Effects of Integrating PBL and Simulation in Senior Nursing Students in Korea

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Abstract

The purpose of this study was to identify the effects of integrating PBL and simulation in senior nursing students. The present study was conducted with a quasi-experimental, single group, pretest-posttest design. Forty-seven senior students enrolled in an integrating nursing course in the fall semester of 2016 in South Korea. Life skills, knowledge, and confidence of basic nursing performance were administered before and after the use of integrating PBL and simulation. The data were analyzed using the paired t-test. The level of life skills \((p=0.001)\), knowledge \((p<.001)\), confidence of basic nursing performance \((p<.001)\) was significantly increased after taking course. This finding suggests that integrating PBL and simulation is an effective learning and teaching method in senior nursing student.

Keywords: Problem solving, Communication skill, Self-directed learning, Problem based learning, Simulation.

Introduction

The worldwide scarcity in the number of nurses is becoming a concern in the field of medicine. Although this phenomenon is also occurring in Korea, the shortage of nurses in Korea is different from that of other countries. According to the data released by the organization for economic cooperation and development (OECD) in 2018, the number of nurses per 1,000 individuals in Korea is 19.69, which is 1.5 times higher than the average of 13.60 in OECD countries. However, the number of nurses working at clinics is 6.8, which is lower than the average of 8.88 in OECD countries\(^1\). This indicates that the shortage of nurses in Korea can be attributed to the shortage of nurses working in clinics rather than the shortage of nurse license holders. To understand the domestic nurse shortage, it is necessary to determine the status of job turnover. According to the study results of the Hospital Nurses Association, the turnover rate of general nurses was 13.9%; however, the turnover rate of new nurses was 29%, which is more than twice of that of the general nurse\(^2\). This suggests that efforts are required to reduce the turnover rate of nurses.

New nurses fear that their inexperience in nursing can cause harm to a patient\(^3\). The study of turnover experience of new nurses shows that differences between school education and real work environment and decreased self-confidence owing to inadequate job handling experience were the causes of job turnover, in addition to difficulties in their relationships with colleagues or patients, their own health problems, and skepticism about life\(^4\). This indicates that it is possible to reduce the fear in new nurses regarding their skills and thereby reduce the turnover rate by performing competent nursing work. Therefore, it is suggested that efforts are needed to reduce the turnover rate of the nursing staff.

Nursing students can become familiar with nursing skills by observing and practicing them. However experiences of clinical skills training are concentrated on fundamentals of nursing practicum and are the least in clinical practice from the report\(^5\). To achieve the goals of clinical practice education, self-initiative of the students is essential\(^6,7\). Nursing students worry and fear that their inexperienced nursing skills will harm the patient. It is becoming a factor that makes college students
Because confidence in performing basic nursing practices improves the satisfaction of clinical practice in nursing college students and the performance of new nurses, there is a need for intervention to improve confidence of basic nursing performance.

As it has been previously described, it is difficult to learn basic nursing directly in clinical practice. To overcome these clinical practice problems, it has been recently reported that the education method combining problem-based learning (PBL) and simulation has been used in nursing education and it has improved learning attitude, problem solving process, clinical performance, and nursing competence. The preceptor who is in charge of new nurses and the nursing managers in hospitals emphasize the necessity of basic nursing and problem-solving skills for patient nursing as core competencies of new nurses. In addition, it has been shown that simulation education before graduation is continued after graduating as a new nurse, who helped in improving clinical performance and critical thinking skills, and has also affected job turnover rate.

Therefore, this study aimed to investigate the effects of integrating PBL and simulation (IPS) education on the confidence of nursing students with respect to basic nursing performance, communication skills, problem-solving skills, and self-directed learning skills and to propose an education method for nursing education as expected from the clinics.

**Method**

**Design:** This study is quasi-experimental, single-group and pre-test-post-test in design.

**Participants:** Participants were selected using convenience sampling from a population of undergraduate senior students enrolled in a mandatory integrating nursing course in the fall semesters of 2016 at a nursing college in gangneung, Korea. There were 76.6% female and their average age was 24.13±1.75 years.

