



Application of PBL Combined with CBL Teaching Mode in Clinical Training of Hematology Department

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Abstract

Objective: To explore the application value of PBL (problem-based learning) combined with CBL (case-based learning) teaching model in the standardized training teaching of hematology clinicians. **Methods:** Thirty-four subjects in the Hematology Department of the First Affiliated Hospital of Bengbu Medical College from July 2020 to December 2020 were selected and randomly divided into two groups. The control group adopted the traditional teaching method, while the experimental group adopted the combination of PBL and CBL teaching method. Carry on the theory knowledge, the skill operation examination to the student. The results of the two groups were compared for statistical analysis. And complete the questionnaire. **Results:** The average scores of the experimental group were better than those of the control group ($P < 0.05$). The questionnaire scores of the experimental group showed that the experimental group was satisfied with PBL combined with CBL teaching model. **Conclusion:** PBL combined with CBL teaching mode in clinical teaching of hematology can stimulate students' subjective initiative and improve their theoretical knowledge and operational ability.

Subject Areas

Hematology

Keywords

PBL Combined with CBL Teaching Method, Standardized Training of Medical Students, Hematology Department

1. Introduction

Standardization training of resident is the only way that must be passed for

medical students to transition from theory to clinical practice, and high-quality standardization training of resident is an important element for training excellent young doctors. Although medical students have completed routine medical history inquiry and invasive operation assessment before entering the department, most patients still refuse the medical examination inquiry and invasive operation by the regular training doctor in the real clinical practice. As one of the internal medicine specialties and different from conventional medical treatments, patients with blood disease need to undergo various invasive operation and examinations, which poses a great challenge for medical students undergoing training in hematology to effectively communicate with patients and successfully complete the operations. And the results of the studies that have been done suggest [1] that good doctor-patient communication is not only a reflection of humanistic care but also a test of theoretical knowledge. Hematology is highly specialized and complex, so how to quickly increase the interest of resident doctors in learning, let them quickly grasp the treatment ideas and methods of common diseases in hematology, smoothly carry out treatment, and ensure the medical safety of patients, not only requires the efforts of resident doctors themselves, but also requires the teachers to actively explore scientific and effective teaching methods [1].

The PBL method, first proposed by McMaster University in Canada, is based on problem-based learning and is a problem-solving driven teaching model through group learning discussions and mutual communication. The experienced lead instructor asks questions to stimulate students' interest in learning, so that they can take the initiative to review the literature after class, summarize the information and ask new questions. This teaching mode is to cultivate students' motivation and improve their ability to dig into problems and solve them [2]. CBL is a discussion-based teaching mode that uses concrete clinical cases and theoretical knowledge to analyze, and its core is "case-oriented, problem-based, student-oriented, and teacher-led", which focuses on the integration of theory and practice to develop students' clinical thinking skills [3]. The simple CBL teaching may lead to students' lack of independent thinking ability and neglect the key of the problem. Instead, the two are combined and the PBL teaching model is applied to specific real clinical cases, with the lead instructor designing relevant questions to guide students through the data, literature, and summary reports. The two groups of students exchanged and discussed with each other, which broadened their thinking in dealing with the case, and under the guidance of the teacher, they applied the basic theoretical knowledge they learned to the clinical case, dug out new problems, and then the lead teacher answered and solved the problems in time, which stimulated the ability of their independent learning, improved the analysis of problems, problem solving and team cooperation abilities, and at the same time cultivated the clinical thinking ability. And these improved abilities deepen the students' confidence in performing puncture operations. In this case, the seriousness and professionalism

demonstrated by the medical students can win the trust of the patients and ensure that the treatment is carried out in an orderly manner.

Many studies have found that CBL is effective in enhancing residents' and medical students' clinical practice, problem-solving, and analytical skills [4]. Additionally, several recent systematic reviews have found that compared to traditional lectures, students in PBL programs consistently report higher levels of satisfaction and active engagement [5]. However, taken alone, neither PBL nor CBL is without limitations. CBL requires that teachers dedicate a lot of time to preparation in order to amass a sufficient number of cases to support clinical teaching. At the same time, CBL also demands that teachers create a set of questions for students to discuss, leading to a tendency for students to lack proactive involvement in and general enthusiasm for the learning experience [6]. In contrast, PBL puts students in the central, leading role during the classroom process. This function requires them to spend a lot of time preparing problems and materials before class, which is extremely difficult for medical students, given their heavy curriculum tasks and commitments. In addition, PBL emphasizes students' subjective initiative; However, a lack of guidance from teachers could lead to students missing the program focus, which could hinder general program quality [7]. Therefore, we hypothesize that a teaching method that combines the virtues of PBL and CBL can better achieve the goal of promoting effective, high-quality student learning. To our knowledge, there is no literature that analyzes the outcome of a combined PBL-CBL method in medical education, especially in hematologic malignancy teaching.

