

Research on the Application of Problem-Based Learning (PBL) Teaching Method in Clinical Emergency Teaching

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Abstract: *Objective:* To explore the application advantages of problem-based learning (PBL) teaching method in clinical emergency teaching. *Methods:* Two classes of students in the five-year clinical medicine major of our university were selected as the research subjects and divided into two groups according to different teaching methods. Among them, 50 students who received the traditional teaching method constituted the control group, while 52 students who received the PBL teaching method constituted the observation group. After one semester, an exam was conducted to assess their theoretical knowledge and first-aid practical skills, and evaluate their clinical thinking skills. At the same time, a teaching satisfaction questionnaire was distributed to evaluate the teaching satisfaction. *Results:* The results of the *t*-test showed that the observation group was significantly higher than the control group in terms of theoretical assessment, first aid practical assessment, and clinical thinking skills, and the differences were statistically significant ($P < 0.05$). The results of the χ^2 test showed that the difference in teaching satisfaction between the observation group and the control group was statistically significant ($P < 0.05$), and the teaching satisfaction in the observation group was significantly higher than the control group. *Conclusion:* Compared with traditional teaching methods, applying PBL teaching method in clinical emergency teaching can achieve more significant teaching effects. Students' mastery of theoretical knowledge, first aid practical skills, and clinical thinking skills can be effectively strengthened, and it is conducive to improving teaching satisfaction.

Keywords: Emergency; Clinical teaching; PBL teaching method; Traditional teaching method; Undergraduate students

Online publication: November 23, 2023

1. Introduction

Hospital emergency departments usually receive patients who are in critical condition, and most of them are admitted due to emergencies requiring urgent treatment. Emergency medicine also emphasizes the need to use clinical diagnosis and treatment as a means to treat critically ill patients through learned and mastered medical knowledge and related skills to the greatest extent possible, so as to achieve the purpose of reducing mortality and completing the treatment in the shortest time^[1,2]. To this end, the clinical emergency teaching syllabus requires students to have a solid theoretical foundation in emergency medicine and rich first aid practical

skills, as well as excellent emergency response capabilities and agile clinical diagnosis and treatment thinking abilities. However, the traditional teaching method is still limited to knowledge explanation and does not circle back to the disease and the patient. This results in students' understanding of diseases being limited to books even though they have certain theoretical knowledge of emergency medicine, weak first aid awareness, and lack of independent processing ability and way of thinking when facing practical problems^[3,4]. Starting from the characteristics of emergency medicine, it is necessary to explore a teaching model suitable for clinical emergency teaching, which should be more closely aligned with the learning requirements of clinical emergency students. The problem-based learning (PBL) teaching method emphasizes students' independent learning. When used in clinical teaching, it is problem-based, student-centered, and teacher-guided, so as to cultivate students' independent abilities. This study explored the application of the PBL teaching method in emergency clinical teaching, and achieved satisfactory results compared with traditional teaching methods.

2. Materials and methods

2.1. General information

The research subjects were students from two classes of the five-year clinical medicine major at Binzhou Medical University. All of them were informed about this teaching experiment and could treat learning with a positive attitude. Students who were absent from class without reason, were late, or left early more than twice during the study period, took leave for more than 2 days for any reason, and did not participate in the final exam, were excluded. They were divided into two groups according to different teaching methods. 50 students who received the traditional teaching method constituted the control group, while 52 students who received the PBL teaching method constituted the observation group. There were 29 males and 21 females in the control group; their ages ranged from 20 to 23 years old, with an average age of 21.17 ± 0.72 years. There were 31 males and 21 females in the observation group; the age range was 19 to 22 years old, with an average of 21.22 ± 0.70 years. There is no statistical significance in the data difference between the two groups, $P > 0.05$.