**Measures:** Life skill questionnaire for Korean college students and adults was used for communication skills (49 items), problem-solving skills (45 items), and self-directed learning skills (45 items). Each item is scored on a 5-point Likert-type scale, from 1 (very uncommon) to 5 (very frequent), with higher scores indicating a higher level of life skills. Cronbach’s alpha was .80~.93 for the sub-scales. In this study, Cronbach’s alpha was .92~.94. Knowledge were measured a self-administered questionnaire designed to assess senior nursing students’ knowledge about course topics. It was developed by researcher. It consists of chest pain (8 items), dyspnea (9 items), and fracture (5 items) patients care. Each item is scored on a 5-point Likert-type scale (not true=1, very true=5), with higher scores indicating a higher level of knowledge. In this study, α coefficient ranged .93 ~.95. Confidence of basic nursing performance were measured a self-administered questionnaire with questions. It was developed by researcher. It consists of confidence of nursing performance on medication (IV, oral medication, 2 items), oxygen therapy (1 item), EKG & SPO2 monitoring (1 item), intubation assist (1 item), crutch walking support (1 item). Each item is scored on a 5-point Likert-type scale (very low=1, very high=5), with higher scores indicating a higher level of confidence on basic nursing performance. In the current study, α coefficient ranged from .79 to .83.

**Procedure:** The IPS education was employed in the nursing course. The study duration was from October to December, 2016. This course was a two credit course (total 30 hours). This course was designed based on the framework of PBL combined with simulation and aimed to improve core nursing competency in the cardiovascular, respiratory and musculoskeletal nursing. The nursing students were assigned to 8 groups with 6 students each.

1. **Pre-test:** The preliminary survey was conducted immediately after the curriculum orientation. Pre-survey questionnaires comprise general characteristics, life skill questionnaire, knowledge, and confidence of basic nursing performance.

2. **Integrating PBL and simulation:** The program was run with a total of three sessions. Each session was organized based on various subjects. The PBL scenarios were evaluated by three experienced clinical nurses who served as subject matter experts. The three sessions were organized by considering patients with chest pain, those with dyspnea, and those with fracture as subjects. Each session comprised two scenarios related to the subject (total 6 scenarios). The first scenario was used for PBL and the second was used for the simulation scenario. The specific process is as follows.

It took 4 h for each PBL scenario. Based on symptoms of PBL scenario, subject cases were analyzed from various perspectives and necessary data were collected to identify nursing problems and to determine
solutions for nursing problems. Simulation scenarios reduce the scope of nursing problems by focusing on diseases. Myocardial infarction in the first session, chronic obstructive pulmonary disease in the second session, and nursing problems in tibia fracture in the third session were organized as subjects to be addressed. Through the scenarios for each PBL and simulation, nursing students were given the opportunity to perform initial assessment, core assessment, and nursing intervention, to design problem-solving plans, and to choose and apply the necessary nursing skills directly to standardized patients.

In the nursing intervention for myocardial infarction and chronic obstructive pulmonary disease patients, nursing performance of ECG and SPO2 monitoring, oxygen therapy, administration of oral medication, IV side shooting and endotracheal intubation assist is included. Nursing intervention of tibia fracture patients includes crutch walking support and administration of oral medication.

For simulation education, trained personnel were recruited to perform the role of patient and guardian, and orientation on the role of patient and guardian was performed. Skills that could not be performed on the patient, IV side shooting and endotracheal intubation assist, were performed on IV simulator and intubation trainer. The 5-h simulation session was followed by a three step simulation process comprising briefing, simulation, and debriefing. The topics that must be learned for the simulation exercise, scenario outline, and learning objectives were included in the briefing. The simulations were run for 15 min per scenario. The group who did not perform the simulation practice was directed to perform hands on simulation, evaluate simulation practice of the other group, and group discussion for the simulation practice under the guidance of the teaching assistant. The group who finished the simulation practice was directed to write a reflection journal. Once all groups were finished with the simulation practice, there was an hour long debriefing period for the entire team. The course was directly managed by the researcher who has many years of experience in PBL and simulation education.

**3. Post test:** The post test was conducted immediately after completing integrating PBL and simulation.

**Data analysis:** The collected data was analysed using SPSS Statistics 21 version. In addition to using descriptive statistics, the paired t-test was used to compare the mean scores and the changes in the scores of variables at a significance level of .05.

**Ethical Consideration:** All participants were enrolled in a mandatory integrating nursing care course. However, participants who completed the questionnaire survey also filled out informed consent form agreeing to participate in the study. Students were briefed on the study purpose and process, as well their right to withdraw participation at any time without any adverse effect on their course grade.

**Findings:** Problem-solving skills (t=4.77, p<.001) and self-directed learning skills (t=2.53, p=.015) were statistically significant; however, communication ability was not statistically significant (t=1.76, p=.085). Knowledge was statistically significant in all three items (t=12.03, p<.001). In the confidence of basic nursing performance, the total score was increased with a statistical significance (t=3.92, p<.001), but among the sub-domains, oxygen therapy care was not significant (t=0.66, p=.511) (Table 2).

