

The Application of O-AMAS Teaching Model Combined with PBL Teaching in the Clinical Teaching of Neurocritical Care Trainee Nurses

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Abstract: *Objective:* This study's purpose is to explore the application of the O-AMAS teaching model combined with the PBL teaching method in the clinical teaching of neurocritical care trainee nurses. *Methods:* The nursing students who were doing internship in neurocritical care from June 2024 to September 2024 were set as the control group, and the traditional one-on-one teaching mode was adopted; From October 2024 to January 2025, the nursing students were set as the observation group and the course teaching based on the O-AMAS teaching model combined with PBL teaching was implemented. *Results:* The theoretical examination scores, operational assessment scores, teaching satisfaction, autonomous learning ability and clinical evaluation thinking ability of the two groups of nursing students were observed. The score of the experimental group was significantly higher than that of the control group (all $P < 0.01$). *Conclusion:* The application of the O-AMAS teaching model combined with PBL teaching in the clinical teaching of neurocritical care intern nursing students can improve the teaching effect and cultivate the autonomous learning ability and clinical evaluation thinking ability of nursing students.

Keywords: Clinical critical thinking; Neurocritical care trainee nurse; O-AMAS teaching model; PBL teaching method; Self-directed learning ability

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1. Introduction

A Neurointensive care unit is a medical unit dedicated to treating and managing patients with severe neurological disorders, mostly treating acute and critical cases with a high risk of death or disability^[1-3]. In the course of clinical practice, nursing staff need to have a systematic grasp of various specialized techniques in neurointensive care, possess a solid professional theoretical foundation and excellent specialized technical operation skills, so as to make correct judgments, evaluations and treatments in response to changes in the condition, thereby solving the problem^[4, 5]. However, newly graduated nursing students have poor practical ability to apply theoretical

knowledge to practice and have difficulty dealing with complex changes in the condition ^[6,7]. At present, the traditional teaching model for neurocritical care trainee nurses mainly focuses on imparting knowledge, with low initiative in learning and weak autonomous learning ability ^[8].

The result-oriented (O-AMAS) effective teaching model, developed by the effective Teaching team of Nankai University, consists of five elements: teaching objectives, interest activation, diversified teaching, effective assessment, and summary evaluation ^[9]. The project is goal-oriented, promotes teaching through teacher-student interaction, strengthens process evaluation, and achieves the synergy of precise teaching and students' independent exploration and thinking development. The research has received a good response in China ^[10, 11]. PBL teaching is an interactive teaching model that takes learners as the main body and explores through clinical cases, guiding nursing students' teaching with questions to cultivate their learning ability ^[12]. This study combined the O-AMAS effective teaching model with the PBL teaching method and applied it to neurocritical care trainee nursing students to explore its effect on clinical critical thinking and self-directed learning ability of trainee nursing students, providing a reference for the reform of clinical nursing teaching.

2. Subjects and methods

2.1. Research subjects

Nursing students in neurocritical care at a tertiary grade A general hospital were selected as the research subjects, and 37 nursing students from June 2024 to September 2024 were selected as the control group for traditional teaching. With 35 nursing students from October 2024 to January 2025 as the experimental group, on the basis of the traditional teaching model, the O-AMAS effective teaching model combined with the PBL teaching method was applied to the internship teaching.

The inclusion criteria are as follows:

- (1) Internship duration in neurocritical care ≥ 4 weeks;
- (2) Informed and voluntary participation in this study.

The exclusion criteria are nursing students who did not complete the departmental internship in full. There were 72 students in the observation group and the control group, and 70 valid answers were excluded. There was no statistically significant difference in gender, age, and admission scores between the two groups of nursing students. This study was approved by the hospital ethics committee (approval number: 2024-04-006-K01).

