

Original Article

The Effects of the 1-Min Preceptor and Problem-Based Clinical Educations on Nursing Students' Critical Thinking

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ABSTRACT

Background: There are inconsistencies about the best clinical teaching method for strengthening nursing students' critical thinking (CT). **Objective:** This study is aimed to compare the effects of the one-min preceptor (OMP) and problem-based learning (PBL) clinical education on nursing students' CT. **Methods:** This was a randomized controlled trial. All forty 3rd-year nursing students who had taken the Medical-Surgical Nursing III clinical course were recruited to the study through the census method in 2016 in Kashan University of Medical Sciences, Kashan, Iran. The students were randomly allocated into three groups of 13 to pass their clinical course via the OMP, the PBL, or the conventional clinical education methods, respectively. In the first session and at the end of the last session, the students completed the California CT Skills Test Form B. The one-way analysis of variance and the Kruskal–Wallis and Mann–Whitney tests were used to analyze the data. **Results:** Students' mean age was 21.77 ± 1.32 years. There were no significant differences in baseline CT score among the conventional (11.17 ± 1.64), OMP (10.58 ± 1.34), and PBL (10.79 ± 1.18) groups ($P = 0.894$). However, at the end of the study, the difference among the groups regarding CT score was significant (12.17 ± 1.89 , 13.69 ± 1.10 , and 13.64 ± 1.44 ; $P = 0.049$). **Conclusion:** OMP and PBL can be potentially effective in improving students' CT ability. Therefore, these methods can be used in clinical nursing education to improve students' CT ability.

KEYWORDS: *Critical thinking, Learning, Nursing, Problem-based learning, Teaching*

INTRODUCTION

At least half of educations for nursing students are provided in clinical settings. Clinical education provides students with the opportunity for turning their theoretical knowledge into different subjective, mental, and motor skills, which are essential to patient care.^[1,2] Although effective clinical education has received particular attention during recent years,^[1] studies in Iran show that clinical educations are not sufficiently effective and maybe other teaching methods should be used.^[1,3,4]

One of the teaching methods is 1-min preceptor (OMP) or the five micro-skills model of clinical teaching. The five micro-skills, which are: get a commitment, probe for supporting evidence, teach general rules,

reinforce what was done right, and correct mistakes.^[5] In this model, preceptors assess students' information and needs and consider patient care. OMP enables preceptors to effectively teach and give constructive feedbacks. In this model, preceptors ask open-ended questions to evaluate students' understanding and encourage them to think more carefully. OMP improves preceptor-student interaction and helps students use scientific evidence to support their care-related decisions.^[6]

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A number of studies indicated the positive effects of OMP in clinical education, especially for nurse practitioners and medical students.^[7] Pascoe *et al.* found that this model could provide opportunities for hospitalist educators to better assess trainees, integrate regular feedback, and encourage self-directed learning.^[5] Chan and Wiseman also reported OMP as an effective teaching method in the gross anatomy laboratory.^[6] This model is suitable in different clinical settings and for both faculty and students who wish to learn, test, and modify their teaching and learning approaches.^[8] This method is also useful in decreasing nurses' turnover and creating a healthy work environment.^[9] It has also been shown that OMP encourages students to understand and find solutions to clinical problems and promotes their analytic and critical thinking (CT) abilities in different situations. Yet, researchers pointed to the need for more investigations on using OMP in clinical nursing education.^[10] A study also reported that OMP is helpful to preceptors in providing more frequent, high quality, educational experiences to students in complex clinical settings.^[11] However, limited high-quality studies exist on the effects of OMP in nursing students who pass their clinical education.

