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Research Trends on Curriculum Design of Clinical Nursing Based on the CBE Education Model

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Abstract: *Objective:* To explore the research progress of clinical nursing curriculum design based on competency-based education (CBE), and provide a reference for nursing education reform in China. *Methods:* By systematically sorting out relevant domestic and foreign literature, this paper analyzes the theoretical foundation and core elements of the CBE model, compares the research status at home and abroad, and summarizes the challenges faced and corresponding countermeasures. *Results:* The CBE model is supported by theories such as constructivism, and its core elements include the construction of competency standards, the reconstruction of curriculum content, the innovation of teaching methods, and the reform of evaluation systems; foreign countries have established a mature system, while China is in the stage of localized exploration, with problems such as inconsistent competency standards; in response to the challenges faced, countermeasures such as establishing a collaborative mechanism are proposed. *Conclusion:* The CBE model is an important trend in nursing education reform. China needs to improve the dynamic adjustment mechanism of competency standards, strengthen resource construction, and promote the integration of information technology to cultivate high-quality nursing talents that meet clinical needs.

Keywords: Competency-based education; Clinical nursing; Curriculum design; Core competence; Nursing education reform

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1. Introduction

With the rapid development of the medical and health field, the difficulty and professionalism of nursing work are constantly increasing. The traditional nursing education method focusing on knowledge imparting can no longer meet the needs of clinical practice for high-quality nursing talents. The competency-based education (CBE) model, which aims to cultivate students' key competencies and emphasizes the matching degree between practical application and job requirements, is gradually becoming the core trend of global nursing education reform. As a bridge course connecting nursing theory and practice, the rationality of clinical nursing curriculum design has a direct impact on the quality of nursing talent training. The purpose of this study is to systematically sort out the research progress of CBE-based clinical nursing curriculum design, analyze its core elements, practical

approaches, and challenges, and hope to provide a reference for promoting nursing education reform in China.

2. Theoretical foundation and connotation of the competency-based education model

2.1. Theoretical foundation

The competency-based education model originated from the vocational education reform in North America in the 1960s, and its theoretical foundation integrates a variety of educational concepts. Among them, constructivist theory emphasizes that learners construct knowledge and competency systems through active participation in practical activities and interaction with the environment, providing important theoretical support for student-centered teaching design. Situated learning theory points out that learning should be carried out in real or simulated work scenarios, and the formation of competencies is closely related to specific scenarios, which provides a theoretical basis for integrating scenario simulation, clinical internship, and other links into clinical nursing courses. In addition, the competency theory by McClelland proposes that individual competencies are the key factors affecting work performance. This theory directly promotes the construction of core competency frameworks in the nursing field and becomes an important reference for formulating competency standards in competency-based education curriculum design.

2.2. Core connotation

In the field of clinical nursing, the competency-based curriculum design takes "cultivating clinical practitioners with comprehensive nursing competencies" as the goal, and its core connotation is as follows:

2.2.1. Guided by core competency standards

Curriculum design starts with a clear definition of the competencies required for nursing positions, and all teaching activities are carried out around the achievement of competencies.

2.2.2. Emphasis on practical application

Through simulating clinical scenarios, analyzing real cases, and other ways, students are promoted to transform theoretical knowledge into clinical operation competencies.

2.2.3. Focus on personalized learning

Students are allowed to adjust their learning progress according to their own competency development rhythm, and formative evaluation is used to provide timely feedback and optimize the learning process.

2.2.4. Attention to the dynamics of competencies

Competency standards need to be dynamically updated according to the needs of clinical practice to ensure that the cultivated competencies keep pace with the development of the industry.

3. Research on core elements of CBE-based clinical nursing curriculum design

3.1. Construction of competency standard system

As a key foundation of CBE curriculum planning, the rationality of competency standards directly affects the realization level of curriculum objectives. Domestic and foreign experts have conducted many discussions on the

construction of core nursing competencies.

