A study on the Application of PDCA Cycle Combined with PBL Teaching Method in Teaching Cardiovascular Medicine Interns

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Abstract: To study the application effect of PDCA cycle combined with PBL teaching method in the teaching of cardiovascular internal medicine trainees. Sixty intern trainee doctors were selected as the research subjects, and were divided into the observation group and the control group using the random number table method, with 30 in each group. The observation group implemented the PDCA cycle combined with the PBL method of teaching, and the control group implemented the traditional method of teaching, observing and comparing the teaching effect of the two groups of doctors. The observation group was better than the control group in all assessment scores, teaching satisfaction and teaching effect indicators after teaching (P<0.05). Therefore, the PDCA cycle combined with the PBL teaching mode is conducive to improving the trainee doctors' learning initiative, cultivating clinical thinking ability, and improving the quality of teaching.

Keywords: Practice; PDCA Cycle; PBL Teaching Method; Cardiovascular Medicine; Interns

1. Introduction

PBL (Problem based Learning) teaching method is a new type of problem-centered teaching mode firstly created by Barrows [1-3], a professor of neurology in the United States in 1967, which stimulates students' interest in learning and improves their motivation to learn through self-study and posing of problems, and has become the direction and development trend of the reform of modern medical education.

The concept of PDCA cycle is put forward by the famous American quality management expert Deming Yu in the early 1950s, which consists of four steps: P (plan), D (do), C (check), A (act), and forms a cycle of weekly process, so that the level of the work rises gradually in the process of solving problems continuously. The application of PDCA cycle theory in many fields has shown better benefits, and in recent years, a few hospitals have introduced the PDCA cycle theory in performance management, drug management, clinical teaching management and other aspects. Cardiovascular medicine is an important part of internal medicine, with many diseases, complex and similar clinical symptoms, which are easy to be confused in clinical diagnosis, therefore, it is very important to combine theoretical knowledge of textbooks with actual practice, so that students can fully grasp the diagnosis and treatment of diseases.

2. Information and Methods

2.1 General Information

A total of 60 trainee doctors, 32 males and 28 females, aged from 22 to 26 years, with a mean age of (23.5±5.3) years, were selected as study subjects from the Department of Cardiovascular Medicine of Heping Hospital Affiliated to Changzhi Medical College. They were divided into observation group and control group with 30 doctors in each group by using random number table method. Comparison of the two groups of trainee doctors in terms of age, gender and comprehensive qualities showed no statistically significant differences ($P > 0.05$) and were comparable.

2.2 Research Methods

The control group used traditional teaching methods, and the observation group used PDCA cycle combined with PBL teaching method. The internship process was mainly divided into 5 steps: (1) asking questions: before joining the group, a questionnaire was

issued by the teaching doctor to understand the learning needs of the trainee doctors at this stage, determine the internship objectives based on the survey results, and ask questions for the trainee doctors to think and answer; (2) Planning: based on the questions raised in the survey results, the teaching teacher will make a plan for the internship and prepare the corresponding content of teaching; (3) Implementation: the trainee doctors should do the pre-internship according to the questions raised by the teacher and complete the homework assigned by the teacher, and then enter into the clinical internship, where the teaching teacher will explain the demonstration, and the trainee doctors will practically operate. At the end of the apprenticeship, the teacher can summarize the cases encountered in the apprenticeship into a case file for the trainee doctors to review and summarize; (4) check: after a disease system is explained and the apprenticeship is completed, the corresponding examination should be carried out to consolidate the content of the study; at the same time, a questionnaire survey is carried out before the end of the stage of the study to find out the degree of satisfaction with the teaching and evaluation of the teaching, and at the same time, ask for the next stage of the study demand, determine the learning theme, each time. At the end of the apprenticeship should carefully complete the homework and pre-study the next disease content, and so on cycle; (5) processing: through the field questions, skills operation, post-course homework and questionnaire results to evaluate the effect of teaching and deficiencies, timely feedback results and adjust the corresponding teaching content, so that the teaching effect in the continuous apprenticeship to improve. At the end of the apprenticeship, the trainee doctors will be assessed on their skills and evaluated by the teaching teachers.

2.3 Evaluation Indicators

2.3.1 Achievement assessment

At the end of the internship, a post-training performance assessment is carried out before leaving the department, and the assessment is uniformly arranged by the School of Clinical Medicine. The full score of the assessment is 100 points, and the score of >90 points is excellent, 60 to 90 points is qualified, and <60 points is unqualified.

2.3.2 Teaching satisfaction survey

Formulate a questionnaire on satisfaction with the teaching effect and distribute it to the students at the end of the internship. Satisfaction = (number of satisfied students / total number of students in the group) × 100%.

2.3.3 Evaluation of teaching effect of internship

Formulate a questionnaire on the teaching effect of internship and distribute the questionnaire to the trainee doctors to investigate their evaluation of the PDCA cycle combined with PBL teaching method.

2.4 Statistical Methods

SPSS 25.0 software was used to analyze and process the data. Measurement data were expressed as (mean ± standard deviation) and t-test was used; count data were expressed as rate and $\chi 2$ test was used, and $P < 0.05$ indicated that the difference was statistically significant.

3. Results

3.1 Comparison of Assessment Scores after Teaching

After teaching, all the assessment scores of the observation group were better than those of the control group, and the difference was statistically significant ($P < 0.05$), as shown in Table 1. There was no unqualified trainee doctor in the observation group, which was lower than the unqualified rate of the control group by 16.7%, and the difference was statistically significant ($P < 0.05$).

3.2 Comparison of Teaching Satisfaction

The satisfaction rate of the observation group after teaching was 96.7%, which was better than 73.3% of the control group, and the difference was statistically significant ($P < 0.05$).