2.2. Study methods

2.2.1. Teaching objectives

This study follows the SMART principle (i.e., specific - measurable - achievable - realistic - time-bound) when formulating the teaching objectives, and sets specific teaching objectives based on the six aspects of the educational objectives in Bloom's cognitive domain ^[13,14]. Take traumatic brain injury as an example:

- (1) Memorization: Be able to accurately recall the clinical manifestations, complications and key points of care of traumatic brain injury;
- (2) Comprehension: Be able to explain the changes in the patient's condition and the causes, and understand the principles, procedures and precautions of nursing operations;
- (3) Application: Be able to apply theoretical knowledge to implement nursing measures correctly in actual nursing work, and be able to perform nursing operations using neurocritical care equipment;

- (4) Analysis: Be able to distinguish the key points and differences of care for the disease, analyze the patient's condition data, and determine the development trend of the patient's condition;
- (5) Evaluation: Be able to assess the effect of care, optimize the plan and make suggestions for improvement;
- (6) Creation: Be able to design personalized neurocritical care plans based on the specific circumstances of patients with traumatic brain injury and propose improvement measures for care methods.

2.2.2. Teaching methods

The control group adopted the traditional teaching method based on one-on-one knowledge transmission by the teaching instructor according to the teaching syllabus and requirements of the internship. The teaching instructor first previewed the relevant theoretical knowledge and then explained the key knowledge content in combination with common diseases of neurocritical care. Under the guidance of the instructor, the trainee nursing students completed the internship tasks in neurocritical care.

Teaching was carried out using the PBL teaching method based on the O-AMAS effective teaching model. Under this program, the teaching instructor carried out the teaching of clinical nursing students in accordance with the internship syllabus and requirements, and completed the internship tasks of neurocritical care.

The teaching instructor, based on teaching, combined with clinical practice, uses multimedia to bring in the context, and through multimedia fun guidance, arouses the interest of nursing students in learning, and encourages nursing students to discover and collect clinical problems of patients in the process of caring for patients. In the teaching process, modern teaching methods are integrated and real clinical scenarios are designed to make the teaching content both vivid and interesting as well as close to clinical practice. Based on the problems that arise from simulated discussions, and with the guidance of clinical instructors, nursing students are divided into groups of 4 to 6 people, who search for literature through retrieval platforms, read books, consult experts to solve problems, and discuss the collected answers with each other. At the same time, through forms such as role-playing, case discussions, and skills competitions, ensure that each nursing student can actively participate.

Teachers, in accordance with the syllabus, flexibly apply various teaching methods such as lecture, case study, and situational simulation, and promote comprehensive learning activities such as independent inquiry, experiential practice, and collaborative interaction among nursing students through problem-driven approaches. For example, the clinical nursing problems of patients are presented based on cases, and students are encouraged to simulate each other to conduct clinical operation training in the laboratory, integrating the basic and specialized operations of neurocritical care.

For instance, the key points of observing patients with brain herniation are introduced through TV plots, enabling students to learn how to observe pupils and consciousness in order to improve their clinical practical operation ability. For example, through the case of the care of a patient with intracranial hypertension, the group members draw lots to determine different roles (nurse, patient, doctor, etc.), and the nursing students raise relevant questions based on the drawn roles, solve them and perform them. During the summary and review stage of the learning, the instructor raises questions, and the students answer questions by means of group mutual comments, "passing the flower", question chain, etc., guiding the students to review the pathophysiological mechanism, clinical manifestations, treatment plan and personalized nursing measures of the medical record. The teacher emphasizes the key points of disease observation, complication prevention and emergency handling procedures based on the students' responses.

After learning about common neurocritical conditions through case studies, bedside teaching, and group

discussions, nursing students take online tests to assess their learning outcomes. Affirm the knowledge points that students have mastered, and provide individualized tutoring for those who have not met the standards. Analyze the weak points of the wrong questions and provide targeted guidance, and encourage intensive review. After the teaching ward round, the instructor focused on analyzing and guiding the mistakes and ambiguity in the discussions of the nursing students, and evaluated their performance and ability to formulate nursing plans.

After the clinical teaching session, the instructor and the nursing students conducted a systematic learning summary, focusing on the core concepts, diagnostic criteria, and key points of care for common neurocritical illnesses, including cerebral hemorrhage, subarachnoid hemorrhage, severe craniocerebral injury, ischemic stroke, etc., with particular emphasis on key points of disease observation, complication prevention, and emergency response procedures. Guide the nursing students to systematically sort out the solutions to clinical problems using the SOAP model and cultivate their clinical thinking ability.

For questions with a high error rate, senior instructors will give special lectures using the three-step teaching method of “error tracing - knowledge point analysis - clinical connection” to help nursing students deeply understand the reasons for errors and strengthen the memory and application of knowledge points. At the same time, an error file is established to provide a basis for subsequent teaching improvement and to achieve the teaching goal of “promoting learning through testing and teaching through evaluation”.