At the international level, the "Essential Competencies for Nursing Education" proposed by the American Association of Colleges of Nursing (AACN) covers core competency dimensions such as patient-centered care, interprofessional collaboration, and evidence-based practice [1]. The "International Framework for Nursing and Midwifery Competencies" released by the World Health Organization emphasizes the competency requirements of nursing staff in primary health care, public health emergency and other fields.

In domestic research, Ding *et al.* [2] constructed the core competency system for undergraduate nursing graduates in China using the Delphi method, which includes 8 first-level indicators and 35 second-level indicators such as clinical nursing competency, communication and collaboration competency, and critical thinking competency. Gao *et al.* [3] proposed a competency standard centered on "job competency" for specialized nursing education, highlighting the importance of practical skills such as basic nursing operations and condition observation.

The main methods for constructing competency standards are as follows.

3.1.1. Job analysis method

Extract the required competencies by sorting out the work tasks and responsibilities of clinical nursing positions.

3.1.2. Delphi method

Reach a consensus on the composition of competencies through multiple rounds of expert consultation.

3.1.3. Literature research method

Conduct localized adjustments based on existing domestic and foreign standards and research results [4].

3.2. Reconstruction of curriculum content

The reconstruction of curriculum content based on competency standards needs to break through the boundaries of traditional disciplines and organize teaching content in the form of competency modules. Studies have shown [1] that modular curriculum design can effectively improve students' clinical application capabilities.

In specific practice, the reconstruction of curriculum content presents the following characteristics.

3.2.1. Integrating knowledge around clinical scenarios

For example, integrate the content related to "nursing of patients with acute abdomen" in medical nursing and surgical nursing into a module, covering the cultivation of competencies such as etiological analysis, condition observation, and first-aid cooperation [5].

3.2.2. Integrating humanistic literacy and professional literacy

Add content such as nursing ethics, doctor-patient communication, and occupational stress response to the curriculum content to cultivate students' comprehensive professional competencies [6].

3.2.3. Connecting with the latest industry needs

Incorporate knowledge and skills in emerging fields such as smart nursing and telecare into the curriculum, such as introducing nursing information system operation and remote patient monitoring.

3.3. Innovation of teaching methods

To achieve the goal of competency cultivation, the teaching methods of clinical nursing under the CBE model focus on students' active participation and practical experience, mainly including:

3.3.1. Problem-based learning (PBL)

Taking clinical practical problems as the breakthrough point, guide students to solve problems through independent research and team cooperation, and cultivate their clinical thinking abilities. Studies have shown that PBL teaching can significantly improve students' problem-solving abilities and autonomous learning abilities.

3.3.2. Scenario simulation teaching

Construct a real clinical environment by imitating wards, standardized patients (SP), and other methods, allowing students to practice nursing skills in simulated operations. For example, in the scenario of "first aid for patients with myocardial infarction," students need to complete a series of tasks such as ECG monitoring, defibrillation operation, and family communication, and teachers provide targeted guidance by observing their performance.

3.3.3. Clinical pathway-based teaching

Taking the patient's diagnosis and treatment nursing process as a clue, integrate the teaching content into specific clinical pathways, so that students can understand the cooperative relationship between nursing work and the medical team. For example, in the teaching of "nursing of patients with diabetes," the teaching is organized according to the pathway of "admission assessment–treatment cooperation–health education–discharge guidance."

3.3.4. Interprofessional collaborative learning

Cultivate students' teamwork abilities by participating in case analysis or simulation training together with students of medical, pharmaceutical, rehabilitation, and other majors. Studies have shown that interprofessional learning can enhance nursing students' awareness of the importance of multidisciplinary teams.

3.4. Reform of the evaluation system

The evaluation system under the CBE model focuses on the comprehensive and dynamic evaluation of students' competencies, emphasizing "promoting learning through evaluation," mainly including:

3.4.1. Formative evaluation

Continuously track the process of students' competency development through classroom performance, group reports, skill practice records, and other methods. For example, the "nursing competency development portfolio" is used to collect materials such as students' skill operation videos and case analysis reports at different stages, which fully reflect their progress.

