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Nurse Educators' Experience of Developing and Implementing a High-fidelity Simulation-based Interprofessional Education Module for Medical and Nursing Students

[1]Yun KANG, [2]Somyeong Kim

[1]Assistant Prof., Dept. of Nursing, Taegu Science Univ., Korea,
[2]Assistant Prof., Dept. of Nursing, Catholic Sangji Univ., Korea,
E-mail [1]ykang01157@tsu.ac.kr, [2]smkim@csj.ac.kr

Abstract

Objective: *Despite the recommendation of the use of high-fidelity simulation (HFS) in interprofessional education (IPE), there is little known about its work for nursing students. Thus, this study aimed to explore nurse educators' perceptions and experiences in developing and implementing the HFS-based IPE for nursing and medical students.* ***Methods:*** *This study used a case study, using reflective filed notes.* ***Results:*** *Nursing educators perceived HFS as an effective educational approach to engaging nursing and medical students actively in interprofessional collaborative practice (ICP) experiences and in evaluating their actual performance on it. In terms of their perspectives on the elements necessary for effective HFS-based IPE, four themes were identified: collaborative learning, co-facilitating debriefing, leadership commitment and active faculty involvement.*

Keywords: *Case study design, High-fidelity simulation, Interprofessional education; Nursing education*

1 INTRODUCTION

Simulation is defined as activities that reflect the reality of clinical environment and are designed to demonstrate procedures, appropriate organization of students in the simulation activity, decision making, and critical thinking through techniques such as role playing and the use of devices such as low, moderate or high-fidelity mannequins [1]. A high-fidelity mannequin can be programmed to produce physiological function such as palpable pulses, voices and heart sounds through computer interfaces [2]. So, the high-fidelity mannequin can provide real physical symptoms and is the most realistic of simulation, compared with low and moderate mannequins [2]. Also, a meta-analysis and systematic review [3] showed that high-fidelity simulation (HFS) has strong educational effects on improved knowledge acquisition, professional skills, critical thinking ability, clinical judgement ability and communication skills in nursing students.

HFS-based interprofessional education (IPE) is the process where two or more health professions students learn with, from and about each other to develop and master core competencies for interprofessional collaborative practice (ICP) through HFS activities [4-7]. It enables students from different health professions

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Corresponding Author: smkim@csj.ac.kr
Tel: +82-54-851-3276, Fax: +82-54-851-3160
45 Sangji-gil, Andong, Gyeongsangbuk-do, Korea

to engage in the most realistic simulation-based experiences to strengthen teamwork and collaboration, communication skills, and understanding of their roles and responsibilities in an interprofessional team, which can enhance core competence for IPC in future [6-9]. Thus, incorporating the HFS into IPE can be used to learn, facilitate and improve ICP for nursing students.

As a pedagogical strategy, the use of HFS into IPE needs to be supported by learning theories, which can lead to good practice [10]. Situated learning theory (SLT) is based on the premise that learning is influenced by the situation in which it occurs and that learning should be embedded in authentic activities that assist transformation of knowledge from theory to practice [11]. According to SLT, students participate in experiences that reflect real life with authentic context and for situated learning to be effective, learning environment should reflect the way in which the knowledge will be used [11]. Thus, HFS-based IPE that incorporates the SLT is needed for nursing students to achieve the understanding of individual roles and responsibilities, the roles and responsibilities of other health professions, teamwork and collaboration, and communication skill.

While there is an interest in HSP-based IPE, the standards of best practice of simulation-based IPE in healthcare [7] has been published for use. However, there is little known about its work for nursing students [10, 12]. Also, insufficient human resources such as a lack of access to simulation-based education training, and insufficient time to accommodate the additional workload related to simulation are the barriers to providing the simulation-based education in undergraduate healthcare education [10]. Thus, this study was conducted to explore nurse educators' perceptions and experiences of using HFS in IPE in South Korea.

2 METHODS

2.1 Study design

This study used a case study to explore nurse educators' perceptions and experiences in developing and implementing the HSP-based IPE for nursing and medical students, using reflective field notes. As part of the 2-day program [13], this HSP-based IPE activity was conducted as extracurricular activities.

2.2 Participants

Two nurse educators who were involved in developing and implementing the HSP-based IPE module on acute myocardial infarction (AMI) management in adults at emergency department (ED) as nursing faculty members.