2.3. Evaluation methods

2.3.1. Theoretical and operational assessment results

The theoretical assessment is strictly based on the requirements of the internship syllabus. The examination is conducted in a standardized closed-book format, with a full score of 100 points and a time limit of 60 minutes. The examination and scoring process ensures standardization and fairness. The operation assessment is carried out strictly in accordance with the standard operating procedures (SOP), and is supervised and evaluated by the instructor in a real medical setting where clinical conditions permit. When the clinical environment fails to meet the assessment requirements, simulation mannequins are used for operation evaluation. The assessment scoring system is based entirely on quantified indicators of standardized operating procedures to ensure objectivity and consistency of the assessment results.

2.3.2. Teaching satisfaction

Nursing student satisfaction consists of indicators such as teaching attitude and responsibility, professional ability and teaching level, teaching management and arrangement, and learning environment. Teacher satisfaction is measured by clinical instructors who fill out standardized satisfaction survey scales based on multiple indicators such as the students' mastery of professional knowledge, clinical skill operation level, professional quality performance, and learning attitude during the internship.

2.3.3. Clinical reasoning ability scale and autonomous learning ability scale

The “Nurse Clinical Reasoning Ability Scale” revised by Wang is evaluated using the Likert 5-point scoring method, consisting of 15 items (1 point very dissatisfied; 2 points dissatisfied; 3 points average; 4 points satisfied; 5 points very satisfied)^[15]. It has a Cronbach's coefficient of 0.867, indicating good reliability.

The Self-directed Learning Ability Scale for Nursing Students, revised by Wu, consists of 20 items in four dimensions (learning motivation, planning and implementation, self-management, interpersonal communication),

and is scored on five grades: “strongly disagree 1 point, disagree 2 points, average okay 3 points, agree 4 points, strongly agree 5 points” [16]. The Cronbach’s α coefficient of the total scale was 0.914, indicating good reliability and validity.

2.4. Statistical methods

The data were analyzed using SPSS 20.0 software. The mean and standard deviation (SD) were used for the scores of students’ practical and theoretical performance and the evaluation score of teaching satisfaction. The two independent samples t-test was used for comparison between groups, with a test level of $\alpha = 0.05$.

3. Results

3.1.1. Comparison of theoretical and practical examination results between the two groups of nursing students

The theoretical and practical examination scores of the experimental group were both higher than those of the control group ($P < 0.05$), as detailed in **Table 1**.

Table 1. Examination results of the two groups of trainee nurses (n, mean $\pm$ SD)

Group	Number of people	Theoretical grades	Operation grades
Control group	35	84.04 $\pm$ 5.28	93.14 $\pm$ 1.97
Experimental group	35	86.71 $\pm$ 4.73	94.17 $\pm$ 2.13
<i>t</i>		-2.232	-2.093
<i>P</i>		0.029	0.04

3.1.2. Comparison of student satisfaction and instructor satisfaction between the two groups

For both groups of trainee nurses, the satisfaction of teachers and students in the experimental group was better than that in the experimental group, as shown in **Table 2**.

Table 2. Satisfaction of the two groups of nursing students (n, mean $\pm$ SD)

Group	Number of people	Nursing student satisfaction	Satisfaction of the teaching instructor
Control group	35	92.54 $\pm$ 3.24	85.14 $\pm$ 3.37
Experimental group	35	94.49 $\pm$ 2.77	89.45 $\pm$ 6.37
<i>t</i>		-2.689	-3.515
<i>P</i>		0.009	0.001

3.1.3. Comparison of clinical reasoning ability and autonomous learning ability between the two groups of nursing students

The clinical reasoning ability and self-directed learning ability of the experimental group were superior to those of the experimental group ($P < 0.05$), as shown in **Table 3** and **Table 4**.

