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Construction of an Infectious Disease Nursing Clinical Practicum Teaching Model Based on the BOPPPS Model

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Abstract

Clinical practicum teaching in infectious disease nursing faces practical challenges including monotonous teaching methods, low student engagement, and insufficient cultivation of clinical thinking. The BOPPPS model, renowned for effective teaching, emphasizes goal-oriented and student-centered participatory learning, which aligns highly with the essence of clinical practicum teaching—learning by doing. Based on an analysis of the core connotations of the BOPPPS model and the characteristics of infectious disease nursing clinical practicum, this study constructs a systematic teaching model comprising three phases: pre-class preparation, in-class implementation (Bridge-in - Objective - Pre-assessment - Participatory Learning - Post-assessment - Summary), and post-class consolidation. Implementation strategies are proposed from the perspectives of preceptor capacity building, teaching resource development, and teaching evaluation system construction. This is a conceptual paper that proposes a teaching model; it does not include an empirical evaluation of its effectiveness. This model provides an actionable pathway for standardizing infectious disease nursing clinical practicum teaching and enhancing the comprehensive competence of nursing students.

Keywords

BOPPPS Model, Infectious Disease Nursing, Clinical Practicum Teaching, Teaching Model, Nursing Education

1. Introduction

Infectious disease nursing is one of the core courses in nursing education, and its

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clinical practicum represents a critical transition for nursing students from theoretical knowledge to clinical practice. However, current clinical practicum teaching in infectious disease nursing faces several practical challenges. First, traditional preceptor-led instruction predominantly adopts a "demonstration-imitation" model, with preceptors delivering lectures while students remain passive recipients, resulting in low classroom engagement and diminished learning initiative [1]. Second, infectious disease nursing encompasses specialized content such as standard precautions, isolation techniques, and occupational exposure management, which demand high levels of procedural standardization and emergency response competence. Nevertheless, instruction often overemphasizes didactic transmission while neglecting the cultivation of clinical thinking and decision-making abilities. Third, as the disease spectrum shifts—with declining incidence of classical infectious diseases and the continuous emergence of novel and emerging infectious diseases—teaching content requires constant updating, placing higher demands on the professional competence and pedagogical skills of preceptors.

The BOPPPS model (Bridge-in, Objective, Pre-assessment, Participatory Learning, Post-assessment, Summary) is a closed-loop instructional process model renowned for effective teaching, emphasizing goal-oriented instruction and student-centered participatory learning [2]. In recent years, the BOPPPS model has been gradually applied in nursing theory courses and skills training with favorable outcomes [3], yet systematic application in infectious disease nursing clinical practicum teaching remains underexplored. This is a conceptual teaching-model construction paper. While we anticipate that the proposed model will improve teaching quality, student engagement, and clinical reasoning, these remain expected benefits that require future empirical validation. Grounded in the theoretical framework of the BOPPPS model and integrating the characteristics and needs of infectious disease nursing clinical practicum, this study constructs a systematic teaching model aimed at providing a reference for standardizing infectious disease nursing clinical practicum and improving teaching quality.

2. Core Connotations of the BOPPPS Model and Its Adaptability Analysis

2.1. Core Connotations of the BOPPPS Model

The BOPPPS model [1] was developed by the Instructional Skills Workshop (ISW) in Canada and divides the classroom teaching process into six components. Bridge-in captures students' attention and stimulates interest through clinical cases, news events, or topical discussions. Objective establishes clear, measurable learning goals that guide students in understanding the learning direction. Pre-assessment evaluates students' existing knowledge to inform differentiated instruction. Participatory Learning emphasizes teacher-student and student-student interaction and constitutes the core component of the model. Post-assessment examines whether learning objectives have been achieved. Summary reviews and elevates the teaching

content. The model possesses three fundamental characteristics: first, it emphasizes explicit and attainable learning objectives around which all teaching activities are organized; second, it highlights students' subject status and participatory learning, promoting a shift from "passive listening" to "active learning"; third, it values immediate feedback and continuous improvement throughout the teaching process, forming a virtuous cycle of "teaching-evaluation-adjustment."

2.2. Logic of the BOPPPS Model's Adaptation to Infectious Disease Nursing Clinical Practicum

Infectious disease nursing clinical practicum is characterized by the following features: teaching content covers multidimensional skills including isolation and protection for different transmission routes, condition observation, and health education; teaching scenarios encompass real-world settings such as isolation wards, outpatient clinics, and community settings; nursing students must perform nursing procedures under infection prevention and control requirements, demanding high levels of standardization and adaptability. The structured process of the BOPPPS model aligns highly with these teaching needs.

