

Development of a Simulation Practicum Module using a High-fidelity Simulator: Focusing on Team Based ECCA

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Abstract

Objectives: The study aimed at developing and operating the simulation practicum module for team-based emergency care for cardiac arrest patients, and looking into its effectiveness. **Methods/Statistical Analysis:** The study subjects were 54 senior nursing students in college B who completed theoretical coursework and clinical training associated with cardiovascular care. For the simulation practicum, we utilized high-fidelity simulator (SimMan3G) and debriefing system. **Findings:** The simulation practicum module for emergency care for cardiac arrest patients was operated in accordance with the development plan, and the preliminary knowledge for the team-based emergency care for cardiac arrest patients was 23.1 points on average, and the score of practice assessment on average was 48.2 points, which were verified as effective. There was no correlation in the evaluation between preliminary knowledge and practice assessment. The study for the development of simulation practicum module carries significance in that it helps for students to adapt quickly to nursing service after graduation, executing the practice simulation for emergency care at the time of the environmental change of clinical practice. **Improvements/Applications:** it is necessary to further develop scenarios by learning concept and in addition, the effectiveness of verification in team-based simulation practice in various aspects.

Keywords: High-fidelity, Practicum, Simulator, Simulation

1. Introduction

Despite the advancements in medical technology, the death from unpredicted acute cardiac arrest is the important public health problem that advanced countries including Korea are facing. The number of deaths related to acute cardiac arrest is on the rise in Korea. The rapid growth in Korea's aging population currently in progress further links to the increase in these deaths. The number of deaths from cardiac arrest in Korea is over four times as many as that from car accidents^{1,2}. Saving a patient not only requires individual knowledge or techniques but the teamwork of a resuscitation treatment team³. On the other hand, from the side of nursing education, as patients' rights and safety are emphasized and medi-

cal environments are rapidly changing, nursing students' direct clinical training for patients has been restricted^{4,5}. Therefore, clinical training education using a simulator based on scenario, which can solve the problems in clinical training education and efficiently improve the clinical practice ability has been introduced⁶. Accordingly, the study was initiated to develop and operate the simulation practicum module for team-based ECCA (Emergency Care for Cardiac Arrest patients), and to verify its effectiveness. The specific objectives of the study are as follows:

First, develop and operate the simulation practicum module for team-based ECCA.

Second, verify the effectiveness of operations of the simulation practicum module for team-based ECCA.

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According to the Korea Center for Disease Control and Prevention, over 30,000 cases of acute cardiac arrest appeared in 2014, and only four percent of the patients survived. To reduce the death rate caused from acute cardiac arrest, a precaution against the diseases that could be causes of acute cardiac arrest, such as cardiovascular disorders and damages are of importance, and the implementation rate of Cardiopulmonary Resuscitation (CPR) for cardiac arrest patients out of hospital will have to be enhanced. For a successful resuscitation treatment in hospitals, the role of various medical personnel is in need¹⁻⁴.

Simulation practicum training enables students to improve their nursing ability in solving the problems in actual clinical practice through reenacting safe clinical arenas with no harm to the patient, and also helps develop team competence a future nurse should have through collaborative learning among team members⁵⁻⁷.

2. Research Method

2.1 Subject and Time of Study

The study proceeded in targeting 54 senior nursing students who completed theoretical subjects and clinical training associated with cardiovascular care in college B between November 1, 2014 and November 30, 2014.

2.2 Research Tool

For the measurement of knowledge for emergency nursing for cardiac arrest patients, a questionnaire consisting of 25 questions, which was developed by the Korean Association of Cardiopulmonary Resuscitation(KACPR) for emergency patient care for cardiac arrest, was used. The extent score of the 25 questions on the questionnaire ranges from zero points as the minimum to 25 points as the maximum. The details included in the questionnaire covered the understanding of team-based emergency care, cardiac arrest drug treatment, electrocardiogram, defibrillation therapy, cardiac arrest emergency care algorithm, etc.

For the training evaluation for the team-based ECCA, the checklist with 25 questions developed by KACPR was used. By the contents of Basic Life Support (BLS) performance, teamwork and leadership, VF/pulse less VT management, PEA management, asystole management, post cardiac arrest care, etc. The total score of the checklist consists of 50 points; two points are given for precise

practice, one point for poor practice, and 0 points for non-implementation or mis-implementation.

For the practice simulation, high fidelity simulator (SimMan3G) and debriefing system were used as follows (Figure 1).



Figure 1. High fidelity simulator (simman3g).

2.3 Data Collection and Study Methodology

We first explained to the subjects the objective and contents of the study, and the subjects drew up a written agreement about the study. For data collection, to measure preliminary knowledge, subjects directly filled out the self-administered questionnaire themselves. For practical skill evaluation, we measured it using the developed checklist. As for the effectiveness analysis for simulation practicum module, a real number and percentage were used in the scores of preliminary knowledge and practical assessment. The Pearson's correlation was applied to examine the relation between the level of preliminary knowledge and the score of practical assessment.

3. Research Results

3.1 The Development and Operation of the Simulation Practicum Module of Team-based ECCA

To accomplish the study objective, we developed and operated the team-based ECCA, and its result is as follows.

