

From Knowledge Transfer to Capability Development: The Future of PBL + CBL Teaching Method in Operating Room Nursing Education

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Abstract: Concomitant with the advancement of contemporary medical technology, the significance of perioperative nursing has been increasingly accentuated, necessitating elevated standards for the pedagogy of perioperative nursing. Presently, the PBL (problem-based learning) pedagogical approach, when integrated with CBL (case-based learning), has garnered considerable interest. An extensive literature review has been conducted to analyze the application of the PBL-CBL fusion in the education of perioperative nursing. Findings indicate that this integrative teaching methodology not only enhances students' theoretical knowledge, practical competencies, and collaborative skills but also contributes to the elevation of teaching quality. In conclusion, the PBL-CBL teaching approach holds immense potential for broader application in perioperative nursing education. Nevertheless, it is imperative to continually refine this combined pedagogical strategy to further enhance the caliber of perioperative nursing instruction and to cultivate a greater number of exceptional nursing professionals in the operating room setting.

Keywords: Knowledge transfer; Capability development; PBL + CBL teaching method; Operating room nursing; Education

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1. Introduction

Operating room nursing is a critical component of modern nursing systems. It not only requires nurses to have a solid theoretical foundation and proficient practical skills but also demands their ability to respond to unexpected problems. Therefore, cultivating high-quality operating room nursing talents is the top priority of nursing education in the operating room. However, with the continuous advancement of medical education, traditional teaching methods can no longer meet the current needs of operating room nursing education. Finding innovative teaching methods has become key to improving operating room nursing education. In this context, the combination of problem-based learning (PBL) and case-based learning (CBL) has gradually attracted the attention and research of many scholars. This article aims to review the current application of

PBL combined with CBL in operating room nursing education, analyze its advantages and disadvantages, and provide references for further optimizing operating room nursing education methods.

2. Overview of operating room nursing teaching

2.1. The importance of operating room nursing teaching

As a crucial component of surgical nursing, the operating room is a specialized department characterized by its strong specialization, wide range of nursing teaching content, high practicality, and stringent sterility requirements. The specialized knowledge of operating room nursing has always been a difficult point in the clinical learning process ^[1,2]. As a department that relies on teamwork, the tacit cooperation between operating room nurses and surgeons is crucial to the smooth progress of surgeries. This underscores the importance of mentors in operating room nursing teaching, who must not only impart theoretical knowledge and complex nursing skills but also cultivate students' teamwork and adaptability. Therefore, an efficient teaching model for operating room nursing is essential for cultivating high-level operating room nursing talents.

2.2. The shortcomings of traditional teaching methods in operating room nursing teaching

The traditional teaching method typically revolves around teacher-centered lectures, with students passively receiving knowledge. This approach hinders students' ability to think independently and explore actively. Additionally, student engagement is low in this teacher-centered classroom environment ^[3]. Furthermore, operating room nursing is a highly practical discipline. However, in traditional teaching methods, many practical knowledge points are imparted through lectures, leaving students with inadequate opportunities for practice. Moreover, with the further development of endoscopic technology, operating room nursing has expanded alongside advancements in surgical methods. However, the content of traditional teaching methods fails to be updated promptly. With the continuous development of modern medical education, the traditional teaching model, characterized by its singular approach, strong reliance on teaching experience, poor clinical teaching effectiveness, and low satisfaction among nursing interns ^[4], has become inadequate to meet the needs of modern medical education ^[5]. Therefore, it is imperative to explore a new teaching model for operating room nursing.

3. Overview of PBL teaching method

The PBL teaching method is a problem-oriented approach that guides students to actively discuss and explore issues. It encourages students to identify problems independently and seek solutions through active research in literature and books. In nursing education, the PBL method involves teachers posing problems, guiding students through group discussions, and enhancing students' interest in active learning, thereby integrating theory with practice.