2.3 Educational intervention implementation

The HSP-based IPE module aligned with SLT in this study has a 6-step simulation process that incorporates pre-briefing (20 minutes), pre-scenario activities (20 minutes), task training (40 minutes), simulation running (30 minutes), post-scenario activities (30 minutes), debriefing (20 minutes) and self-reflection (40 minutes) (Figure 1).

One week prior to the HSP-based IPE, pre-required learning was guided to all participants in line with the simulation scenario objectives. For this module session, the medical and nursing faculty members involved in this study collaborated to make an instructor guide with details about the scenario and the expected course of interventions in order to promote consistency between instructors. The instructor guide included a performance checklist of discipline-specific practice behaviors and teamwork practice behaviors. Its twenty three-item checklist was in line with the simulation scenario objectives, and then matched them with core competencies specific to the four domains (i.e., values/ethics, roles/responsibilities, interprofessional communication and teams/teamwork) of the IPC core competencies [14] (Figure 2). Prior to the 2-day IPE program [13], all the faculty members involved in this module session had a meeting about how to

implement and evaluate the performance of the ICP as the team from their respective discipline, using the instructor guide.

During the simulation running, each faculty team (i.e., 1 medical professor and 1 nursing professor, two teams in total) evaluated 11 teams, scoring their respective discipline performance of the ICP with the performance checklist on the AMI management in the adult at ED.

Following the simulation running, they as facilitators gave an immediate feedback to the participants as a team. They also provided all the participants in whole with debriefing to reflect and enhance their HSP-based IPE learning experiences. Debriefing addressed the clinical aspects of the team-based performance, with specific attention to whether appropriate interventions and escalation occurred when needed. The medical and nursing faculty members co-facilitated discussions about the teamwork aspect of the team's performance, with a focus on whether the team communicated effectively and worked well together to treat and manage for deteriorating the adult with AMI. They used debriefing questions they developed in line with the simulation scenario objectives to guide the debriefing process. While one medical faculty member took the lead in facilitation, all the faculty members were present and involved in the discussion. To begin the debriefing, students were encouraged to talk about their emotions during the simulation running to validate their experience and understand how emotions may have affected their performance. The leader students within the teams were asked to speak first, followed by the other students.

The two nurse educators who were nursing faculty members recorded reflective field notes over the course of the study. They were asked to keep a journal for reflective comments about their perceptions and experiences of developing and implementing the HSP-based IPE module on AMI management in adults at ED. They wrote reflective field notes in response to structured questions based on Gibbs' reflective cycle [15].

Division	Time(min)	Detailed contents	Group	Simulated setting
▣ **pre-required learning 1 week prior to HFS-based IPE at both universities**				
Pre-briefing	20	**Introduction** - Grouping - Orientation on the HFS-based IPE module: purpose, objectives, patient's situation and overview, HFS-based IPE process, evaluation, and simulated setting, - Informed consent	team	Emergency Department
Pre-scenario activities	20	**Discussion** - Analysis of situation - Plan - Division of roles - Task decision	team	
Task Training	40	Practical exercise	team	
Simulation Running	30	Performance assessment	team	
Post-scenario activities	30	Immediately after evaluation (peer evaluation)	team	
Debriefing	20	Self-reflection writing	individual	
Self-reflection	40	Debriefing in whole	team	

Figure 1. HFS-based IPE Module process

Areas	Core competencies	Practice item	Medical Students		Nursing Students	
			YES	NO	YE	NO

			S
V1	Patient-centered care planning	Chief complaint, History of present illness, Past medical history, physical examination, pain assessment	
V2	Mutual respect for other professions	Mutual respect and effective communication when requesting help	
V3	Act with dignity and integrity	Providing information to the patient and explaining during interventions(medication)	
R11	Recognize one's limitations in skills, knowledge and abilities	Request for help-Code blue broadcast, E-cart request	
R21	Engage diverse professionals to complement one's own expertise	Prepare or present necessary items or equipment	
R31	Use unique and complementary abilities of all members of the team	Check patient monitor(V/S, SpO_2,EKG)	
R32		NTG, BASA, Morphine, heparin administration	
R33		Cardiac massage: Ambu bagging	
R34		Keep airway & BVM	
R35		Epinephrine 1mg IV administration and 3-5 minute interval instruction	
R36		Emergency PCI Referral	
I11	Confident expression of one's knowledge and opinions	CPR Algorithm awareness	
I12		Early response to AMI(chest pain pattern, EKG distinction)	
I13		Cardiac arrest and consciousness check	
I14		Head down Backboard apply	
I15		Automatic defibrillation(safety instructions)	
I16		Rhythm analysis every 5 cycles	
I21	Listen actively	Constructive intervention and active listening	
I31	Encourage ideas and opinions of others	Investigation of reversible causes of cardiac arrest, additional necessary tests and treatment, ask colleagues for opinions	
I41	Give timely, sensitive, instructive feedback	Summarize CPR progress to team members	
I42		Recheck consciousness level, vital signs, oxygen saturation, and electrocardiogram	
T1	·Engage and integrate other professionals in patient-centered care ·Share accountability	Team member role assignment and performance	
T2	Reflect on team performance	ROSC and encouragement	