3.4.2. Objective structured clinical examination (OSCE)

Through simulated clinical tasks at multiple stations, comprehensively evaluate students' abilities in skill operation, communication, emergency response, and other aspects. OSCE has been widely used in nursing education, and its reliability and validity have been confirmed by a large number of studies.

3.4.3. 360-degree evaluation

Comprehensively reflect students' comprehensive abilities by combining the evaluation opinions of multiple subjects, such as teachers, classmates, patients, and community staff. For example, during clinical internships, the performance of students is evaluated by teaching teachers, internship partners, and the patients they care for.

3.4.4. Competency-based assessment (CBE-specific assessment)

Directly based on the preset competency standards, judge whether students have reached the expected competency level, rather than comparing horizontally with other students. This evaluation method pays more attention to students' individual progress.

4. Research status and comparative analysis at home and abroad

4.1. Foreign research status

The development of competency-based clinical nursing curriculum planning overseas started earlier, and a relatively complete system has been formed so far. Nursing education institutions in the United States, Canada, Australia, and other countries widely adopt the CBE model and have established national unified or industry-recognized competency standards. For example, the "Registered Nurse Standards for Practice" formulated by the Australian Nursing and Midwifery Board (NMBA) provides a clear reference for the curriculum design of various colleges and universities, and its courses emphasize the in-depth integration of clinical internships and theoretical teaching, with the internship duration accounting for more than 50% of the total class hours [7].

In the field of academic research, foreign experts pay more attention to the effect verification of the CBE model. For example, through longitudinal studies, they compare the differences in clinical competency between graduates trained by the CBE model and the traditional model, or explore the application of information technology in CBE courses, such as the effect of virtual reality (VR) in nursing skill training [8].

4.2. Domestic research status

The introduction of the CBE model in China began in the early 21st century. In recent years, with the deepening of nursing education reform, relevant research has shown a gradual growth trend. The research mainly focuses on the following aspects.

4.2.1. Localized construction of competency standards

Combining the characteristics of China's medical system, revise international competency standards, and construct a nursing core competency framework in line with China's national conditions (such as the *Guidelines for Core Competencies of Nursing Graduates* released by the Chinese Nursing Association in 2021).

4.2.2. Practical exploration of curriculum reform

Many colleges and universities have carried out CBE curriculum pilot projects in undergraduate or specialized nursing education. For example, Peking Union Medical College reconstructed the curriculum module around "emergency and critical care nursing competency," and Tongji Medical College of Huazhong University of Science and Technology adopted the Objective Structured Clinical Examination (OSCE) as the main evaluation method for clinical nursing courses [9].

Existing problems: Studies have shown that China's CBE curriculum design still faces problems such as

inconsistent competency standards, a lack of practical teaching resources, and weak awareness of CBE among teachers [10].

4.3. Comparative analysis

The commonality between domestic and foreign research is that they both emphasize the key position of competency standards and the importance of practical teaching, but the differences are also obvious:

(1) Foreign countries pay more attention to systematic and standardized construction, with national competency frameworks and mature evaluation tools; domestic research is mainly based on local pilots, lacking unified standards.

(2) Foreign research focuses on technology integration (such as the application of VR and artificial intelligence in teaching) and long-term effects (such as tracking the 5- to 10-year career development of graduates); domestic research mostly focuses on the preliminary exploration of curriculum design and short-term effect evaluation.

(3) The cooperation between foreign colleges and universities and clinical institutions is closer, and clinical teaching teachers are deeply involved in curriculum design; the cooperation between domestic colleges and universities and hospitals mostly stays at the level of internship arrangement, and a collaborative education mechanism has not yet been formed (**Table 1**).

Table 1. Comparison of research status at home and abroad

Dimensions	Characteristics of foreign research	Characteristics of domestic research
Competency standards	Nationally unified and industry-recognized	Localized exploration, lack of unified standards
Practical teaching	High proportion of hours, in-depth integration with clinical practice	Insufficient resources, imperfect collaborative mechanism
Evaluation system	Mature and diverse, focusing on long-term evaluation	Mainly OSCE, insufficient application of formative evaluation
Technology application	Widely apply emerging technologies such as VR and AI	Preliminary attempts, low popularity

5. Challenges and countermeasures

5.1. Main challenges

5.1.1. Significant difficulty of dynamic adjustment of competency standards

With the continuous advancement of medical technology, clinical nursing practice is constantly changing, and competency standards need to be continuously updated. However, the revision process involves the coordination of multiple stakeholders and takes a long time.

