

Original Article

Practical value of hierarchical teaching combined with simulation scenario training for operating-room nurses

Min Zhang*, Li Fan*, Yanling Zhou

*Operating-Room of The Second Affiliated Hospital of Soochow University, Suzhou 215004, Jiangsu, China. *Equal contributors.*

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Abstract: Objective: This study explored the application value of combined training by hierarchical teaching with situational simulations for operating-room (OR) nurses. Methods: A total of 41 nurses that received pre-job training for the operating room from January 2018 to December 2019 were selected as the research subjects and randomly divided into a control group and a study group. The control group was given the hierarchical nurse-teaching method, while the study group was given combined training with the hierarchical teaching and scenario simulations. In this study, the operating room capability, clinical work ability, results of theoretical assessment and specialized operation, and nurses' satisfaction with the teaching patterns were compared between the two groups. Results: After training, the scores of the operating-room operations in the study group, such as laying of aseptic towels, surgical hand washing, wearing of surgical gowns and gloves, and the setting up of the operating table, were higher than that in the control group ($P<0.05$). The scores of clinical work abilities in the study group, such as emergency handling ability, standardized operation ability, mastery of professional knowledge, observation and evaluation ability of disease, and clinical thinking ability, were higher than those in the control group ($P<0.05$). The theoretical examination scores and specialized operation scores of nurses in the study group were higher than those in the control group ($P<0.05$). The satisfaction with the degree of teaching methods in the study group was higher than that in the control group ($P<0.05$). Conclusion: The application of the combined training methods of hierarchical teaching with situational simulations for OR nurses can effectively improve their operational and clinical work ability, deepen their mastery of theoretical knowledge, and enable junior nurses to master the professional skills required in the operating room in a faster way, which is worthy of clinical teaching application.

Keywords: Operational ability in the operating-room, specialized operation ability of nurses, teaching mode of scene simulations, hierarchical teaching mode, satisfaction degree

Introduction

With the constant improvement of medical standards, the demand for well educated nurses has greatly increased, and the number of operating-room nurses and other nurses present are also on the rise [1]. Therefore, to best optimize the teaching process and cultivate the best professional quality of operating room (OR) nurses as quickly as possible has become vital in nursing education. In addition, the intense characteristics in operating rooms such as emergencies, strict sterility requirements, and strong specialization also put forward extremely high requirements on the work load of OR nurses [2]. Under the traditional teaching mode, OR nurses are not well trained the abi-

lity to actively think and solve problems and master knowledge, but generally execute medical orders in a mechanical way. They usually cannot adapt quickly in their internship, and often feel scared, nervous or confused, and do not understand the working conditions in the operating room [3]. In order to change the above-mentioned situations of OR nurses and cultivate their best qualities as soon as possible, this study explored the teaching mode of combined training with hierarchical teaching and scenario simulation for implementation of teaching OR work. Meanwhile, the application value of the teaching mode was evaluated to continuously improve the educational methods of clinical nursing, and promote the development of nursing education.

Materials and methods

General materials

A total of 41 nurses who worked in the operating room from January 2018 to December 2019 were recruited as the research subjects and randomly divided into two groups. The control group consisted of 20 nurses, aged between 20-24 years old, with an average age of (21.5±4.3) years old. There were 5 males and 15 females with an educational background of 10 undergraduates and 10 junior college graduates. The study group consisted of 21 nurses, aged between 20-25 years old, with an average age of (21.8±4.2) years old. There were 6 males and 15 females with an educational background of 12 undergraduates and 9 junior college graduates. The general data of the two groups of nurses were comparable ($P>0.05$). This study was approved by the hospital ethics committee.

Inclusive criteria: (1) All nurses held nurse qualification certificates; (2) Nurses in good physical condition; (3) Nurses that completed the whole training process; (4) Nurses who signed the informed consent; and (5) Those who had less than 3 years of working experience.

Exclusive criteria: (1) Nurses who were unable to participate in training, such as applying for leave; (2) Nurses who withdrew from training midway; (3) Nurses who were unwilling to cooperate with the study.

Methods

(1) Hierarchical teaching mode conducted in the control group: the OR nurses were divided into three ranks based on their working years in operating-room, including 12 nurses with 3 years, 4 nurses with 2 years, and 4 nurses with 1 year. In the study, the corresponding teaching and training plans were formulated for the different ranks of each nurse. The instructors were responsible for the organization, implementation and assessment of the training plan, as well as the evaluation of the training effect. The training key for each level was as follows: the operational training for 3-year nurses was mainly focused on new professional training; the theoretical training was primarily focused on surgery-related anatomical knowledge and specialized training. The operational

training for 2-year nurses focused on the nursing cooperation of conventional operations, and theoretical training of conventional operations-related anatomy. The operational training for 1-year nurses included basic operations in operating room, and the theoretical training included basic knowledge and the rules and regulations that work in operating room. The operational and theoretical training for different ranks were carried out and assessed on a monthly basis to clarify the nurses' training effects, any poorly mastered content was strengthened in the follow-up training.