* V: Values/Ethics, R: Roles/Responsibilities, Interprofessional Communication, Teams/Teamwork

2.4 Data collection procedure

The two nurse educators who were nursing faculty members recorded reflective field notes over the course of the study. They were asked to keep a journal for reflective comments about their perceptions and experiences of developing and implementing the HSP-based IPE module on AMI management in adults at ED. They wrote reflective field notes in response to structured questions based on Gibbs' reflective cycle [15].

2.5 Data analysis

The content of the field notes was analyzed using inductive content analysis [16]. We began by reading the field notes carefully to immerse ourselves in the data and identified the pattern of categories and the relationships between categories. We refined themes as the analysis process progressed through discussions until consensus was reached. The names of the themes were chosen based on their clarity to represent the overall sense of the reflective notes [16].

2.6 Ethical considerations

Ethical approval was obtained from the OO University Institutional Review Board (IRB No. AJIRB-SBR -SUR-20-125). All participants gave informed written consent prior to participating in this study.

3 RESULTS

3.1 Nurse educator reflective field notes

The nurse educators perceived the use of HFS in IPE as the positive approach to facilitate medical and nursing students' practice and evaluation for ICP. In terms of their perspectives on the elements necessary for effective HSP-based IPE, four themes were identified: collaborative learning, co-facilitation debriefing, leadership commitment, and active faulty involvement.

Use of HFS. The reflective notes identified that almost medical and nursing students had positive experiences in the treatment and management of the adult with acute chest pain at ED, using high-fidelity simulators: '*They were satisfied with practicing and testing the care of patient with acute chest pain in the high-fidelity simulator'* (Facilitator A). The use of HFS facilitated to be involved actively in practicing interprofessional collaborative practice: *'…..it was good to use high-fidelity simulations in order to ensure that medical and nursing students practiced promoting team collaboration in the care of patients with acute chest pain at ED'* (Failicator B).

Collaborative learning. The nursing educators identified that small group activities promoted collaborative work for nursing and medical students. They found that students had to participate actively in the group discussion during the pre-scenario activity and simulation running: '*… discussed the scenario with team members …they performed during the simulation running…That promoted collaborative learning'* (Facilitator B). Students appreciated the opportunity for collaborative learning that encouraged them to take roles and responsibilities for working together and facilitated a team approach to the care of patient with acute chest pain at ED: '*…It helped students get to know how the other health profession students solve problems and recognize the other perspectives in the same situation. There were opportunities to work together in order for the practice of treatment and management of AMI at ED'* (Facilitator A).

Co-facilitation debriefing. The reflective notes showed that co-facilitation debriefing promoted nursing and medical students' understanding and clarity of the roles and responsibilities within interprofessional teams: *'Co-facilitation of medical and nursing faculty members during debriefing shared their profession-related knowledge and perspectives, which helped medical and nursing students understand and clarify their and the other's roles and responsibilities within the team'* (Failicator A). They also found that co-facilitation debriefing allowed them to complement one another in areas where there may be gaps, which facilitated patient-centered approach: *'Emergency medicine knowledge the medical facility member provided helped to encourage interprofessional practice, which led to patient-centered care'* (Failicator B).