The purpose of this study is to investigate the implementation of PBL combined with CBL teaching mode in clinical teaching of hematology to enhance theoretical and practical training to improve the clinical practice ability of doctors in training. This study provides insights by examining students' ways of reasoning in various areas, from basic knowledge to case analysis. Moreover, this study analyzes students' perspectives regarding their self-perceived competence and their satisfaction with the PBL-CBL learning process.

2. Objects and Methods

2.1. Objects

A total of 34 clinical regular training physicians who entered the Department of Hematology of the First Affiliated Hospital of Bengbu Medical College from July 2020 to December 2020 (the regular training time is 2 months) were selected as the research objects and randomly divided into two groups: the experimental group (PBL combined with CBL teaching group, $n = 17$) and the control group (traditional teaching group, $n = 17$ participants). There were no significant differences in gender, age and previous performance of the participants in the two groups. Among them, there were 13 men and 21 women; The age ranges from 21 to 24 years, with an average of (22.6 ± 0.6) years.

2.2. Training Methods

The hematology instructor will develop a training plan based on the relevant professional knowledge and routine operation skills of hematology (bone marrow aspiration and lumbar puncture). Before the training, students will be familiar with the concepts, clinical manifestations, diagnostic criteria and treatment methods of common hematology diseases. The training time is 3 times a week, 30 minutes each time, lasting for 2 consecutive months. Each training session has clear teaching objectives, and the key contents include hematology doctor-patient communication skills, rules and regulations, professional ethics education, case writing norms, medical history inquiry skills (how to ask and collect comprehensive information, how to explain the medical condition and the diagnosis and treatment project), indications and matters needing attention for bone marrow aspiration and lumbar puncture, and laboratory diagnostic criteria for common diseases.

1) The control group used the conventional teaching mode: the teacher presented the teaching content through the mode of PPT and case analysis, and the teacher gave the main lecture while the students listened mainly.

2) The experimental group adopted the teaching mode of PBL combined with CBL to stimulate students' active learning, and divided the students into two groups. a) Before the class, the instructor clarified the learning content, selected real cases and asked questions; b) The students in both groups studied the cases and questions and reviewed the documents for learning. Based on the clinical features of the case, laboratory tests, physical examination, and differential diagnosis, new questions were raised; c) The group members worked together to complete history taking, physical examination, discussion of diagnosis and basis, other diagnoses that need to be differentiated, treatment plan, prognosis, etc.; d) The instructor conducted operational exercises and made comments and suggestions to each group, and systematically explained difficult points and analyzed and answered controversial questions.

3) Assessment and evaluation: All students took the theoretical examination (50%) and the puncture operation examination (50%), and questionnaires were designed to investigate the evaluation of the respective teaching effects by the conventional teaching group and the PBL combined with CBL teaching mode group of the training students. The curriculum experience questionnaire (CEQ) is used to investigate the students, which has 12 dimensions and 56 sub-items, and adopts the 5-level scoring method with 1 - 5 points. The higher the score is, the higher the degree of agreement to the teaching model is. This questionnaire is widely used in the curriculum evaluation of higher education. The reliability of the questionnaire was evaluated. The Cronbach's alpha coefficient was 0.871. There was a significant positive correlation between the total score of PBL-CBL evaluation questionnaire and the total score of educational environment measurement questionnaire ($P < 0.05$).

4) Statistical analysis: The data were statistically analyzed using SPSS 22.0

software, and the measurement data were expressed as $X \pm S$. The t-test of two independent samples was used for comparison between two groups, and $P < 0.05$ was considered a statistically significant difference.

3. Results

3.1. Comparison of the Results of the Two Groups

The mean score of theory examination in the experimental teaching group was (86.6 ± 3.6), the mean score of theory examination in the traditional teaching group was (75.1 ± 3.4), the mean score of clinical skills examination in the experimental group was (91.8 ± 2.6), the mean score of operation in the traditional teaching group was (73.1 ± 3.3), and the difference was statistically significant ($P < 0.05$) when comparing the two groups (Table 1).

3.2. The Comparison of Survey Scores between the PBL-CBL and Traditional Groups

As shown in Table 2, the CEQ score of the study group was significantly higher than that of the control group ($P < 0.05$).

Table 1. Comparison of the performance of the two groups of hematology regular training students ($X \pm S$).

Groups	Theory Exam	Clinical Skills Exam
Experimental group (n = 17)	86.6 ± 3.6	91.8 ± 2.6
Control group (n = 17)	75.1 ± 3.4	73.1 ± 3.3
P	0.043	0.027

Table 2. Comparison of CEQ scores between the two groups ($X \pm S$).