The Bridge-in component can leverage topical events or typical cases related to infectious diseases to create immersive scenarios that stimulate students' inquiry motivation; the Objective component can set specific, assessable practicum goals based on core competency requirements in infectious disease nursing; the Pre-assessment component can rapidly evaluate students' mastery of specific infectious disease knowledge, enabling more targeted instruction; the Participatory Learning component can employ diverse formats such as bedside teaching, case discussions, and protective equipment drills, allowing students to actively construct knowledge in authentic or high-fidelity simulated environments; the Post-assessment component can immediately verify the mastery of core skills; and the Summary component helps students integrate fragmented clinical experiences into a systematic nursing thinking framework. Empirical studies have demonstrated that instructional designs based on the BOPPPS model can effectively improve nursing students' academic performance, self-directed learning ability, and critical thinking [2] [3].

3. Construction of the Infectious Disease Nursing Clinical Practicum Teaching Model Based on the BOPPPS Model

3.1. Teaching Objective Setting

Drawing on Bloom's taxonomy of educational objectives [4] and integrating competency requirements for infectious disease nursing positions, three-dimensional teaching objectives are established.

Knowledge objectives: Students should be able to describe the etiological characteristics, epidemiological features, clinical manifestations, and nursing essentials of common infectious diseases such as viral hepatitis, AIDS, hand-foot-and-mouth disease, and chickenpox; and describe the content and applicable contexts

of standard precautions and transmission-based precautions.

Competency objectives: Students should be able to independently complete admission assessments, nursing diagnoses, and care plan formulation for patients with infectious diseases; perform nursing procedures such as donning and doffing personal protective equipment, specimen collection, and disinfection and isolation in a standardized manner; and apply critical thinking to analyze clinical nursing problems, consult literature, and propose solutions. Observable performance indicators for these objectives include: 1) completing a specified isolation-care assessment checklist for a patient with a respiratory infection; 2) correctly communicating transmission-based precautions to a patient's family member using the teach-back method; 3) identifying an appropriate occupational exposure management action (e.g., post-exposure prophylaxis protocol) in a simulated scenario.

Attitudinal objectives: Students should embrace a patient-centered nursing philosophy, demonstrate humanistic care toward patients with infectious diseases and their families, enhance professional responsibility, understand the public health significance of infectious disease prevention and control, and cultivate a sense of mission to serve grassroots communities and contribute to society. Observable indicators for these objectives include: 1) consistently addressing patients by their preferred name and explaining procedures before touching them; 2) voluntarily offering emotional support to a distressed family member during a bedside interaction; 3) reflecting on personal biases about infectious diseases in a written journal entry.

3.2. Teaching Implementation Process

3.2.1. Pre-Class Preparation Phase

1) Pre-Practicum Assessment and Teaching Preparation

Before students enter the clinical department, preceptors distribute pre-practicum assessment questionnaires via the online teaching platform, covering core content such as types of isolation and measures, occupational exposure management protocols, and transmission routes of common infectious diseases. Based on the assessment results, preceptors identify students' knowledge gaps and adjust teaching priorities and strategies accordingly. For instance, if more than 60% of students answer a key question about airborne precautions incorrectly, the preceptor will schedule a targeted 10-minute review session on this topic during the first in-class meeting. If individual students score below a predefined threshold (e.g., <70%), they will be assigned additional preparatory reading materials and a follow-up quiz. The Pre-assessment component of the BOPPPS model helps teachers accurately gauge students' learning status and implement targeted instruction [3].

2) Teaching Case and Resource Preparation

The preceptor team selects 6 - 8 core teaching cases based on the disease spectrum of the infectious disease department and the National Nurse Licensing Examination syllabus, including viral hepatitis, AIDS, and hand-foot-and-mouth

disease. Standardized clinical cases are developed, and with informed patient consent, typical clinical manifestations and laboratory results are compiled into video or image materials and uploaded to the hospital teaching platform for student preview. Teaching cases should be designed at two levels—basic questions focusing on core disease knowledge, and extended questions pointing toward disciplinary frontiers and deep thinking.

3.2.2. In-Class Implementation Phase

1) B—Bridge-In

Diversified bridge-in strategies are employed to stimulate students' learning motivation. Typical clinical scenarios can be used to create suspense (e.g., "A child with fever and rash was admitted today, preliminarily diagnosed with hand-foot-and-mouth disease. As the primary nurse, how would you receive the patient?"); infectious disease-related news reports or public health events can be used to introduce the topic; or exemplary stories of outstanding figures in infectious disease nursing can be shared to integrate professional education with value orientation. Research has shown that case-based or problem-oriented bridge-in methods can effectively capture students' attention and lay the foundation for subsequent learning.

