

Evaluation of the Effectiveness of Scenario-Based Participatory Teaching in Cardiothoracic Surgery Nursing Education

Hongjuan Ding, Hao Liu, Ermei Jin*

The First Affiliated Hospital of Xi'an Medical University, Xi'an 710077, Shaanxi, China

*Author to whom correspondence should be addressed.

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Abstract: *Objective:* To evaluate the efficacy of scenario-based participatory teaching methods in thoracic surgery nursing education. *Methods:* Sixty undergraduate nursing students were randomly assigned to two groups: a traditional teaching group and a scenario-based participatory teaching group, with 30 students each. The teaching outcomes of both groups were assessed. *Results:* The clinical reasoning assessment scores of the scenario-based participatory teaching group were significantly higher than those of the traditional group ($P < 0.05$). Additionally, the scenario group demonstrated higher satisfaction levels, superior theoretical and practical skills, improved patient education effectiveness during admission and discharge, and enhanced emergency response coordination ($P < 0.05$). *Conclusion:* Scenario-based participatory teaching effectively enhances the comprehensive competencies of nursing students in thoracic surgery, demonstrating favorable educational outcomes.

Keywords: Thoracic surgery nursing education; Scenario-based teaching; Efficacy evaluation

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1. Introduction

Scenario-based teaching is a pedagogical approach designed to effectively enhance the quality of clinical education. By integrating students into clinical nursing curricula in accordance with established guidelines, this method deepens their understanding of theoretical knowledge and strengthens the integration of theory with practice^[1]. Cardiothoracic surgery units frequently encounter critically ill patients, where proficient operational skills and appropriate, effective communication can significantly improve patients' healthcare experiences, reduce medical risks, and ensure treatment efficacy^[2]. To optimize clinical nursing education outcomes and enhance the quality of clinical nursing, the department has incorporated scenario-based clinical nursing education into its curriculum. This approach has yielded satisfactory results and is reported as follows.

2. Subjects and methods

2.1. General information

Sixty undergraduate nursing students who interned in our department from June 2024 to December 2024 were randomly divided into two groups: the traditional teaching group and the scenario-based participatory teaching group, with 30 students in each group. The scenario-based participatory teaching group consisted of 1 male and 24 females, aged between 18 and 21 years, with an average age of 18.93 ± 0.740 years. The traditional teaching group comprised 3 males and 22 females, aged between 18 and 22 years, with an average age of 18.9 ± 0.885 years. The statistical analysis of the general information of the two groups of students showed $P > 0.05$.

2.2. Methods

2.2.1. Traditional teaching group

The traditional teaching method was employed, where students, upon entering the department, were routinely received by the chief nursing instructor, who introduced them to the departmental environment, staff composition, disease types and nursing considerations, rules and regulations, and internship requirements. Students were randomly assigned to instructors for one-on-one guidance. During the internship, special lectures were held regularly, focusing on common nursing skills in cardiothoracic surgery, clinical manifestations and assessment points of critical illnesses, coordination in emergency rescue efforts, proficiency in using various medical instruments, and nursing documentation.

2.2.2. Scenario-based participatory teaching group

Building upon traditional teaching methods, the head nurse of the department and the chief instructor collaborated to design specific internship scenarios based on the characteristics of diseases in the department and potential high-risk incidents. Training commenced within the first week of the internship. In alignment with training objectives and the curriculum, a comprehensive analysis of teaching content and student characteristics was conducted. Various multimedia tools, including audio recordings, videos, wall charts, and computers, were utilized to create nursing teaching scenarios encompassing routine care, unexpected emergencies, and critical illness rescues.

2.3. Observation indicators

Upon completion of the teaching period, students in both groups were evaluated on satisfaction, theoretical and practical performance, effectiveness of admission and discharge education, and emergency coordination capabilities. The theoretical assessment was conducted as a written exam, with a maximum score of 100. Instructors provided comprehensive evaluations of students' practical skills, admission and discharge education, and emergency coordination abilities, each with a maximum score of 100. Additionally, a clinical nursing teaching satisfaction evaluation was completed at the end of the internship.

