



# Development and evaluation of a clinical simulation for new graduate nurses: A multi-site pilot study



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## ABSTRACT

**Background:** New nursing graduates have revealed that they perceive a gap between theory and practice with reference to their education and the real workplace setting. Additionally, many nurses experience a reality shock when they participate in clinical practice.

**Purpose:** The purpose of this study was to develop and test the effects of a scenario-based simulation training program on new graduate nurses' competency, critical thinking dispositions, and interpersonal communication skills.

**Method:** This pilot multi-site study used a pretest-posttest control group design. It was conducted at four sites of a university-affiliated simulation center in Korea. Participants were recruited utilizing a convenience sample from four tertiary hospitals in Korea. Twenty-four new graduate nurses participated in this study.

**Results:** At the three-month follow-up, the levels of communication skills used in practice among the intervention group were statistically significantly higher than those of the control group participants ( $U = 151.50, p = .005$ ). However, there were no significant differences between the groups in changes in nursing competency ( $U = 287.50, p = .992$ ) or critical thinking disposition scores ( $U = 269.50, p = .702$ ). The participants' mean rating scores concerning the objectives, intentions, and recommendations for other nurses were positive and high.

**Conclusion:** The involvement of current practicing of nursing in certain scenarios and the implementation of simulation learning could enhance the readiness of new graduate nurses.

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## 1. Introduction

Both nationally and internationally, considerable attention is being focused on the nursing shortage within the health care arena. Despite the undesirable effects of this nursing shortage on the health care system, a registered nurse shortage is expected in the near future in Korea, the US, and even Canada (Korea Institute for Health and Social Affairs, 2015; American Nurses Association, 2016; Canadian Nurse, 2009). Various strategies have been considered to manage the nursing shortage, and one of the most effective ways was controlling attrition rates among existing and newly graduated nurses. The attrition rate in Korea has been reported as 16.9% for existing nurses and 31.2% for newly graduated nurses (Korea Health Industry Development Institute, 2014). These attrition rates can have significant negative financial impacts on the overall health care setting in terms of processes such as recruiting, hiring, orientating, and training new nurses (Rush et al., 2013). New nursing graduates have revealed that they perceive a

gap between theory and practice with reference to their education and the real workplace setting. Additionally, many nurses experience a reality shock when they participate in clinical practice. Moreover, new graduate nurses experience problems related to complexity of care, heavy workloads, technological advances, and lack of communication skills. Thus, they experience a transition shock and increased work-related stress, as they lack the competency to tackle the challenges of continuing a nursing career (Bisholt, 2012; Rudman and Gustavsson, 2012; Wu et al., 2012). A meta-analysis revealed that many trials have been conducted to prevent nursing shortages and increase the retention of nurses. Furthermore, transition programs have been introduced to decrease the reality shock experienced by newly graduated nurses (Missen et al., 2014). Such transition programs focus on helping new nurses adjust to the real-life settings. Systematic review studies have reported that transition programs for new graduate nurses generally positively affect nurse retention and competence; however, the best transition program could not be identified due to the variability in program length and structure (Missen et al., 2014; Rush et al., 2013). In Korea, most hospitals have few resources to train novice nurses.

A simulation is a pedagogical tool of teaching/learning that is based on a real-life situation. It is designed to provide students with actual

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situations and allow them to practice and learn in a safe environment (Arthur et al., 2012). Clinical simulation plays an important role in helping students and professionals conduct clinical practice, as it provides opportunities to repeat clinical performance and integrate knowledge into the clinical setting without the risk of harm to real patients and professionals (Campbell and Daley, 2008). Additionally, simulation-based clinical practicums improve newly graduated nurses' abilities to collaborate with other health care providers. Furthermore, they help these new nurses implement communication skills and manage complex clinical situations. A meta-analysis study demonstrated that simulation programs were more effective than traditional learning methods (Shin et al., 2015). However, in spite of the advantages of simulation-based transition programs, most related studies have examined the educational effects on nursing students, while very few have been conducted with new graduate nurses.

The effects of simulation-based educational methods have been reported in various areas. For instance, simulation-based education has been found to increase students' empowerment and self-efficacy (Babenko-Mould et al., 2015), communication skills (Kameg et al., 2010), and thinking abilities (Norman, 2012). Additionally, significantly decreased anxiety levels have been reported when the students were taught in a simulated setting (Gore et al., 2011; Khadivzadeh and Erfanian, 2012; Megel et al., 2012). An integrated review study revealed simulation education outcomes in the following five areas: confidence/self-efficacy, satisfaction, anxiety/stress, skills/knowledge, and interdisciplinary experiences (Foronda et al., 2013). Despite the substantial amount of research on the impact of simulation, few studies have been conducted using newly graduated nurses as the subjects. However, the simulation-based learning method may be an effective way to improve newly graduated nurses' abilities to adjust, and may enhance their transition from student to clinical nurse. Therefore, the purpose of this study was to develop a scenario-based simulation training program (SSTP) for newly graduated nurses, and to test the effects of the SSTP on their nursing competency, critical thinking dispositions (CTDs), and interpersonal communication skills.