5.1.2. Lack of practical teaching resources

The construction cost of resources such as simulated wards and standardized patients is high, which is difficult for some colleges and universities, especially grass-roots colleges and universities, to bear. In the clinical internship stage, the workload of teaching teachers is heavy, and it is difficult to invest sufficient energy in guiding students.

5.1.3. Difficulties in the transformation of teachers' roles

In the traditional teaching model, teachers mainly take on the task of knowledge teaching, while the CBE model

requires teachers to transform into skill instructors and evaluators. Many teachers lack relevant training and find it difficult to adapt to this role transformation [11].

5.1.4. Poor evaluation systems

The implementation of formative evaluation and 360-degree evaluation requires a lot of time and energy, and the evaluation results are easily affected by subjective factors, so their reliability and validity need to be further verified.

5.2. Solutions

5.2.1. Constructing a dynamic competency standard update mechanism

Industry associations, colleges and universities, and clinical institutions jointly establish a competency standard committee, regularly conduct clinical demand surveys, and revise the competency standards every 3–5 years to ensure their timeliness.

5.2.2. Integrating resources to build a collaborative education platform

Jointly build practical teaching bases through "school-hospital cooperation" to realize the sharing of simulation equipment and teaching staff. Use information technology to develop virtual simulation teaching resources to reduce the cost of practical teaching (such as online simulated nursing operation platforms).

5.2.3. Strengthening teachers' CBE concept and skill training

Improve teachers' curriculum planning ability and evaluation ability by holding seminars, arranging clinical internship training, and supporting domestic and foreign study visits. Establish a teacher incentive mechanism to encourage teachers to participate in CBE teaching reform [12].

5.2.4. Optimizing evaluation tools and processes

Develop an intelligent evaluation system using big data technology to automatically record students' learning process data and reduce subjective evaluation errors. Adopt a closed-loop mechanism of "evaluation-feedback-improvement" to improve the effectiveness of evaluation.

6. Prospects for future research

6.1. Refinement and individualization of competency standards

Future research can focus on establishing characteristic competency standards for different nursing specialties (such as pediatric nursing and geriatric nursing) and designing individualized competency cultivation paths for students' individual differences.

6.2. In-depth integration of information technology and CBE courses

Study the application of technologies such as artificial intelligence and blockchain in competency evaluation. For example, use AI to analyze the video of students' OSCE performance and automatically generate competency development reports; use blockchain technology to establish students' competency files to realize cross-college and cross-institution competency certification.

6.3. Long-term effect tracking of the CBE model

Conduct longitudinal studies to track the performance of graduates trained by the CBE model in their career development, such as clinical error rate, patient satisfaction, and promotion speed, to provide more convincing evidence for the improvement of CBE curriculum design.

6.4. Coordinated development of internationalization and localization

On the basis of learning from international advanced experience, deeply study the special needs of China's medical system for nursing competencies, and construct a CBE clinical nursing curriculum system with Chinese characteristics.

7. Conclusion

Competency-based clinical nursing curriculum planning is an inevitable trend to adapt to the reform of nursing education. Its core is to guide by competency standards, and cultivate students' clinical operation abilities and professional literacy through the reconstruction of curriculum content, the innovation of teaching methods, and the reform of evaluation systems. Domestic and foreign studies have proved the effectiveness of the CBE model, but China still has deficiencies in systematic construction, resource integration, and teacher training. In the future, through multi-party cooperation, we need to improve the dynamic adjustment mechanism of competency standards, strengthen the construction of practical teaching resources, promote the in-depth integration of information technology and courses, and then build a clinical nursing curriculum system that adapts to the development needs of China's medical and health undertakings.

Disclosure statement

The author declares no conflict of interest.

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