2.4. Data processing

All data from this study were statistically analyzed using SPSS 20.0. Teaching satisfaction, effectiveness of admission and discharge education, and emergency coordination ability assessment scores were considered as categorical data, represented by percentages (%), and analyzed using the χ^2 test. Theoretical and practical performance scores were treated as continuous data, represented by mean \pm standard deviation (SD), and analyzed using the t -test. A statistically significant difference was indicated by $P < 0.05$.

3. Results

3.1. Comparison of clinical thinking ability assessment scores between the two groups of students

There was no significant difference in theoretical scores between the two groups, indicating no statistical significance ($P > 0.05$). However, in practical performance assessments, the scenario-based participatory teaching group outperformed the traditional teaching group, with a statistically significant difference ($P < 0.05$). Specific data can be found in **Table 1**.

Table 1. Comparison of theoretical and practical operation scores between the two groups of students (points, mean \pm SD)

| Item | Scenario-based teaching group ($n = 30$) | Traditional teaching group ($n = 30$) | t -value | P -value |
|------------------------|--|---|------------|------------|
| Theoretical assessment | 87.67 \pm 6.40 | 88.33 \pm 6.34 | 0.405 | > 0.05 |
| Practical assessment | 89.00 \pm 8.85 | 75.33 \pm 11.67 | 5.113 | < 0.05 |

3.2. Comparison of the effects of hospital admission and discharge education and first aid coordination abilities between the two groups of students

The scenario-based participatory teaching group demonstrated superior performance in terms of hospital admission and discharge education effects and first aid coordination abilities compared to the traditional teaching group, with statistically significant differences ($P < 0.05$). Specific data can be found in **Tables 2** and **3**.

Table 2. Comparison of the effects of hospital admission and discharge education between the two groups of students [n (%)]

| Group | Number of participants | Excellent | Qualified | Poor | Qualification rate |
|-------------------------------|------------------------|------------|-----------|-----------|--------------------|
| Scenario-based teaching group | 30 | 22 (73.33) | 7 (23.33) | 1 (3.33) | 96.67 |
| Traditional teaching group | 30 | 13 (43.33) | 8 (26.67) | 9 (30.00) | 70.00 |
| χ^2 value | | | | | 8.781 |
| P value | | | | | < 0.05 |

Table 3. Comparison of first aid coordination abilities between the two groups of students [n (%)]

| Group | Number of participants | Excellent | Qualified | Poor | Qualification rate |
|-------------------------------|------------------------|------------|-----------|------------|--------------------|
| Scenario-based teaching group | 30 | 19 (63.33) | 9 (30.00) | 2 (6.67) | 93.33 |
| Traditional teaching group | 30 | 11 (36.67) | 7 (23.33) | 12 (40.00) | 60.00 |
| χ^2 value | | | | | 9.526 |
| P value | | | | | < 0.05 |

3.3. Comparison of satisfaction with clinical teaching modes between the two groups of students

The scenario-based participatory teaching group exhibited higher satisfaction with clinical nursing teaching compared to the traditional teaching group, with statistically significant differences ($P < 0.05$). Specific data can be found in **Table 4**.

Table 4. Comparison of satisfaction levels with clinical teaching between the two groups of students [*n* (%)]

| Group | Number of participants | Very satisfied | Satisfied | Dissatisfied | Satisfaction rate |
|-------------------------------|------------------------|----------------|-----------|--------------|-------------------|
| Scenario-based teaching group | 30 | 25 (83.33) | 4 (13.33) | 1 (3.33) | 96.67 |
| Traditional teaching group | 30 | 16 (53.33) | 7 (23.33) | 7 (23.33) | 76.67 |
| χ^2 value | | | | | 7.294 |
| <i>P</i> value | | | | | < 0.05 |

