

Combination of PBL and LBL in Teaching Clinical Apprenticeship in Vascular Surgery

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Abstract: We selected 60 interns who underwent clinical internships in our vascular surgery department from January 2022 to January 2023. They were randomly divided into two groups: the control group (n=30) received LBL teaching, and the observation group (n=30) received PBL teaching in addition to LBL. We compared the team cohesion scores, critical thinking ability scores, teaching quality scores, and teaching effectiveness scores before and after the apprenticeship between the two groups. Before the apprenticeship, there was no significant difference in team cohesion scores between the two groups ($P>0.05$). After the apprenticeship, the team cohesion scores of the observation group were higher than those of the control group ($P<0.05$). Before the apprenticeship, there was no significant difference in critical thinking ability scores between the two groups ($P>0.05$). After the apprenticeship, the critical thinking ability scores of the observation group were higher than those of the control group ($P<0.05$). Before the apprenticeship, there was no significant difference in nursing quality scores between the two groups ($P>0.05$). After the apprenticeship, the nursing quality scores of the observation group were higher than those of the control group ($P<0.05$). The teaching effectiveness scores of the observation group were higher than those of the control group ($P<0.05$). Implementing PBL combined with LBL in clinical apprenticeship teaching in vascular surgery can improve the teaching effectiveness and quality of interns, demonstrating its high practical value and worth promoting.

1. Introduction

Clinical internships are crucial in bridging the gap between medical students and healthcare practitioners, serving as a necessary stepping stone for the growth of healthcare professionals. To enhance the quality of medical education, it is imperative to elevate the comprehensive competence of clinical interns. This ensures that they grasp the significance of medical work and cultivate a strong sense of professional consciousness. In particular, emphasis should be placed on training and mentoring vascular surgery interns, as it directly correlates with the smooth execution of vascular surgical treatments and is closely linked to patient safety. Vascular surgery work exhibits distinct invasiveness [1]. Without effective teaching prior to assuming responsibilities, there is a significant risk of complications arising between medical staff and patients. In the context of advancing modern medical technology, the demand for high-quality mentorship during clinical internships in

vascular surgery has been escalating. In traditional teaching methods, the use of didactic instruction in vascular surgery internships provides interns with a certain level of understanding of diagnostic and treatment procedures, enabling them to acquire necessary skills and develop professional awareness. However, in this traditional model, the focus is primarily on education itself, overlooking the importance of active learning [2-3]. Consequently, during the practical period, interns' ability to handle unforeseen events and perform procedures may be significantly compromised. Thus, it is essential to implement effective teaching methods to enhance the mentorship of vascular surgery clinical interns, thereby improving their overall learning outcomes. In this study, the author selected 60 vascular surgery interns from our hospital who will undergo clinical internships between January 2022 and January 2023. The aim of this research is to analyze the effectiveness of incorporating Problem-Based Learning (PBL) combined with Lecture-Based Learning (LBL) teaching methods [4].

2. Information and Methods

2.1. General information

Our department of vascular surgery will be hosting a clinical internship for a total of 60 interns from January 2022 to January 2023. The interns will be randomly divided into two groups: a control group (n=30) and an observation group (n=30). The control group will receive instruction using the Lecture-Based Learning (LBL) method, consisting of 26 male and 4 female interns, with an age range of 20-24 years and an average age of (22.43±0.48) years. Among them, 5 have a bachelor's degree and 25 have a specialist degree [5]. The observation group, on the other hand, will receive instruction using a combination of Problem-Based Learning (PBL) and the LBL method. This group consists of 27 male and 3 female interns, with an age range of 20-24 years and an average age of (22.38±0.41) years. Among them, 4 have a bachelor's degree and 26 have a specialist degree. The demographic characteristics of the two groups of interns are comparable ($P>0.05$) [6].

2.2. Methodologies

Control group: Traditional imparting teaching method: Through imparting teaching method, the mentoring teacher acts as the main speaker during the teaching process and the students actively engage in learning by recording the teaching content. Simultaneously, the learning content is aligned with the requirements outlined in the syllabus, aiming to provide nursing interns with standardized demonstrations of relevant knowledge and operational techniques in the field of vascular surgery. After undergoing unified training, the nursing interns are then assigned to their respective mentoring teachers, who guide them in practice and observation [7].

