basic CPR, which only includes chest compression and artificial ventilation, and advanced CPR, which includes advanced healthcare techniques. A low rate in the return of spontaneous circulation(ROSC) among in-hospital cardiac arrest patients is influenced by early rhythms in a cardiac arrest, delayed time to defibrillation, whether chest compressions were conducted after a cardiac arrest, the level of the resuscitation technique performed on the patient, and post-resuscitation treatment. Furthermore, basic CPR performed quickly by the first witness on an in-hospital cardiac arrest patient improves the possibility of ROSC by artificial defibrillation and advanced cardiovascular life support[3,4]. Hence, it is necessary to have CPR training to improve the ROSC rate of in-hospital cardiac arrest patients.

Since the role of the first responder is more important when there is a cardiac arrest patient without normal breathing[5], it is critical to ensure that nurses, who continually provide care near patients, offer a skilled emergency response. Since inactive nurses may find it more difficult to effectively respond to a cardiac arrest situation as they have been away from clinical practice for a long time, it is necessary to consider the characteristics of inactive nurses in education and training so that they can appropriately respond to an emergency.

Simulation practice training, which is applicable with a combination of knowledge and motor skills to safely resolve a problem with patients and ensure a quick and accurate emergency response in a potentially life-threatening situation like a cardiac arrest, is considered a very useful method[6]. Patient simulator-based cardiac arrest simulation training can represent a real cardiac arrest in a safe environment, improve performance ability among learners, and increase the level of knowledge in a training course integrated with practice experience, reflection, and debriefing; it can also facilitate the transition of such knowledge to clinical practice[7]. Since inactive nurses are away from clinical practice for a long time, they lack confidence and professionalism in tasks in clinical practice to the point where they say they need re-training. Since participating in simulation training for a cardiac arrest emergency when there is a lack of confidence in tasks in clinical practice may lead to stress and burden, it is important to present a new simulation training operating method to improve confidence among participants while reducing stress and burden.

Generally, the simulation learning course consists of three phases: summary, simulation scenario running, and debriefing. Debriefing is highlighted to ensure effective learning from the simulation[8]. The debriefing technique is used in studies in which the respondents review the results of their motor skills and receive instant feedback after individual practice to improve knowledge and motor skills. Since debriefing-based simulation training intentionally or unintentionally accepts a mistake that must not occur in real situations or adapts to a training goal and digitally provides instant feedback, it is effective for both individual and group learning[9]. Since previous studies found that observation learning improved performance ability[10,11], it is possible that experience through observation learning could improve performance ability no matter the role in the simulation scenario.

In this regard, the purpose of this study was to confirm the effect of training after dividing inactive nurses into performance and observation at the simulation scenario running and debriefing phases in emergency simulation training, and to serve as a reference in presenting a model for a new simulation operating method.

1.2 Study Question

The following study questions are established for the study's purpose. First, what effect does emergency simulation training have on inactive nurses? Second, how does emergency simulation training work for inactive nurses?

2. METHOD

2.1 Design

This study is a pilot study designed to divide emergency simulation training for inactive nurses into performance and observation and to confirm the effect of training.

2.2 Participants

After informing nurses participating in training designed for inactive nurses about this study's purpose and method, the nurses who voluntarily decided to participate in the study were chosen as the respondents. The respondents voluntarily chose to join the experimental or control group; there were five respondents in each group. The control group had a debriefing after emergency simulation, while the experimental group had a debriefing after observing the emergency simulation performed by the control group in a real-time video.

2.3 Study Procedure and Data Collection Method

Before conducting the study, approval was obtained from the manager of the Nursing Workforce Training Support Center. The respondents were informed about the study and provided signed informed consent forms. They were randomly sampled at the ratio of 1:1 into the experimental and control groups. The respondents participated in training for five hours; a coffee gift voucher was offered as a token of gratitude for their participation

2.4 Tool

2.4.1 Quantitative Approach

Training satisfaction in this study was divided into airway management and emergency ECG, and manual external defibrillation and emergency drugs. Each question was measured on a five-point scale from 'Strongly disagree'(one point) to 'Strongly agree'(five points); a higher score means a higher level of training satisfaction. This study showed Cronbach'sα=.975.

This study divided performance confidence into airway management and emergency ECG, manual external defibrillator and emergency drug, simulation, and debriefing. The visual analog scale(VAS) designed to indicate the level of performance confidence on a scale of 0 to 10 cm was used in this study. A higher score means a higher level of performance confidence. This study showed Cronbach'sα=.948

2.4.2 Qualitative Approach

After the training, both groups participated in a group interview; qualitative data about their overall impression, feeling, and experience during emergency simulation training were collected.