4. Discussion

Clinical internships serve as a bridge between theoretical classroom knowledge and clinical practice, representing an essential pathway for the growth of medical students and a crucial component of medical education ^[3]. Through internships, nursing students can integrate theoretical knowledge acquired in the classroom with clinical practice, enabling a better understanding of the actual manifestations and scenarios of diseases. They can master the usage of various instruments, routine nursing care for critically ill patients, basic nursing skills for common diseases, and the proper administration of medications. Through hands-on practice, students can independently perform various nursing procedures, enhancing their professional skills and playing an irreplaceable role in cultivating qualified medical professionals. Internships not only cultivate students' professional skills but also emphasize the development of professional ethics and humanistic care. Students need to communicate with patients and their families, understanding their needs and psychological states, and providing psychological care. This kind of practical experience helps students develop a "patient-centered" nursing philosophy, enhances their ability to comprehensively analyze and solve problems. Through clinical nursing work, students can gain a more specific understanding of the characteristics of various departments, laying a solid foundation for their future employment in hospitals. Additionally, internship experiences also assist students in clarifying their career directions and preparing for future professional development. Surgical treatment of cardiothoracic surgical diseases, as a crucial component of surgical clinical teaching, involves a wide range of content and numerous challenges. Given the acute onset and severe conditions of cardiothoracic surgical patients, the ability to quickly assess their condition, make a diagnosis, and formulate a treatment plan within a short timeframe is particularly important. During the school learning phase, as well as the clinical internship and practicum stages before entering clinical work, consolidating theoretical foundations and improving operational skills can effectively promote the cultivation of students' overall qualities.

The significance of teaching clinical nursing students lies in cultivating their comprehensive abilities to identify, analyze, and critically think, as well as to engage in systematic thinking, which is beneficial for the cultivation of talent for subsequent clinical work. This is a complete process of independent thinking and analysis, as the development and progress of the nursing team require each nurse to possess a certain degree of critical and exploratory thinking. Nursing internship students, as the main force for future nursing development, should have their corresponding thinking abilities nurtured more intensively in the practical bases where they transition from school to clinical nursing. The implementation of scenario-based participatory teaching methods encourages students to brainstorm, discuss collectively, and engage in intellectual collisions, which is conducive to training the thinking abilities of clinical nursing students ^[4-6]. How to maximize students' learning interests within a limited timeframe, enabling them to acquire more clinical knowledge and cultivate efficient clinical diagnostic and therapeutic thinking, requires the optimization and improvement of teaching methods. Only in this way can students' subjective initiative be fully leveraged, promoting the enhancement of medical students'

qualities. The clinical scenario-based participatory teaching model can better apply scenario simulations to orthopedic clinical teaching, stimulating students' learning interests more effectively compared to traditional one-sided lectures by teachers.

The scenario-based participatory teaching model is an innovative and groundbreaking instructional approach that is currently being implemented across various disciplines, yielding favorable teaching outcomes. By integrating authentic participation with case-based teaching methods, scenario-based participatory teaching has revolutionized clinical nursing education. Initially, instructors select appropriate clinical cases aligned with the nursing education curriculum, requiring nursing interns to preview the teaching content, analyze, and discuss each nursing case. Subsequently, nursing interns autonomously search for relevant information based on the cases. Meanwhile, cases are introduced in the classroom to create teaching scenarios, enabling discussions and nursing simulations based on real-world situations ^[7-9].

In clinical nursing education, theoretical knowledge and practical skills hold equal importance. The adoption of scenario-based participatory teaching enables nursing interns to engage in hands-on practice within authentic participatory environments, fully mobilizing their enthusiasm and enhancing their practical skills. Through practical training in simulated scenarios, students can better analyze nursing-related issues, master specific nursing procedures and techniques, and strengthen their practical abilities, preparing them for future clinical practice. The scenario-based participatory teaching model closely mirrors real-world clinical settings, immersing medical students in authentic experiences that expand their thinking, problem-solving abilities, and ultimately enhance teaching quality and effectiveness. Through scenario-based simulations, students engage in role-playing within simulated work environments, thinking and acting in response to various clinical situations, thereby enhancing their problem-solving abilities and professional competence ^[10-12]. This approach fosters the development of sound thinking patterns and the integration of theory with practice, benefiting not only students' personal growth but also promoting instructors' gradual improvement in teaching abilities. During the teaching process, instructors can also better observe students' performance and provide timely guidance and feedback ^[13], helping students overcome difficulties and enhance learning effectiveness. The adoption of scenario-based participatory teaching also increases instructor satisfaction. In scenario-based participatory teaching, clinical instructors can gain a better understanding of students' learning progress and practical abilities, enabling targeted guidance and support. The performance of students in simulated practical operations can also assist instructors in better evaluating students' professional competence and ability levels, thereby enhancing the instructors' satisfaction with the teaching process ^[14-17].