Another teaching approach is problem-based learning (PBL). PBL is a student-centered method through which small groups of students identify a problem, study it, and attempt to solve it to improve their knowledge and understand the immediate situations. The underpinning philosophy of PBL is that learning can be considered a "constructive, self-directed, collaborative and contextual" activity.^[12]

There are many studies on the effectiveness of PBL, but the majority of these studies have focused on the field of medicine, a lot of them have compared the PBL with lecture-based learning, and used BPL in theoretical education.^[13] A review study reported that studies on the effects of PBL are still inconclusive and more investigations are needed to elucidate its effects on students' learning outcomes.^[13]

In recent years, CT has turned into the main component of theoretical and clinical nursing education. Clinical decision-making necessitates considerable clinical knowledge, data collection ability, and appropriate knowledge for using the best possible solutions to solve patients' problems.^[14] CT help students identify patients' problems, adopt best solutions and actions, and make wise decisions.^[15]

Nursing programs are responsible for providing teaching and learning that develops students' knowledge, skills, CT and attitudes in alignment with contemporary

nursing standards and healthcare demands. Teaching methods have considerable effects on the development of the students CT skills.^[16] However, little attention is paid to CT in nursing education^[15] so much so that studies show that nursing students have limited CT ability.^[14] Then, scholars are searching for teaching strategies to improve nursing students' CT.^[17] The results of a qualitative study in Thailand illustrated that PBL can improve problem-solving and CT among nursing students.^[12] A review study also reported a positive relationship between PBL and improved CT in nursing students. However, there is a need for more rigorous studies on the effects of PBL on CT.^[18] In addition, although OMP has been frequently used for the clinical education of medical students, there are limited data about its appropriateness in clinical nursing education and its effects on nursing students' CT. Furthermore, no study has compared the effects of BPL, OMP, and conventional clinical teaching methods on nursing students' CT.

Objective

This study was carried out to compare the effects of OMP, PBL and conventional clinical education on nursing students' CT.

METHODS

Study design and participants

This randomized controlled trial was conducted in the 2016 academic year in Kashan University of Medical Sciences, Kashan, Iran. All forty 3rd-year nursing students who had taken the Medical-Surgical Nursing III clinical course were recruited to the study through the census method. The students were included if they had passed the theoretical course of Medical-Surgical Nursing III in their past semesters and were not guest student in the study setting. The absence of more than a section was considered as the exclusion criterion. The students were allocated to either an OMP ($n = 13$), a PBL ($n = 14$), or a control (conventional) group ($n = 13$) through simple randomization with throwing the dice. The students in each group were then divided into two subgroups for better education because PBL and OMP should be used in small groups.^[11,13]

Instruments

Two instruments were used for data collection, namely a demographic form (including items such as age, gender, and the average of the last semester) and the California CT Skills Test Form B (CCTST-B). CCTST-B is a specific test for the assessment of CT skills and contains 34 multiple-choice questions in five areas, namely inductive reasoning, deductive reasoning, interpretation, evaluation, and analysis.^[15] Each question has a correct

answer. If a respondent answers all questions correctly, s/he would obtain a total score of 34.^[19] Khodamardian *et al.* assessed the validity and reliability of CCTST-B. They reported the test-retest correlation coefficient of the test as 0.90.^[20]

Intervention

At the beginning of their Medical-Surgical Nursing III clinical course, the students received necessary information about the study and the course in a 3-h session. Moreover, their baseline CT skills were assessed via the CCTST-B. Accordingly, they were asked to answer the test in 45 min. Then, they were provided with a lesson plan which had been developed based on the syllabus of the Medical-Surgical Nursing III course. Afterward, the clinical education course was offered to the students of each subgroup in 65-h sessions in three consecutive weeks and two sessions a week.

In the PBL group, the first session of clinical education was held to familiarize the students with PBL and to let them practice the method. Then, in the five remaining sessions, the students used PBL in their clinical practice under their preceptor's supervision. The five steps of PBL are problem identification (through taking patient's medical history and establishing nursing diagnoses), data collection (from scientific resources), hypothesis formulation (i.e., seeking and developing possible solutions and interventions), hypothesis testing (through implementing nursing measures), and conclusion, generalization, and application (evaluation).