## 2. Methods

This study had two research phases. To develop an SSTP for new graduate clinical nurses, an analysis of focus group interviews among new graduate nurses and nurse managers was conducted in the first phase. For the second phase, a pre- to post-intervention control group design was implemented to investigate the effectiveness of SSTP on nursing competency, CTD, and interpersonal communication skills among new graduate clinical nurses.

### 2.1. Phase 1. Development of an SSTP for New Graduate Clinical Nurses

The SSTP development process comprised analysis, design, development, and evaluation (Waxman, 2010). We also used evidence-based guidelines for the development of clinical simulation scenarios. The critical elements included ensuring the learning objectives were defined, identifying the level of fidelity, defining the level of complexity, using evidence-based references, incorporating instructor prompts and cues, and allowing adequate time for debriefing or guided reflection.

Simulation-based educational scenarios were developed through data acquired from focus group interviews with new graduate nurses and nurse managers. Eight graduate nurses from hospitals in Seoul and Cheonan and 7 clinical educators, including head nurses and preceptors, from a hospital in Seoul participated in semi-structured interviews pertaining to which skills were most difficult to perform independently. All participants were conveniently recruited from among newly graduated nurses who were currently working on surgical medical wards or in emergency rooms, and who had cared for patients over the previous 1–3 months, and from among clinical educators in the

tertiary hospital. Their clinical experiences were measured using self-report questionnaires.

Four focus groups were conducted, and each session lasted 1–2 h. Each group discussion was audio-recorded and was transcribed verbatim with the participants' permission. "What are essential nursing skills for new graduate nurses?" and "What are the skills found most 'difficult' to perform?" were the guiding interview questions. Qualitative data from the focus group interviews were analyzed using Patton's (2014) inductive qualitative content analysis process, and the following four themed difficulties were identified: (1) interpersonal skills, (2) decision making, (3) coping in crisis, and (4) reporting. In terms of nursing procedures, many graduate nurses felt ill prepared to administer medications and pre- and post-care diagnostic tests. Despite obtaining certification as registered nurses, new graduate nurses did not seem to be proficient in performing those skills and procedures. A detailed description of the study is reported elsewhere (Lee et al., in press, 2016).

After an analysis of the focus group data, goal setting and learner activities were established by scenario. Four core concepts—interpersonal skills, decision making, coping in crisis, and reporting—were designated as being integral to all scenarios. Concerning the procedural components, diagnostic test and medication care administration were integrated into each scenario. We defined each scenario's level of complexity as medium to high, as these subjects were graduate registered nurses. More repetition of these skills in certain scenarios would be necessary to provide mastery. The entire panel, which included four nursing professors who had experience in nursing simulation education and four clinical nurse preceptors with master's degrees who were working in a tertiary hospital, was involved in this development of scenarios.

The template included learning objectives; contents; algorithms; lab, prop, and supply preparations; medical records; cueing; and consistency relevant to standardized patient (SP) performance. After the scenario template was produced, the scenario contents were selected and categorized according to the four identified themes. The four simulation scenarios were titled medication errors, diagnostic tests for coronary angiography, hypoglycemia, and pain management after operation completion. Two scenarios depicted internal medicine clinical situations, while the others depicted surgical ward situations. The 1–2 day module features a combination of a high-fidelity human patient simulator and an SP of a family member lasting approximately 10–20 min. These situations were chosen to assess the critical thinking, interpersonal communication, and reporting skills of new graduate registered nurses in Korea.

For the validity and pilot testing, four written scenarios were validated through clinical expert reviews, and they were subsequently pilot tested by two graduate nurses before the experimental studies were conducted. Following the feasibility test, some scenarios were modified, and levels of difficulty were assessed by interviewing the participants.

### 2.2. Phase 2. Evaluation of an SSTP for New Graduate Clinical Nurses

#### 2.2.1. Design

This study used a quasi-experimental design featuring a pre- and posttest control group to investigate the effectiveness of a simulation-based educational program on nursing competency, CTD, and interpersonal communication skills among new graduate clinical nurses. This multi-site pilot study was conducted at four locations of a university-affiliated simulation center in Korea between September and December 2015 by four research team members who are faculty members of their respective campuses. Evaluations of an SSTP were undertaken independently in the university-affiliated nursing simulation center of each university hospital. To ensure the multi-site consistency of the study procedures, a study protocol guidebook was provided to each center. However, other institutional, or instructor and learner, variations were permitted.