Observation group: Teaching using a combination of PBL and LBL methods: (1) Designing teaching objectives: Based on the syllabus of vascular surgery, the relevant teaching content is determined. (2) Designing teaching methods: Mentoring teachers need to introduce nursing interns to important considerations, typical clinical manifestations, auxiliary examination measures, major causes, diagnostic measures, and treatment measures for common vascular surgical diseases. Using typical cases, the teachers provide teaching while also introducing potential complications that may arise after treatment. The focus is on guiding students through independent thinking. During the implementation of the teaching process, mentoring teachers need to guide students in actively identifying relevant problems and proposing corresponding solutions, thus further enhancing their exploratory abilities and subjectivity. (3) Mentoring teachers need to make adequate preparations, collect typical diseases, process and organize them based on teaching structure, gradually increase the teaching depth using typical cases, and provide these cases to nursing interns. The interns are

then required to form groups and conduct in-depth understanding of theoretical content related to the diseases by consulting relevant reference materials. (4) Student preparation: After gaining a thorough understanding of the typical cases and related problems, students should be able to fully comprehend the solution methods and independently think about how to solve the problems [8]. (5) Analyzing problems and working in groups: During the process of problem-solving, students need to work in groups, starting with questions that interest them. They should maintain communication with patients, conduct field visits in the department, consult relevant information, and collect patient information. Group members should integrate the collected information to enhance their analytical abilities, disease classification capabilities, critical thinking skills, and teamwork. (6) Mentoring teachers need to assess the mastery of fundamental knowledge in vascular surgery by nursing interns based on their actual circumstances, conducting evaluations before, during, and after class. Deficiencies should be identified and resolved appropriately [9].

2.3. Observation indicators

- 1) Comparison of team cohesion scores before and after banding;
- 2) Comparison of critical thinking skills ratings before and after banding;
- 3) Comparison of teaching quality ratings before and after teaching;
- 4) Comparison of teaching effectiveness ratings.

2.4. Statistical processing

SPSS20.0 statistical software was used for analysis, mean + standard deviation ($\bar{x} \pm s$) for measurement data, t-value check, rate (%) for count data, X2 check, when $P < 0.05$, the difference between the two groups of data is statistically significant.

3. Results

3.1. Comparison of team cohesion scores before and after coaching

Before teaching, the team cohesion scores of clinical interns in both groups were compared ($P > 0.05$), and after teaching, the team cohesion scores of clinical interns in the observation group were higher than those of the control group ($P < 0.05$), as shown in Table 1;

Table 1: Comparison of team cohesion scores before and after coaching ($\bar{x} \pm s$) (points)

Group	Number of cases	Self-discipline		Joyfulness		Belongingness		Value-based	
		Before teaching	After teaching	Before teaching	After teaching	Before teaching	After teaching	Before teaching	After teaching
Observation Group	30	1.24±0.26	2.04±0.52	1.47±0.16	2.25±0.76	1.20±0.47	2.13±0.67	1.53±0.51	2.23±0.53
Control Group	30	1.26±0.23	1.76±0.37	1.45±0.14	1.80±0.55	1.26±0.46	1.78±0.45	1.57±0.56	1.93±0.34
t	-	0.316	2.403	0.515	2.627	0.500	2.375	0.289	2.610
P	-	0.754	0.020	0.608	0.011	0.619	0.021	0.773	0.012

3.2. Comparison of Critical Thinking Skills Scores Before and After Taking Teachers

Before teaching, the critical thinking ability scores of clinical interns in the two groups were compared ($P > 0.05$), and after teaching, the critical thinking ability scores of clinical interns in the observation group were higher than those of the control group ($P < 0.05$), as shown in Table 2;

Table 2: Comparison of critical thinking skills scores before and after teaching ($\bar{x} \pm s$) (points)

Group	Number of cases	Analytical skills		Cognitive Maturity		Intellectual curiosity		Self-confidence	
		Before teaching	After teaching	Before teaching	After teaching	Before teaching	After teaching	Before teaching	After teaching
Observation Group	30	35.22±6.36	44.37±4.12	37.25±4.16	44.37±5.46	33.86±5.34	45.32±4.12	38.23±4.56	45.35±4.57
Control Group	30	35.30±6.44	40.21±3.89	37.32±4.35	41.23±4.53	33.80±5.46	41.76±3.86	38.12±4.63	41.10±4.13
t	-	0.048	4.021	0.064	2.424	0.043	3.454	0.093	3.779
P	-	0.962	0.000	0.949	0.019	0.966	0.001	0.927	0.000

3.3. Comparison of banding quality scores before and after banding

Before teaching, the quality of care scores of clinical interns in the two groups were compared ($P > 0.05$), and after teaching, the quality of care scores of clinical interns in the observation group were higher than those of the control group ($P < 0.05$), as shown in Table 3;

Table 3: Comparison of banding quality scores before and after banding ($\bar{x} \pm s$) (points)