Table 3. Comparison of clinical reasoning ability between the two groups of trainee nurses

Group	Number of people	Clinical reasoning ability
Control group	35	51.80 ± 5.22
Experimental group	35	61.03 ± 9.59
<i>f</i>		5.59
<i>P</i>		0.021

Table 4. Comparison of autonomous learning ability between two groups of trainee nurses

Group	Number of people	Learning motivation	Planning and implementing	Self-management	Interpersonal communication
Control group	35	22.69 ± 2.39	18.80 ± 2.59	18.00 ± 1.78	15.26 ± 1.27
Experimental group	35	26.09 ± 3.16	20.63 ± 3.66	20.86 ± 3.01	16.74 ± 1.38
<i>f</i>		7.745	5.514	12.131	0.93
<i>t</i>		-5.084	-2.412	-4.831	-4.691
<i>P</i>		< 0.001	0.019	< 0.001	< 0.001

4. Discussion

4.1. The O-AMAS effective teaching model combined with the PBL teaching program can improve the theoretical and operational assessment results of neurocritical care trainee nurses

The results of this study showed that the O-AMAS effective teaching model, through clear teaching objective setting, diversified teaching activity design and systematic teaching evaluation system, constructs a complete teaching loop, which not only effectively promotes the achievement of teaching objectives, but also significantly improves teaching quality and learning outcomes^[17]. In clinical practice teaching, instructors create problem situations in combination with real clinical cases to guide nursing students to think actively and explore deeply.

This immersive learning experience significantly enhances the depth of knowledge understanding and the persistence of memory^[6]. The results of this study fully confirm the superiority of the O-AMAS effective teaching model combined with the PBL teaching program in improving the clinical teaching effect of neurocritical care and provide an effective teaching paradigm for cultivating high-quality neurocritical care nursing talents.

4.2. The O-AMAS effective teaching model combined with the PBL teaching program can effectively improve the evaluation of practical teaching

Research shows that in traditional clinical teaching for intern nursing students, there is less integration of theory and practice, and nursing students are often in a passive learning state, which leads to burnout of clinical learning among nursing students in traditional teaching. This study applied the teaching model to clinical teaching, oriented towards the learning outcomes of nursing students, and driven learning through positive interaction between teachers and students. The initiative and participation of the nursing students were significantly enhanced during the teaching process, creating a positive interactive teaching atmosphere and effectively stimulating the teaching enthusiasm of the instructors^[11]. Two-way positive interaction enhanced teaching quality and promoted harmony

between teachers and students. It was observed that nursing students were more engaged in discussion, analysis and operation, which led teachers to optimize teaching and formed a virtuous cycle of “mutual growth”.

4.3. The O-AMAS effective teaching model combined with the PBL teaching program can enhance the clinical reasoning and autonomous learning ability of nursing students

In traditional clinical practice teaching, nursing students often have to rely solely on cognitive logical reasoning to deal with complex clinical situations, and this single teaching method can easily lead to a dull learning process. Especially for nursing students with insufficient professional knowledge, they often feel powerless when facing complex clinical problems and are prone to frustration, which in turn affects their enthusiasm for learning and self-confidence. This teaching program guides nursing students to use critical thinking to analyze cases through heuristic questioning, encourages personalized solutions, highlights the student-centered teaching concept, cultivates clinical thinking and problem-solving abilities, and promotes the exchange of views and deepens the understanding of professional knowledge through collaborative learning^[11].

Clinical practice instructors have individual differences, and teaching methods are not uniform^[16]. The focus of this study is on the nursing students themselves. Through the guidance of the instructor, the interest of the intern nursing students is aroused, and the nursing students participate^[6]. The core of this teaching concept is: to drive the learning process with clinical problems as the orientation, to achieve the transformation of the teaching model from “teacher-centered” to “student-centered”, and to transform the nursing students from passive acceptance of knowledge to active exploration and practice.

In this study, teachers guide students to hand over problems, and students can obtain relevant information through the Internet, literature, books, etc. Teachers guide students to solve problems by independently consulting information and expressing opinions. This diversified teaching approach enlivened the classroom, stimulated enthusiasm for learning, and developed nursing students’ autonomous learning ability, laying the foundation for clinical work.