### 2.3. Participants

The 48 participants' characteristics are presented in Table 1. The mean (SD) age for the total sample was 24.36 (SD 1.20) years, with a range of 23 to 29 years. The majority of the participants were working in internal medicine. Participants' GPAs ranged from 3.0 to 4.20, with an average of 3.51. All the nurses in the experimental group and 87% of the nurses in the control group had experienced simulation-based education in their undergraduate programs.

### 2.4. Data Collection

The study was performed at 4 university hospitals in South Korea. With the permission of the hospital administrator, new graduate nurses were invited to participate in this study. The participants were enrolled in the program at the hospital through the unit managers. Inclusion criteria for participating in the study were full-time registered nurses: 1) who had graduated from an accredited nursing school with a bachelor's degree in nursing, and 2) had <6 months of working experience. They were expected to be novices because they were likely to lack work skills and to experience difficulties in performing nursing skills independently (Sin, 2015). Approximately 12 of the conveniently selected new nurses were recruited at each site; therefore, a total of 48 new graduate nurses were recruited.

After the participants were enrolled, baseline evaluations including self-report demographic characteristics, level of nursing competency measurements, and assessments of critical thinking and interpersonal communication skills were performed using self-administered questionnaires prior to the simulation program for the experimental and control groups. The SSTP program consisted of four 15- to 20-min unfolding simulation scenarios, each followed by a separate debriefing session using a standard set of learning outcomes and guided questions. The control group received an ordinary hospital education and continued with their ordinary practices. Follow-up surveys were completed either via postal mail or email 3 months after the program ended. Each participant completed two posttests measuring nursing competency, critical thinking, and interpersonal communication skills. Evaluations of general satisfaction and reactions toward the program were reported immediately following its completion. This experimental study was reviewed and approved by the Ethics Review Board of the principal investigator's university in Korea. In each center, trained researchers from the college conducted the participants' recruitment process and informed them of the purpose of the study. The participants were assured of both anonymity and confidentiality, and their informed consent was obtained before they completed the sessions.

### 2.5. Primary Outcome Measures

Before the group allocation, the participants completed a self-report pretest questionnaire to evaluate nursing competency, critical thinking,

**Table 1**  
Participants Characteristic by Group.

Variables	Exp (n = 24) mean (SD)	Cont (n = 24) mean (SD)	U or $\chi^2$	Significance (2-tailed)
Age, y	24.42 (0.92)	24.30 (1.46)	224.00	0.223
Bachelor degree	22 (91.7%)	24 (100%)		0.489
Internal Medicine Ward	17 (70.8)	16 (66.7)	0.097	0.755
SBL experience(yes)	24(100%)	21(87%)		0.234
SBL importance(yes)	20(83.3%)	20(83.3%)		1.000
GPA	3.57(0.33)	3.46(0.35)	211.50	0.168
HNCS	4.48 (0.57)	4.94 (0.62)	266.00	0.650
CTD	98.66 (6.96)	97.91 (10.09)	286.50	0.975
Communication skill	55.25(5.47)	56.00(6.52)	262.50	0.598

Abbreviations: SBL, Simulation-based learning; GPA, Grade Point Average; HNCS, Holistic Nursing Competence Scale; CTD, Critical Thinking Disposition. Data are presents as n (%).

and interpersonal communication skills. The same questionnaire was used for the posttest.

#### 2.5.1. Holistic Nursing Competence Scale (HNCS)

Participants' nursing competence was assessed using the HNCS (Takase and Teraoka, 2011), which includes two sections. Section A contains seven items that evaluate an individual's usual behavior (general aptitude). Section B, which has 29 items, includes four subscales rated on a 7-point scale, from 1 (not competent at all) to 7 (extremely competent), with higher scores indicating greater levels of clinical competence. The Cronbach's  $\alpha$  value was 0.93.

#### 2.5.2. Critical Thinking Disposition

The Critical Thinking Disposition (CTD) instrument was used to measure the participants' pre- and posttest levels of CTD. The instrument's seven subscales are objectivity, prudence, systematicity, intellectual eagerness/curiosity, intellectual fairness, healthy skepticism, and critical thinking/self-confidence. The instrument consists of 27 items that are assessed on a 5-point Likert-type scale, with responses ranging from 1 (strong disagreement) to 5 (strong agreement) (Yoon, 2004). Two items were reversed. High scores indicate greater CTD, and the scores ranged from 27 to 135. The Cronbach's  $\alpha$  value was 0.82.