3.1. Application of PBL teaching method in nursing education

The concept of the PBL teaching method was first applied to medical education by Professor Barrows, a neurologist from the United States ^[6]. It was introduced to China in 1986 by Shanghai Second Medical University and the former Xi'an University. Since its application in medical education in the 1960s, it has become a popular teaching model in nursing education. Domestic scholars such as Ling Liu ^[7] have

found through research that compared to traditional teaching methods, the PBL approach not only enriches nursing students' theoretical knowledge and improves their practical skills but also enhances their self-evaluation, improves the relationship between students and teachers, and increases students' satisfaction with their teachers. Additionally, while traditional teaching models focus on theoretical knowledge, operating room nursing tends to emphasize practical skills. Domestic scholar Yanyan Xiao^[8] believed that adopting the PBL teaching method in operating room nursing education can more effectively improve the practical skills of nursing students. Other domestic scholars also agreed that the PBL teaching method better integrates theory with practice for nursing students and can reduce safety hazards in the operating room^[6]. Furthermore, studies have shown that the PBL teaching method improves the effectiveness of operating room nursing education and stimulates students' active learning^[9,10]. Moreover, the PBL teaching method cultivates students' ability to think independently, solve problems, and develop critical thinking^[11]. Based on independent learning, students' clinical thinking and mastery of professional clinical skills are fostered.

3.2. Limitations of the PBL teaching method

Although the PBL teaching method is a popular teaching model both domestically and internationally, it still has certain limitations. Firstly, the PBL teaching method demands a high level of comprehensive skills from teachers. The teaching team needs to ensure that each learning group is assigned a teacher who can provide guidance during student discussions to prevent the discussion from deviating from the learning objectives. Therefore, teachers need to have a solid foundation in clinical nursing theory and rich clinical experience^[12]. Secondly, the problems posed by teachers in the PBL method should align with clinical operating room nursing to avoid overly divergent questions. Additionally, introverted students may be less receptive to the PBL teaching method, so motivating students is one of the challenges faced in this approach. Finally, the implementation of the PBL teaching method requires students to have a certain level of literature-searching skills.

4. Application of PBL + CBL teaching method in operating room nursing teaching

The CBL (case-based learning) teaching method refers to presenting real clinical nursing cases and conducting teaching based on these cases. Combining PBL with CBL in operating room nursing teaching has several advantages. On one hand, the problems involved in PBL can be based on real cases in CBL, allowing intern nurses to have a more authentic clinical experience, attracting their interest, and avoiding overly complex or unrealistic problems posed by teachers. On the other hand, cases in CBL are presented through problem-based teaching, enabling students to solve problems by searching for literature, better understanding the key points and difficulties of nursing knowledge involved in the cases, and improving their mastery of the teaching content.

4.1. Steps of applying PBL + CBL teaching method in operating room nursing teaching

- (1) Preparation phase: The teacher selects operating room nursing cases and designs relevant problems based on the selected cases. The problems should cover common operations in operating room nursing, basic knowledge of operating room nursing, and principles and methods for handling special situations encountered during surgery. After preparing the case and problems, students are divided into several groups, with a moderate number of members in each group to facilitate collaboration.
- (2) Case introduction and problem posing: The teacher introduces the selected case to the group,

including the patient's preoperative diagnosis, the surgical method adopted, and the estimated surgery time to confirm whether a urinary catheter is needed. Finally, the teacher poses problems based on the case and encourages students to think and discuss actively.

- (3) Group discussion phase: Each group conducts discussions, with every student expressing their views and doubts about the selected problems. Group members analyze the case together to find solutions, verifying their viewpoints through textbooks, literature, and the latest clinical nursing guidelines.
- (4) Reporting phase: Each group selects a representative to report the group's discussion results in the form of a PowerPoint presentation.
- (5) Evaluation phase: The teacher scores the students' performance, corrects any deficiencies, and encourages excellent performance.

4.2. Teaching evaluation of PBL + CBL teaching method in operating room nursing teaching

- (1) Evaluation of intern nurses' learning effectiveness: The mastery of relevant professional knowledge by intern nurses is evaluated through theoretical and skill exams. Their ability to handle problems is assessed by setting clinical case questions.
- (2) Evaluation of teaching quality: A questionnaire is designed to investigate students' acceptance of the PBL + CBL teaching method and their satisfaction with the teacher.