Dimension	Experimental group (n = 17)	Control group (n = 17)	t	p
Clarity of purpose	4.47 ± 0.72	3.18 ± 0.53	5.988	0.000
Organization of the Course	4.53 ± 0.72	3.12 ± 0.49	6.721	0.000
Good teaching	4.47 ± 0.72	3.12 ± 0.33	7.056	0.000
Learning Resources	4.36 ± 0.71	3.18 ± 0.39	6.030	0.003
Basic Skills	4.37 ± 0.70	3.24 ± 0.44	5.573	0.000
Quality of learning	4.41 ± 0.71	3.30 ± 0.47	5.401	0.000
Appropriate study load	4.47 ± 0.72	3.35 ± 0.49	5.295	0.000
Intellectual stimulation	4.64 ± 0.49	3.24 ± 0.47	8.196	0.000
Be appropriate	4.71 ± 0.47	4.30 ± 0.77	1.879	0.071
Student support	4.71 ± 0.41	3.75 ± 0.46	7.169	0.000
Learning Community	4.71 ± 0.47	3.76 ± 0.66	4.770	0.000
Overall satisfaction	4.53 ± 0.72	3.06 ± 0.43	7.255	0.003

3.3. PBL Combined with CBL Satisfaction Questionnaire Analysis

17 questionnaires were collected, and 17 valid questionnaires were returned. The survey results showed that about 90% of the regular training students thought that the PBL combined with CBL teaching method was effective in the mastery of important and difficult knowledge, the sense of independent learning, the sense of teamwork and the improvement of communication skills (**Table 3**).

4. Discussion

The long-term and highly specialized nature of hematology-oncology treatment requires physicians to have good professionalism and medical humanism. The traditional lecture teaching method is indeed the most economical and efficient way to deliver a theoretical lecture; however, it is not suitable for high-grade medical students, who need to cultivate superior communication and clinical thinking skills. The internship is the transition from medical student to licensed physician. Although medical schools provide formal communication training and workshops for medical students new to clinical practice before starting their internship [8]. However, in clinical practice, facing a new environment of dealing with difficult clinical situations, even under the supervision of the supervising physician, the improper handling of these situations sometimes results in communication errors, patient dissatisfaction and loss of confidence in the physician. How to strengthen the patient's trust in the regular training trainees, and thus willing to accept the medical student's clinical inquiry and operation, is the focus of clinical training teaching. In the process of clinical teaching in hematology, the traditional teaching mode is centered on the lead teacher, unidirectional instillation of theoretical knowledge, but in the real clinical practice, students are in a passive learning position, and the operation is even more difficult

Table 3. Questionnaire results of the experimental group (%).

Investigation Project	Totally agree	Basically agree	Not sure	Basically disagree	Disagree completely
Self-motivated learning awareness	93.3	6.7	0	0	0
Mastery of important and difficult points	96.7	3.3	0	0	0
Improve clinical thinking ability	96.7	5	0	0	0
Quickly master the learning content	93.3	6.7	0	0	0
Teaching method satisfaction	90	6.7	3.3	0	0
Enhance team awareness	93.3	6.7	0	0	0
Improve doctor-patient communication	96.7	3.3	0	0	0
Better teaching mode for experimental group compared to traditional teaching	93.3	6.7	0	0	0

to start, which makes the students lose the interest in active learning, so that it is difficult to achieve the teaching effect of combining theoretical knowledge with clinical practice [9]. In this endeavor, PBL and CBL, which are markedly different from traditional teaching methods, aim to establish real medical scenes and encourage students to take subjective initiative toward shifting from a “what I have been taught” paradigm to “what I want to learn” [10] [11].

We investigated the combined PBL-CBL teaching method’s effectiveness and acceptability in a clinical course on hematologic malignancy through a comparison with the traditional lecture teaching method. In our study, according to the analysis of students’ perspectives and self-perceived competence as measured by the survey in the two groups, we confirmed that the students in the PBL-CBL group tended to take a more well-balanced approach to learning and practice, thus becoming more proactive learners. The combined PBL-CBL teaching model’s positive impact on students in the curriculum areas of understanding, communication skills, clinical thinking skills, self-learning skills, teamwork skills, and knowledge absorption was also well received by the participants themselves. By comparing the two group’ total quiz scores, we found that the PBL-CBL group’s theory examination and clinical skills examination was significantly higher than the traditional group’s, thus indicating the effectiveness of the combined PBL-CBL teaching model. Additionally, the PBL-CBL combined teaching method occupied less of the students’ free time, which evidences its efficiency for application to medical education. However, our study had several limitations. First, we analyzed results from only one clinical department within our institution; these results may have been different beyond our institution. Second, since there was no blind method in our study, some analysis bias is unavoidable. Given that the nature of the curriculum prevents facilitators from observing students blindly, we acknowledge that their assessments of students’ leadership traits may have been influenced by subjective factors, including improved perception and interpersonal bonds that formed over time. Therefore, satisfaction survey content may be biased toward PBL-CBL in the areas of self-learning and teamwork skills.

5. Conclusion

In summary, the use of PBL combined with CBL teaching mode in hematology standardized training may be effective for improving medical students’ and residents’ performance and enhancing their clinical skills and capabilities when learning about hematologic malignancy. Additionally, the combined PBL-CBL teaching method effectively enhanced students’ understanding, student-teacher interaction, communication skills, clinical thinking skills, self-learning skills, teamwork skills, and knowledge absorption.

Fundamental Project

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Conflicts of Interest

The authors declare no conflicts of interest.

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