#### 2.5.3. Communication Skills

This study also measured communication skills. The interpersonal communication competence scale consists of 15 items and is scored on a five-point Likert scale, with responses ranging from strongly agree (5) to strongly disagree (1), with total possible scores ranging from 15 to 75 (Hur, 2003). Subjects with higher scores have higher levels of interpersonal communication skills. Its Cronbach's  $\alpha$  value was 0.82.

### 2.6. Secondary Outcome Measures

After the training, a questionnaire was distributed to the intervention group for the posttest. Confidence in meeting the curriculum's learning objectives was measured on a 5-point Likert scale. Participants were asked about their intentions to make recommendations for other nurses using a 5-point Likert-type scale. Evaluations of the SSTP for new graduate nurses were reported with open-ended questions

### 2.7. Data Analysis

Data analysis was performed using per-protocol analysis to determine the effects of the program. Descriptive statistics were used to illustrate demographic characteristics. Mann-Whitney U and chi-square tests were used to determine the homogeneity of the general characteristics and evaluate differences in the pretest scores between the control and intervention groups. Pre- and posttest group comparisons were analyzed using a Mann-Whitney U test. *P*-values were calculated by comparing differences in score changes. Statistical analysis (two-tailed,  $p < 0.05$ ) was conducted with SPSS (Version 22.0; SPSS Inc., Chicago, IL, USA).

## 3. Results

### 3.1. Primary Outcome Measures

At the three-month follow-up, the levels of communication skills in practice among the intervention group were statistically significantly higher than those of the participants in the control group. However, the differences in changes in HNCS and DTD scores were not significant between the two groups (Table 2).

**Table 2**  
Baseline and Three Months Follow up: Scores of Variables of Participants by Group.

	Exp (n = 24) mean (SD)			Cont (n = 24) mean (SD)			U	P
	Pre	Post	Change	Pre	Post	Change		
HNCS	4.48 (0.57)	4.93 (0.65)	0.04	4.94 (0.62)	5.00 (0.65)	0.06	287.50	0.992
CTD	98.66 (6.96)	99.33 (5.19)	0.66	97.91 (10.00)	98.41 (7.55)	0.50	269.50	0.702
Communication skill	55.25 (5.47)	57.95 (6.46)	3.08	56.00 (6.52)	55.54 (6.47)	-0.45	151.50	0.005

Abbreviations: HNCS, Holistic Nursing Competence Scale; CTD, Critical Thinking Disposition.

### 3.2. Secondary Outcome Measures

Concerning confidence in meeting the curriculum's learning objectives, the participants' mean scores were 4.08, 4.08, 4.25, and 4.25 on a 5-point Likert scale for priority, decision making, communication, and reporting, respectively. The recommendation intentions were high, with a mean score of 4.5. The program evaluations included positive narrative responses, such as:

- “Practicing with angry patients and family members was helpful.”
- “Communicating with patients provided an excellent empathy learning experience.”
- “A nice reminder of patients' and their families' needs.”
- “I learned why the nurse's role is important to patient care.”
- “This was a wonderful experience to learn professionalism and communication skills.”
- “This program was different from that of my school's graduate program. It is essential for clinical nurses to receive these programs as part of their continuing education.”

## 4. Discussion

The purpose of this study was to develop scenarios for simulation-based education for new graduate nurses to determine if simulation-based education would positively affect nursing competency, CTD, and communication skills.

In the current study, SSTP was effective in facilitating the development of new graduate nurses' communication skills. Findings from previous studies support this result (Bays et al., 2014; Hsu et al., 2015; Kameg et al., 2010). In this study, standard patients (SP) were utilized in simulations to increase realism. For example, SPs took on caregiver roles, in which they asked new graduate nurses to call doctors, act quickly, and urgently solve chief complaints. A meta-analysis integrating the effects of SP reported that simulation-based learning using SP is an effective way to increase self-efficacy, learning motivation, and clinical competency (Oh et al., 2015). Since simulation and SP maximized the situational realism in this study, we believe new graduate nurses could enter seriously into the situation and experience nurses' communication roles in relationships with caregivers, as well as patients.

New graduate nurses have been reported to lack communication skills when faced with real patients and their caregivers (Sönmez and Yildirim, 2016). Moreover, the current study's results of a focus group interview with nurse managers also revealed that new graduate nurses lack communication skills. This is one of the most important elements of nursing, since communication with patients and their caregivers is a vital component of high-quality care (Bays et al., 2014; Kameg et al., 2010). Studies demonstrate that effective communication improves patient outcomes by alleviating symptoms, decreasing patient distress, and improving adherence to treatment (Lienard et al., 2008; Zolnierok and DiMatteo, 2009). Thus, it is important to increase new graduate nurses' communication skills to help them adjust to their work environments and increase retention rates within a clinical setting. We believe

SSTP with SP may provide a solution for fostering new graduate nurses' communication skills.

