Comparison of the Effects of Simulation Practice and Clinical Practice Education: Nursing Care of Children with Respiratory Diseases

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Abstract

This study This study aimed to find the efficient practice education measures for the practice of pediatric health nursing by comparing the effects of simulation practice education and existing clinical practice one about children with respiratory diseases. Using the nonequivalent comparison group post-test non-synchronized design method, the research subjects were composed of total 62 people including 32 subjects for experimental group and 30 subjects for comparison group. Using the IBM SPSS v. 25.0 for data analysis, the differences in the baseline characteristics of both groups were tested through the t-test, X2-test, and Fisher's exact test. The results of this research are as follows. In the results of conducting the homogeneity test on the experimental group and comparison group, there were no differences between two groups while it was statistically significant in self-efficacy. The experimental group who participated in practice education using the simulator was statistically significant in nursing competence($F=27.183$, $p<.001$), communication skills($F=7.876$, $p=.001$), and learning satisfaction($F=12.950$, $p<.001$). The problem-solving ability($F=2.515$, $p=.089$) was not statistically significant. Such results are significant in the aspect of implying the possibility of practice education using the simulator that could effectively complement clinical practice in the practice education of pediatric health nursing in the future.

Keywords: simulation practice, nursing performance, problem solving ability, communication skills, learning satisfaction

1. Introduction

With the increased consciousness of patient right, it is limited to be fully equipped with clinical competence through clinical practice in the recent nursing education(Lee, 2001). For this reason, the opportunities for direct nursing performance are reduced while the observation-centered practice is mostly performed(Lee et al., 2007). Especially, in case of pediatric health nursing practice, the opportunities for direct nursing performance are extremely limited due to the severe low birthrate, so most of the practices are based on observation. Because of the realistic difficulty of pediatric health nursing practice, it is urgently needed to provide the practice education using simulation, and it is urgently required to evaluate if the simulation practice education is a teaching method that could supplement the clinical practice.

The clinical practice education is an important process in which nursing students can experience the overall nursing by applying and integrating the nursing knowledge and skills in various clinical settings like hospital after completing the intramural practice(Yang, 2008). Nevertheless, due to the recent social trend to emphasize patient rights and to regard safety as important, it is a lot limited to directly perform nursing, so the observation-based practice is mostly performed(Kim et al., 2012). As the clinical practice is frequently stopped by the recent COVID-19 pandemic, it is more urgent to have the researches on teaching methods that could replace clinical practice. Especially, in case of pediatric health nursing practice that targets children who are vulnerable subjects, the safety of children should be considered. Most of the hospitalized children are suffering from acute diseases, so the length of hospital stay is short, and it is more difficult for students to experience pediatric health nursing in the actual clinical settings(Chae et al., 2015; Lambton, O'Neill, & Dudum, 2008). In particular, when practicing in a university hospital, it is difficult to directly nurse a child. Accordingly, in Kim (2014)'s study, more than 1/3 of the students who experienced clinical practice responded that they had never directly encountered nursing, and students who practiced

at university hospitals mainly saw only high-risk cases, so there was a gap in practice experience depending on the place of practice. Since it is large, the need for an alternative to this part was raised.

The simulation study is a learning method that improves clinical competence by artificially reproducing a situation based on a virtual scenario similar to a possible situation in clinical settings within a practice room, utilizing the simulator similar to human or standardized patients, and directly applying knowledge and skills of students(Cooper & Taqueti, 2004). Owing to this strength, the importance of simulation learning is rising as the measures for complementing the vulnerability of practice education. The Korean Accreditation Board of Nursing Education is presenting the standard of nursing education accreditation evaluation that recognizes the simulation practice education as a part of clinical practice education hours (Korean Accreditation Board of Nursing Education, 2017).

Concerning pediatric health nursing practice, it is much more difficult to approach subjects than before the pandemic. And the trainees' contact itself can cause various risks related to the spread of infectious disease, so the simulation education in the pediatric health nursing area is reported in many researches as a strategy that could complement or replace the clinical practice(Cole & Foito, 2019; Fogg, Kubin, Wilson, & Trinka, 2020). However, most of those researches were based on the one-group pre/post-test design(Bambini, Washburn, & Perkins, 2009), with self-report evaluation of education only about self-efficacy, practice satisfaction, confidence, and interest on the last day of practice.

Thus, this study aimed to prove the baseline data for the development of efficient practice program by reproducing the clinical settings for patients with respiratory diseases, providing the basic nursing for children such as vital signs, oxygen therapy, application of Nebulazer, and administration of antibiotics, developing/applying a simulation scenario in which students communicate with children and their guardians, verifying its effects on nursing competence, communication skills, learning satisfaction, and problem-solving ability, and then comparing the practice using the simulator with the existing clinical practice.

