

Practical Exploration of BOPPPS Teaching Model in the Teaching of Nursing Care in a Chinese City-based Hospital Intensive Care Unit

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Abstract

In order to explore the practical effect of BOPPPS teaching model in the teaching of nursing care in the intensive care unit (ICU), 102 internship nursing students who were interned in the ICU of Deyang People's Hospital from June 2022 to June 2024 were selected as the research subjects, and were evenly divided into the control group (n=51) and the observation group (n=51) according to the order of the internship before and after the admission to the department, and the control group implemented the traditional teaching of ICU nursing, while the observation group implemented the teaching method of BOPPPS teaching model. In comparison with the teaching effect of the 2 groups of internship nursing students as the results shown, the theoretical knowledge test scores and skill operation test scores related to common nursing operations in ICU of the observation group, the CDMNS scores of the observation group and the teaching satisfaction scores of the observation group were all significantly higher than those of the control group ($P < 0.05$). In conclusion, the ICU nursing teaching practice with BOPPPS teaching model has improved the mastery of ICU related knowledge and skills, enhanced the clinical decision-making ability of the interns, and improved their teaching satisfaction, which is worth to be popularized and applied in the clinic in a larger scope.

Keywords: BOPPPS teaching model, nursing teaching, intensive care unit nursing, intensive care unit nursing teaching

1. Introduction

Nursing internship teaching is an indispensable part of nursing education, and through

nursing clinical internship education, it enables nursing interns to transfer the theories learned in the classroom to practical nursing operations, which is conducive to the cultivation of nursing students' clinical thinking ability, so that the intern nursing students' nursing professional skills and expertise competence can be improved, and they can gradually develop psychological adaptation to clinical work (Chen et al., 2018). In mainland China, the training mode of nursing students is that after completing two or three years of theoretical study in school, they also need to complete eight months or more of clinical internship in the clinic before they can graduate and take the nurse licensing examination to become a professional nursing staff, and participate in rotations in departments including internal medicine, surgery, emergency medicine, obstetrics and gynecology, pediatrics, operating room, intensive care unit (ICU), etc. Among them, ICU is an important department for nursing interns to rotate in, so nursing internship education in ICU is crucial for nursing students' clinical practice (Jiang et al., 2024; Wei et al., 2021).

Intensive Care Unit (ICU) is a medical unit in hospitals that specializes in providing centralized monitoring and advanced life support for critically ill patients, the core of which is to maximize patient survival and quality of life through modern medical facilities and equipment, specialized medical and nursing care, and has now become an indispensable part of the healthcare system (Marshall et al., 2017). Nursing is an important part of ICU team management, ICU nursing as a highly specialized and refined nursing discipline, involving multi-disciplinary collaboration and 24/7 monitoring, aiming to provide advanced life support and prevention of complications for critically ill patients. Due to the heavy daily nursing tasks in ICU and the complexity of nursing work and various operations, it also brings great challenges to the clinical teaching of ICU nursing (Egerod et al., 2021; Liu et al., 2024). Traditionally, the teaching of ICU nursing internships is teacher-centered, and students are taught through theoretical explanations and operational demonstrations by the instructor, who passively accepts the professional knowledge provided by the instructor; however, for some complex nursing techniques such as Continuous Renal Replacement Therapy (CRRT), blood purification, sputum suctioning, and endotracheal intubation, the students cannot complete the relevant operational techniques by solely relying on the instructor to explain the relevant operational technique without practice, and the critical condition of the patients may make the interns fearful of operating, which also poses a certain obstacle to the teaching of nursing internships in ICUs (González-García et al., 2020; Y. Li et al., 2024). BOPPPS is a student-centered closed-loop teaching model, the theoretical basis of which is derived from constructivist learning theory and experiential learning cycle theory, which was introduced into higher education teaching in mainland China in 2011, and is now widely used in medical education (Ma et al., 2022). The BOPPPS method is modularized in the process of implementation, forming a coherent learning system through 6 modules: Bridge-in, Objective, Pre-assessment, Participatory Learning, Post-assessment, and Summary. In order to mobilizing students' learning initiative, this teaching method is widely used in clinical nursing teaching (Hu et al., 2022), but less frequently used in nursing internship teaching in the intensive care unit. To tap into this specific area, this study applies this teaching method to the teaching of nursing interns in our hospital to observe the specific application effect.