2) O—Objective

Preceptors articulate the learning objectives of the teaching activity in concise and explicit language. For example, the teaching objectives for chickenpox patient care are: knowledge objective—describe the transmission routes and rash characteristics of chickenpox; competency objective—independently implement contact isolation measures for children with chickenpox and guide family members; attitudinal objective—demonstrate empathy and respect for patients with infectious diseases and their families. Objectives should be specific and measurable to facilitate student self-assessment and preceptor evaluation.

3) P—Pre-assessment

Through questioning or brief quizzes, preceptors gauge students' existing knowledge of the upcoming content. For example, before teaching chickenpox care, questions such as "What is the source of chickenpox infection?" and "What are the transmission routes of chickenpox?" are posed. Based on students' responses, preceptors flexibly adjust teaching depth and pace. Pre-assessment not only helps teachers accurately gauge learning status but also activates students' existing knowledge frameworks, building cognitive bridges for new learning.

4) P—Participatory Learning

Participatory Learning is the core component of the BOPPPS model and represents the fundamental departure from traditional preceptor-led instruction. In infectious disease nursing clinical practicum, Participatory Learning can take the following forms:

a) Bedside teaching. Preceptors lead students into isolation wards to conduct bedside assessments and nursing rounds around typical cases. Students work in small groups (4 - 5 per group) to complete patient assessments, identify nursing

problems, and formulate nursing measures under the guidance of the preceptor. Patient Safety and Governance Statement for Bedside Teaching: The preceptor observes throughout, provides immediate feedback, and guides students to connect theoretical knowledge with clinical scenarios [5]. In nursing teaching rounds practice, transforming students from "observers" to "primary investigators" can effectively stimulate active thinking.

b) Case discussion. Teaching cases with educational value are selected, and group discussions are organized around preset questions. Students seek solutions by consulting literature, and groups present their findings for peer exchange. Case discussions should focus on guiding students to analyze the mechanisms behind nursing problems and cultivate critical thinking, rather than merely memorizing conclusions.

c) Skills training. Operational training such as donning and doffing personal protective equipment and specimen collection is conducted in simulation training rooms or isolation wards. A cyclic model of "demonstration - practice - feedback - re-practice" is adopted to ensure students master standardized procedures and reinforce occupational protection awareness. "Gamified interaction" can be incorporated into skills training, such as a "spot the error" session, allowing students to reinforce standardization awareness in a relaxed atmosphere.

d) Group debate. Debates are organized around ethical dilemmas or controversial issues in infectious disease nursing (e.g., "Should patients with infectious diseases be subject to mandatory isolation treatment?" "What principles should govern disclosure of illness?"), guiding students to examine issues from multiple perspectives and cultivate dialectical thinking and ethical decision-making abilities.

5) P—Post-assessment

After the teaching activity concludes, the achievement of learning objectives is evaluated through immediate assessments. The following formats can be used: brief written tests (5 - 8 multiple-choice or true/false questions designed around the core knowledge points of the session); operational skills assessment (requiring students to demonstrate a nursing procedure in a simulated scenario and explain the key points); and situational questioning (presenting a new clinical scenario to assess students' knowledge transfer ability). Post-assessment results serve both to evaluate student learning outcomes and to provide preceptors with a basis for teaching reflection.

6) S—Summary

Preceptors systematically review and distill the teaching content, using tools such as mind maps or mnemonic rhymes for core knowledge points to help students construct knowledge frameworks. For example, integrating "standard precautions—transmission-based precautions—occupational exposure management" into a logical chain of safety protection in infectious disease nursing. Simultaneously, students are guided to engage in self-reflection—"What was the greatest gain from this session?" "What confusions remain unresolved?"—to cultivate their metacognitive abilities.

3.2.3. Post-Class Consolidation Phase

The post-class consolidation phase is a critical extension of the teaching closed loop, designed to help students internalize classroom learning into stable clinical competence while providing learning status references for the next teaching session. Preceptors should assign systematic post-class extension tasks.

1) Literature review report. Preceptors pose specific questions related to teaching cases, requiring students to search high-quality literature published in core journals within the past five years through platforms such as CNKI, Wanfang, and PubMed, and summarize the latest research advances in the nursing care of that disease. In implementation, preceptors should guide students in mastering literature retrieval strategies, quality appraisal methods, and the basic framework of literature review. Students are required to not only extract core viewpoints from the literature but also conduct comparative analysis with real observations from clinical practicum, articulating the gap between research evidence and clinical practice. This design draws on the "literature-oriented self-learning" concept from the CBS-RISE teaching model, contributing to the cultivation of students' evidence-based nursing awareness and research literacy.