In PBL, students learned and applied concepts stimulated by real-life scenarios. Scenarios provided vehicles by which the students worked in small groups, generated hypotheses about the situation, identified and sought information needed to support or refute the hypotheses, and generated nursing solutions. The information was shared within a group and thus promoted the development of effective group process as well as self-directed learning. Accordingly, the students were asked to attend their patients' bedside, take their medical histories, identify their health problems, and make appropriate nursing diagnoses. Then, they were allowed to study about the identified problems and established nursing diagnoses, formulate hypotheses, and identify the most appropriate nursing measures. Then, they discussed their patients' problems and appropriate nursing measures. Finally, they attended their patients' bedside and implemented the identified nursing measures and evaluated their outcomes. The students took all these steps under their preceptor's supervision. The role of the preceptor was to construct paper cases, facilitate reflective group work during PBL tutorials and help students refine their approach to PBL. Thereby, the

students were taught about patients' problems and their management through PBL.

In the OMP group, five micro-skills were taught to the students. In the five remaining sessions, all steps of OMP were followed for each student through question and answer between the intended student and the preceptor. Although at each OMP episode, questions were asked from one student, other students also attended the episode for the sake of learning. In each OMP episode, the intended student was asked to attend a patient's bedside and take his/her complete medical history. Then, the steps of the OMP were taken [Table 1].

In the control group, the clinical course was run using the conventional clinical teaching method (i.e., doing the patients nursing care, some case reports and presenting a few conferences).

The preceptor of all groups was the first author to prevent the teacher's own effect on students' learning. One week after the last session of the course, the students were asked to recomplete the CCTST-B in a quiet classroom.

Ethical considerations

The Ethics Committee and the Institutional Review Board of the Kashan University of Medical Science, Kashan, Iran, approved the study (Grant Number: 9478 and the ethical code of the study: IR. KAUMS. REC.1394.78). The study also was registered at the Iranian Registry of Clinical Trials (registration code: IRCT2015122013102N2). The students were assured that their data would be handled confidentially. All students provided informed consent for participation in the study. They were being free to withdraw of the study.

Data analysis

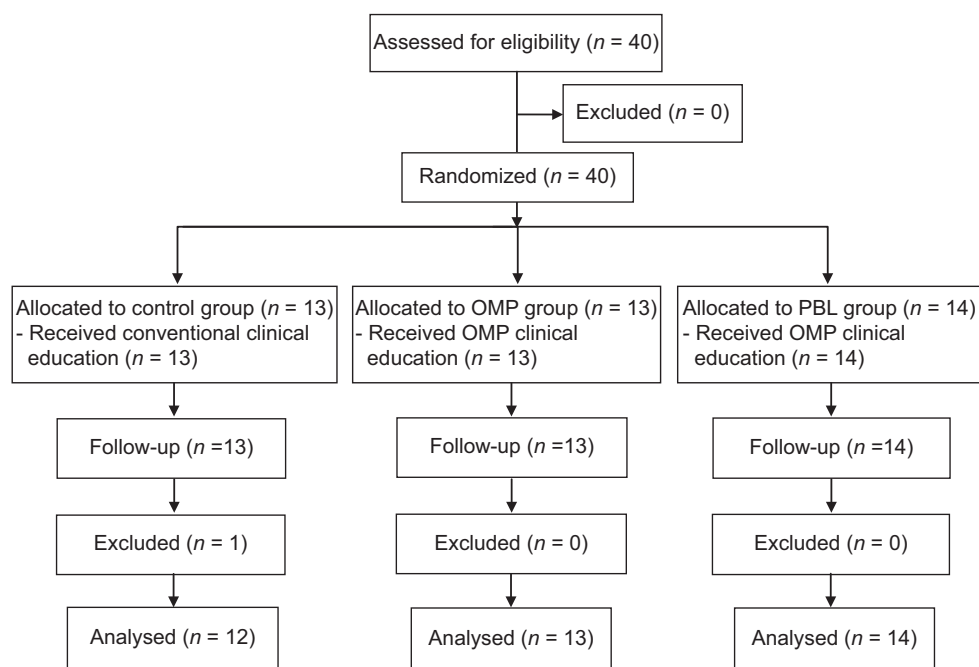
The data were analyzed using the SPSS software v. 16.0 (SPSS Inc., Chicago, IL, USA). Initially, the Kolmogorov–Smirnov test was used to assess the normality of the study variables. Then, the one-way analysis of variance (ANOVA) or the Kruskal–Wallis tests was done to compare the distribution of variables in three groups and Mann–Whitney test was used to compare the distribution of variables in the two intervention groups. Values of $P < 0.05$ were considered statistically significant.