2. General Information

This study is a prospective study, all intern nursing students graduated from higher education institutions in mainland China, and all teaching teachers were nursing staff with clinical teaching qualifications recognized by Deyang People's Hospital. 102 intern nursing students who were interned in the ICU of Deyang People's Hospital from June 2022 to June 2024 were selected as the study subjects, and they were divided into the control group (n=51) and the observation group (n=51) according to the order before and after the internship in the department. Inclusion criteria: (1) those who were informed and agreed to participate in this study; (2) aged ≥ 18 years; (3) whose initial education levels were all full-time junior colleges and above, and exclusion criteria: (1) those who had psychoactive behavioral disorders; and (2) those who discontinued or ceased to be interned in the ICU for various reasons. Among the 51 interns in the control group, there were 11 males and 40 females, aged 20-23 years old, with an average age of 20.56 ± 2.01 years old, 32 cases of junior college graduation diploma and 19 cases of bachelor's degree; among the 51 interns in the observation group, there were 12 males and 39 females, aged 20-23 years old, with an average age of 20.42 ± 1.76 years old, 36 cases of junior college graduation diploma and 15 cases of bachelor's degree. There was no significant difference between the general information of the 2 groups of internship nursing students ($P > 0.05$), and thus they were comparable.

3. Methodology

3.1 Control Group

The control group implements traditional ICU nursing teaching, and the specific teaching methods are as follows: (1) environment familiarization and basic skills training: upon the first week of the interns' admission to the department, the teaching instructor will lead the interns to familiarize with the ICU environment and the ICU workflow, and will carry out the demonstration of cardiac and electrical monitoring, use of restraining belts, monitoring of vital signs, and other basic nursing operations, so as to make the interns gradually familiarize with and master the basic nursing operations related to critically ill patients. (2) Strengthening of practical skills: in the second week of the internship, the teacher will explain the theoretical knowledge of sputum suction, oral care, artificial airway care, use of ventilator, etc., and carry out the relevant operation demonstration at the bedside; after the students are familiar with the relevant theoretical operations, they will be allowed to review the relevant procedures and then carry out the special operation training under the supervision of the teacher, and the changes of the patient's condition need to be closely observed during the operation, so as to avoid the patient's condition being changed due to blind operation. During the operation, it is necessary to closely observe the patient's condition changes and avoid causing accidental injury to the patient due to blind operation. (3) Clinical thinking training: in the third week of the internship, the instructor conducts clinical thinking training, selects typical cases in the department, and guides the internship nursing students to conduct clinical reasoning training through guided questioning, so as to make the internship nursing students master the nursing process of the typical cases in ICU. (4) First aid training and cultivation of independent practice ability: in the 4th and 5th weeks after the interns are admitted to the

department, under the leadership of the instructor, they will carry out simulation simulator training of first aid for shock patients, so that the interns can master the first aid skills such as cardiopulmonary resuscitation (CPR) and electric defibrillation, and finally carry out independent low-risk nursing operation before the interns leave the department. During the operation, the instructor should be able to let go and fully grasp the basic nursing skills and knowledge of first aid skills related to ICU.

