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Research Article

Construction and Evaluation of an Operating Room Nursing Faculty System Based on OBE Model

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Abstract

Objective: This study aimed to investigate the application effects of Outcome-Based Education (OBE) model in the construction of an operating room nursing faculty system. **Methods**: A total of 100 instructors who participated in the operating room OBE faculty training program from September 2023 to April 2024 were selected as research subjects. These instructors underwent an 8-month OBE-oriented faculty training program, and their assessment scores, comprehensive teaching abilities, and teaching satisfaction were evaluated before and after the training. **Results**: After the training, the assessment scores, comprehensive teaching ability scores in all four dimensions, and teaching satisfaction scores of the 100 instructors were significantly higher than before the training ($P<0.01$). **Conclusion**: The construction of an operating room nursing faculty system under the OBE teaching model can effectively improve the assessment scores and comprehensive abilities of instructors, enhance their teaching confidence and satisfaction, and thereby improve the quality of teaching in the operating room.

Keywords: Operating room; Faculty system; Training; OBE; Teaching

Introduction

In the field of medical education, the construction of the faculty team is crucial for enhancing teaching quality and cultivating high-quality medical talents [1]. The operating room, as a vital component of medical education, has a particularly important role in the training and construction of its faculty team. Outcome-Based Education (OBE), a student learning outcome-cantered educational model, emphasizes that educational activities should be designed, implemented, and evaluated around predetermined learning outcomes [2-3]. The introduction of the OBE model into operating room faculty training aims to build a systematic faculty training system, which comprehensively enhances the educational teaching abilities of instructors by clarifying teaching objectives, optimizing teaching content, improving teaching methods, and evaluating teaching effectiveness.

In recent years, research and application of the OBE model in the field of medical education have been increasing both domestically and internationally, with studies showing that this model can effectively improve the quality and effectiveness of medical education. For instance, a study at a medical college in the United States found that curriculum design using the OBE model significantly improved students' clinical thinking and operational skills [4]. Research conducted in China also revealed that the OBE model has a distinct advantage in enhancing medical students'

autonomous learning abilities and clinical practice capabilities [5].

Nevertheless, research on the application of the OBE model in operating room faculty training remains relatively scarce. This study aims to explore the application effects of constructing an operating room nursing faculty system under the OBE model by building and implementing a systematic faculty training program, assessing its impact on instructors' assessment scores, comprehensive teaching abilities, and teaching satisfaction, with the goal of providing scientific and effective training models and strategies for operating room faculty training. The detailed process of this study is reported as follows.

Subjects and Methods

Study Subjects

The study enrolled 100 instructors who participated in the operating room OBE faculty training program at our hospital from September 2023 to April 2024. Among them, there were 88 females and 12 males; nursing experience ranged from 2 to 20 years; in terms of professional titles, there were 4 nurses, 66 nurse practitioners, 19 senior nurse practitioners, and 11 deputy chief nurses; regarding educational background, 93 held bachelor's degrees and 7 held master's degrees (including 3 in progress). The inclusion criteria were: **(1)** clinical nurses working in the operating room; **(2)** full participation in the faculty training course based on the Outcome-Based Education (OBE) philosophy; **(3)** possessing good communication skills to accurately convey their true feelings after teaching activities; **(4)** voluntary participation in this study after a full understanding of its content. The exclusion criterion was the inability to cooperate in completing interviews or withdrawal from the study midway.

Research Methods

Setting Training Objectives

This study employed the Delphi method to gather the needs of different teaching leaders regarding the evaluation of teaching qualifications. In-depth interviews were conducted with nursing department educators and teaching management experts on the topic of "core competencies that operating room instructors should possess and the advantages of OBE teaching philosophy in enhancing the teaching capabilities of operating room nursing instructors." The interview data were analyzed and organized. Based on this, and in conjunction with the competency-based clinical nursing instructor training requirements proposed by Qin Shuyu et al [6], the training objectives for operating room teaching qualifications were established as "four competencies": teaching ability, research ability, organizational management ability, and communication ability. These objectives aim to ensure that instructors can effectively impart knowledge and skills in the unique practical field of the operating room and promote their professional growth. Furthermore, in line with the OBE philosophy, a survey was conducted on the capacity enhancement needs for the aforementioned four modules, and the needs of the training class participants were organized (Table1).