3.3 Evaluation of Internship Teaching Effect

The teaching effect indicators of the observation group are better than those of the control group, and the difference is statistically significant ($P < 0.05$), as shown in Table 2.

Table 1. Comparison of Post-training Assessment Scores of Trainee Doctors in the Two Groups (Mean ± Standard Deviation)

Group	n	Basic Theory	Basic operation	Medical Record Writing	Clinical analysis ability	Teamwork
observation	30	17.2±0.92	18.3±1.23	17.5±1.13	16.9±1.03	18.9±1.21
control	30	15.3±1.11	15.8±1.12	15.2±1.35	14.7±1.32	17.1±1.02

Table 2. Comparison of Two Groups of Trainee Doctors' Evaluation of Teaching Effectiveness [n (%)]

Survey items	Observation group (n=30)	Control group (n=30)
Secondary interest in learning	29 (96.7)	13 (43.3)
Deepen understanding of diagnosis and treatment of related diseases	28 (93.3)	14 (46.7)
Connecting with practice and broadening knowledge	28 (93.3)	10 (33.3)
Improve learning efficiency	30 (100)	13 (43.3)
Improve self-learning ability	29 (96.7)	16 (53.3)
Improvement of analytical problem solving skills	30 (100)	16 (53.3)
Improvement of clinical operation ability	29 (96.7)	12 (40.0)
Develop clinical thinking	30 (100)	13 (43.3)
Improve learning initiative	28 (93.3)	11 (36.7)

4. Discussion

Cardiovascular medicine is an important part of internal medicine system, its condition is more complex, clinical symptoms and signs are not very different, differential diagnosis is more difficult, and it is very important to cultivate correct diagnosis and treatment ideas, agile adaptability and fine operation ability. The traditional mode of cardiovascular internship is often a duck-filling teaching mode, that is, the teacher should first review the theoretical content, and then lead the students to see the patient, case discussion, the teacher to summarize, mostly with the teacher as the theme, which is not conducive to the mobilization of the enthusiasm of interns [4-6]. In this study, the PDCA cycle combined with PBL teaching method was applied to the internship teaching of cardiovascular internal medicine, and the results showed that, after teaching, all the assessment scores of the observation group were better than those of the control group ($P < 0.05$). The results show that after the teaching, all the assessment results of the observation group were better than those of the control group ($P < 0.05$), which indicates that the PDCA cycle combined with the PBL teaching method is beneficial to the improvement of the trainee doctors' clinical operation skills, and the trainee doctors' diagnosis and treatment level of the clinical diseases has been greatly improved through the process of constantly asking questions and solving problems.

The results of this study showed that the theoretical and practical scores of the observation group using the PDCA cycle combined with the PBL teaching method were better than those of the control group, indicating that the above joint teaching can effectively improve the comprehensive performance of interns, which is consistent with the results of related studies [7]. The results of this study also showed that the learning interest and clinical thinking ability of interns in the observation group were significantly better than those in the control group, suggesting that the PDCA cycle combined with PBL teaching method can improve the effect of cardiovascular internal medicine residency training. The reasons are: PDCA cycle and PBL teaching method can form a complementary, in mobilizing the enthusiasm and initiative of interns to learn at the same time, through the problem-oriented, so that interns have a purpose to learn, so as to deepen their knowledge and understanding. At the same time, the use of the PDCA cycle of planning, implementation, etc. to promote the entire learning process, avoiding excessive dispersion of learning energy, and through evaluation, improvement, etc. to make the entire training intense, orderly and efficient, and ultimately, under the joint efforts of the two, the training work can be carried out

smoothly, and the quality of the training can be significantly improved [8]. In addition, the PDCA cycle combined with the PBL teaching method can effectively improve the teaching satisfaction of interns and promote the training work toward standardization and high quality [9]. The data of this trial show that the observation group has higher teaching satisfaction, $P < 0.05$, which confirms the above conclusion. PDCA cycle combined with PBL teaching can enhance the team's sense of cooperation, so that the new staff can adapt to the hospital environment and work faster, and can screen out the most appropriate cases, and constantly improve the training program, which provides a good idea for the hospital's future training and management of talents [10]. In order to improve the quality of teaching, this study, based on the concept of teaching and quality management, applies PBL and PDCA to the teaching of cardiovascular internal medicine, through the teaching of classic cases, and at the same time integrates the PDCA cycle model, constantly identifies teaching problems and solves problems, in order to make the quality of teaching in a “spiraling upward”. The results of the study showed that the assessment scores of the observation group were significantly higher than those of the control group, especially in the areas of clinical skills and case analysis, suggesting that PBL combined with the PDCA cycle model can effectively improve the practical ability of the students and the ability to analyze clinical cases, which is conducive to the cultivation of high-quality composite talents [11]. In addition, the evaluation of the teaching mode of the observation group was higher than that of the control group, suggesting that the PBL teaching combined with PDCA mode is more recognized by the trainees than the traditional teaching mode. This is because the PBL teaching combined with PDCA mode emphasizes more on building a flexible, open and independent learning environment for students, and in the process of cyclic quality improvement, it realizes the continuous innovation and optimization of learning, which is of great significance to improve the effectiveness of students' learning [12].

5. Conclusions

In conclusion, in the process of cardiovascular internal medicine traineeship, the PDCA cycle combined with the PBL teaching management mode is conducive to improving the trainee doctors' initiative in traineeship, cultivating the habit of thinking hard, stimulating the interest in learning, cultivating the ability of clinical thinking, and improving the quality of teaching.

Acknowledgments

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