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Application of PBL Combined with CBL in the Teaching of Stoma Complications

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Abstract: *To explore the application effect of Problem-Based Learning (PBL) combined with Case-Based Learning (CBL) teaching method in the course of ostomy complications. Students majoring in wound and stoma nursing in Shaanxi Province (enrolled from 2021 to 2024) were selected as research participants. The subjects were divided into experimental group (n=62) and control group (n=56). Control group using traditional teaching mode, experimental group on the basis of the traditional teaching using PBL combined with CBL teaching method, Teaching effectiveness was evaluated through examination results and questionnaire surveys. Compared with the control group, the experimental group had a significant increase in theoretical scores (86.21±5.12 vs 80.23±6.98, p<0.001) and clinical skills scores (89.38±4.11 vs 85.85±4.10, P <0.001). In the evaluation of teaching satisfaction, the teaching satisfaction of the experimental group was significantly higher than that of the control group (460±41.10 vs 294±32.72, p<0.001). PBL combined with CBL model in the application of colostomy complications teaching can improve students' clinical thinking ability, learning achievement and teaching satisfaction, to promote the development of colostomy complications teaching plays an important role.*

Keywords: *Problems of Teaching, Case-Based Teaching, Teaching of Stoma Complications*

1. Introduction

In China, more than 1 million patients have undergone enterostomy[1]. The incidence of stoma complications is between 10% and 70%, of which 9.3% are serious complications[2]. This not only reduces the overall quality of life of patients, but also increases the medical burden[3]. Studies have shown that early identification and targeted intervention by professional enterostomal therapists can effectively reduce the incidence of ostomy complications[4, 5]. However, because the management of stoma complications involves extensive theoretical knowledge, complex and variable clinical manifestations, and high practical requirements[6], the traditional “indoctrination-style” teaching method is used, which makes it difficult for students to understand and accept the knowledge in a short time, and it is more difficult for students to use the knowledge in clinical practice flexibly[7]. In recent years, team discussion-based teaching methods such as PBL and CBL have been widely applied in college nursing education. [8]. PBL, through group discussions, helps students activate and reflect on prior knowledge [9], CBL, as a case-oriented teaching method, combines clinical cases with textbook content, enabling students to deepen their understanding of knowledge and stimulate their learning enthusiasm during the learning process. and stimulate students' learning enthusiasm[10]. The combination of PBL and CBL can effectively improve students' clinical practice ability and cultivate their clinical thinking through group discussions on clinical cases, preset questions, and collaborative exploration of solutions applied to simulated clinical scenarios. [11]. Therefore, this study explores the application effect of PBL combined with CBL in the education of ostomy complications, so as to provide reference and method for the education model in this field.

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2. Research Objects and Methods

2.1 Participants

Research objects: 118 students (enrolled from 2021 to 2024) from a wound and stoma nursing training institution in Shaanxi Province were selected as research participants. 56 students from the class of 2021 and 2022 were selected as the control group, and 62 students from the class of 2023 and 2024 were selected as the experimental group. All students were informed about the study and agreed to participate in this research.

2.2 Teaching Implementation

The control group and experimental group adopted uniformly compiled teaching materials provided by the training institution. All teachers had obtained certification from the World Council of Enterostomal Therapists (WCET). Each class in the two groups was 50 minutes and 10 hours in total, including 4 hours of theoretical teaching, 2 hours of interactive teaching and 4 hours of workshop. In order to let the teacher know students mastering knowledge, all students must take admission before test. Theoretical teaching in the same way in both groups, the classroom teacher through PPT show case interpretation and complications, complications, knowledge, matters needing attention and corresponding treatment method, focuses on students' performance is weak in the entrance test points.

Control group teaching: After 4 class hours of theory teaching, students had 2 days to review freely, master what they had learned, and mark their weak content, and then the teacher used 2 class hours to answer questions in class.

Experimental group teaching: the students in the experimental group were all taught by PBL combined with CBL.

(1) Preliminary preparation

Case selection: Teachers selected representative and educational cases covering common problems of ostomy complications and their coping strategies. Based on these cases, teachers set guiding questions, which not only involved basic knowledge, but also practical applications such as treatment methods and clinical protocols. The cases will be sent to the students at the end of the theoretical class.

(2) Students were grouped

Teachers grouped students according to their departmental specialty direction, and make sure that each group has 1-2 gastric surgery or urology students, and each group has a group leader who is responsible for organizing students' discussion.

(3) Teaching objectives

Students will have 2 days to prepare: (1) to master the causes, differential diagnosis and management of stoma complications, (2) Students needed to discuss and develop a nursing care plan from five perspectives: the patient’s physical structure, physiological functions, personal participation, psychological state, and living environment, to develop a plan of care.