2) Reflective journal. Students are required to record their learning gains, shortcomings, and directions for improvement in a narrative-reflective format [6]. Reflective journals should be structured, guiding students to reflect on the following dimensions: knowledge level (what new infectious disease nursing knowledge has been mastered); skill level (progress and deficiencies in operations); attitudinal level (new understanding of patients with infectious diseases and the professional role); and improvement plan (how to target specific enhancements in subsequent practicum). Preceptors should regularly review reflective journals and provide written feedback, incorporating reflection quality into process-based evaluation.

3) Online platform post-class test. Post-class tests are published via the hospital teaching platform, with questions designed around teaching objectives. Question types may include multiple-choice and short-answer questions, to be completed within a time limit. Test results help students self-assess their learning effectiveness and provide preceptors with a basis for teaching reflection.

Preceptors should promptly review and provide targeted feedback on student assignments, and incorporate post-class performance into the comprehensive rotation assessment at a certain proportion. Worth noting is that the "credit bank" concept advocates converting clinical operations, daily performance, and theoretical scores into cumulative learning outcomes, enabling visualized tracking of learning effectiveness. This approach helps stimulate students' motivation for continuous learning and ensures that formative evaluation permeates the entire practicum process.

3.3. Teaching Evaluation System

Teaching evaluation is the core means of examining the effectiveness of a teaching model. This study constructs a multi-dimensional evaluation system combining

formative and summative assessment to ensure the scientific rigor, comprehensiveness, and orienting function of evaluation.

1) Formative Assessment

Formative assessment permeates the entire teaching process, accounting for 40% of the total grade. Pre-assessment scores account for 10%, used to evaluate students' knowledge reserves upon entering the department and provide a baseline for teaching. Classroom engagement accounts for 15%, with preceptors comprehensively evaluating students' active participation, quality of questioning, and collaborative performance in bedside teaching, case discussions, and skills training. Post-class assignments and reflection reports account for 15%, evaluating the depth of students' literature review, the authenticity of reflection, and the operability of improvement plans. The purpose of formative assessment is not to screen but to identify problems promptly, guide improvement, and achieve "assessment for learning."

Assessment Component	Exemplary (4 pts)	Proficient (3 pts)	Developing (2 pts)	Needs Improvement (1 pt)
Classroom Engagement	Actively initiates discussion, asks insightful questions, and collaborates effectively with peers.	Regularly participates and contributes to group work; asks relevant questions.	Occasionally participates but rarely initiates; passive in group settings.	Does not participate or disrupts group dynamics.
Reflective Journal	Demonstrates deep, critical self-reflection linking theory to practice; identifies specific, actionable improvement plans.	Shows adequate reflection with some connection to practice; includes a general improvement plan.	Reflection is superficial and descriptive; lacks analysis or a clear plan.	Journal is incomplete or shows no evidence of reflection.
Case Analysis	Accurately identifies all key problems, applies evidence-based rationale, and proposes a comprehensive, creative care plan.	Identifies most key problems, provides sound rationale, and proposes an appropriate care plan.	Identifies some problems but misses key elements; rationale is weak or incomplete.	Fails to identify core problems or propose a coherent plan.
Clinical Skills Assessment	Performs all steps fluently and in correct order; explains rationale; demonstrates excellent patient communication and safety.	Performs steps correctly with minor errors; communicates adequately with patient.	Performs steps with significant errors or omissions; poor patient communication.	Unable to complete the skill safely or correctly.

2) Summative Assessment

Summative assessment is conducted at the end of the rotation, accounting for 60% of the total grade. Theoretical examination accounts for 30%, with the test design breaking away from the limitations of traditional multiple-choice questions and incorporating case analysis questions and literature application questions. Case analysis questions provide authentic clinical scenarios, requiring stu-

dents to complete assessment, diagnosis, planning, and evaluation using the nursing process; literature application questions provide a brief nursing research abstract, requiring students to critique the rationality of the research design and consider its implications for clinical practice. Such designs focus on examining students' clinical thinking ability and evidence-based nursing literacy.