**Table 1: Effects of integrating PBL and simulation**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Pre Mean ±SD</th>
<th>Post Mean ±SD</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life skill</td>
<td>3.56±0.42</td>
<td>3.71±0.40</td>
<td>3.45</td>
<td>.001</td>
</tr>
<tr>
<td>Problem Solving ability</td>
<td>3.49±0.45</td>
<td>3.72±0.43</td>
<td>4.77</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Self-directed learning</td>
<td>3.54±0.51</td>
<td>3.68±0.46</td>
<td>2.53</td>
<td>.015</td>
</tr>
<tr>
<td>Communication ability</td>
<td>3.72±0.43</td>
<td>3.80±0.46</td>
<td>1.76</td>
<td>.085</td>
</tr>
<tr>
<td>Knowledge</td>
<td>2.91±0.51</td>
<td>3.91±0.49</td>
<td>12.03</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Chest pain patient care</td>
<td>2.66±0.53</td>
<td>3.66±0.55</td>
<td>11.14</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Dyspnea patient care</td>
<td>3.33±0.69</td>
<td>4.27±0.59</td>
<td>8.20</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Fracture patient care</td>
<td>2.62±0.62</td>
<td>3.74±0.54</td>
<td>11.24</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Confidence of Basic Nursing performance</td>
<td>3.72±0.61</td>
<td>4.06±0.57</td>
<td>3.92</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>IV shooting care</td>
<td>2.59±0.85</td>
<td>3.45±0.85</td>
<td>4.88</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Oral medication care</td>
<td>2.57±0.97</td>
<td>3.34±0.75</td>
<td>4.51</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Oxygen therapy care</td>
<td>4.40±0.69</td>
<td>4.49±0.64</td>
<td>0.66</td>
<td>.511</td>
</tr>
<tr>
<td>EKG &amp; oximeter care</td>
<td>3.79±1.16</td>
<td>4.19±0.74</td>
<td>2.29</td>
<td>.027</td>
</tr>
<tr>
<td>Intubation assist</td>
<td>3.02±1.26</td>
<td>3.60±0.94</td>
<td>3.35</td>
<td>.002</td>
</tr>
<tr>
<td>Crutch walking support</td>
<td>2.11±0.91</td>
<td>3.79±0.90</td>
<td>10.62</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>
Discussion

In this study, IPS improves the problem-solving skills and self-directed learning skills. PBL education is an education method where learners organize their knowledge through the process of acquiring and utilizing the knowledge required for self-directed problem solving. It is a self-directed learning education as the learners strive to find the best solution for the problem in the process. Therefore, it appears that the process of finding the nursing problems together by group members and finding the solutions for the problems, has affected to improve the subjects’ problem-solving and self-directed learning skills. It may also be that providing additional opportunities to solve modified situations by applying PBL and simulation scenarios differently has helped to improve problem-solving skills. In addition, to successfully integrate PBL and simulation education in a nursing college, it is necessary to have a professor who serves as a learning guide and facilitator. It may have helped in improving problem-solving and self-directed learning skills that the researcher who has experience of PBL education and simulation education using various scenarios for many years has performed education.

We showed that IPSeducation has an effect on knowledge and confidence of basic nursing performance in this study. The confidence of the basic nursing performance might have improved because the basic nursing skills were directly performed through simulation. Considering the fact that the confidence of basic nursing performance improves job performance of new nurses and improved job performance lowers job turnover, it might help reduce the turnover of new nurses by applying the IPSeducation to the nursing college students who are about to graduate.

The researchers expected the communication skills of the nurses to be improved because they were communicating during the simulation process with the standardized patients; however, there was no difference in the communication ability of the subjects before and after the experiment. Programs for improving communication skills include helping students find problems in listening, empathizing, and communicating by themselves. In this study, however, we provided a virtual hospital situation and only the opportunity to talk with standardized patients and it might be the cause that we obtained the result. From a different perspective, we can think of the reasons underlying the insufficient basic nursing skills of the students. As mentioned earlier, because the basic nursing performance of nursing college students is focused in the fundamental nursing practice curriculum and there is little opportunity to practice the basic nursing skills in the clinical practice, the nursing skills is in a premature state although they are senior students before graduation. Therefore, IPS might not have improved communication skills because students concentrate on basic nursing skills that they need to develop rather than communication with standardized patients in the situation where students need to analyze and apply necessary nursing skills selectively. We propose a future study in which a program that allows the students to practice the basic nursing skills required in the scenarios is first executed, followed by the program analyzing its effect on the communication skills of nursing students.

Conclusion

This study confirms the effects of integrating PBL and simulation. However, this study has limitations; the subjects were nursing students of the same college; hence, it is difficult to generalize the results of the research; and we cannot exclude the possibility that the test effect and the effect of maturity could have intervened in the experimental design of pretest and posttest with the single group. We propose a study that includes intervention for improvement of communication skills and a study using a control group.

Conflict of Interest: No conflict of interest.

Source of Funding: Self

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