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Effect of MDT-Oriented CBL Model in Teaching Nursing Students in Cardiology

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Abstract: *Objective*: To investigate the impact of MDT-oriented CBL model on teaching for cardiac nursing interns. *Methods*: A convenience sampling study was conducted with 100 cardiac nursing interns from September 2023 to June 2024 as subjects. The cohort was divided into two groups: 50 interns (control group, traditional teaching method) from September 2023 to January 2024, and 50 interns (experimental group, MDT-oriented CBL model) from February 2024 to June 2024. Comparative analyses were performed on theoretical assessments, practical skill evaluations, and teaching satisfaction. *Results*: The experimental group demonstrated higher scores in both theoretical and practical knowledge assessments ($p < 0.05$) compared to the control group. The experimental group also scored higher in all skill assessment categories (communication, teamwork, emergency response, medical history acquisition, organizational skills, humanistic care, and clinical competence) ($p < 0.05$). Satisfaction ratings for teaching objectives, content, methods, process, and outcomes were significantly higher in the experimental group ($p < 0.05$). *Conclusion*: Implementing the MDT-oriented CBL model in cardiac nursing education significantly improves interns' theoretical and practical knowledge assessment scores, enhances nursing skills, and increases teaching satisfaction. This teaching model demonstrates significant potential for widespread application.

Keywords: Cardiology nursing students; Multidisciplinary collaboration; Case teaching method; Satisfaction; Theory and skill assessment

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1. Introduction

Cardiovascular and internal medicine encompass diverse and complex conditions, often accompanied by multi-organ dysfunction. Clinical interventions require interdisciplinary collaboration, demanding cardiac nursing staff to possess multidisciplinary knowledge [1]. Against the backdrop of sustained national economic development, medical technologies are constantly evolving with expanding knowledge and information. Coupled with the intensifying issue of population aging, the integration of various disciplines has raised higher requirements for clinical and nursing practices [2]. Nursing students act as fresh blood in departments, their participation enhancing the quality of care. However, clinical teaching methods for nursing students have drawn significant attention.

Traditional teaching approaches exhibit shortcomings, with students passively absorbing knowledge and teaching efficiency needing improvement, thus necessitating efficient and student-friendly teaching methods [3]. Multi-disciplinary team (MDT) collaboration, a novel clinical approach, enhances nursing staff's initiative and optimizes clinical work efficiency [4]. Case-based learning (CBL), a method grounded in classic cases, aims to improve students' basic skills and strengthen clinical practice capabilities [5]. Although MDT and CBL are widely used in clinical practice, there are few studies on their combination. Therefore, this study included 100 nursing students in cardiology department from September 2023 to June 10, 2024 as the subjects to deeply explore the teaching effect of MDT-oriented CBL model on nursing students. The report is as follows.

2. Data and methods

2.1. General information

The study was conducted on 100 nursing interns in the Department of Cardiology of Deyang People's Hospital from September 2023 to June 2024,50 nursing interns in the control group from September 2023 to January 2024, and 50 nursing interns in the experimental group from February 2024 to June 2024. The age and gender data of the two groups of nursing interns (see **Table 1**) showed no statistical significance ($p > 0.05$).

Table 1. General information

Group name	Sex [% (n)]		Age ($\bar{x} \pm s$), years
	Masculinity	Femininity	
Control group	20.00 (10/50)	80.00 (40/50)	24.52 ± 1.25
Test team	24.00 (12/50)	76.00 (38/50)	24.55 ± 1.22
χ^2/t value	0.233		0.121
p	0.629		0.904

2.2. Inclusion and exclusion criteria

2.2.1. Inclusion criteria

(1) Full-time nursing interns

(2) Complete documentation; informed consent and voluntary participation in the study

(3) Normal cognitive, language, and thinking abilities

(4) High compliance with actively completing all teaching tasks

2.2.2. Exclusion criteria

(1) Poor cooperation

(2) Failure to attend classes as scheduled

(3) Withdrawal from the study midway

(4) Other reasons preventing full participation in learning activities

2.3. Methodology

2.3.1. Control group

The traditional teaching methodology, encompassing lecture-based instruction and demonstration teaching, is

implemented through a well-structured curriculum designed by supervising instructors based on the internship syllabus for cardiac medicine nursing students. Upon entering the department, students receive one-on-one mentoring and hands-on skill demonstrations from their instructors. Concurrently, supervising instructors collaborate with teaching coordinators to deliver theoretical lectures and practical training sessions. The four-week program culminates in clinical rounds and mini-lectures during the final week, followed by comprehensive assessments upon completion of the curriculum.

