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Development and Evaluation of a PBL-based Continuing Education for Clinical Nurses: A Pilot Study

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Purpose. The purposes of this study were to develop a PBL program for continuing nurse education and to evaluate the program after its implementation.

Methods. The PBL program was developed in the core cardio-pulmonary nursing concepts through a collaborative approach with a nursing school and a hospital. The PBL packages with simulation on ACLS were implemented to 40 clinical nurses. The entire PBL program consisted of six 3-hour weekly classes and was evaluated by the participants' subjective responses.

Results. Two PBL packages in cardio-pulmonary system including clinical cases and tutorial guidelines were developed. The 57.5% of the participants responded positively about the use of PBL as continuing nurse education in terms of self-motivated and cooperative learning, whereas 20.0% of the participants answered that the PBL method was not suitable for clinical nurses. Some modifications were suggested in grouping participants and program contents for PBL.

Conclusion. The PBL method could be utilized to promote nurses' clinical competencies as well as self-learning abilities. Further research is needed in the implementation strategies of PBL-based continuing education in order to improve its effectiveness.

Key Words : Problem-based learning, Continuing education, Clinical nurses

INTRODUCTION

Today's nurses need to be autonomous, able to think independently, and make their own decisions. Becoming self-directed and accepting learning as a lifelong activity have also been identified as essential components of continuous self-development in the nursing profession (Nolan & Nolan, 1997). Along with this recent significant change, problem-based learning (PBL) has become widely adopted in nursing education in Korea.

Benefits of PBL include assisting students to acquire and retain relevant information by integrating basic and clinical sciences, and increasing their interest and motivation for learning (Finucaine, Johnson, & Prideaux, 1998). Learning through the PBL method also improves clinical reasoning skills, clinical knowledge, learning motivation, and autonomy (Thomas, 1997). The implementation of PBL in nursing education has resulted in students' greater engagement in learning, more self-directed learning, and higher levels of interpersonal communication and satisfaction (Morales-Mann & Kaitell, 2001). In addition, PBL has increased willingness in adult nurses to be active and self-directed learners (White, Amos, & Kouzekanani, 1999). A review study reported that learning with cases facilitates active and reflective learning,

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and results in the development of critical thinking and effective problem-solving skills that are required to be self-directed lifelong learners (Tomey, 2003).

Although many studies reported the outcomes of PBL in student education, fewer studies described the use of PBL in continuing education for nurses. Peterson, Hakendorf, and Guscott (1999) adopted a PBL approach to nurse continuing education through a 3-day workshop and reported that it was an effective approach for introducing nurses to guidelines on aged care and for developing their skills in applying this information in contextual and holistic situations. They reported that the use of journal writing encouraged critical thinking and reflective practice. The PBL approach was also suitable for an in-service educational strategy among nurses working in a multicultural community (Blackford & Street, 1999).

Continuing nurse education is a planned educational activity for professional development. It includes recent nursing theories, information, and more advanced nursing care skills for nurses to cope with the rapidly changing health care system and to acquire maximal nursing practice abilities. Rapid changes of modern medical information and technology, the existing gaps between school education and nursing practice, and the expanded role of nurses increase the importance of continuing educations for nurses (Kim et al., 1996). However, some critical issues of current mass continuing education for nurses in Korea included that the educational programs are not taking into account individual nurses' educational needs and learning abilities (Kim & Kim, 2000). In addition, inappropriate teaching methods arise as controversial points from the previous approaches as well as the inappropriate time management and location (Korean Nurses Association, 2000).

To solve these issues, nursing researchers developed web-based continuing nurse education programs focusing on special areas; 'transfusion therapy' and 'medical law' (Park, Cho, & Kim, 1998), and 'emergency nursing' and 'medical fee management' (Kim, 2001). However, web-based education has a weakness that limits sharing and reflecting their clinical experiences in group works.