3.2 Observation Group

The observation group implemented the teaching method of BOPPPS teaching model, and the internship period was one month, as follows: (1) Scenario introduction (Bridge-in): at this stage, the teachers leading the instruction in the department jointly made or chose nursing operations commonly used in ICU nursing (such as the use of micro-pumps and electro-cardio graphic monitors, mechanical ventilation, oral care for patients with tracheal tube, arterial blood gas analysis, cardiopulmonary resuscitation and electrocardiography, and the collection and analysis of cardiopulmonary resuscitation and electrocardiography, and electric defibrillation, catheter care, hemodynamic monitoring, etc.) related images and audio-visual materials for the internship nursing students to learn, showing the real scene of the relevant nursing operations, with the aim of stimulating the internship nursing students' interest in learning. (2) Objective: Nursing instructors need to guide the interns to master the main points of nursing knowledge of the common nursing operations in ICU nursing, highlighting the level of cognition and skills that the students should achieve in the undergraduate internship, in order to cultivate the interns' positive learning attitudes. (3) Pre-assessment: In this stage of nursing teaching, the instructor will make theoretical test questions for the commonly used nursing operations in ICU for assessment, aiming at evaluating the learning situation of the interns in the previous stage, and providing reference for the curriculum and teaching activities in the later stage. (4) Participatory Learning: Participatory learning is the core of the BOPPPS teaching model, and the main purpose of this stage of teaching is to let students master the relevant nursing operation skills in depth, and turn the theoretical knowledge into clinical practice, which is mainly carried out by using high-fidelity modeling and group collaboration. Before the implementation of the operation the teacher will demonstrate, after the demonstration the internship nursing students will be divided into 2 groups respectively, they should be offered simulated scenes, carry out their own training, the teacher in the side to observe the effect of the operation of the internship nursing students. Upon each group of internship nursing student's rehearsal is completed, the members of other groups should give sincere feedback, comment on the advantages and put forward the improvement measures, and finally the teacher summarize the internship nursing students' performances and lead them master all the commonly used nursing operation skills in ICU accordingly. (5) Post-assessment: The purpose of post-assessment is to find out whether the students have mastered what they need to learn in the department. In this stage, in order to further understand the mastery of the students, the instructor will return various nursing operations to the patients themselves, and the internship nursing students will carry out the practical operation on their own. In the process of the practical operation, the instructor will combine the patient's individual condition with the nursing operation, and the

internship nursing students will dynamically evaluate and adjust according to the actual situation of the patients in order to exercise the internship nursing students' critical thinking and practical operation ability. (6) Summary: Before summarizing, the nurse trainees will summarize the main points and difficulties of the relevant knowledge, and the common places will be summarized by the representatives of the nurse trainees, and finally the teacher will supplement the summary, and all the knowledge will be connected to help the nurse trainees to deepen their memory and consolidate mastery.

3.3 Observation Indicators

3.3.1 Knowledge and skill Mastery

This study used the theoretical test paper made by the department to assess the theory of the 2 groups of internship nursing students, the test questions were jointly prepared by the department's instructors, the test questions covered the theoretical knowledge related to the common nursing operations in the ICU, and the score of the test paper was 100 points, and the higher the score, the higher the theoretical knowledge of the internship students on the commonly used nursing operations in ICU nursing was mastered. The nursing skills assessment items of the 2 groups of internship nursing students are mechanical ventilation care, oral care of patients with tracheal intubation, the use of micro-pumps and cardiac monitors, cardiopulmonary resuscitation and electric defibrillation, each operation is worth 100 points, and the average of the 5 operations is the internship nursing student's skills assessment score, and the score is directly proportional to the level of skills mastery of the internship nursing students.

3.3.2 Clinical Decision-Making Skills

The clinical decision-making skills of the 2 groups of practicing nursing students in their ICU placements were evaluated by using the Nursing Clinical Decision-Making Scale (CDMNS) (Eskiyurt & Özkan, 2024), which has a content validity (CVI) = 0.90 and Cronbach's α = 0.85, and contains 4 dimensions, namely, clarifying goals and values, searching for information and new information, searching for alternative options, and evaluating or evaluating the results multiple times, with a total of 40 entries. The entries were rated on a Likert 5-point scale, with a total score of 40-200 points, with a low level (40-93.33 points), a medium level (93.34-146.67 points), and a high level (146.68-200 points). The higher the score, the better the clinical decision-making ability of the nursing students.