Leadership commitment. Educators found that leadership commitment, particularly dean of college was essential in developing, planning, and implementing the HFS-based IPE. They noted that the dean of college plays a critical role in supporting for HFS-based IPE initiatives in terms of financial and human resources: *'The dean of college of nursing persuaded the president for HFS-based IPE initiatives. It helped faculties*

and students participate in HFS-based IPE in a good environment' (Facilitator B). As deans, they also used their bully pulpit to advance the necessity of HFS-based IPE, which led faculties and students to participate actively in HFS-based IPE: '*The deans voiced the mission and values of the colleges….nursing students were recruited in no time, were highly motived and were actively engaged in HFS-based IPE. …it ensured that the faculties actively took part in designing, implementing and evaluating the HFS-based IPE'* (Facilitator A).

Active faculty involvement. The reflected notes identified the importance of active faculty member involvement in developing, implementing, and evaluating the HFS-based IPE. It was effective to have a lead person within the team, who provided directions and guidance for faculty members within a team: *'...A leader person within the team was helpful for us to proceed the HFS-based IPE. We worked at different universities and busy, so it was hard to have meetings. It helped that the leader person prepared the draft of the HFS-based IPE template and let us review, discuss and refine it until all of us agreed….It helped having the one-hour training with a guide for faculty members prior to the implementation of it. The guide included the learning objectives, plan, descriptions of scenarios and debriefing methods'* (Facilitator B).

4 DISCUSSION

This study explored nurse educators' perceptions and experiences of HFS incorporated into IPE to establish how acceptable HFS would be in IPE for nursing students in South Korea. Participants perceived HFS used in IPE as an effective educational approach to engaging nursing and medical students actively in ICP experiences and in evaluating their actual performance on it. This finding is consistent with the recent review showing that HFS helps students develop collaborative, team-based skills within an interprofessional learning environment [17]. Also, this review suggests that HFS is a suitable teaching strategy to motivate students to achieve the core competencies for ICP.

Small group activities in HFS-based IPE facilitated nursing students to work collaboratively, which stimulated engagement actively during the pre-scenario activity and simulation running. Collaborative learning in small groups encouraged medical and nursing students to take roles and responsibilities for working together and facilitated a team approach to the AMI management of adults at ED. This finding supports the previous research [18], suggesting that IPE is facilitated when small groups of students from different healthcare professions bring knowing being and doing together in experiential activities to respond to realistic simulated clinical situations.

This study showed that active faculty involvement encouraged the use of HFS in IPE for nursing and medical students effectively. A leader person prepared the draft of the HFS-based IPE template, which encouraged faculty team members to review, discuss and refine it, although they worked at different universities and were busy. Also, prior to the implementation of the HFS-based IPE, faculty training with a guide that included the learning objectives, plan, descriptions of scenarios and debriefing methods encouraged them to facilitate HFS-based IPE effectively. This finding supports the previous research [19], showing that facilitators need to be prepared by having a commitment to be fully engaged and to be aware of learning context and IPE principles for effective IPE. Thus, this study suggests that active educator participation is important to facilitate HFS-based IPE effectively by having a leader person within the faculty team and faculty training with a guide prior to its implementation.

Leadership commitment played an important role in supporting financial and human resources such as appropriate equipment to facilitate HFS-based IPE for nursing and medical students effectively. It helped faculties and students participate in HFS-based IPE in a good environment. In this way, nurse educators will have satisfying experiences and consequently readily accept the use of HFS in IPE.

We believe that this is the first study to explore nurse educators' perceptions and experiences of developing and implementing the HSP-based IPE for nursing students in South Korea. Internationally, the standards of simulation-based IPE recommend that an appropriate evaluation plan should be included as one of the criterion [7]. In this study, it could be challenging for medical and nursing faculty members to develop the performance evaluation checklist in line with the scenario objectives, using their emergency care expertise. The use of performance evaluation checklist during the simulation running helped ensure the measurement of core

competencies for ICP in the AMI management of the adult and effective reflection during the debriefing. Thus, it is recommended to use the performance evaluation checklist in line with the scenario objectives for HSP-based IPE in order to improve nursing students' core competencies for ICP.

This study has several limitations. First, the findings of this study may not be generalized as this study involved one college of nursing and one school of medicine in South Korea. Second, the perceptions and experiences of the HSP-based IPE was explored through nurse educators' reflective notes only. Thus, it would be a recommendation that further research is needed to identify their perspectives through individual interviews in South Korea.

5. CONCLUSION

HFS is perceived as a valuable educational strategy that improves nursing and medical students' core competence, encouraging educators to incorporate it in facilitating ICP for AMI management in adults at ED. The elements necessary for effective HSP-based IPE should be taken into consideration in planning, designing and implementing it.

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