(4) Reporting cases (2 hours)

One member of each group was selected for case presentation. During the group debriefing, students and teachers can express questions and opinions at any time. At the end of each group report, the teacher will lead the students to summarize and reflect, and propose suggestions and improvement measures based on the previous clinical experience.

Stoma Complications Workshop: First, the teacher will show the products related to stoma care and explain their characteristics and application methods. A case without colostomy complications was provided for the control group, simulated students familiar with and master how to use the colostomy care products. In the experimental group, the teacher prepared real cases and set problems in advance, and the students still discussed them in the form of group. According to the results of the discussion, the group members cooperated with each other to practice on the simulated person, and the teacher made comments on the flexible application of knowledge, communication skills, group cooperation, nursing measures and health education through the group members.

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2.3 Evaluation of teaching effect

2.3.1 Clinical comprehensive ability assessment test

Including clinical skills and theoretical tests

Clinical skills examination: Assessment criteria were based on those of the Clinical Skills Examination and Appraisal Panel of the First Affiliated Hospital of Xi'an Jiaotong University, and all panel members were qualified clinical teaching teachers according to the special students and case defense and score to operation, out of a possible 100 points. For the theoretical examination, the school unified questions, showing the pictures of complications cases and a simple description, requiring students to give the correct diagnosis of complications, analyze the causes, and formulate a nursing plan according to the pictures.

2.3.2 Questionnaire survey

At the end of the teaching, the questionnaires were distributed and collected. Questionnaire contents include: (1) the student satisfaction, team cooperation ability, master degree of knowledge, learning the enthusiasm and initiative and practical ability. The questionnaire adopts a 5-point scoring method, which is divided into very satisfied, satisfied, general, not satisfied and not satisfied at all, scored as 100, 80, 60, 40, and 20 points, respectively. Overall satisfaction was taken as the average of five levels.

2.4 Statistical

SPSS 26.0 statistical software was used for statistical processing and data analysis. Measurement data were expressed as mean ± standard deviation ($\bar{x}\pm s$), and categorical data (originally "Count data") were expressed as frequency and percentage, The independent samples t-test was used for between-group comparisons. A p-value < 0.05 was considered statistically significant.

3. Result

3.1 Comparison of general information and entrance test scores between the two groups

There was no significant difference in gender, education level, and professional title between the two groups ($p > 0.05$), as shown in Table 1. There was also no significant difference in the pre-admission test scores for stoma complications between the two groups (p > 0.05), as shown in Table 2.

3.2 Comparison of theoretical assessment and clinical skill scores between the two groups

The theoretical assessment score of the experimental group was (86.21±5.12), with no students scoring below 60, the theoretical assessment score of the control group was (80.23±6.98), and 3 students in this group scored below 60. The difference in theoretical scores between the two groups was statistically significant ($p < 0.001$).

The clinical skill assessment score of the experimental group was (89.38±4.11), while that of the control group was (85.85±4.10), the difference in clinical skill scores between the two groups was statistically significant ($p < 0.001$), as shown in Table 3.

3.3 Comparison of students' satisfaction with training between two groups

The scores of each item (teamwork skills, knowledge mastery, etc.) and the total score of the training satisfaction questionnaire in the experimental group were higher than those in the control group, and all differences were statistically significant ($p < 0.001$), as shown in Table 4.

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Table 1 Two groups of students general data comparison

Groups	Control group (n=56)	Experimental group (n=62)	t/χ^2	*P*-value
Age (years, $\pm s$)$\overline{x}$	35.95±5.43	36.58±5.84	-0.603	0.548
Gender (ex.)			0.7	0.15
Male	1	6		
female	55	56		
Job title (e.g.)			0.004	0.948
Junior and intermediate	49	54		
Advanced	7	8		
Education (example)			1.279	0.258
Undergraduate	55	57		
Master's	1	5		
Unit (example)			1.632	0.201
Level 2	4	9		
Level 3	52	53		
Experience with stoma care (e.g.)				
is	15	41	-0.842	0.401
no	20	42		

Table 2 Comparison of admission scores between the two groups (score, $\pm s$)$\overline{x}$

Groups	Control group (n=56)	Experimental group (n=62)	*t* value	P-value
Grade point average	66.5	67.5	1.875	0.063

Table 3 Comparison of theoretical and clinical skills scores between the two groups (score, $\pm s$)$\overline{x}$