5. Conclusion

In this study, the application of the O-AMAS teaching model combined with PBL teaching in clinical teaching of neurocritical care nursing students can effectively improve the students’ academic performance, clinical reasoning ability and autonomous learning ability, further stimulate the students’ enthusiasm for learning, and encourage them to learn more actively and effectively. The high satisfaction of the nursing students with the course also promoted the harmony of the teacher-student relationship, the successful achievement of the teaching objectives, and prepared the nursing students for more efficient adaptation to clinical work in the future. However, the number and representativeness of students included in this study are limited. It is suggested that a multi-regional and multi-disciplinary survey be conducted in the future to comprehensively analyze the application of the O-AMAS effective teaching model in clinical teaching for intern nursing students and provide a reference for the design of clinical teaching for nursing students.

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Disclosure statement

The authors declare no conflict of interest.

References

- [1] Guan L, Qian S, 2002, Construction and Management of Neurosurgical Intensive Care Units. *Journal of Nursing Training*, 17(3):197–197.
- [2] Wen S, Qin S, Xu X, 2001, Establishment and Role of Neuro-Intensive Care Units. *Chinese Journal of Hospital Management*, 17(4):228–229.
- [3] Fu X, 2015, A Comparison of the Effects of TBL and LBL Teaching Models on Critical Thinking Ability of Higher Vocational Nursing Students. *The Chinese Modern Nursing Journal*, 2015(36): 4440–4442.
- [4] Banning M, 2008, Clinical Reasoning and its Application to Nursing: Concepts and Research Studies. *Nurse Educ Pract*, 8(3):177–183.
- [5] Duan A, Jiang F, Li L, et al., 2024, Design and Practice of Blended Teaching of Internal Medicine Nursing Based on O-AMAS effective teaching model. *BMC Med Educ*, 24(1):580.
- [6] Kavanagh J, Szweda C, 2017, A Crisis in Competency: The Strategic and Ethical Imperative to Assessing New Graduate Nurses’ Clinical Reasoning. *Nurs Educ Perspect*, 20(2): 57–62.
- [7] Li C, Shao Q, Xu Y, et al., 2019, Exploration and Practice on the Construction of “Teacher-Student Community” in Nankai University. *Proceedings of the Sixth Forum on Modern College System Education in Universities across the Taiwan Strait and Hong Kong and Macao*, 2019:110–117.
- [8] Luo P, Li Q, Chen X, et al., 2023, Application of Result-Oriented Teaching Mode in Clinical Teaching of Undergraduate Nursing Students in Cardiology. *Chinese Nursing Education*, 202(6): 687–691.
- [9] Zhao W, He L, Deng W, et al., 2020, The Effectiveness of the Combined Problem-Based Learning (PBL) and Case-Based Learning (CBL) Teaching Method in the Clinical Practical Teaching of Thyroid Disease. *BMC Med Educ*, 20(1):381.
- [10] Xu Z, 2019, Effective Observation of Classroom Teaching Based on the SMART Principle of Goal Management. *China Vocational and Technical Education*, 2019(35):68–72.
- [11] Wang Y, 2018, Research on the Current Status of Clinical Reasoning Ability of Nurses in Tertiary Grade A Hospitals in Shenyang and Its Correlation with Autonomous Learning Ability, thesis, China Medical University.
- [12] Wu D, 2014, Research on the Current Situation and Influencing Factors of Autonomous Learning Ability of Undergraduate Nursing students, thesis, *Journal of Nursing*, Central South University.
- [13] Sun F, Ning J, Liu G, et al., 2022, Online Hybrid Strategy and Practice of Effective Teaching: in Microbiology, For Example. *Journal of Microbiology*, 49(11): 4909–4917.
- [14] Wang B, Zhao Y, Chen C, et al., 2023, The Effects of Experimental Teaching Based on Constructivist Learning Theory on Self-Efficacy and Learning Burnout of Undergraduate Nursing Students. *Nursing Practice and Research*, 20(2):286–289.

- [15] Clinical Reasoning Teaching and Practice Guidelines, 2012, Chinese General Practice, 15(7):713–714.
- [16] Sun D, Li L, Wang C, et al., 2018, Application of Self-Directed Learning Theory Combined with Incentive Mechanism Method in Clinical Practice Teaching for Undergraduate Nursing Students. Nursing Research, 32(7):1099–1101.
- [17] Gan J, Qiu S, Fan Q, et al., 2018, Research on the Application of PBL and LBL Teaching Methods in Ophthalmic Nursing Courses for Higher Vocational Nursing Specialties. Nurse Education Journal, 2018(23): 2197–2200.

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