Nursing competency requires a cognitive ability that includes problem solving, decision-making, and clinical judgment. Although the usefulness of PBL that stimulates the cognitive ability has been emphasized within the health care and education systems in recent years, it has been seldom utilized in a continuing education program for clinical nurses. Furthermore, there is little collaboration of schools and clinical practice settings in continuing education. Therefore, it will be worthwhile to explore the possibility of the use of PBL as a continuing nurse education with a collaborative approach. The purposes of this study were to develop a PBL program for continuing nurse education and to evaluate the program after its implementation.

METHODS

Research design

This pilot study was a pre-experimental study with one-group posttest design. PBL-based continuing nurse education program was developed and evaluated by the written responses of the participants after its implementation.

Development of the PBL program and pilot test

PBL packages were developed by a collaborative approach between nursing faculties in a university and clinical nursing leaders in an affiliated hospital from August to December, 2005. Initially, the need of PBL education was identified in a collaborative workshop between nurse representatives and nursing school faculties. During the workshop, the educational topics emerged into two clinical areas of the cardiac and respiratory care as core nursing concepts. The program development team consisted of four head nurses in the hospital and three nursing professors in the university who were the experts in a cardio-pulmonary care. Introduction and objectives of PBL, and the role as a facilitator were explained to the head nurses through the first team meeting. In that meeting, discussion was held to determine learning objectives, timeframes, and learning contents of each PBL package. The steps to develop the learning packages were as follows:

Step 1: Set the goals of each learning package.

Step 2: Identify the main concepts and nursing diagnoses relevant to cardio-pulmonary system.

Step 3: Select the real clinical cases that encompass core-learning concepts. The cases were selected from the actual patient situations at a respiratory and a cardiovascular unit of the university hospital.

Step 4: Develop the scenarios based on the real cases. Each scenario comprises patient's situations that formulated nursing problems or issues at admission, transfer, cardiac arrest, and/or discharge.

Step 5: Identify the materials that can be offered as ad-

ditional information such as progress notes, nursing records, lab findings, medication records, and vital sign flow sheets.

Step 6: Identify the relationships between health problems (or nursing diagnoses) and related factors, and draw a clinical mapping for each situation.

Step 7: Revise the scenarios and clinical data consistent with the clinical mapping.

Step 8: Develop tutorial guidelines that PBL facilitators can use. It includes case scenarios, questions to be asked and proper answers, clinical mapping, and relevant nursing interventions and outcomes.

Step 9: Modify the developed program through the pilot test.

Prior to the implementation, a pilot class for each case was performed by one of the facilitators and observed by the others in a separate room through one-sided mirror, which was very useful for facilitators to allocate time in advance and gain some ideas how to manage their own group.

Implementation of the program

The program were implemented for 6 weeks, from January through February in 2006. The education consisted of six weekly classes and each class was three hours long. Each PBL package comprised three class sessions. Four head nurses and one nursing professor (who is one of the investigators) who were trained the facilitator's role in the program development team played the role of facilitators in classes. One facilitator was assigned to each small group. The roles of the facilitator were to provide case scenarios and additional information in an appropriate timing and to facilitate active group works with critical and clinical reasoning skills. White boards, pens, a computer, and a beam projector were provided. A leader and a clerk were chosen in each group and they managed the classes by deriving thoughts from their group members and taking notes of discussions in their group.

In the first class session of each PBL package, the nurse participants identified the clues and nursing problems in a scenario and developed hypotheses to solve the problem or to examine the possible causing factors through group discussion. Following the completion of individual tasks by self-directed learning, the participants presented their work on the given subject matter along with their solutions to the problems in the second session. Participants were actively encouraged by mapping the medical and nursing concepts represented in each case scenario. The initial concept maps were modified after the self-learning and group discussions.

Especially, a one-hour class utilizing computerized simulator education, SimMan®, along with a one-hour lecture regarding advanced cardiovascular life support (ACLS) was provided by experts in emergency medicine while participants were learning the patient case with chronic heart failure. The simulation education offered the opportunity of a hands-on practice for a cardiac arrest situation to the participants. SimMan® is a total body simulator that provides realistic patient care scenarios designed for training advanced clinical skills, such as intubations of normal or difficult airway, cardiopulmonary resuscitation (CPR), and defibrillation.