4.3. Current application status of PBL + CBL teaching method in operating room nursing education

The combined application of PBL and CBL teaching methods can avoid the drawback of problems deviating from clinical practice when using PBL alone. It enhances students' interest in learning through clinical cases. On the other hand, the traditional CBL teaching method often focuses on teacher instruction, with students passively receiving the content. The PBL teaching method can improve students' autonomous learning abilities, shifting the focus of teaching from "teacher-centered" to "student-centered." Domestic research comparing the traditional teaching method combined with PBL to CBL combined with PBL found that the latter significantly improves nursing interns' performance^[13]. Chinese scholars Meng Cao and Liangyu Chen^[14] pointed out that the PBL combined with CBL teaching method can effectively enhance students' comprehensive abilities, including self-study, cognitive abilities for new things, and problem-solving skills. The study by Li *et al.*^[15] revealed that intern nurses who adopted the PBL combined with CBL teaching method scored higher in operating room nursing theory and operating skills than those who adopted traditional teaching methods, and the difference was statistically significant. Domestic scholar Shumei Peng^[16] discovered that students who adopted the combined PBL and CBL teaching method had higher recognition of innovative teaching, problem-solving, and knowledge coverage improvement than the observation group, proving that combining PBL and CBL can positively improve teaching quality and promote mutual growth in teaching and learning. Weijie Peng and Yuting Yang's research found that the PBL teaching method combined with case simulation can also help reduce the incidence of nursing errors^[17]. Other domestic scholars also believed that the dual-track teaching model of PBL and CBL can enhance operating room intern nurses' comprehensive knowledge application abilities and cultivate students' innovative and critical thinking skills^[18].

5. Problems in operating room nursing teaching with PBL + CBL teaching method

5.1. High requirements for teachers' comprehensive abilities

In the implementation of the PBL + CBL teaching method, teachers often spend a lot of time and energy preparing cases and designing problems ^[19]. Moreover, operating room nursing teachers are usually nursing staff in hospital operating rooms, and the implementation of the combined teaching method undoubtedly increases the pressure on teachers to prepare for classes. On the other hand, when implementing the combined teaching method, teachers not only need to guide students in discussions but also need to be prepared for students' questions and discussion directions. This places high demands on teachers' knowledge reserves and teaching levels.

5.2. High requirements for case quality

In the combined teaching method, the selected cases should not only be clinically relevant but also cover multiple knowledge points, including theoretical knowledge, practical operations, and comprehensive application skills. Furthermore, the cases need to be adjusted according to students' current learning stage to avoid overly complex cases that make it difficult to carry out teaching activities.

5.3. Limited reserve of systematic knowledge systems

The PBL + CBL learning method integrates clinical cases with problem-based teaching. However, students often focus on specific problems in cases due to limited theoretical knowledge reserves, ignoring the continuity and integrity of the knowledge system.

5.4. Difficulties in student adaptation

Most students have long been exposed to traditional teaching methods and are accustomed to passively receiving knowledge. When they first encounter the combined teaching method, they may feel uncomfortable and even be reluctant to participate in discussions. This is especially true for students with poor independent thinking skills, who may struggle to keep up with the teaching pace in the initial stages, affecting their learning outcomes.

6. Summary and outlook

Operating room nursing work is characterized by strong practicality, strict sterility requirements, and tacit team collaboration. The work environment is fast-paced and demands quick responses. Traditional teaching methods can no longer meet the current needs of operating room nursing teaching. Through research by numerous scholars, it has been found that the PBL + CBL teaching method plays a positive role in operating room nursing teaching. The problem-oriented teaching method promotes the transformation of the teaching model from teacher-centered to student-centered, while the case-based teaching method enhances students' interest in learning through the application of excellent clinical nursing cases. The combination of these two teaching methods has several benefits: in terms of academic performance, it promotes both theoretical knowledge and practical skills; in terms of comprehensive qualities, it helps cultivate students' critical thinking, enhances cooperation among classmates, and enables students to consider problems from a more comprehensive perspective; in terms of teaching quality, it requires teachers to carefully prepare cases and design appropriate problems, which also improves their teaching skills. Through joint discussions between teachers and students, deficiencies can be identified and improvements can be made for the next

implementation of the teaching method.

However, this teaching method faces many challenges in its application. To better apply it in operating room nursing education, nursing education departments need to further optimize case selection by selecting representative cases that meet the latest surgical developments and practical needs. They can also establish a case-sharing platform to improve case quality through communication and collaboration. In terms of teacher training, they can visit schools where the PBL + CBL teaching method has been successfully implemented or hold seminars to improve teachers' teaching levels and enhance their ability to guide students. Regarding student skill development, it is suggested to implement the combined teaching method across multiple branches of nursing science, not just in operating room nursing teaching. This will help cultivate students' holistic thinking and team collaboration from the foundational disciplines.

In conclusion, the PBL + CBL teaching method has broad prospects in operating room nursing teaching. By continuously optimizing case quality, improving teachers' teaching levels, and cultivating students' learning abilities, it is believed that the combined teaching method will be more maturely applied in operating room nursing teaching in the future, cultivating excellent talents for operating room nursing.

Disclosure statement

The authors declare no conflict of interest.

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