2. Materials and Methods

2.1 Research Design & Research Subjects

This study used the nonequivalent control group post-test non-synchronized design method (Figure 1). The research subjects were the third-year students of College of Nursing located in Y city of Korea. Following the selection standards, the subjects were a) the students who already took the theory course of Pediatric Health Nursing, and b) the students who understood the target of this research and agreed to participate in it.

The sample size was measured by using the G*Power Program(3.1.9.2), and when effect size was .65, α=.05, power .80 it was 30 people of each experimental group and comparison group. After recruiting 33 people for each two groups, total 62 people were included in the final analysis as one person from experimental group and three people from comparison group were dropped out. The voluntary consent form was collected from every participant.

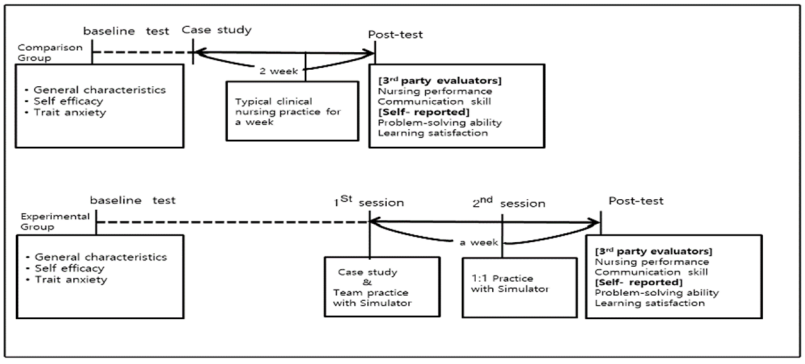

Figure 1. Research Design

2.2 Research Procedures

Before applying the intervention, the scenario that would be used for intervention was developed. The contents of scenario to be used for intervention were composed to apply the nursing process based on core nursing skills, therapeutic communication, and critical thinking focusing on the cases in which the major knowledge and relevant knowledge could be comprehensively applied for solving the health problems of subjects.

The core contents of module were mainly composed of checking the symptoms of children suitable for the stage of infancy by asking questions to guardians and then providing the education suitable for it, nursing intervention for oxygen therapy necessary for nursing respiratory distress, administration of antibiotics following the prescription, and skin test for the administration of antibiotics, and assessment of suitable condition of sick children before/after intervention. The researcher with clinical experiences for more than ten years and experiences in clinical practice instruction & simulation practice education for more than ten years took in charge of the improvement of scenario, driving of simulation, and operation of debriefing. The insufficient contents(Inducing mothers to state the symptoms of patients to assess them, and etc.) were complemented by asking two nursing professors with pediatric nursing clinical experiences for more than five years for verifying the content validity of the scenario.

For data collection, among the nursing students in a college of nursing, the students who understood the aim of this work and also agreed to participate in this study were divided into experimental group and comparison group by applying the matching method based on their school grade in the previous semester. After that, the students who agreed to participate in this research were divided into pre-test and post-test(Figure 1). former one was conducted for verifying the homogeneity between two groups. After that, the intervention was first conducted in the comparison group. After dividing the comparison group(N=30) into five groups, they received the case education about nursing of children with respiratory diseases. For two weeks since then, they experienced the nursing of children with respiratory diseases by performing the traditional clinical practice.

The experimental group received total two sessions of practice education about children with respiratory diseases using the simulator for two weeks. The experimental group(N=32) was divided into two classes. In the first practice education, each class of 16 students was split into three groups(5-6 students in each group) and performed the case study. After the case study, the group practice utilizing the standardized patient was performed for total 1 hour & 15 minutes(25 minutes per group). In the method of group practice, a single simulator was arranged in each group, and many students performed nursing to the simulator. When a student could not handle the given situation, another student who could handle the same situation took over the nursing performance from the previous student, so many students handled the given clinical situation as if a single student performed nursing. Through the debriefing[4] after the group practice ended, the students and professor shared and explained what they felt in the practice, and the professor let the students analyze the nursing skills they performed. In the second practice education, a student nurse performed one-to-one nursing using the simulator for ten minutes in the real ward situation. It took ten minutes per person. It took total 4 hours & 30 minutes to complete the debriefing in each group.

After all the intervention for both two groups ended, the post-test was conducted. The post-test measured the effects of intervention in both groups by using the simulator and scenario of nursing children with respiratory diseases. And the scenario used for this was different from the one used for intervention of students. In the post-test, in order not to be able to identify who was experimental group or intervention group, the communication skills and nursing competence were evaluated by a third person who did not participate in student education for intervention, which was to raise the validity of measurement. The problem-solving ability and learning satisfaction were evaluated by students themselves.