Module	Head Count Subtotal	· Scale/%
Teaching ability	86	86
Scientific research ability	78	78
Organize and implement management ability	73	73
Communication ability	70	70

Table 1: outcome-based education survey on the needs of 100 teachers in the teacher training course.

Establishing Hierarchical Teaching Standards

This study established the admission criteria for hierarchical teaching in the operating room and created a hierarchical teaching database. Based on the hospital's clinical nursing teaching position level recognition system, which considers professional technical positions, operating room work experience, professional capabilities, and teaching abilities, the operating room nursing faculty positions were categorized into five levels, N1 to N5. The distribution of these levels is illustrated in Figure 1.

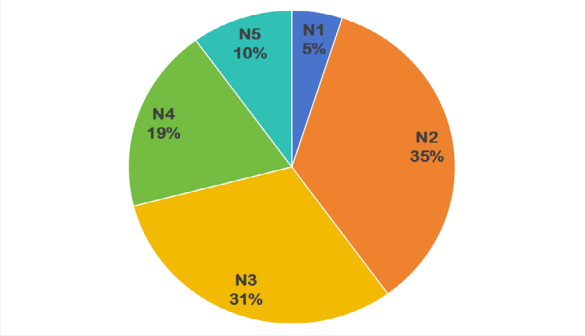

Figure 1: Statistical results of the level distribution of teachers in training courses.

Conducting OBE Faculty Training Classes

Guided by the Outcome-Based Education (OBE) philosophy, this study developed a tiered faculty training curriculum ranging from N1 to N5, aligned with the training objectives of the four major modules. Combining theoretical instruction with practical operations, the curriculum was designed to meet the educational goals. Upon completion of the faculty training class content, a

comprehensive evaluation and assessment of the learning outcomes of instructors at each level were conducted using diverse methods such as reflective journals, live demonstrations, and operational examples. Instructors who met the criteria were awarded certificates of qualification for tiered teaching. The detailed design of the curriculum content is presented in Table 2.

Module	Learning Content	Training Duration	Teaching Method	Training Objective
Teaching Ability	Outcome-based education teaching concept and evaluation method	60 minutes	Theoretical teaching	Improve the teaching design and implementation ability of teachers
	Teaching problems and countermeasures	60 minutes	Theoretical teaching	
	Goal-oriented nursing curriculum	60 minutes	Theoretical teaching	
	Enlightenment of clinical nursing teaching	60 minutes	Theoretical teaching	
	Sharing of teaching experience with famous teachers	60 minutes	Theoretical teaching	
	Teaching PPT production and beautification	60 minutes	Theory teaching + live demonstration	
	Reflect on the application of journaling	60 minutes	Theoretical teaching	
Scientific Research Ability	Formulation of clinical research topics	60 minutes	Theoretical teaching	Enhance teachers' ability and interest in scientific research
	Development of clinical nursing research	60 minutes	Theoretical teaching	
Organize and Implement Management Ability	Presentation skills +4 step method	180 minutes	Theoretical teaching	Improve the efficiency and effect of teachers in operating room teaching management
	The basic method of body search	60 minutes	Theoretical teaching + operational demonstration	
	Teaching plan writing, operating room business rounds	150 minutes	Theory teaching + live demonstration	
	Creative teaching, flipped classroom	180 minutes	Theoretical teaching	
Communication Ability	Case - oriented communication skills for different situations	60 minutes	Theoretical teaching	Improve teachers' ability to cope in a diversified communication environment

Table 2: outcome-based education teacher training course training content course design.

Evaluation Indicators

Assessment Scores

Both pre- and post-training assessments of the participants' theoretical knowledge and practical skills were conducted by the same group of faculty examiners. Scores for both theoretical knowledge and practical skills ranged from 0 to 100. The total score consists of theoretical assessment (30%) and practical assessment (70%), with the latter including operational demonstrations, clinical mini-lessons, and teaching rounds. Participants were required to complete an individual assessment, selecting one task based on a case study. A higher total score indicates better performance.

Comprehensive Teaching Ability

A self-designed questionnaire was used to evaluate the comprehensive teaching ability of the participants, including teaching ability, research ability, organizational management ability, and communication ability. Each dimension was scored from 0 to 10, with higher scores indicating stronger comprehensive teaching abilities.