3.3 Satisfaction With Teaching

The department's self-developed teaching satisfaction questionnaire was used to evaluate the teaching satisfaction of the 2 groups of internship nursing students, the satisfaction score was 100 points out of 100, and the score value was directly proportional to the satisfaction of the 2 groups of nursing students with the teaching.

4. Results

4.1 Comparing the degree of knowledge and skill mastery of the 2 groups of internship nursing students, the theoretical knowledge test scores and skill operation test scores related

to common nursing operations in ICU of the internship nursing students in the observation group were significantly higher than those of the internship nursing students in the control group ($P < 0.05$).

Table 1. Comparison of Common Nursing Operation Related Theoretical Knowledge Achievement and Skill Operation Test Scores ($\bar{x} \pm s$, points) of the 2 Groups of Internship Nursing Students in ICU

Group	Number of cases	ICU common nursing operation related theory test scores	ICU common nursing skill operation test scores
Control group	51	83.22±2.66	82.26±3.73
Observation group	51	92.31±2.85	91.26±3.28
<i>t</i>		16.652	12.940
<i>P</i>		0.000	0.000

4.2 Comparing the scores of the Clinical Decision Making Scale for Nursing (CDMNS) of the 2 groups of internship nursing students, the CDMNS scores of the internship nursing students in the observation group were significantly higher than those of the internship nursing students in the control group ($P < 0.05$).

Table 2. Comparison of the CDMNS Scores of the 2 Groups of Internship Nursing Students ($\bar{x} \pm s$, points)

Group	Number of cases	Clinical Decision Making in Nursing Scale (CDMNS) scores
Control group	51	140.82±13.89
Observation group	51	156.27±15.62
<i>t</i>		5.279
<i>P</i>		0.000

4.3 Comparing the teaching satisfaction scores of the 2 groups of internship nursing students, the teaching satisfaction scores of the internship nursing students in the observation group

were significantly higher than those of the internship nursing students in the control group ($P < 0.05$).

Table 3. Comparison of the Teaching Satisfaction Scores of the 2 Groups of Internship Nursing Students ($\bar{x} \pm s$, points)

Group	Number of cases	Teaching Satisfaction Scores
Control group	51	84.34±2.17
Observation group	51	92.26±3.38
t		14.081
P		0.000

4. Discussion

4.1 BOPPPS Teaching Model Could Effectively Improve ICU Intern Nursing Students' Mastery of ICU Knowledge and Skills

Clinical nursing internship is an important process to enhance the clinical competence of intern nursing students, who can realize the comprehensive nursing skills gained from clinical experience to enhance the ability to care for patients and build confidence in clinical decision-making during the nursing process. During the internship, intern nursing students hope to enhance their clinical practice ability through real nursing scenarios, and then realize the enhancement of their overall quality, therefore, how to transform interns' extensive theoretical knowledge into professional and independent nursing skills is crucial to the teaching of clinical instructors (Sim et al., 2021). At the same time, due to the critical condition of patients in ICU wards, it is inevitable that trainee nurses would prone to be fearful and nervous when performing nursing operations, which results in trainee nurses' inability to adapt to the ICU environment and their fear of performing nursing operations (Özkaya Sağlam et al., 2021; Yıldız et al., 2025). Compared with the traditional teacher-centered didactic teaching model, which not only lacks interaction between teachers and students, but also teamwork among students, the BOPPPS teaching model can stimulate the enthusiasm and initiative of practicing nursing students to the greatest extent possible, and mobilize the attention of students in every step of the process to overcome obstacles to learning and achieve the purpose of teaching. The good application of this teaching method in undergraduate nursing students' surgical teaching is a good proof of this (Z. Li et al., 2023). In this study, we applied the BOPPPS teaching model to nursing students practicing in the ICU. Through the 6 links of BOPPPS, the students were able to participate in the learning and practice of nursing skills related to the ICU before, during, and after the class, and the application of situational simulation could better avoid the fear of practicing nurses when

performing nursing operations on critically ill patients in the ICU, so that the students could actively participate in the training of common nursing operations in the ICU. In the Participatory Learning process, the instructor applied the simulated cases in the practical training, and let the interns use the grouping way to carry out the teamwork, which could also make the interns better transform the theoretical knowledge into professional skills, and thus the interns in the observation group who applied the BOPPPS teaching model had higher theoretical knowledge scores and skills test scores related to the common nursing operations than those of the control group in ICU.