Nursing competency plays an important role in ensuring patient safety (Schwarz et al., 2007) and improving the nurses' problem-solving abilities to enable them to more effectively solve problems within clinical settings. In the current study, however, the SSTP had no effect on nursing competencies. The current result was not congruent with that of a previous study (Lee et al., in press, 2016), which demonstrated the effects of a simulation education program on nursing competencies. The discrepancy between the results may be due to the brevity of the intervention, and especially clinical background differences. Specifically, the majority of the participants had a background in internal medicine, but they were also working in oncology, ICU, and pediatric settings. After the simulation's completion, the nurses mentioned their clinical backgrounds differed from what was represented in the contents of the study's simulation scenarios. Thus, the participants reported limitations in applying the SSTP's effects to real practice settings. We also found that a sensitive measure should be developed to evaluate nursing competencies after the completion of each simulation. The measure utilized in this study measured general competencies, but it was not sensitive enough to specifically measure SSTP effects.

Critical thinking is essential for new graduate nurses' development. American Association of Colleges of Nursing (2008) announced that graduating nurses can apply critical thinking, which is composed of both skills and disposition (Facione and Facione, 1994; Facione et al., 1994), in all practice situations to improve patient health outcomes. Critical thinking disposition is defined as a thinking habit or mental trait (Facione et al., 1994).

In the current study, the CTD scale was used to measure the participants' levels of critical thinking disposition. The total CTD score did not significantly differ between the two groups. The effects of simulation education on critical thinking have proven to be controversial. Two studies reported that simulation-led education had no significant effects on critical thinking (Maneval et al., 2012; Shinnick and Woo, 2013). However, simulation education was effective in improving CTD (Kim and Choi, 2015). Few studies have been conducted to measure the effects of simulation education on CTD. Previous studies measured the outcome of simulation effects using critical thinking, but these measures were not consistent. For example, skills and disposition have both been utilized to measure critical thinking. Thus, future studies should be conducted to measure the effects of simulation on CTD.

Although high-fidelity simulated environments provide the opportunity for undergraduate nursing students to develop and refine their recognition and response skills (Bogossian et al., 2014), critical thinking skills training could be different from conventional education (Wong, 2007), and significant changes in critical thinking require longer periods of time (Costley and Han, 2013). Therefore, it will be necessary to explore the long-term effects of SSTP among newly graduated nurses in the future.

Examining the secondary outcome was also beneficial to furthering an understanding of the study results. The participants reported that SSTP was a valuable experience that allowed them to reflect on their clinical performance and motivated them to study clinical features in



more depth. The SSTP was successfully delivered to all the participants from the 4 hospitals. The no-dropout rate might have been due to the evidence-based scenario that was developed according to the nurses' current educational needs. The study results suggest the program could be continuously used for newly graduated nurses.

#### 4.1. Limitation of Study

Our study has some limitations in that SSTP intervention has been utilized for a very brief period, and the measurements were not sensitive enough to examine SSTP's effects on new graduate nurses. The majority participants had had previous experience with simulation learning, had attained their bachelor's degrees, and had mid-high GPAs. Thus, these participants may have been of a mid-high level of clinical competency, and they may not represent the general population of new graduate nurses in Korea in terms of competency levels. We are also aware that recall bias, social desirability bias, and intrinsic self-rating scales may have affected the validity of the current findings. However, this study's main strength lies in the fact that it used a multi-center design that allowed for results with good representativeness and showed the potential for the program's continuous use.

## 5. Conclusion

We developed our clinical simulation scenarios using evidence-based data acquired from focus group interviews of newly graduated nurses and nurse managers. The study results support the use of simulation as an effective educational tool for use with both newly graduated nurses and nursing students. From the current study, we found that a transition program should be established for new graduate nurses to help them adjust effectively to new situations. Furthermore, the involvement of their current practicing of nursing in certain scenarios, as shown in this study, and the implementation of simulation learning could enhance the readiness of new graduate nurses. In addition, healthcare settings should consider adopting clinical simulation for new graduate nurses as an effective transitional education strategy. Continuing study of the transition program for new graduate nurses should be considered, and simulation scenarios that include various clinical settings should be developed to enable new graduate nurses to adjust to clinical settings.

## Conflicts of Interest

The authors declare that they have no competing interests.

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