RESULTS

The number of participating students was 40. One student was excluded from the control group due to more than one absence from the course [Figure 1]. The mean of the students' age was 21.77 ± 1.32 . Most students (60%) were female. The students' diploma

Table 1: The outline of the 1-minute preceptor clinical education

Steps of OMP	
Step 1	Get a commitment: After presenting patient's medical history to other students and the preceptor, a series of general questions were asked from the presenting student. For example, "What care measures are needed for patients in this condition?" "What should be the focus of care for this patient?" Thereby, a supportive and stimulating environment was created for the students to provide their answers. Correct answers were approved while incorrect ones were considered as new learning opportunities
Step 2	Probe for supporting evidence: In this step, the presenting student was required to provide scientific basis for his/her opinions and suggestions. In fact, he/she was encouraged to follow evidence. Consequently, the student's accidental answers were identified and he/she was invited to search for appropriate evidence. For instance, the student was asked, "Which factors in patient's medical history led you to reach such a conclusion?" "Why did you select these care measures?"
Step 3	Reinforce what was done right: In this step, the strengths of the intended student were identified and reinforced. For instance, "Given the presented medical history, the established nursing diagnoses were correct." "The medical history that you presented was well-organized." "You explained the chief complaint and the present medical illness in detail"
Step 4	Correct mistakes: In this step, the weaknesses of the student were identified. "When presenting patient's medical history, you pointed to fever; however, you did not say anything about fever-related nursing diagnoses." "As your patient is suffering from sleep problems, it would be better to consider nursing measures for promoting his/her sleep." Therefore, besides the identification of the weaknesses, appropriate solutions were suggested for minimizing them
Step 5	Teach general rules: In the final step, the general rules and educations were provided to the student and he/she was required to attend patient bedside and implement necessary nursing measures

**Figure 1: Consort flow diagram of the study**

grade point average was 17.17 ± 1.17 , while their last term average was 16.25 ± 1.24 . The one-way ANOVA and the Kruskal–Wallis test revealed no significant difference between the groups with respect to the students' age, gender, diploma grade point average, and last term average [$P > 0.05$; Table 2]. The Kruskal–Wallis test illustrated that there was no statistically significant difference between the groups respecting the baseline scores of CCTST-B ($P = 0.89$). However, after the study, the difference between the groups was significant so that the CCTST-B mean score in the PBL and the OMP groups were greater than the control group [$P = 0.049$; Table 3].

The mean score of CCTST-B of nursing students in the OMP clinical education group was higher than PBL group, but the statistical test did not show a significant difference between this two intervention groups [$P = 0.052$; Table 4].

DISCUSSION

After the study, the difference between the groups regarding the mean score of CCTST-B was significant. This finding means that OMP and PBL were effective in improving the CT score. However, the comparison of CT score before and after the intervention in PBL and OMP groups showed that after the study, the difference among the PBL and OMP groups was not significant.

Table 2: Comparison of demographic information of the three groups^a

Group	one-min preceptor (n=13)	Problem-based learning (n=14)	Conventional education (n=12)	P
Gender				
Male	5 (38.5)	4 (28.6)	6 (50)	0.53 ^b
Female	8 (61.5)	10 (71.4)	6 (50)	
Age	21.54 ± 0.66	22.07 ± 2.09	21.54 ± 0.66	0.80 ^c
Diploma grade point average	17.20 ± 0.98	17.18 ± 1.13	17.13 ± 1.48	0.98 ^d
3-year grade point average	16.45 ± 1.31	16.01 ± 1.15	16.31 ± 1.31	0.98 ^d