Evaluation of the program

- Study subjects

Initially, 45 nurses at a university hospital located in Seoul were recruited and assured that their participation was voluntary. They were also informed that their activity within a small group would be used only for the research and their confidentiality would be maintained. The study participants were not previously exposed to the PBL method. All 45 nurse participants agreed to participate and were divided into five small groups according to their current clinical backgrounds and careers. Five participants failed to complete the program, and then a total of 40 participants remained and were included to analyze. The entire process of this study was presented in Figure 1.

-Data collection and analysis

After completion of each PBL modules, the participants were asked to write freely their opinions regarding two components: 1) perceived advantages and disadvantages of PBL, and 2) the possibility to use the PBL method as a continuing education. Authors carefully read their qualitative responses and key responses were grouped by similar themes. Descriptive statistics were used to obtain the frequencies and percentages of the responses.

RESULTS

The two sets of PBL packages for cardiac and pulmonary systems including clinical cases and tutorial guidelines were developed. The clinical cases of each

PBL package included a 58-year-old male patient who complained of dyspnea and was diagnosed of chronic heart failure, and an 85-year-old female patient who complained of severe dyspnea with aggravated pneumonia and asthma. The case scenarios mainly focused on and included the following nursing diagnoses: ineffective breathing pattern, decreased cardiac output, impaired gas exchange, decreased tissue perfusion, excess fluid volume, ineffective airway clearance, risk for infection and aspiration, and imbalanced nutrition. The contents of the PBL packages have shown in Table 1.

The mean age of study participants was 37.0±5.3 years (ranged 28 - 50 years). Fifty percent of the participants (n=20) had master degrees and 40% (n=16) graduated 4-year nursing college. The 47.5% of the participants (n=19) were head nurses who were in charge of nursing units and 52.5% were staff nurses. The 77.5% of the participants (n=31) had clinical experiences longer than 10 years and the mean year of clinical experience was 14±5.5 years. Thirty percent (n=12) and 32.5% (n=13) of the participants had a working experience in cardiac and respiratory care settings. The characteristics of the study participants have shown in Table 2.

As perceived advantages of PBL, 32.5% of the participants (n=13) answered that 'the PBL was a strong motivator for self-learning' and 27.5% (n=11) answered that 'the PBL enabled them to have active learning attitudes for a group discussion'. In addition, 20.0% (n=8) answered that 'PBL was a good method to enhance their presentation skills and self-confidence' and were followed by 'it was a comprehensive approach rather than only focusing on symptom management' (15.0%); 'a good opportunity to study recent treatments and research articles' (12.5%); 'to have cooperative learning and sharing clinical experiences with other nurses' (12.5%); 'to have self-reflection of their own learning weakness' (10.0%); 'to think the importance of an evidence-based nursing' (7.5%).