In this study, students in the scenario-based participatory teaching group outperformed those in the traditional teaching group in clinical operation ability assessments. This indicates that the clinical scenario-based participatory teaching model, starting from clinical practice, integrates theory with practice, identifies and solves problems, and optimizes solutions. It stimulates students' exploratory spirit and enhances their learning motivation ^[18]. With students as the main focus and teachers providing auxiliary instruction, this approach enables students to actively learn in a real-world environment. Compared to traditional teaching methods, it features high participation and strong purposefulness, significantly aiding in boosting students' interest and motivation in learning. It helps students gradually become genuine clinicians and reduces confusion during the transition ^[19,20].

The nursing work in cardiothoracic surgery is characterized by acute onset, critical conditions, complex working environments, and multidisciplinary collaboration. This results in relatively conservative student participation in clinical nursing, fewer internship weeks, and greater risks during the internship process,

leading to more uncertainties. For instance, there are varying levels of proficiency in operational skills, rescue abilities, and communication skills required for certain internships. Therefore, to enable students to better master the skills and knowledge required in the cardiothoracic surgery section of the teaching syllabus, and to strengthen their proficiency in emergency care skills and enhance their awareness of detection and rescue in critical situations, scenario-based participatory teaching methods allow students to actively participate and become members of the clinical team, thereby increasing their interest in learning^[15]. Students' satisfaction with their instructors also significantly improves. The clinical scenario-based participatory teaching model can also promote the enhancement of students' overall qualities, particularly their communication skills. Through role-playing and genuine participation in clinical nursing, students can not only master operational skills and seamlessly integrate theory with practice but also improve their abilities to identify, think about, analyze, and solve problems in practice. When encountering acute, critical, or severely ill patients, they can proactively and orderly implement relevant work procedures, transforming passive execution into active completion and promoting the improvement of their overall quality^[21]. Scenario-based teaching is also beneficial for enhancing the quality of clinical instructors. The scenario-based participatory teaching model is a novel approach that, in contrast to traditional teaching methods, shifts the focus from an "educator-centered" mindset to a "student-centered" philosophy^[22]. The entire teaching process, from its initial intentions and design to its execution, revolves around questions such as "What do students need?", "How can we stimulate students' enthusiasm for clinical practice?", "How can we facilitate the integration of students' foundational school knowledge?", "How can we encourage students to take initiative in learning?", and "How can we enhance students' abilities to identify and solve problems?". All aspects of the design emphasize the student as the central figure, starting with gathering student feedback and learning needs, designing programs tailored to cardiothoracic surgery clinical teaching, and guiding students from passive knowledge recipients to active participants in learning. The scenario designs employed in this study have fully mobilized the teaching enthusiasm of both instructors and students. During the scenario design process, each instructor collaborates with students throughout clinical nursing tasks, simultaneously reviewing relevant literature and actively utilizing advanced multimedia technologies to enhance the diversity of teaching activities. Additionally, during the implementation of scenario-based participatory teaching, instructors promptly address issues that arise during students' learning, which aids in improving instructors' teaching adaptability and judgment, thereby enhancing the overall quality of clinical instructors and effectively guaranteeing the improvement of future clinical nursing teaching quality.

The results of this study demonstrate that the satisfaction rate with the teaching methods in the clinical scenario-based participatory teaching group was higher than that in the conventional clinical internship teaching group ($\chi^2 = 8.879$, $P = 0.011 < 0.05$). The satisfaction rate with teaching methods in the clinical scenario-based participatory teaching group was 96.67%, whereas it was 70% in the conventional clinical internship teaching group.

5. Conclusion

In summary, the implementation of the clinical scenario-based participatory teaching model for cardiothoracic surgery students has yielded definitive results. It enables clinical nursing interns to absorb and integrate knowledge at a deeper level, engage in profound understanding and contemplation, and is more conducive to enhancing their comprehensive nursing abilities, critical thinking skills, and nurse-patient communication abilities. It also improves student satisfaction, significantly enhances their clinical diagnostic and therapeutic

thinking, and fosters teamwork spirit ^[20].

Disclosure statement

The authors declare no conflict of interest.

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