2.3.2. Test group

The MDT-Oriented Clinical Case-Based Learning (CBL) Model

(1) Formation of an MDT-CBL Team

The head nurse of the cardiology department organizes a teaching team comprising the department head, ward teaching supervisors, and clinical instructors. Teaching supervisors from related departments such as respiratory medicine, nephrology, and endocrinology are also invited to participate. All members undergo specialized training and pass assessments to demonstrate strong teaching capabilities. The team collaboratively identifies classic clinical cases, designs teaching content based on case scenarios, and formulates teaching questions. The four-week program follows weekly learning themes outlined in the internship curriculum for nursing students. Representative clinical cases such as myocardial infarction and chronic heart failure nursing knowledge are uploaded to the nursing students' WeChat group one week before instruction begins, allowing students to study and research materials according to their schedules.

(2) Curriculum Development

Based on the internship curriculum for nursing students, the program focuses on key challenges and priorities in cardiovascular nursing education. Typical cases are selected following holistic nursing principles, incorporating relevant interdisciplinary content. Clear objectives, schedules, locations, and progress milestones for case-based teaching are established. The department head reviews and supplements the curriculum content to create a comprehensive framework.

(3) Implementation

Nursing students are divided into five groups. Basic nursing knowledge is assessed through question-and-answer sessions, with group leaders selected based on evaluation results. When the supervising instructor shares classic case materials in the WeChat group, they instruct the head of the nursing student team to guide and coordinate discussions. Students are organized to analyze cases by consulting textbooks, literature, and reference materials, then compile nursing methods for submission. The supervisor reviews each team's summary, highlighting strengths with encouragement while addressing areas needing improvement, guiding students to reflect and improve. After summarizing current teaching progress, the course coordinator reiterates essential nursing knowledge points. Other specialized nursing instructors within the teaching team provide additional guidance, helping students master department-specific care protocols and stay updated with cutting-edge nursing practices.

(4) Post-class Practice

Following group evaluations, clinical training begins under instructors' supervision. Students develop care plans based on their assigned patient cases and conduct practical operations. Instructors monitor progress in real-time, offering feedback and suggestions to continuously enhance care quality.

2.4. Observing indicators

2.4.1. Theoretical assessment

The entire teaching team collaboratively developed the cardiac nursing assessment framework, implemented through electronic questionnaires with identical content for both control and experimental groups. A total of 100 electronic questionnaires were distributed and fully recovered, achieving a 100% response rate. The examination comprised two components: theoretical knowledge assessment (0–100 points) and practical skills evaluation (0–100 points), where higher scores indicated better performance in the nursing students' theoretical examinations.

2.4.2. Skills assessment

The modified Mini Clinical Evaluation Exercise (Mini-CEX) scale was employed to assess nursing interns' competencies across seven dimensions: communication, teamwork, emergency response, medical history acquisition, organizational skills, humanistic care, and clinical competence. Each dimension is rated on a 0–9 point scale, with results categorized into four levels: Excellent (7–9 points), Satisfactory (4–6 points), and Need Improvement (1–3 points). A score of 5 or higher is deemed passing, with evaluations jointly conducted by the teaching supervisor, attending instructors, and ward teaching coordinator.

2.4.3. Instructor satisfaction

The teaching satisfaction survey was developed by the teaching team and administered anonymously to nursing students. The questionnaire evaluated four dimensions: teaching objectives (0–100 points), course content (0–100 points), teaching methods (0–100 points), and instructional process (0–100 points), with higher scores indicating greater satisfaction. A total of 100 questionnaires were distributed, all 100 returned, achieving a 100% response rate.

2.5. Data statistics and processing

All data from this study were processed using SPSS 25.0 software system. Numerical data were described as [%(n)] with χ^2 tests; measurements meeting normal distribution were presented as $\bar{x} \pm s$ (mean ± standard deviation), using *t*-tests; non-normal distributions were analyzed with non-parametric tests. Differences were considered statistically significant when $p < 0.05$.

3. Results

3.1. Theoretical assessment

The theoretical knowledge assessment and practical knowledge assessment scores of the intern students in the experimental group were higher than those in the control group, with statistical significance ($p < 0.05$). Detailed data are shown in **Table 2**.

Table 2. Theoretical assessment [($\bar{x} \pm s$), score]

Group name	Theoretical knowledge assessment	Assessment of practical knowledge
Control group (n = 50)	95.65 ± 1.22	96.88 ± 1.06
Test group (n = 50)	98.75 ± 1.16	98.97 ± 1.02
t	13.021	10.046
p	< 0.001	< 0.001

3.2. Skills assessment

The assessment scores of communications, teamwork, emergency treatment, medical history acquisition, organizational ability, humanistic care and clinical competence of the intern nurses in the experimental group were higher than that of the control group, and the difference was statistically significant ($p < 0.05$). Detailed data are shown in **Table 3**.