3.1.1 Setting of Learning Objectives

After examining the cases needing team-based care activities at the clinical practice emergency scene, we, along with them set ECCA as a learning objective. Details

Table 1. Simulation practicum module of team-based ECCA

Learning subject		Simulation practice of team-based ECCA			
Learning objective		To be able to perform simulation practice of team-based ECCA			
Learning procedures		Learning contents	Teaching-learning activities	Time required	Class hours
Introduction	Providing learning motivation and learning objective		. Providing handouts with learning objective . Case presentation for ECCA through videos	5	5
Development	Session (1) Measurement of preliminary knowledge and lectures	. Evaluation of preliminary knowledge for ECCA	. Measurement of knowledge through the questionnaire	15	20
		. ECCA	. Relearning the core contents of team-based ECCA . Presentation of the videos of team-based ECCA . Group discussion session for emergency nursing	30	50
	Break		. Q&A session for individual questions	10	60
	Session (2) Practice and evaluation	ECCA: Practice and evaluation	. Providing the cautions for the use of the simulation laboratory . Simulation practice by suggested scenarios by team . Progressing the practice by circulating the assigned roles to team members . Having a debriefing session shortly after practicing simulation by group . Evaluation of the team leader's professional capacity assessment in emergency nursing to cope with the suggested scenario	45	105
Close	Summary of contents and feedback		. Summary of team-based ECCA . Questions to figure out the level of understanding for the contents of the classes . Checking the learning objective	5	110

include the understanding of team-based emergency care, cardiac arrest drug treatment, electrocardiogram, defibrillation therapy, cardiac arrest emergency care algorithm, operation of the simulation of team-based emergency care, etc.

3.1.2 Operation of the Simulation Practicum Module of Team-based ECCA

The simulation practicum module for the team-based ECCA consists of verification of preliminary knowledge of ECCA, lectures of core contents using videos and handouts, practical assessment and evaluation for the

team-based ECCA using a high fidelity simulator, and debriefing as follows (Figure 2, Table1).

3.2 Effectiveness of the Operation of the Simulation Practicum Module of Team-based ECCA

The subjects' preliminary knowledge for the team-based ECCA ranged from a minimum of 11 points to a maximum of 25 points, with an average of 23.1 points. The subjects' score of practical assessment for the team-based ECCA ranged from a minimum of 40 points to a maxi-

imum of 50 points in maximum, with an average of 48.2 points as seen in Table 2.



Figure 2. Simulation PRACTICE OF TEAM-based ECCA.

Table 2. Preliminary knowledge and practical assessment for the team-based ECCA

Category	Min	Max	Mean
Preliminary knowledge for the team-based ECCA	11	25	23.1
Practical assessment for the team-based ECCA	40	50	48.2

There was no correlation between the subjects' preliminary knowledge and the score of the practical assessment for the team-based ECCA as seen in Table 3.

Table 3. Correlation between preliminary knowledge and practical assessment for the team-based ECCA

Category	Preliminary knowledge for the team-based ECCA	Practical assessment for the team-based ECCA
Preliminary knowledge for the team-based ECCA	1	.191
Practical assessment for the team-based ECCA	.191	1

4. Conclusion

The study aimed at developing and operating the simulation practicum module for team-based ECCA, and looking into its effectiveness. The study subjects were 54 senior nursing students in college B who completed theoretical coursework and clinical training associated with cardiovascular care. For the simulation practicum, we uti-

lized high fidelity simulator (SimMan3G) and debriefing system. The simulation practicum module for ECCA was operated in accordance with the development plan, and the preliminary knowledge for the team-based ECCA was 23.1 points on average, and the score of practical assessment on average was 48.2 points, which were verified as effective. There was no correlation in the evaluation between preliminary knowledge and practical assessment.

The study for the development of simulation practicum module carries significance in that it helps for students to adapt quickly to nursing service after graduation, executing the practice simulation for emergency care at the time of the environmental change of clinical practice. The study focused on the development of the simulation practicum module for emergency cardiac arrest patients. The effectiveness verification of the education was carried out only in terms of knowledge and working in effectiveness, and henceforth it is necessary to further develop scenarios by learning concept later. In addition, the effectiveness of verification in team-based simulation practice in various aspects such as self-confidence, self-efficacy, communication ability, problem solving ability, etc. is demanded.

References

1. Korean association of cardiopulmonary resuscitation. New science, new guideline. 2015 Symposium of Korean Association of Cardiopulmonary Resuscitation, Woori publication: Seoul; 2015.
2. Nikolai AG, Konstantin YS, Vyacheslav VK, Valeriy YN, Galina SK. Development of algorithms for the external cardiac compressor of original design. *Indian Journal of Science Technology*. 2015; 8(1):1-5.
3. Korean association of cardiopulmonary resuscitation. Provider Manual of Korea Advanced Life Support (KALS), Koonja: Seoul; 2014.
4. Lee SA, Jeon EY, Oh HK. Effects of team based simulation learning depending on the level of metacognition. *Journal of Korean Society for Simulation in Nursing*. 2015; 3(2):45-53.
5. Moon WH, Kim YJ, Ahn SY. Simulation-based learning Korean nurses: A systematic review. *Indian Journal of Science Technology*. 2015; 8(1):1-5.
6. Garrett B, MacPhee M, Jackson C. High-fidelity patient simulation: considerations for effective learning. *Nursing Education Perspectives*. 2010; 31:309-13.

7. Kang HY, Choi EY, Kim HR. Nursing students' team capability and performance in simulation education using team based learning. *Journal of Korea Society for Simulation in Nursing*. 2013; 1(1):29-41.