2.2. Methods

The control group received traditional teaching methods, that is, teachers formulated teaching plans based on the content of emergency medicine textbooks and teaching syllabi, determined teaching objectives, teaching centers, and key and difficult teaching points, and set up theoretical and practical classes. The teaching format was centralized teaching, and the teaching procedures were pre-class review, teaching in class, and summary at the end of class.

The observation group received the PBL teaching method. The PBL teaching method divides the teaching process into four stages: raising questions, collecting information, solving problems, and summarizing.

- (1) Question-raising stage: The teacher collected classic cases of various diseases in the emergency department and wrote lesson plans. One week before class, the typical case materials were distributed to the students divided into groups (5–6 students each). The teacher then assigned questions and guided students to learn and think independently about problems.
- (2) Information collection stage: Students were allowed to use books, the Internet, and other channels to find relevant information on related issues, integrate various information and materials through group discussions, and independently explore the answers to the questions.
- (3) Problem-solving stage: The teacher guided the student groups to discuss and analyze the case, combining the preset questions with the case analysis. The group sent representatives to answer each question. Each group could complement each other and provide answers to those who have

doubts. For each part, the teacher provided appropriate guidance and focused on the difficult issues encountered during the discussion.

- (4) Summary stage: At the end of the discussion, teachers guided students to reflect on the problem-solving process, independent learning process, and team cooperation activities, and assisted students in summarizing new knowledge and further understanding the application of new knowledge.

2.3. Observation indicators

- (1) Evaluation of teaching effect: Assessment of basic knowledge of emergency medicine theory and first aid practical skills, as well as evaluation of clinical thinking skills were carried out. The assessment questions for the basic knowledge of emergency medicine theory included multiple-choice questions, fill-in-the-blank questions, question-and-answer questions, and medical record analysis questions, with 100 points being the full score; the first aid practical skills assessment mainly evaluated the accuracy of various first aid practical skills, with 100 points being the full score. The higher the score, the stronger the student's grasp of knowledge. Clinical thinking skills analyzed students' critical thinking skills, logic, analytical skills, and problem-solving skills. Each item was 25 points, with 100 points being the full score. The higher the score, the stronger the student's clinical thinking skills.
- (2) Satisfaction with teaching: A teaching satisfaction questionnaire was used, the content including teaching attitudes, teaching effects, teaching methods, etc. The full score was 100 points, of which the score of complete satisfaction is ≥ 85 points, the score of basic satisfaction is 61–84 points, and the score of dissatisfaction is ≤ 60 points.

2.4. Statistical methods

The data processing tool used in this study was SPSS20.0 software. Statistical methods used were description of statistical counting data (satisfaction rate, etc.) and measurement data (theoretical assessment results, practical assessment results, scores of clinical thinking skills, etc.) according to frequency and mean \pm standard deviation (SD), and χ^2 test and t -test respectively. It was used for comparison between groups, and there was a statistical difference when $P < 0.05$.

3. Results

3.1. Evaluation of teaching effects of two groups

The t -test showed that there was a statistically significant difference between the observation group and the control group in the theoretical assessment scores and first aid practical assessment scores ($P < 0.05$), and the scores in the observation group were significantly higher than the control group, as shown in **Table 1**.

Table 1. Evaluation of teaching effects of two groups (mean \pm SD, points)

Group	n	Theoretical assessment results	Practical assessment results	Scores of clinical thinking skills
Control group	50	84.23 \pm 4.18	80.44 \pm 5.55	70.26 \pm 6.13
Observation group	52	93.89 \pm 5.26	94.12 \pm 4.77	90.12 \pm 5.21
t	-	10.242	13.367	17.654
P	-	0.000	0.000	0.000

3.2. Comparison of teaching satisfaction between the two groups

The χ^2 test results showed that the difference in teaching satisfaction between the observation group and the control group was statistically significant ($P < 0.05$), and the teaching satisfaction in the observation group was significantly higher than the control group, as presented in **Table 2**.