Groups	Control group (n=56)	Experimental group (n=62)	*t* value	P-value
Theoretical grades	80.23±6.98	86.21±5.12	-5.347	<0.001
Clinical skills scores	85.85±4.10	89.38±4.11	-4.664	

Table 4 Comparison of students' satisfaction between two groups (score, $\pm s$)$\overline{x}$

Items	Control group (n=56)	Experimental group (n=62)	*t* value	*P*-value
Teamwork skills	62.0±19.89	96.0±8.43	-4.977	< 0.001
Mastery of knowledge	62.0±14.75	92.0±13.89	-4.666	< 0.001
Learning motivation and initiative	72.0±10.32	96.0±8.43	-4.330	< 0.001
Practical skills	46.0±21.19	84.0±15.77	-8.521	< 0.001
Overall satisfaction	294±32.72	460±41.10	-9.992	< 0.001

4. Discussion

4.1 PBL combined with CBL teaching model can improve students' clinical skills

The results of this study showed that the theoretical score (86.21±5.12) and clinical skill score (89.38±4.11) of the experimental group were higher than those of the control group, the number of unqualified students in the experimental group was lower than that in the control group. These results indicate that applying the PBL-CBL combined teaching method in stoma complication training is conducive to improving students' theoretical scores and enhancing their clinical practice ability[12, 13]. For the reasons behind this, on the one hand, compared with traditional training, the PBL-CBL combination has changed the previous situation where teachers unilaterally emphasized knowledge output. IWhen analyzing real clinical cases, students used the nursing process as a framework to provide planned, continuous, and comprehensive holistic nursing based on patients' different needs. In this process, theoretical knowledge about stomas was integrated into clinical cases, helping students master the key points of stoma complication nursing. Each group of students took nursing needs and problems as the entry point, combined patients' characteristics, thought from multiple angles, and formulated targeted nursing measures. When encountering challenging problems, team members decomposed complex issues

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into sub-problems for discussion, and reflected on and evaluated the rationality of nursing plans—this enabled students to gain a deeper grasp of the causes, manifestations, and nursing knowledge of stoma complications. On the other hand, teachers also played a key role in teaching. In addition to sharing professional knowledge and experience, they proposed a series of progressive and logical questions based on cases, prompting students to think innovatively and reflect on their previous methods for dealing with similar problems. Through brainstorming, students generated new ideas, later practical training helped them consolidate and improve their understanding of knowledge and flexible application abilities, thereby enhancing their theoretical and clinical practice skills and cultivating their clinical thinking.[14]. Previous studies have shown that innovative teaching methods such as PBL and CBL not only help students master solid medical theoretical knowledge but also enable them to select the most effective clinical evidence for diagnosis when facing specific patients, and exercise their clinical thinking ability [15]. It is reported that adopting the typical case teaching method in the training of wound, ostomy, and continence specialist nurses helps students strengthen their understanding and mastery of specialist knowledge in a short time[16]. In the experimental group, students formed mutual-aid learning groups through group discussions, which effectively helped students with weak knowledge foundations improve and reduced the number of unqualified students. Thus, the PBL-CBL model promotes students' collaborative learning: by following the process of "identifying questions → analyzing cases → discussing issues → seeking information → answering questions → summarizing and analyzing," it gives full play to students' subjective initiative, improves their independent thinking ability, enhances their clinical theoretical and practical skills, and helps them become competent in clinical work more quickly.[17-19].

4.2 PBL combined with CBL teaching mode can improve the students' satisfaction

The results of this study showed that the total satisfaction score of the experimental group was (460±41.10), which was significantly higher than that of the control group (294±32.72). Studies have shown that facing challenging clinical cases helps students identify gaps in their own knowledge, hone their thinking skills, and exercise their creativity[20]. First, the PBL-CBL combination provides students with clinical cases in advance, which include patients' background, clinical history, and laboratory test results. Team members acquire relevant knowledge through textbooks, the Internet, and other resources to fully prepare for group discussions—this makes members more active, attentive, and highly engaged in the discussion process. Second, teachers guided students to actively experience and participate through video demonstrations, workshops, and other methods, transforming boring teaching content into a more intuitive and realistic learning experience.[21, 22]. By simulating real clinical scenarios in class, abstract theories are turned into practical operations, allowing students to gain a sense of accomplishment and professional value. This helps them clarify the significance of stoma complication nursing and the importance of their profession.

5. Conclusion

In this study, the training method of PBL combined with CBL in stoma complications can effectively help students to improve theoretical knowledge and operation skills, help to improve students' clinical thinking ability and teaching satisfaction, and lay a solid foundation for future clinical work, which is worthy of reference.

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