Table 3. Skill assessment [($\bar{x} \pm s$), n = 50, score] C: control group; T: test team

Group	Commu-nicate	Teamwork	Emergency handling	History taking	Organizing ability	Humani-stic concern	Clinical compete-nce
C	8.12 ± 0.28	8.15 ± 0.12	8.25 ± 0.12	8.26 ± 0.16	8.24 ± 0.22	8.38 ± 0.17	8.17 ± 0.20
T	8.76 ± 0.22	8.85 ± 0.13	8.89 ± 0.10	8.85 ± 0.14	8.77 ± 0.20	8.82 ± 0.16	8.85 ± 0.14
t	12.709	27.978	28.971	19.623	12.605	13.327	19.696
p	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001

3.3. Teaching satisfaction

The satisfaction scores of teaching objectives, teaching content, teaching methods, teaching process and teaching effect in the experimental group were higher than those in the control group, and the difference was statistically significant ($p < 0.05$). Detailed data are shown in **Table 4**.

Table 4. Teaching satisfaction [($\bar{x} \pm s$), n = 50, points]

Group name	Instructional objectives	Content of courses	Teaching method	Teaching process	Teaching efficiency
Control group	95.56 ± 1.27	95.46 ± 1.33	95.75 ± 1.20	95.86 ± 1.15	95.66 ± 1.22
Test team	98.66 ± 1.25	98.58 ± 1.31	98.67 ± 1.22	98.85 ± 1.16	98.77 ± 1.21
t	12.301	11.818	12.066	12.944	12.798
p	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001

4. Discussion

Cardiology departments primarily treat cardiovascular disease patients, whose conditions are complex and variable with high recurrence risks, significantly increasing clinical care challenges [6]. Moreover, most cardiovascular patients are elderly individuals with multiple comorbidities. As health awareness continues to grow, the demand for high-quality cardiac nursing care has become increasingly urgent. Providing comprehensive, well-structured, and scientifically grounded nursing services has become a key focus in cardiac care [7].

Clinical nursing instruction constitutes a vital component of cardiology nursing practice. Enhancing the quality of clinical mentoring for intern nurses not only strengthens their comprehensive competencies and professional ethics but also fully leverages their initiative, fostering proactive engagement in clinical work [8]. However, traditional teaching methods alone can no longer meet modern cardiac disease care demands, resulting in suboptimal mentoring outcomes. With continuous advancements in medical technologies and knowledge systems, there is an urgent need for efficient and high-quality mentoring models to optimize cardiac nursing education [9]. The Case-Based Learning (CBL) model has become widely adopted across clinical departments, with growing evidence confirming its effectiveness in improving interns' skills and developing critical thinking

abilities [10]. Meanwhile, the Multidisciplinary Team (MDT) approach, a novel strategy for managing diverse patient conditions, has demonstrated significant improvements in care quality and satisfaction, earning widespread patient recognition. Integrating MDT into CBL programs enhances both the scientific rigor and clinical relevance of mentoring practices [11].

In this study, the experimental group demonstrated higher scores in both theoretical and practical knowledge assessments compared to the control group ($p < 0.05$). The experimental group also scored higher in skill assessment ($p < 0.05$) and teaching satisfaction ($p < 0.05$), indicating that the MDT-guided CBL model effectively enhances teaching outcomes for cardiology nursing interns, improves their nursing skills, and achieves high satisfaction. Analysis reveals that using MDT as a framework deepens interns 'understanding of various cardiovascular diseases, broadens their perspectives when caring for patients, facilitates comprehensive grasp of pathological concepts, and cultivates awareness of integrating theory with practice while strengthening integrated nursing competencies [12]. Furthermore, collaboration with other hospital departments helps interns acquire more disease-related nursing knowledge, expand their knowledge systems, enhance knowledge retention capabilities, and improve clinical decision-making abilities [13]. Moreover, the MDT-oriented CBL model transforms passive learning into active engagement, compensates for shortcomings in traditional teaching methods, boosts interns' initiative, develops critical thinking skills, and enables them to analyze and solve problems based on patients' actual conditions when addressing cardiovascular diseases [14]. It can be said that MDT + CBL aligns closely with the characteristics of cardiology nursing education. While instructors impart experience through classic cases, this approach enhances nursing students' understanding of case scenarios and reinforces their awareness of teamwork, nurse-patient communication, and humanistic care in nursing practice. This comprehensive optimization of integrated skills holds significant importance for cultivating well-rounded nursing professionals in cardiology [15].

5. Conclusion

In summary, the MDT-oriented CBL model has a significant effect on the teaching of nursing students in cardiology department, with high teaching satisfaction and worthy of promotion.

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Disclosure statement

The author declares no conflict of interest.

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