Table 2. Comparison of teaching satisfaction between the two groups [n (%)]

Group	n	Completely satisfied	Basically satisfied	Not satisfied	Overall satisfaction rate
Control group	50	30 (60.00)	14 (28.00)	6 (12.00)	44 (88.00)
Observation group	52	40 (76.92)	11 (21.15)	1 (1.92)	51 (98.08)
χ^2	-	-	-	-	4.049
P	-	-	-	-	0.044

4. Discussion

In the hospital's emergency departments, there are many types of diseases and heavy rescue and management tasks. Therefore, clinical emergency teaching pays more attention to the cultivation of clinical practice skills and thinking skills. However, the traditional teaching method is often teacher-centered and uses teaching as the main means. Although this saves educational resources, it also causes students to be overly dependent on teachers, which is reflected in their reluctance to think proactively during the teaching process and their lack of creativity. Due to their lack of enthusiasm for learning, they cannot master the basic knowledge of emergency medicine theory and first aid practical skills, and it is difficult to significantly improve their clinical thinking skills, resulting in non-ideal teaching effect and quality.

The PBL teaching method began in the 1950s at the School of Medicine, Xiyu University. In 1969, the PBL teaching method was first introduced into the field of medical education by American neurology professor Barrows. PBL teaching method is a heuristic education method that is student-centered and supplemented by teacher guidance. It gives students greater autonomy and aims to allow students to actively participate in teaching activities and cultivate independent thinking and problem-solving skills on the basis of independent acquisition of knowledge. Moreover, PBL teaching method begins with actual clinical problems, encourages communication and cooperation among students, and trains students' teamwork on a deeper level^[5-7]. From the evaluation of the teaching effect in this study, compared with the traditional teaching method, students receiving the PBL teaching method had significantly better theoretical assessment scores, first aid practical assessment scores, and scores of clinical thinking skills. The difference between the groups was statistically significant ($P < 0.05$), which shows that the application effect of PBL teaching method in clinical emergency teaching is positive. This may be attributed to the advantages of PBL teaching method^[8-10]:

- (1) PBL teaching method plays a positive role in cultivating students' independent learning and thinking skills. Through independent learning and thinking, students can build a reasonable logical framework between diseases, which greatly improves the learning effect.
- (2) PBL teaching method is conducive to training the collaborative skills between teams. After raising questions, the group needs to divide the work to collect and process information, and work together to deal with existing problems and raise new questions, which can greatly help students to make progress together and further exercise students' teamwork.
- (3) PBL teaching method is conducive to cultivating students' ability to solve comprehensive problems. In the process of students' independent thinking and problem-solving, if new problems are discovered,

they can form their own thinking framework, which will help to improve students' independent thinking and innovation abilities.

In addition, judging from students' feedback on teaching methods, the teaching satisfaction of the observation group who received PBL teaching method was significantly higher than that of the control group who received traditional teaching. The difference between the groups was statistically significant ($P < 0.05$). The largest advantage of PBL teaching method is its student-centered characteristic. Students do not subjectively feel that they are being instilled with knowledge, but are actively involved in learning practice, which significantly improves students' sense of experience as well as student satisfaction. However, attention should be paid to the following during the teaching process. Firstly, teachers must always remember that they are the leader and put students at the center of learning. Secondly, the cases selected by teachers must be representative clinical cases spanning from simple to complex, so as to fully mobilize students' enthusiasm and satisfy students' sense of accomplishment^[11-13]. Thirdly, teachers need to pay attention to cultivating students' divergent thinking and cannot let their own will control the direction of their thinking, but they must not forget their own teaching-oriented responsibilities to ensure the smooth progress of teaching activities.

5. Conclusion

In summary, applying PBL teaching method in clinical emergency teaching can enable students to master the basic theoretical knowledge of emergency medicine and first aid practical skills, greatly improve their clinical thinking skills, and thus cultivate qualified talents for emergency medicine.

Disclosure statement

The author declares no conflict of interest.

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