Group	Number of cases	Hands-on		Assisting and Collaborating		Communication	
		Before teaching	After teaching	Before teaching	After teaching	Before teaching	After teaching
Observation Group	30	12.00±2.39	18.14±1.09	10.89±2.21	18.15±1.39	10.95±2.93	18.23±1.26
Control Group	30	12.01±2.35	15.35±1.21	10.76±2.18	14.53±1.41	10.78±2.89	15.00±1.19
t	-	0.016	9.383	0.229	10.014	0.226	10.208
P	-	0.987	0.000	0.819	0.000	0.822	0.000

Table 3: (continued)

Group	Number of cases	Service Attitude		Emergency Response Capability		Total Score	
		Before teaching	After teaching	Before teaching	After teaching	Before teaching	After teaching
Observation Group	30	11.25±2.34	18.16±0.59	10.23±3.06	18.35±1.46	70.46±4.23	96.35±1.56
Control Group	30	11.19±2.30	15.23±1.10	10.19±3.03	14.85±2.26	70.40±4.19	81.16±2.31
t	-	0.100	12.857	0.051	7.125	0.055	29.848
P	-	0.921	0.000	0.960	0.000	0.956	0.000

3.4. Comparison of Teaching Effectiveness Ratings

The teaching effectiveness scores of the clinical interns in the observation group were higher than those of the control group ($p < 0.05$), as shown in Table 4;

Table 4: Comparison of Teaching Effectiveness Scores ($\bar{x} \pm s$) (points)

Group	Number of cases	Learning Interests	Clinical Thinking Skills	Knowledge Mastery	Learning Efficiency	Course Organization	Self-learning ability	Innovative
Observation Group	30	2.29±0.51	2.20±0.64	2.38±0.47	2.35±0.49	2.34±0.52	2.27±0.60	2.33±0.57
Control Group	30	1.61±0.49	1.73±0.56	1.67±0.60	1.81±0.65	1.76±0.59	1.59±0.51	1.65±0.53
t	-	5.266	3.027	5.102	3.634	4.039	4.730	4.785
P	-	0.000	0.004	0.000	0.001	0.000	0.000	0.000

4. Conclusions

With the continuous improvement of medical diagnosis and treatment techniques, the demand for clinical medical students' capabilities is also increasing. Vascular surgery is a highly specialized field, requiring students to possess strong theoretical knowledge and extensive practical experience. The LBL teaching method is a traditional instructional approach that places the teacher at the center of teaching, effectively grasping relevant knowledge and theoretical content. However, in this teaching process, the interaction between teacher and student, as well as the integration of theory and practice, is relatively lacking, which fails to fully stimulate students' enthusiasm and affects their independent learning abilities. Students who are taught using the LBL method remain passive throughout, and the amount of knowledge they learn is closely related to the teaching abilities, clinical experience, and knowledge levels of their instructors. The stronger the teaching abilities of the instructors, the more knowledge the students acquire [10]. This mandatory "cramming" teaching method neglects the cultivation of clinical thinking and research awareness in interns and prevents the integration of theoretical knowledge with practical operations. Therefore, it is crucial to apply a more efficient teaching model in clinical vascular surgery internships.

The PBL teaching model, which places problems at the core, is a novel teaching method. By simulating actual clinical cases and under the guidance of teachers, students discover and analyze the problems within the case through self-study, research, and discussions, and propose solutions. This approach can fully stimulate students' interests, as well as their teamwork capabilities, which will impact their independent learning abilities and understanding of problems. The present study found that the team cohesion ratings of the observed group of interns were significantly higher than those of the control group ($P < 0.05$). Furthermore, the critical thinking ability scores of the observed group of clinical interns were significantly higher than those of the control group ($P < 0.05$). Additionally, the nursing quality scores and teaching effectiveness scores of the observed group were higher than those of the control group ($P < 0.05$). These results suggest that teaching vascular surgery interns using a combination of the PBL and LBL teaching methods can further enhance teaching effectiveness and quality. The reason for this lies in the fact that implementing the PBL teaching method in conjunction with the LBL method can compensate for the shortcomings of both approaches [11]. During the application of the PBL teaching method, students improve their understanding and deepen their knowledge by consulting materials and engaging in mutual discussions, allowing them to recall and resolve similar problems in a timely manner. On the other hand, the LBL teaching method helps students fully grasp theoretical knowledge, laying a solid foundation for their future clinical practice. The combination of these two teaching methods is innovative, capturing students' interest and enhancing their motivation to learn, thereby improving their understanding of theoretical knowledge [12,13].

In summary, during the vascular surgery internship, employing a combination of the PBL and LBL teaching methods in instruction provides a valuable teaching approach that is deserving of

widespread adoption.

Acknowledgements

PBL teaching mode and the application of student-led ward round in the clinical teaching of interventional vascular surgery.

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