

Simulation-based Learning of Korean Nurses: A Systematic Review

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Abstract

Objectives: This study proposes a direction for future development and a basic data on the effectiveness of simulation-based education by conducting a systematic review on the simulation-based education in Korean nurses.

Methods: Literature was selected in accordance with the criteria of PICOT-SD by three professors in nursing with experience in meta-analysis evaluating the quality of the paper and analysing their content. Among the total of 65 literatures searched through KERIS (2014.4.15) and KAN & KJAN (2014.4.18) DB, a final 8 literatures were selected according to the criteria. 8 articles were collected and analysed according to the Cochrane-handbook and PRISMA's guideline on reporting.

Results: As a result of the overall quality assessment of targeted literatures, it was analysed that 3 literatures that used the study design of RCT was (++) and the other 5 literatures were (+). Most of the literature analysed in this study addressed the theme of simulation with a focus on ACLS (advanced cardiovascular life support) and ER/ICU care. There were many literatures having no educational effect in the cognitive & affective domain of Bloom, but for psychomotor domain, most of the literatures have shown an educational effect of improvement on the clinical performance ability. This study showed that simulation based learning was effective in improving clinical performance ability in Korean nurses.

Conclusion: This study has significance in that it was the first to attempt the systematic review on the simulation education study targeting the Korean nurses.

Keywords: Educational Effect, Nursing Education, Nurse, Simulation Based Learning, Systematic Review,

1. Introduction

While simulation has been used in nursing education since the late 1990s in advanced countries such as the US or UK¹, it was adopted starting in the mid-2000s in Korea. Nursing education using simulation allows the nurse to go through repeated situations that cannot be experienced in a clinical setting, thereby helping her improve her clinical practice skills and critical thinking capabilities^{2,3}. As cutting-edge medical device led to an increase in preventive treatment and shortened stays at the hospital, basic nursing carried out through outpatient treatment or at the patient's own home has increased. Along with the change in patients' perceptions towards nursing and increased demand for higher quality in nursing, simulation-based nursing is emerging as the best alternative in training new nurses.

Even though simulation-based education that re-enacts a clinical situation has many advantages, it can lead to varied results depending on the context of clinical nursing, simulation theme and operation method. At present, most of the scenarios used in simulation in Korea are those that had been developed overseas and therefore do not always reflect the realities of Korean patients. This has led to the scenarios being revised before use. Moreover, depending on the researcher, simulations vary in mediation methods, leading to varied results in terms of education benefits. At a time when the selection of theme and operation method need to be best identified for a more effective simulation-based nursing education, it is difficult to use such varied results from preceding studies as the rationale for applying simulation-based methods in nurse training. This is because there is no comprehensive

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conclusion that brings together the effectiveness of simulation in nurse education or its application methods.

In order to apply the varied study results on simulation nurse education to the curricula as the rationale and basis for such simulation methods, there is a need to draw a more comprehensive conclusion. To that effect, a systematic review was carried out by selecting specific study questions and criteria for the selection of literature and by analysing all possible collectible results of preceding studies⁴.

This study conducts a systematic review on the effectiveness of simulation-based education applied to nurses in Korea. In doing so, it attempts to provide a basic set of data on simulation-based nurse training in Korea.

2. Methodology

2.1 Study Design

This study conducted a systematic review on the educational effects of simulation-based training on Korean nurses.

2.2 Criteria for Selection and Exclusion of Literature

The core question in this study was “what are the effects that simulation based learning have been found to have in experimental research cases in Korean nurses?” This question can be stated in accordance with the PICOT-SD⁵ as follows.

- Participants: Nurses in Korea
- Intervention: Apply simulation to clinical practice training on all clinical theme
- Comparisons: None
- Outcomes: 3 area variables of Bloom⁶
- Timing of outcome: Immediately after the intervention during the simulation and after, including the tracking period
- Study design: All experimental studies including similar study designs

Literature was selected in accordance with the criteria of PICOT-SD [5] by three professors in nursing with experience in meta-analysis evaluating the quality of the paper and analysing their content.

Criteria for exclusion were: 1) Overlapping literature, 2) Non-experimental studies, 3) Studies with participants who are not nurses, 4) Studies that include effects of other interventions.

2.3 Selecting Literature

This study was conducted according to the Cochrane-handbook⁷ and PRISMA report guidelines⁸. Three researchers have used the Internet based DB had searched the ‘simulation’ and ‘nurse’ using a keyword without being limited to the publication year. Among the total of 65 literatures searched through KERIS (2014.4.15) and KAN & KJAN (2014.4.18) DB, a final 8 literatures were selected according to the selection criteria.