2.3 Research Tools

As the assessment tool, this study used the structured questionnaire.

2.3.1 Pre-Test

The The pre-test was fulfilled to identify the homogeneity between experimental group and comparison group. In the pre-test, the general characteristics, trait-anxiety, and self-efficacy were measured. The first one included gender, age, matter of experience in simulation education, and school grade. The second one was measured by using the tool by Spielberger(1975), with total 20 items on the basis of 4-point Likert scale. The high score means a high level of trait-anxiety. In this study, the Cronbach's α was .86. The third one was measured by modifying the items of Nuroscience Nursing Self-efficacy scale developed by Dilorio & Pri(2001) into self-efficacy of children with respiratory diseases. This tool was composed of total 14 items on the basis of 5-point Likert scale. The higher score means high self-efficacy of the provision of nursing before the operation on high-risk pregnant women. In this study, the Cronbach's α was .89.

2.3.2 Post-Test

To compare the interventional effects on the two groups, the post-test was conducted. The post-test included the nursing competence, communication skills, problem-solving ability, and learning satisfaction. The nursing competence was calculated by using the tool modified by the researcher based on the checklist for evaluating the

patient nursing with oxygen therapy, which was presented by the Korean Accreditation Board of Nursing Education. this was composed of total 29 items on the basis of 3-point Likert scale. The higher score means high nursing competence. The content validity of its was verified by two nursing professors, a head nurse of pediatric ward, and a pediatrician. The Cronbach's α of this tool was .89. The communication skills was measured by the method developed by Yo(2001), with five items on the basis of 5-point Likert scale. The higher score means high communication skills. In this study, the Cronbach's α was .85. The problem-solving ability was measured by using the tool developed by Woo(2000), composed of 25 items on the basis of 5-point Likert scale. The higher score means high learning satisfaction. In this study, the Cronbach's α was .94.

2.4 Data Analysis

The IBM SPSS v. 25.0 was used for data analysis. The homogeneity of experimental group and comparison group was tested through the t-test and X^2-test. In the homogeneity test on the general characteristics of those two groups, the self-efficacy was not homogeneous. To see differences between two groups in the state of treating the self-efficacy as covariate, the analysis of covariance(ANCOVA) was conducted.

3. Results

First, the baseline characteristics of research subjects are shown as Table 1. The mean ages of experimental group and comparison group were 21.87Y and 21.13Y respectively. The age, gender, self-expression, interpersonal relationship, school grade, and trait-anxiety did not show huge differences between two groups while the self-efficacy was statistically significant. In other words, the self-efficacy of nursing children with respiratory diseases was significantly higher in the comparison group(2.90points) than the experimental one(2.52points).

Table 1. General Characteristics of Subjects (N=62)

Characteristics	Division	Experimental group(n=32)	Comparison group(n=30)	χ2 or t	p
		M(SD) or n(%)	M(SD) or n(%)		
Age+		21.13(2.03)	21.87(0.66)	6.783	.055
Gender	Male	1(3.1)	3(10.0)	0.346	.282
	Female	31(96.9)	27(90.0)		
Self-expression	Good	5(15.6)	9(30.0)	0.071	.310
	Average	18(56.3)	16(53.3)		
	Poor	9(28.1)	5(16.7)		
Personal relationship	Good	10(31.3)	5(16.7)	1.899	.387
	Average	20(62.5)	22(73.3)		
	Poor	2(6.3)	3(10.0)		
GPA	Under 3.0	2(6.3)	1(3.3)	0.306	.959
	3.0~below 3.5	9(28.1)	9(30.0)		
	3.5~below 4.0	14(43.8)	13(43.3)		
	Over 4.0	7(21.9)	7(23.3)		
Trait anxiety+		2.25(0.32)	2.28(0.05)	0.369	.713
Self efficacy+		2.52(0.47)	2.90(0.49)	3.164	.002

The scores of educational effects on both group are as Table 2. First, the scores of clinical nursing competence were 4.17(±.51) in the experimental group and 3.84(±.60) in the comparison group, so the former was statistically-significantly higher. Second, the communication was shown as 3.89 (±.87) in the experimental group and 2.98(±.94) in the comparison group, so the experimental group was statistically-significantly higher than the latter. Third, the learning satisfaction was shown as 3.97(±.48) in the experimental group and 3.38(±.49) in the comparison group, so the experimental group was statistically-significantly higher than the comparison group. Lastly, the problem-solving ability was shown as 2.80(±.72) in the experimental group and 2.64(±.09) in the comparison group. Even though the score of experimental group was higher than the comparison group's, there were not significant differences.