2.5 Study Procedure

Training in this study consisted of theoretical training, practice training, and simulation(six sessions). Theoretical training included airway management, emergency ECG, manual external defibrillation, and emergency drugs. Practice training included emergency simulation and debriefing. For simulation, the Human Patient Simulator was used, with a scenario for an in-hospital cardiac arrest. In emergency simulation during practice training, the experimental and control groups were matched 1:1 for roles in a resuscitation team so

that they could experience each role. At the end of each of the five sessions, the experimental and control groups were separated for debriefing. For the final session of simulation, the experimental group directly experienced emergency simulation activities, while the control group was instructed to observe emergency simulation activities by the experimental group in real time. At the end of six sessions of simulation, both groups participated in a group interview together.

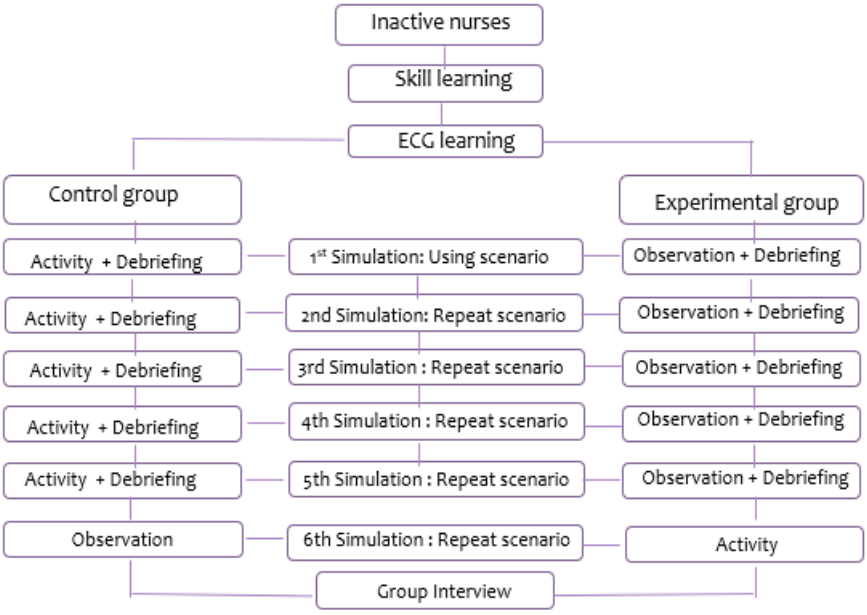

Figure 1. Emergency simulation operation flow

2.6 Data Analysis Method

This study used SPSS 22.0 WIN. Training satisfaction and performance confidence in the respondents were analyzed using the Mann–Whitney test and Wilcoxon Rank Sum test.

3. RESULTS

3.1 Training Satisfaction

This study found that the score of training satisfaction in airway management and emergency ECG was 4.70±0.87 points for the control group and 4.60±0.55 points for the experimental group, which had no statistical significance(z=-.387, *p*=.699). The score of training satisfaction in manual external defibrillation and emergency drugs was 4.70±0.87 points for the control group and 4.60±0.55 for the experimental group, which had no statistical significance(z=-.387, *p*=.699)(Table 1).

Table 1. Education Satisfication of the Subjects

Categories	Exp.(n=5)	Cont.(n=5)	z (*p*)
	Mean ±SD	Mean ±SD	
Airway maintenance & ECG learning	4.70±0.87	4.60±0.55	-.387(.699)
Manual defibrillation & emergency medication	4.70±0.87	4.60±0.55	-.387(.699)

3.2 Performance Confidence

This study divided performance confidence into airway management and emergency ECG, manual external defibrillation and emergency drugs, simulation, and debriefing. The control group showed no statistical significance in airway management and emergency ECG, manual external defibrillation and emergency drugs, simulation, and debriefing(z=-1.461, *p*=.144; z=-1.461, *p*=.144; z=-1.604, *p*=.109; z=-1.069, *p*=.285). The experimental group showed statistical significance in airway management and emergency ECG, manual external defibrillation and emergency drugs, simulation, and debriefing(z=-2.032, *p*=.042; z=-2.060, *p*=.039; z=-2.070, *p*=.038; z=-2.041, *p*=.041)(Table 2).

Table 2. Performance Confidence of the Subjects

Categories	Cont.			Exp.		
	Before education	After education		Before education	After education	
	Mean ±SD		z (*p*)	Mean ±SD		z (*p*)
Airway maintenance & ECG learning	5.00±2.00	7.20±1.64	-1.461(.144)	2.00±1.00	7.60±0.89	-2.032(.042)
Manual defibrillation, emergency medication	5.40±1.67	7.00±1.23	-1.461(.144)	1.80±0.84	7.60±0.89	-2.060(.039)
Simulation	5.60±2.79	7.40±1.82	-1.604(.109)	1.60±0.89	7.00±0.71	-2.070(.038)
Debriefing	5.80±2.59	7.00±2.35	-1.069(.285)	1.60±0.89	7.40±0.55	-2.041(.041)

3.3 Effect of Emergency Simulation Training

At the end of emergency simulation training, both the experimental and control group participated in a group interview in a casual atmosphere. The results of the interview showed the usefulness of training, the impact of participation, the impact of psychological elements, and improvements to be made for the respondents. The inactive nurses indicated in the usefulness of training that emergency simulation training helped them to better respond to cardiac arrest patients. In terms of the impact of participation, the experimental group reported that they learned the knowledge and skills necessary to perform different roles in a resuscitation team through the indirect experience of observing the control group's activities. The control group reported that simulation activities by the experimental group did not differ from their activities.