The process of selecting search literature followed the report guidelines of systematic literature review as presented in PRISMA⁸.

Of the 65 papers that came up in the search, 5 were excluded for overlapping and a total of 60 papers were selected for phase 1. By reviewing the titles and executive summaries of the literature, 43 additional papers were then excluded in accordance with the selection criteria of PICOT-SD⁵, selecting 17 papers for phase 2. Next, using the same criteria for the body of the content in the literature, an additional 9 papers were excluded, to make the final count 8 (Figure 1).

2.4 Data Analysis Method

For the selected literatures, three researchers have independently used the PICOT-SD⁵ and SIGN checklist⁹

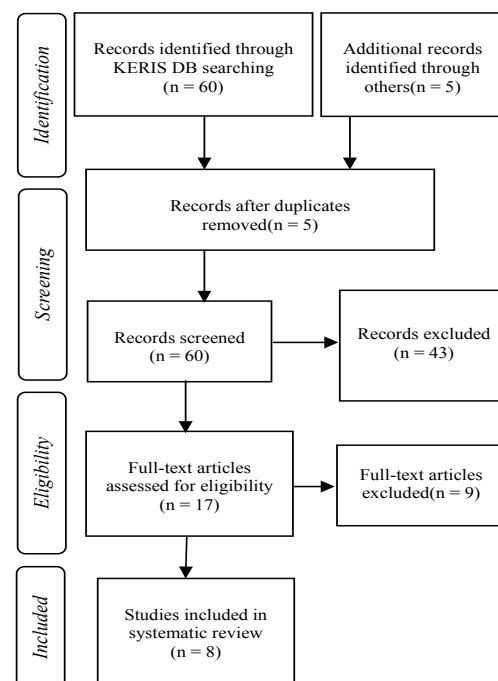


Figure 1. Flow diagram based on PRISMA.

to conduct the literature analysis and quality assessment, and the agreement was made through discussion.

The educational effect of simulation was classified and analysed into cognitive, affective, and psychomotor domain in accordance with the classification standard of Bloom⁶.

2.5 Evaluation of the Literature Quality

To conduct evaluation on the quality of the literature, 11 questions from the SIGN checklist's⁹ section for internal legitimacy were used after excluding three questions (1.2, 1.3, & 1.4). The eleven selected questions included 1 question that assessed the overall quality. Evaluation scores for the overall literature were given as (++), (+), or (0) for the effects to reduce the convenience of the research. Answers as to whether the effects could be verified to be due to intervention, and whether the study results could be applied to other groups were assessed and the conclusion of the author was summarized. The literature analysis and quality evaluation through PICOT-SD⁵ were conducted by 3 researchers independent of each other, with the results later combined to review any items that were not consistent. For these items, a consensus was reached through discussion.

2.6 Ethical Consideration

This study was conducted according to the Cochrane-handbook⁷ and PRISMA report guidelines⁸ for ethical research procedures.

3. Results

3.1 Characteristics of Studied Literature

Eight studies were included in the review. A study design had 5 NRCT (non-randomized controlled trials) and 3 RCT (randomized controlled trials) and for education subject. The most frequently used simulation themes were ACLS (advanced cardiovascular life support) and ER/ICU care, consisting of three cases each. Average education time was 1.6 hours with minimum of 0.5 hour and maximum of 2.7 hours (Table 1).

There were many literatures having no educational effect in the cognitive & affective domain of Bloom⁶, but for psychomotor domain, most of the literatures have shown an educational effect of improvement on the clinical performance ability (Table 2).

3.2 Quality Assessment of Literature

As a result of overall quality assessment of targeted literatures, it was analysed that 3 literatures that used the study design of RCT was (++) and the other 5 literatures were (+) (Table 3).