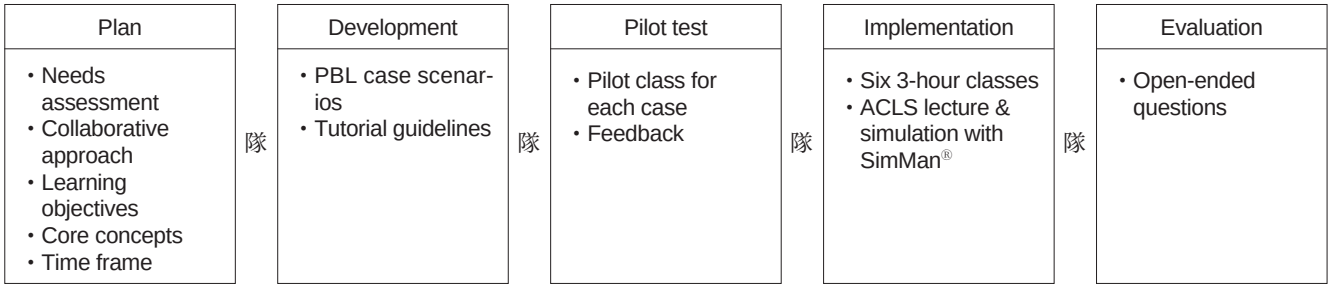

Figure 1. Process of the Development and Evaluation of the PBL Program

Table 1. Contents of the PBL Packages

Packages /Time	Case Scenarios		Nursing Diagnoses	Learning Performances
	Patient Characteristics	Situation		
Cardiac Case / Week 1 - 3 Weekly 3 hours/day (1/17-2/7)	· "SimDeuler" 58-year-old male · Diagnosis: CHF, MI, Hypertension · C/C: chest pain, dyspnea, fatigue	Ward Admission 隋 Cardiac arrest 隋 Discharge	· Decreased cardiac output · Ineffective breathing pattern · Impaired gas exchange · Ineffective tissue perfusion · Excess fluid volume	· Presentation: - Evidence-based nursing protocols - Coping protocols for the patients with emergency situation · ACLS lecture & simulation with SimMan®
Pulmonary Case / Week 4 - 6 Weekly 3 hours/day (2/14-2/28)	· "ChaSooMi" 85-year-old female · Diagnosis: Asthma, Pneumonia · C/C: cough, dyspnea, sputum, fever	ER Admission 隋 ICU 隋 Ward	· Ineffective breathing pattern · Impaired gas exchange · Risk for infection · Ineffective airway clearance · Risk for aspiration · Imbalanced nutrition	· Presentation: - Evidence-based nursing protocols; Prevention and management for the patients with dyspnea and aspiration

* Common group works:
· Participation in a small group discussion
· Clinical reasoning and mapping in a group discussion
· Self-directed learning tasks
· Reading relevant evidence-based research papers

On the other hand, the participants perceived disadvantages that 'the PBL process was a burden in preparing individual learning tasks compared with lecture-based education' (25.0%), and followed by 'too much time-consuming work compared to final outcomes' (20.0%), and 'lack of direction of the facilitator and need to summarize the key study concepts at the end of the modules with a short lecture by the facilitator' (17.5%); 'lack of time to do group work because of different duty schedules' (17.5.%).

In regards to the potential of PBL as a means of continuing education, 20.0% of the participants (n=8) strongly agreed to use PBL in continuing or in-service education for clinical nurses, and 37.5% (n=15) answered that PBL can be an alternative method to mass continuing education if some modifications could be

Table 2. Characteristics of the Study Participants (N=40)

Variables		Frequency (%)
Age	Range	28 - 50 years
	M±SD	37.0±5.3 years
education	Junior college	4 (10.0%)
	College	16 (40.0%)
	Master degree	20 (50.0%)
Job position	Staff nurse	21 (52.5%)
	Head nurse	19 (47.5%)
Total clinical years	5 - 10 years	9 (22.5%)
	11 - 20 years	23 (57.5%)
	21 - 25 years	8 (20.0%)
	M±SD	14±5.5 years
Working experience in cardiac unit	Yes	12 (30.0%)
	No	28 (70.0%)
Working experience in respiratory unit	Yes	13 (32.5%)
	No	27 (67.5%)

Table 3. Subjective Responses for the PBL-based Continuing Education (N=40)

Responses	Main themes	Frequency (%)*
Perceived advantages	· Self-motivation for learning	13 (32.5)
	· Active attitude for a group discussion	11 (27.5)
	· Enhanced presentation skills and self-confidence	8 (20.0)
	· Comprehensive approach rather than only symptom management	6 (15.0)
	· Using of recent treatments and journals	5 (12.5)
	· Cooperative learning and sharing clinical experiences with other nurses	5 (12.5)
	· Self-reflection of their own learning weaknesses	4 (10.0)
	· Recognition of an evidence-based nursing	3 (7.5)
Perceived disadvantages	· Being a burden due to preparing individual tasks	10 (25.0)
	· Too much time-consuming work compared to the final outcomes	8 (20.0)
	· Lack of direction of the facilitator and need to summarize the key study concepts at the end of the modules with a short lecture	7 (17.5)
	· Lack of time to do group work because of different duty schedule	7 (17.5)
	· Too much long period for the continuing education	2 (5.0)
	· Different learning outputs depend on the abilities of group members	2 (5.0)
Possibility to use PBL as a continuing education	· Strongly recommended as a continuing education	8 (20.0)
	· Can be an alternative if modifications are made;	15 (37.5)
	- Grouping with nurses who had similar clinical experiences or interests	4 (10.0)
	- Narrowing the subjects down to an in-depth contents	4 (10.0)
	- Specifying the course outlines	3 (7.5)
	- Increasing the time for simulation-based learning	2 (5.0)
	- Modifying the education time to an all day learning for 1 or 2 days	2 (5.0)
	· Not suitable for clinical nurses	8 (20.0)
	· No answers	9 (22.5)