Teaching Satisfaction Evaluation

A self-designed teaching satisfaction evaluation questionnaire was used to survey satisfaction, including the alignment of the teaching curriculum with actual clinical teaching needs, the rationality of course scheduling, the prominence of key points in course, the professionalism of the instructors, and the rationality of teaching facilities, among 10 items. Each item was scored from 0 to 10 (from "do not meet" to "fully meet"), and the total score was calculated. Higher scores indicate greater satisfaction.

Data Collection Methods

Theoretical and practical examinations were completed one week prior to the commencement of the training class, and post-training theoretical and practical examinations were conducted one week after the completion of all courses. These examinations were coordinated by the person in charge of the training class, with four teaching experts from the operating room serving as station examiners, scoring based on the hospital's operational assessment criteria. Survey questionnaires were created electronically using the Wenjuanxing platform, and evaluations of comprehensive teaching ability and teaching satisfaction were conducted one week before the training for all participants. The questionnaires were completed anonymously, with participants filling them out independently and submitting them on the spot. QR codes for post-training comprehensive teaching ability and teaching satisfaction questionnaires were distributed by the person in charge on the final afternoon of the graduation ceremony, with all questionnaire items being mandatory. Researchers reviewed the completion status in the background and ensured that 100% of the questionnaires were collected by the end of the afternoon.

Statistical Methods

Data analysis was performed using Graphpad Prism 9.0 and SPSS 25.0 software. Normally distributed quantitative data were represented as mean ± standard deviation, non-normally distributed quantitative data were represented as medians and interquartile ranges, and count data were represented as numbers and percentages. Comparisons of rates were made using the chi-square test; normality testing was conducted using the Kolmogorov-Smirnov test. Comparisons between two means were made using independent samples t-tests, and non-normally distributed data or ordinal data were compared using the Mann-Whitney U test. Paired data were compared using paired t-tests or Wilcoxon signed-rank tests. Multiple group comparisons were made using the Kruskal-Walli's test, with Dunn's method for multiple comparisons correction. A $p < 0.05$ was considered statistically significant.

Results

Comparison of Assessment Scores Before and After Training

Analysis of normality indicated that the assessment scores before and after training were not normally distributed. The results revealed that the assessment scores after training were significantly higher than those before training, with a statistically significant difference ($P<0.01$), as shown in Table 3.

Time	Number Of People	Theoretical Score	Operation Result	Total Score
Pre-Training	100	78	76	77
		(75.00,84.00)	(72.25, 80.00)	(72.85,81.28)
Post-Training	100	93	91	92
		(90.00,96.00)	(89.00,94.00)	(89.60,94.00)
P		<0.0001	<0.0001	<0.0001

Table 3: Comparison of assessment results before and after training (points).

Comparison of Comprehensive Teaching Abilities Before and After Training

The results indicated that the comprehensive teaching abilities in all four dimensions were significantly higher after the training compared to before, with a statistically significant difference (P<0.01) [Table 4]. Further analysis of the relationship between nursing faculty grading and the enhancement of teaching abilities (Figures 2A-D) revealed that the OBE model had a more pronounced effect on the improvement of comprehensive teaching abilities for nursing faculty at levels N1 to N3 compared to levels N4 to N5.

Time	Number of people	Teaching ability	Scientific research ability	Ability to organize and implement management	Communication ability
pre-training	100	5	4	5	5
		(3.00,7.00)	(2.00,6.00)	(3.00,6.75)	(3.00,6.00)
post-training	100	9	8.5	9	9
		(8.00,9.00)	(8.00,9.00)	(8.00,9.00)	(8.00,9.00)
p		<0.0001	<0.0001	<0.0001	<0.0001

Table 4: Comparison of comprehensive teaching ability before and after training (points) (Median, quartile).