Table 1. Characteristics of studied literatures

Authors	Design	Sample Size		Clinical Theme	Intervention	Duration	
		Exp.	Cont.			No of Scenarios	Time Day (min)
Kwon et al. ¹⁵	^{a)} NRCT	19	19	ACLS		1	NM 2
Kim ¹⁶	NRCT	26	24	ACLS		1	130 2
Kim ¹⁷	NRCT	15	15	ER/ICU care		4	90 4
Back ¹⁸	NRCT	20	20	ACLS		4	30 1
Cho ¹⁹	^{b)} RCT	19	19	Infection control		1	30 1
Lee and Jung ²⁰	NRCT	30	30	Emergency airway management		4	160 1
Chang ²¹	RCT	20	20	ER/ICU care		5	120 1
Ryoo ²²	RCT	20	18	ER/ICU care		1	^{c)} NM 1

a) non-RCT: non-randomized controlled trials, Nonequivalent control group pretest–posttest design

b) RCT: Randomized controlled trials

c) NM: Not mention

Table 2. Abstraction of studied literatures

Variables	No.	Variables	No.
Study Design		Evaluation	
Randomized Controlled Trials	3	Cognitive domains(Y/N)	(3/5)
Non-randomized Controlled Trials	5	Knowledge	2/3
		Clinical judgment	1/0
Clinical Theme		Problem solving	0/1
ACLS	3	Recognition	0/1
Emergency Airway Management	1	Affective domains(Y/N)	(1/3)
ER/ICU Care	3	Self-efficacy	1/3
Infection Control	1	Psychomotor domains(Y/N)	(7/2)
		Clinical/skill performance	6/2
		Communication competency	1/0
		Perspective satisfaction(Y/N)	(0/1)

Table 3. Evaluation and quality assessment of studied literatures

Authors	Evaluation (Direction of Effect)			Quality Assessment		
	Cognitive	Affective	Psychomotor	^{a)} Persp. Satis.	^{b)} Homo.	^{c)} Quali.
Kwon et al. ¹⁵	Knowledge(-)	Self-efficacy(-)	Performance(-)		Y	+
Kim ¹⁶	Knowledge(↑) Problem solving(-)		Clinical performance(↑)		Y	+
Kim ¹⁷	Clinical judgment(↑)		Clinical performance(↑) Communication competency(↑)		Y	+
Back ¹⁸	Knowledge(↑)		Skill performance(↑)		Y	+
Cho ¹⁹	Recognition(-)	Self-efficacy(-)	Clinical performance(↑)		Y	++
Lee and Jung ²⁰		Self-efficacy(↑)	Clinical performance(↑)		Y	+
Chang ²¹	Knowledge(-)	Self-efficacy(-)	Clinical performance(↑)		Y	++
Ryoo ²²	Knowledge(-)		Clinical performance(-)	Satisfaction(-)	Y	++

a) Persp. Satis. : Perspective satisfaction

b) Homo. : Homogeneity test

c) Quali. : Quality evaluation

4. Discussion and Conclusion

62.5% of the analysed literature had used NRCT study designs. When such a design is used, there is the possibility of an intervention by the third variable and of convergence towards the interaction of maturity and the mean. Therefore, a control on external variables that may affect dependent variables needs to be considered¹⁰. In order for study results on simulation-based nursing education to be used as supporting material, methodologies such as RCT need to be reinforced, thereby securing more reliability on the legitimacy of objective rationale for the mediating effects of systematic review.

87.5% of the analysed literature had addressed situations where emergency-related themes and required skills in addressing such themes. The result was that emergency situations that are important but hard to come by in a clinical setting¹¹ were experienced as an education theme, thereby making the most of the advantages of simulation. However, considering the practice at hospitals where a variety of clinical situations are present, a wider range of clinical situations and contexts would have to be included into simulation-based education going forward.

The results of this study show that clinical performance ability after simulation-based learning increased in 6 cases out of 8 (75%), and that knowledge was expanded in 2 cases out of 5 (40%). Such findings are somewhat similar to those of Cant and Copper¹² where a systematic review showed that 4 out of 9 cases (44%) reported an expansion of knowledge. These findings indicate that simulation-based learning is more effective in the psychomotor domain. In particular, they show that when one scenario was used to conduct one session of simulation-based training, the definitive domains of expanded knowledge or sense of self-efficacy were not affected. This means that the simulation education targeting the nurses is attributed more towards the application of knowledge than the expansion of knowledge¹³.

Meanwhile, when similar scenarios were repeated to the same subject, self-efficacy and clinical judgment increased. This indicates that definitive domains can be improved when scenarios of similar context are repeatedly mediated. Therefore, in order to improve capabilities in the affective and psychomotor domain, repeated education through similar scenarios would be needed.

There is also a report that rather than consecutively repeated training in simulation-based education, repetition at different times is more effective¹⁴. Therefore in follow-up studies, a review on the effect of repeated simulation-based learning on the nursing capabilities in the cognitive, definitive and psychomotor domains will have to be implemented.

This study has significance in that it was the first to attempt the systematic review on the simulation education study targeting the Korean nurses.

5. References

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