4.2 BOPPPS Teaching Model Could Effectively Improve the Clinical Decision-Making Ability of ICU Nursing Interns

Nurses' clinical decision-making ability refers to the ability to use professional knowledge, experience and judgment to make reasonable nursing decisions for patients in clinical practice, and the enhancement of clinical decision-making ability is not only conducive to improving the quality of nursing care and ensuring the safety of patients' medical treatment, but also prompts the upgrading of nursing personnel's knowledge system and the enhancement of their professional identity (Novalia et al., 2021). During their clinical practices, nurse practitioners need to develop not only their clinical practice skills, but also their clinical decision-making skills, so that they can make a smooth transition from school to the hospital environment and gradually adapt to the authentic role of nurses (Yun et al., 2023). In traditional nursing teaching methods, ICU clinical instructors tend to focus solely on the training of clinical operation skills for practicing nurses, but neglect the development of clinical decision-making skills for practicing nurses in the care of critically ill patients, while the BOPPPS teaching model incorporates typical ICU cases into clinical nursing practice operations, so that when practicing nurses are observing samples online, they can fully grasp the applicable population and initially understand the process and mode of the relevant nursing operations. In the subsequent simulation training process, the instructor will integrate specific cases into the nursing operation to gradually cultivate the clinical decision-making thinking of the interns, and in the final post-testing stage, the interns will be allowed to flexibly apply the clinical nursing operation to the patients under the leadership of the instructor to help the interns to make highly effective and efficient clinical decisions, so that the clinical decision-making ability of interns in the observation group was significantly higher than that of the control group, which is also consistent with the study of Xu et al. (Xu et al., 2023).

4.3 The BOPPPS Teaching Model Could Effectively Improve the Satisfaction of ICU Nursing Interns with the Teaching

The main purpose of nursing internship education is to help interns obtain the skills and knowledge needed in the clinic. The traditional nursing teaching form is relatively simple, which is not conducive to the active participation of interns, resulting in unsatisfactory internship results. The BOPPPS teaching model emphasizes the participation and feedback of nurses in the implementation of the teaching and facilitates the transformation of nurses from passive recipients of external stimuli and indoctrination to active information processors and

constructors of meaning, which is conducive to the absorption of knowledge (Wang et al., 2024). Both scenario simulation and teamwork practice can stimulate the students' initiative, so that the interns are able to abandon the nervousness and fear in the ICU nursing practice, and actively deal with the acute and critical patients, so the teaching satisfaction of the interns in the observation group was significantly higher than that of the control group.

5. Summary and Limitations

In this study, we implemented nursing teaching practice with the BOPPPS teaching model for ICU nurse interns, which greatly improved the mastery of ICU-related knowledge and skills, enhanced the clinical decision-making ability of nurse interns, avoided the traditional teaching method's limitations, created a dynamic classroom environment, fully mobilized the learning enthusiasm of nurse interns, and facilitated clinical application practice. However, this study still has some limitations, for example, the implementation cycle is relatively short, and the sample size of interns included in the study is relatively small, either of which could affect the final test results. Secondly, this study implemented nursing teaching in ICU, where the workload is so heavy that there is a larger demand for teachers' human resources reserve, which is essential for guaranteeing the quality of teaching. Meanwhile, this teaching mode has high requirements for teachers' competence, which requires that the teaching instructors have sufficient teaching experience and integration ability, and therefore, it is necessary to continuously improve the teaching ability of the teachers to satisfy the increasing need of practicing intern nurses in terms of both nursing expertise and practical operation skills.

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Data sharing statement

No additional data are available.

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