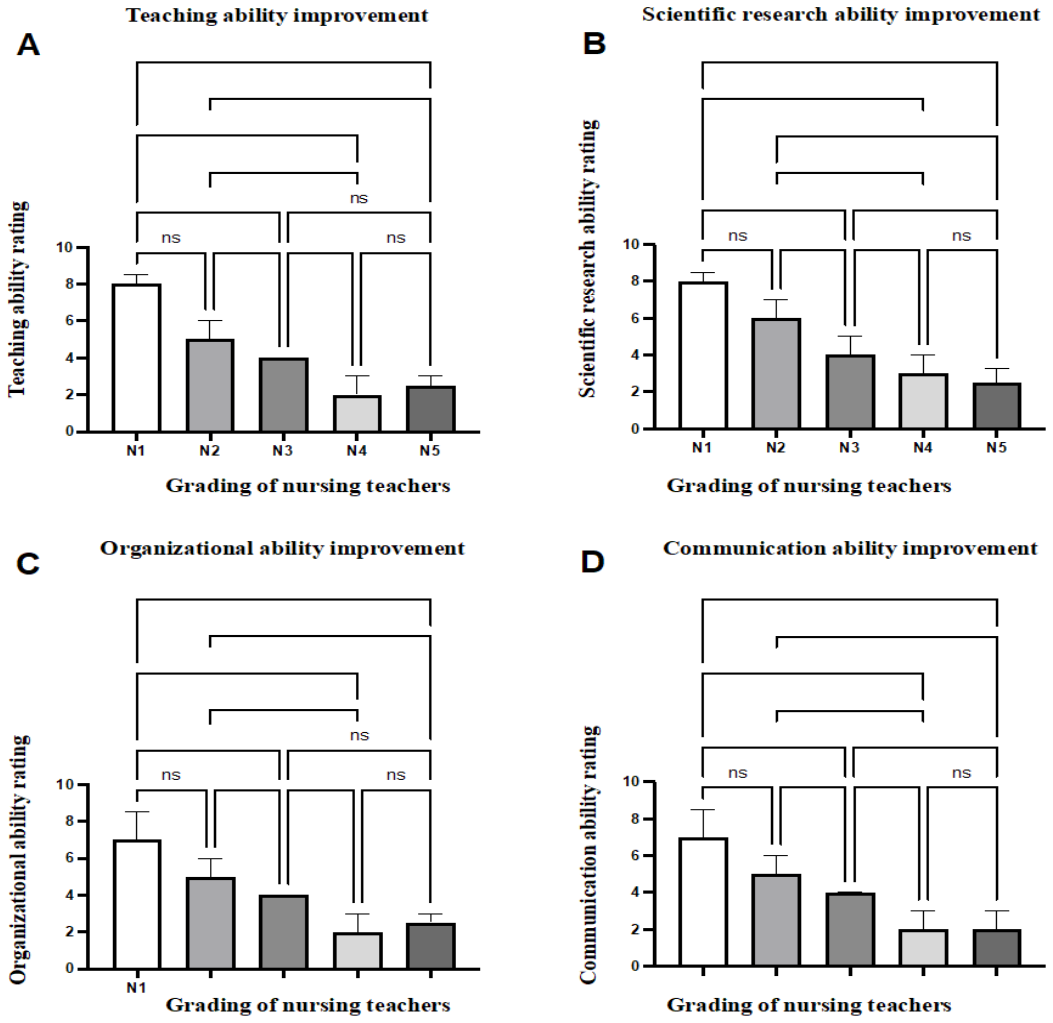

Figure 2: Analysis on the improvement of nursing teachers' grade and comprehensive teaching ability.

Comparison of Teaching Satisfaction Before and After Training

The study results demonstrated that after the training, the teaching satisfaction scores of the participants in the training class were significantly higher than before the training, with a statistically significant difference (P<0.01), as detailed in Table 5.

Time	Number of people	Satisfaction
pre-training	100	50
		(48.00,51.00)
post-training	100	100
		(93.25,100.00)
p		<0.0001

Table 5: Comparison of teaching satisfaction before and after training (Median, quartile).

Discussion

The Effectiveness of the OBE Model in Enhancing Instructors' Theoretical and Practical Scores

The operating room, as a unique practical field in nursing education, requires a high level of knowledge and skills to ensure patient safety in a high-risk, highly specialized work environment [7]. The OBE (Outcome-Based Education) teaching model, characterized by an output-oriented approach, emphasizes that nurses must master learning skills and experiences. It requires instructors to have a clear conception of the capabilities that nurses should achieve by the end of the training and to implement corresponding measures to assist them in reaching these goals [8]. This teaching method encompasses the entire process of defining, implementing, assessing, and utilizing learning outcomes [9-10]. The OBE model emphasizes the results and objectives of learning, rather than just the content of the course. In operating room instructor training, clearly defined learning objectives ensure that instructors know what standards they need to meet, including the depth of theoretical knowledge and the proficiency of practical skills. The OBE model allows for the customization of teaching plans based on the different needs and starting points of instructors, and this flexibility helps each instructor to learn according to their own progress and needs, thereby more effectively mastering and applying the knowledge and skills they have learned. As shown in Table 3, after training under the OBE model-based operating room nursing faculty system, the assessment scores were significantly higher than before the training ($P<0.01$). Therefore, the OBE model provides an efficient, outcome-oriented educational method for operating room instructor training, effectively improving the theoretical and practical scores of instructors through clear learning objectives, personalized learning paths, emphasis on practical operations, and continuous feedback and improvement mechanisms.