Regarding the impact of psychological elements, the respondents noted that the option to choose either the experimental or control group greatly reduced the burden and anxiety about the roles to be performed in a resuscitation team. Finally, regarding improvements that can be made, the experimental group reported that they found it difficult and felt unskilled at using the defibrillator in an emergency simulation and needed additional training.

4. DISCUSSION

The reason why there was no statistically significant difference in training satisfaction between the experimental and control groups for airway management and emergency ECG, and manual external defibrillation and emergency drugs seems to be because the same training was provided to both groups. In a study on 360 VR content-based simulation training in inactive nurses[12], training satisfaction scored 4.86 points for basic CPR review, manual external defibrillator, and emergency drugs, and 4.86 points for airway management. Although the level of satisfaction with simulation training among inactive nurses was higher than the average, the level of training satisfaction was higher when a previous study applied 360 VR content as an assistive method for training[12] than when the traditional training method was used(as in this study). In

the future, it would be worthwhile to apply and confirm various methods for simulation training to increase training satisfaction among learners.

While the score of performance confidence before training was 5 to 5.4 points for the control group, it was 1.6 to 2 points for the experimental group, which showed a difference. The score of performance confidence after training was 7 to 7.6 points for the experimental group and 7 to 7.4 points for the control group. A study that investigated confidence in motor skills among inactive nurses with similar questions as this study[12] reported that the score for confidence was 2.12 to 2.36 points before training and 6.6 to 6.7 points after training. The reason why increased performance confidence was statistically significant in the experimental group in this study was confirmed in the interview conducted at the end of the emergency simulation training. The option provided to the participants to voluntarily choose either the experimental or control group reduced their burden and anxiety about the roles in a resuscitation team. This seems to have been reflected in the increase in the level of performance confidence from before to after training in the experimental group.

Since there are few studies that have applied observation at the phases of simulation scenario running and debriefing in emergency simulation training as in this study, the author compares this study with previous studies that used video observation learning during pre-debriefing in simulation training. A study on pre-briefing for emergency medical technicians based on a simulation video about pre-hospital injured patients reported a significant level of confidence among the participants[13]; the use of video observation learning at the pre-briefing phase in simulation training for undergraduate nursing students was an effective method to improve performance confidence, learning confidence, and debriefing satisfaction among students [14]. While this study and previous studies[13,14] were able to confirm the effect of observation learning, observation learning was applied at different phases. Considering the recent training landscape in which face-to-face training is limited and contactless training is widely utilized due to the COVID-19 pandemic, video observation learning, if applied based on the learning goal at the pre-briefing, simulation scenario running, and debriefing phases as part of a learning simulation[8], is expected to provide a positive training effect.

In the group interview, the respondents mentioned positive effects such as increased confidence in responding to cardiac arrest patients, acquiring knowledge and skills, and reducing the burden and anxiety regarding the method of training divided into performance and observation in this study. Nonetheless, there were additional training needs for defibrillator operation. Since a simulation training method is widely used in nursing training to allow participants to repeatedly experience a setting similar to clinical practice and improve clinical response ability[15], the simulation training method first suggested by this study is expected to be applied repeatedly with more respondents, and is expected to be used more actively in future simulation training.

5. CONCLUSION AND SUGGESTIONS

This study divided the respondents into a group participating in simulation activities and a group observing emergency simulation activities in a video, and confirmed training satisfaction, performance confidence, and the effect of training among the respondents. In particular, the study results show that allowing respondents to choose their training participation reduced their burden and anxiety and led to positive outcomes. This study is significant as it serves as a reference in presenting a model for a new simulation method applying video observation at the simulation scenario running and debriefing phases during simulation learning.

This study has a limitation in that it did not confirm the educational effect in the cognitive and psychomotor domains by measuring and evaluating the effect of emergency simulation education focusing on the emotional content felt by the participants.

Based on the results, the author makes the following suggestions. First, it is necessary to verify an array of variables, such as learning commitment, learning confidence, simulation satisfaction, and team efficacy, which may affect the effect of this study. Second, it is important to conduct a study that expands the number of

respondents and verifies the effect of the program by repeatedly offering the program. Third, it is suggested to conduct a study to verify the effect of emergency simulation education in the cognitive, psychomotor, and emotional domains.

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