Table 2. Comparison between Experimental and Comparison Groups When Adjusted for Self-Efficacy (N=62)

Category	Experimental group(n=34)	Comparison group(n=30)	F	p
	M(SD)	M(SD)		
nursing performance	4.17(0.51)	3.84(0.60)	27.183	.000*
communication skill	3.89(0.87)	2.98(0.94)	7.876	.001
Problem-solving ability	2.80(0.72)	2.64(0.09)	2.515	.000*
learning satisfaction	3.97(0.48)	3.38(0.49)	12.950	.000*

*$p<0.001$

4. Discussion

This study aimed to compare the effects of education using the simulator and existing clinical practice education for educating the nursing of children with respiratory diseases targeting nursing students. In the results of this research, the education using the simulator showed higher effects on nursing competence, communication skills, and learning satisfaction than the existing clinical practice while the problem-solving ability did not show differences from clinical practice. This could be compared with the results of preceding researches as follows.

First, in case of nursing competence, it is hard to find preceding researches that compared the simulator with the existing clinical practice education, so it is difficult to directly compare it with the results of existing researches. In this study, the experimental group was significantly higher than the comparison one. This accords with the researches(Kramer et al., 2002; Park et al., 2005) explaining the results of clinical competence based on the understanding of theoretical knowledge even though they did not conduct the comparison with clinical practice education. Those preceding researches did not have the control group or had the one with no intervention. Thus, this study is different from the existing preceding researches in the aspect of comparing the effects of simulator and existing clinical practice education.

In the communication skills after simulation learning, the score of experimental group was 1 point higher than the comparison group, which was significant. To show the characteristics of pediatric ward in this simulation program, the standardized patients were utilized as a trained assistant played the role of child's mother. When the case of 18-month-old patient was used for the development of scenario, the situation was composed to let students assess the symptoms of patient by considering the developmental stage of child, answer to the guardian's questions, and provide the educational intervention. The simulation learning with standardized patients can be reproduced similarly to the actual situation, so the students could improve their communication skills by interacting feelings and thoughts with patients and their guardians(Cook et al., 2011). As the pediatric ward has high and various needs like learning of guardians, and each child is in different developmental stage to each other, the nurses in clinical settings get a lot more stress from communication than the nurses in other wards(Kim & Park, 2017). Thus, the nursing students also need to fully practice communication with children and guardians in the simulation-like practice learning. However, there are not many domestic researches on simulation related to pediatric health nursing by using the communication confidence and communication skills as measurement variables. Because students mostly perform the observation-based practice in pediatric ward, they are a lot lacking in communication experiences. Thus, this study operated the module for the improvement of communication skills, and verified its effects. Just as the communication skills of students were improved through simulation learning, there should be further researches on the verification of changes in communication skills through the pediatric health nursing simulation learning.

Lastly, in case of problem-solving ability, there were no significant differences between experimental group and comparison one. Instead of meaning that the education using the simulation is not effective for the increase of problem-solving ability, this means the possibility in which both education using the simulator and existing clinical practice could be helpful for problem-solving ability. Also, the self-efficacy was higher in the comparison group than the experimental group, so the students with high confidence might possibly self-report their high problem-solving ability.

The limitations of this study are as follows. First, the subjects of this study were selected from a single college of nursing, so it is limited to generalize the results to another subjects. Second, in case of comparison group, it is hard to understand how much they actually experienced the nursing of children with respiratory diseases during the existing clinical practice. Third, this study used the quasi-experimental design that did not randomly-assign the subjects.

Nevertheless, this study is significant as follows. First, even though most of the preceding researches did not have the control group and had the one without any treatment, this study compared the effects of simulation education and clinical practice by applying the existing clinical practice to the comparison group. Second, in many preceding researches, the effects of education depended on self-report. In this study, however, the nursing competence and communication skills were objectively evaluated by the third person that did not know who was the experimental group or comparison group, which is led to the high validity.

5. Conclusion

This research aimed targeted to seek for the efficient measures for practice education of children with respiratory diseases by comparing the effects of simulation practice education and existing clinical one of children with respiratory diseases targeting nursing students. In the results of this study, the education using the simulator showed higher effects on nursing competence, communication skills, and learning satisfaction than the existing clinical practice education. Also, both education methods presented similar effects on problem-solving ability. Therefore, the education using the simulator could effectively replace the existing clinical practice education in the practice education of pediatric health nursing. Therefore, for simulation practice suitable for the nursing situation, an elaborate scenario that reproduces the actual clinical situation is developed, the expansion of expert training programs to design and operate simulation software, and the maintenance effect of practical training using simulators for 3 months, 6 months, etc. It is considered necessary to evaluate the long-term effect.

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