The OBE Model Effectively Enhances the Comprehensive Teaching Abilities of Instructors

The results of this study indicate that after the training, the scores of instructors in all four dimensions of comprehensive teaching abilities were significantly higher than before the training, with a statistically significant difference ($P<0.01$), and the OBE model is particularly suitable for mid-to-low seniority nursing instructors. Research shows that clinical teaching staff play multiple roles such as nurses, teachers, and managers, and the ability to fully recognize and timely switch these roles is key to effectively carrying out teaching work [11]. Hospitals should adopt the cultivation philosophy of "emphasizing both clinical skills and teaching abilities," drawing on the "invite in, send out, strengthen internal training" "trinity" faculty construction system to cultivate clinical teaching staff [12]. Cultivating the educational teaching abilities of clinical teachers in multiple dimensions can effectively improve clinical teaching work and teaching quality [13]. The OBE model, with its clear goals and assessment standards, promotes the self-assessment and continuous improvement abilities of teaching staff in teaching, thereby enhancing teaching abilities. The training of operating room instructors not only focuses on theoretical knowledge but also emphasizes the cultivation of practical operation and application abilities. The OBE model, through simulated surgeries and practical operation training, enables instructors to apply what they have learned in real scenarios, thereby improving their research and practical abilities. Studies have reported that applying the OBE concept to the cultivation of nursing research talents can comprehensively enhance the overall quality and abilities of nurses in scientific research [14]. Practical operation training also enhances the abilities of instructors in organization and implementation, such as effectively managing the flow and resource allocation of operating rooms. Personalized learning paths can enhance their organizational and implementation management abilities, as they can adjust management strategies according to different situations. At the same time, flexible teaching methods such as case analysis, group discussion, and simulated teaching help improve the communication and teamwork abilities of instructors, which are key elements of effective management and organization. The comprehensive enhancement of these abilities not only helps to stimulate their passion for education but also enables them to excel in clinical and academic practice.

The Impact of the OBE Model on Teaching Satisfaction

As demonstrated in Table 5, the teaching satisfaction of instructors increased after the implementation of the tiered faculty training under the OBE model, compared to before the training. This suggests that practice-oriented teaching methods can effectively enhance the teaching confidence and satisfaction of instructors, as they are able to witness their own progress and the application of their learning outcomes in practice. Knowing the direction and purpose of learning clearly improves the transparency and efficiency of the teaching process, thereby increasing teaching satisfaction. Faculty training programs often incorporate a variety of teaching strategies and tools, such as case studies, simulated surgeries, and group discussions, allowing instructors to learn according to their preferences and actual needs, which in turn enhances their engagement and learning outcomes.

Conclusion

In summary, the study concludes that employing the OBE teaching model in the construction of an operating room nursing faculty system can effectively enhance the assessment scores and comprehensive abilities of nurses in training, strengthen the teaching confidence and satisfaction of instructors, and thereby

improve the quality of teaching in the operating room. The OBE-oriented faculty development strategy, by setting clear teaching objectives for instructors at various levels in the operating room and combining depth with breadth, not only improves the teaching abilities, research capabilities, organizational management skills, and communication abilities of operating room nursing staff but also transforms the educational concepts of teaching teachers, strengthening their professional and teaching competencies. Therefore, this model is worth promoting and applying widely within the healthcare nursing system.

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Author Contributions

Study Conception and Design: LFH, MHX, XJC. Data Collection: XLD, SLY, HD. Data Analysis and Interpretation: All authors. Drafting of the Article: All authors. Critical Revision of the Article: LFH

Ethical Approval

Ethical issues are not involved in this paper.

Conflicts of Interest

All contributing authors declare no conflicts of interest.

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