^aData are presented as n (%) or Mean ± SD, ^bχ², ^cKruskal–Wallis, ^dAnalysis of variance. SD: Standard deviation

Table 3: Comparison of critical thinking score before and after the intervention in three groups

Critical thinking score	Group ^a			P ^b
	one-min preceptor	Problem-based learning	Conventional education	
Before clinical education	10.85 ± 1.34	10.79 ± 1.18	11.17 ± 1.64	0.894
After clinical education	13.69 ± 1.10	13.64 ± 1.44	12.17 ± 1.89	0.049

^aData are presented as Mean ± SD, ^bKruskal–Wallis. SD: Standard deviation

Table 4: The comparison of Critical thinking score before and after the intervention in two intervention groups

Critical thinking score	Group ^a		P ^c
	1 min preceptor	Problem-based learning	
Before clinical education	10.85 ± 1.34	10.79 ± 1.18	0.667
After clinical education	13.69 ± 1.10	13.64 ± 1.44	0.052
P ^b	0.002	0.001	

^aData are presented as Mean ± SD; ^bWilcoxon test; ^cMann–Whitney U-test, ^bWilcoxon test. SD: Standard deviation

In the present study, it was not clear that among PBL and OMP, which method is better. Perhaps, both methods have the same effect on promoting CT. The present study performed with a small sample size and short time period, so more studies with larger sample size and long period of time are needed to compare the effect of these methods on CT.

Base on the results, both PBL and OMP can improve the level of CT in nursing students. Gatewood *et al.* have reported that the use of OMP caused significant improvement in teaching skills as perceived by students and teachers. Students rated the teachers higher in their degree of inclusion of the student in decision-making, evaluation of the student's knowledge, and provision of feedback. Furthermore, the use of OMP can increase feedback, clinical reasoning, and time efficiency in students.^[7] It has also been shown that the use of OMP in teaching emergency medicine, could improve the students clinical decision-making, increased the disease-specific teaching points and feedbacks for improvement, motivated the learner's reading behavior, and increased their ability to diagnose the patients' clinical needs.^[21] In a qualitative study on novice nurses, nurses reported that OMP broadened their understanding of clinical problems, encouraged them to resolve the problems, helped them discuss, analyze, and think in different situations, and improved their CT ability.^[10] These consequences of OMP can justify the improvement of CT in the present.

The ability to think critically is also possibly nurtured by PBL through the process of problem-solving, particularly within-group brainstorming sessions. During these sessions, students critically consider the best possible solution for a problem. It is believed that probing questions may engage students in a systematic cognitive process that promotes the students' reasoning ability, discussion, debating, sharing, and teaching and creates a platform for students to experience an environment that reinforces the CT.^[22-23] It is reported that skills such as interdisciplinary thinking, problem-solving, team working, and holistic thinking are encompassed by the pedagogy of PBL, which provides students with opportunities to learn "how to think" rather than "what to think," and this is why the PBL method can improve CT.^[24]

OMP and PBL are among the active teaching-learning methods in which students are considered as active learners and are encouraged to actively acquire knowledge and skills, change their attitudes, and learn new things through discussing, searching, and practicing. Thereby, these teaching methods can improve students' CT abilities in clinical settings.^[11]

The most obvious limitation of this study is our reliance on the students' self-reporting, which might be affected by recall bias and socially desirable responses. A second limitation is the small sample size, which threatens the

external validity of the study. More studies with larger samples and longer intervention and follow-up may provide a broader perspective of the potential impacts of OMP and PBL on the development of CT in nursing students who pass their clinical courses.

Limiting the study to nursing students makes it impossible to generalize the results to other groups of students. Finally, the real difference in CT development between the two groups should be followed up and monitored by comparing the groups' CT developmental curves in subsequent years.

CONCLUSION

Study findings indicate that OMP and PBL can be potentially effective in improving students' CT ability. Given the importance of CT in nursing students' clinical practice, nurse educators are recommended to use OMP and PBL in clinical courses to promote the CT ability in their students.

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Conflicts of interest

There are no conflicts of interest.

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