Clinical skills assessment accounts for 30%, with standardized scenarios presented through standardized patients or high-fidelity simulators to comprehensively evaluate students' operational standardization, emergency response ability, and humanistic care performance. Assessment should implement a dual-track "technical-humanistic" evaluation philosophy, focusing not only on whether operations are standardized but also on evaluating the effectiveness of communication with patients and families, sensitivity to patients' emotional responses, and awareness of privacy protection. This transforms abstract requirements such as "dedication, friendliness, and professional integrity" into observable, feedbackable concrete behavioral indicators.

4. Implementation Strategies

4.1. Preceptor Capacity Building

The BOPPPS teaching model requires preceptors to undergo a role transformation—from unidirectional knowledge transmitters to learning facilitators, classroom process managers, and feedback promoters of teaching effectiveness [7]. This places higher demands on the knowledge structure and pedagogical competence of clinical preceptors. The infectious disease department should establish a systematic preceptor training mechanism, enhancing teachers' instructional design ability and classroom management skills through teaching observation, collective lesson preparation, and teaching competitions. Training content should cover the operational essentials of each BOPPPS component, application techniques of participatory teaching methods (such as case-based teaching, group discussion, and role-play), and usage methods of information-based teaching tools (such as online platforms and instant feedback systems). Research [8] has explicitly pointed out that effective implementation of the BOPPPS teaching model depends on teachers' accurate understanding of the model's connotations and flexible application of each component; mere introduction of the model without systematic preceptor training is unlikely to achieve the desired teaching outcomes.

4.2. Systematic Development of Teaching Resources

The implementation of the BOPPPS teaching model requires supporting teaching resources. The infectious disease department should systematically build a teaching case repository based on authentic clinical cases, covering common and key infectious diseases such as viral hepatitis, AIDS, and hand-foot-and-mouth disease. Each teaching case should be accompanied by tiered questions—basic questions covering core knowledge points and extended questions guiding in-depth inquiry and literature consultation. Meanwhile, relying on the hospital digital

teaching platform, diverse resources such as micro-videos, operation demonstrations, typical ECG or imaging materials, and relevant guidelines and literature should be integrated to support students' pre-class preview and post-class extension. Where conditions permit, virtual simulation projects can be developed or introduced to simulate scenarios such as infectious disease outbreak management and emergency response to public health emergencies, compensating for the limitations of teaching rare diseases and high-risk scenarios in authentic clinical settings.

4.3. Flexible Management of Teaching Time and Rhythm

Clinical practicum teaching differs from classroom theory teaching in that its scheduling is influenced by multiple factors such as patient admission status, medical workflow, and teaching round arrangements, exhibiting considerable uncertainty. When applying the BOPPPS model, preceptors should flexibly adjust the duration and sequence of each component based on the clinical reality of the day, avoiding rushed, perfunctory teaching resulting from rigid adherence to procedural completeness. The six components of the BOPPPS model are not an immutable "standard procedure" but a flexible instructional framework that can be configured according to specific teaching objectives and content. Its core spirit lies in "student-centeredness and emphasis on interactive feedback," rather than mechanical adherence to fixed steps [9]. Preceptors should grasp the essence of the model and adapt flexibly to clinical contexts, ensuring that the teaching model serves teaching objectives rather than putting the cart before the horse.

5. Conclusion

The infectious disease nursing clinical practicum teaching model based on the BOPPPS model deeply integrates a structured teaching process with the characteristics of infectious disease nursing clinical practicum. Through explicit objectives, precise pre-assessment, deep participation, immediate feedback, and systematic summary, it constructs a teaching pathway of "goal-orientation - student-centeredness - continuous improvement." This model addresses practical challenges in infectious disease nursing clinical practicum teaching, including vague objectives, insufficient participation, and delayed feedback, providing an actionable solution for standardizing clinical teaching and anticipated benefits in improving teaching quality. It is worth noting that the effective operation of this model requires the synergistic support of multiple conditions, including preceptor competence, teaching resource allocation, and management mechanism guarantees. Future research could adopt a quasi-experimental design, selecting control classes and using tools such as theoretical examination scores, skills assessment scores, and self-directed learning ability scales to further validate the implementation effectiveness of this model. Meanwhile, the integration pathways of this model with modern teaching methods such as virtual simulation technology, scenario simulation teaching, and flipped classrooms can be actively explored to continuously

advance infectious disease nursing clinical teaching toward higher quality and greater effectiveness.

Author Contributions

Ouyang Shan: Conceptualization, Methodology, Investigation, Formal Analysis, Writing—Original Draft Preparation, Writing—Review & Editing, Visualization. Wang Juan: Conceptualization, Methodology, Supervision, Project Administration, Writing—Review & Editing.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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