* The answers can be duplicated

made in the following aspects; grouping with nurses who had similar clinical backgrounds or interests, narrowing the educational topics into short-term courses and specific to nurses' clinical backgrounds, specifying the course outlines, and increasing the time for simulation-based learning. However, about 20.0% of the participants (n=8) answered that the PBL method was not suitable for clinical nurses. The participants' subjective responses for the PBL program are summarized in Table 3.

DISCUSSION

Continuing education is intended for adult learners, and it should be planned to stimulate individuals' learning needs for their professional improvement. The participants in this study perceived the need of active self-learning about medical and nursing knowledge through the PBL approach. This perceived self-motivation for learning can be a positive response in terms of the potential for the use of PBL in continuing nurse education. In addition, it is encouraging to know that the nurses realized the need of evidence-based practices. However, the participants also found it difficult to know the right direction to find answers and how much information was enough. Consequently, some participants requested to have supplemental lecture by experts. This result was consistent with the findings from the study conducted for nursing students (Hwang & Jang, 2005).

The study participants were mostly senior nurses who had more than 10 years of clinical experiences (about 80%) and all participants had never been exposed to PBL before. Accordingly, they were mostly used to lecture-based education and some of them criticized that it was extremely time-consuming when compared to the outcomes of learning and the workload of a traditional lecture. However, they might miss the un-measurable outcomes that could be thinking processes to solve the problems through group work, and self-reflection for their nursing practice. The evaluation of the program was conducted by open-ended questions, thus it is necessary to assess more specifically about their positive and negative perceptions with a structured-questionnaire.

As the participants pointed out in the open-ended responses, nurses' clinical backgrounds need to be taken into account when PBL modules are developed. Nurses' working positions should be also considered in order to increase the learning outcomes of PBL. Tailored approaches such as different topics and schedules considering nurses' careers are necessary for developing and implementing PBL.

Collaborative development of the program with school researchers and hospital nurses can be a positive educational strategy for evidence-based researches and practices. For this, there is a need to communicate with each other continuously about the educational issues relevant to recent nursing practice and the feedback to improve the program. The collaborative approach in the development of PBL program was supported by a study (Blackford & Street, 1999), in which a nursing school assisted hospital nurses to enhance their practice of caring for children and families with non-English speaking backgrounds.

Most of the participants were satisfied with the simulation-based education on ACLS given by the emergency medical experts. This supports the fact that a multidisciplinary team approach will be a good strategy for a continuing education to gain cognitive interest from adult learners.

Many nurse participants brought up the issue of the management of PBL in their time-schedule and overloading to complete the learning process. Further research is needed regarding the implementation strategy such as a combining use of online computer education and offline class education that takes into account of outcome- and cost-effectiveness.

Several limitations were identified in this study. Although the facilitators led each small group after they learned about their roles through the meetings, their unfamiliarity with the PBL process still remained and the facilitating process could be somewhat different depending on the perspectives of each facilitator. Also, It is hard to generalize the findings to other hospital nurses as this is the pilot study with a small sample in a hospital.

CONCLUSION

As a continuing educational strategy for clinical nurses, a PBL-based program was developed in the core nursing concepts of cardio-pulmonary system through a collaborative approach with a nursing school and a hospital. The participants perceived positive feelings that they became self-motivated, active in learning attitudes, and self-confident. In addition, 57.5% of the participants responded positively to the use of PBL as a mean of continuing education if some modifications were made in

grouping participants, selecting educational issues and scopes, and managing times. Based on their evaluation, the program needs to be organized and continually validated in order to ensure that the course objectives are being met and that learning issues are appropriate.

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