(2) The teaching mode of combined training by hierarchical teaching with scenario simulation was applied in the research group: the hierarchical teaching mode adopted in this group was the same as that of the control group, and the nurses were also trained with the OR scene simulations at the same time. The teaching process was conducted once a month with specific steps as follows: A) Establishment of an expert group that was led by the charge nurse and composed of nurses with years of clinical teaching experience, senior professional qualifications with a bachelor degree or above, who jointly compiled the training materials and medical records. The medical records were based on actual conditions, such as common clinical diseases and surgical operations in the operating rooms were written out. B) The instructor specifically introduced the contents of the medical records before the scenario simulation course, including the disease conditions, precautions, surgical procedures, itinerant preparation, equipment preparation, material preparation, position requirements of patients, surgical methods, anesthesia methods, dissection methods, etc., and allowed the training nurses to discuss these things by themselves. Meanwhile, a realistic work scene that corresponding to the cases was arranged. C) Simultaneous laying out of the aseptic operating table: The instructor repeatedly emphasized the precautions and organization points of the operating table, explained and demonstrated the tools, and the OR nurses practiced under the guidance of the instructor. After practice, the instructor explained and demonstrated any irregularities again to deepen the impression to the OR nurses. D) Scenario simulation of surgical operation: The OR nurses played different roles according to the medical cases, such as

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instrument nurses, itinerant nurses, anesthesiologists, surgeons, patients, etc. The roles were rotated during each scenario simulation, which enabled each OR nurse the experience of each work content for different positions and the importance of surgical team cooperation. The instructors supervised procedures to observe the emergency handling ability, standardized operation ability, mastery of professional knowledge, ability of disease observation and evaluation, and clinical thinking ability of the OR nurses. E) Surgical observation: During the surgery, the OR nurses under training were guided by the instructor for execution of each procedure. Through the explanation by the instructor and the records of the OR nurses, the nurses would have a thorough understanding and memory of the surgery procedures.

Observation of indexes

The operation skills of the two groups were compared. After the training, the operating-room skills in the two groups of nurses were assessed in a unified manner. The assessment covered 5 aspects including: laying of aseptic towel, surgical hand washing, wearing of surgical gowns and gloves, and the setting up of the operating table. The full score of each aspect was 100 points, and a higher the score indicated better operation skills.

The clinical work ability of the two groups was compared. After the training, the clinical work ability of the two groups of nurses was compared in a unified manner. The assessment covered 5 aspects including: emergency handling ability, standardized operation ability, mastery of professional knowledge, disease observations and evaluation ability, and clinical thinking ability, and was conducted through on-site Q & A, written examination and actual procedural operation. The full score of each aspect was 100 points, and a higher the score indicated better clinical work ability [4].

The scores of theoretical assessment and specialized operation of the two groups were compared. Before and after the training, the two groups of nurses were given a theoretical examination and a specialized operation examination, respectively. The training nurses received a theory test written by the instructor and took a closed-book exam. The full score of each aspect was 100 points, and a higher the

score indicated better theoretical knowledge. Evaluating criteria for specialized operations: specialized operation ability of nurses under training were evaluated through the combination of clinical comprehensive ability and simulated surgery and emergency response behavior [5].

The satisfaction of the two groups with the teaching modes was compared. After the training, a self-made satisfaction survey questionnaire was used to investigate the satisfaction of the two groups with the teaching modes. The survey grades were classified into very satisfied, relatively satisfied, and dissatisfied, of which all were evaluated anonymously. The evaluation of the research group regarding teaching mode was analyzed.

Statistical analysis

Data analysis was conducted with SPSS 18.0. The enumeration data were analyzed with the chi-squared test, the measurement was expressed by the mean \pm standard deviation ($\bar{x} \pm sd$), and the t-test was performed by the analysis of variance. Statistical meaning was accepted when $P < 0.05$.

Results

Comparison of operating-room capability between the two groups

The scores of the study group in operating-room capability, such as placement of aseptic towels, surgical hand washing, wearing of surgical gowns and gloves, and the setting up of the operating table were higher than those of the control group ($P < 0.05$), see **Table 1**.

Comparison of clinical work ability between the two groups

The scores of the study group in emergency handling ability, standardized operation ability, mastery of professional knowledge, observation and evaluation ability of disease and clinical thinking ability were higher than those of the control group ($P < 0.05$), see **Table 2**.

Comparison of theoretical assessment and specialized operations between the two groups

The scores of theoretical assessment and specialized operations in the two groups after train-

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Table 1. Comparison of operating-room capability between the two groups (Scores, $\bar{x} \pm s$)

Group	Number of cases	Placement of aseptic towel	Surgical hand washing	Wearing of surgical gowns	Wearing of surgical gloves	Setting up of the operating table
The control group	20	89.2±1.7	85.1±3.4	83.5±2.6	89.1±3.1	87.3±1.5
The research group	21	98.3±1.9	97.6±2.5	97.2±2.7	98.4±2.7	97.4±1.4
T value	/	16.133	13.458	16.536	10.258	22.300
P value	/	0.000	0.000	0.000	0.000	0.000

Table 2. Comparison of clinical work ability between the two groups (scores, $\bar{x} \pm s$)

Group	Number of cases	Emergency handling ability	Standardized operation ability	Mastery of professional knowledge	Observation and evaluation ability of disease	Clinical thinking ability
The control group	20	7.2±0.8	7.0±0.9	15.3±1.2	15.3±1.1	15.0±0.9
The research group	21	8.0±0.9	7.8±0.7	17.2±1.2	17.3±1.0	17.3±1.0
T value	/	3.003	3.186	5.068	6.097	7.728
P value	/	0.005	0.003	0.000	0.000	0.000

Table 3. Comparison of theoretical assessment and specialized operation between the two groups (Scores, $\bar{x} \pm s$)

Items	Theoretical assessment		T value	P value	Specialized operation		T value	P value
	Before training	After training			Before training	After training		
The control group	76.4±1.1	85.5±5.5	7.256	0.000	75.3±6.1	81.1±4.8	3.342	0.002
The research group	76.8±1.3	91.3±7.1	9.206	0.000	75.8±6.6	87.4±5.2	6.327	0.000
T value	1.050	2.888			0.252	4.025		
P value	0.300	0.006			0.803	0.000		

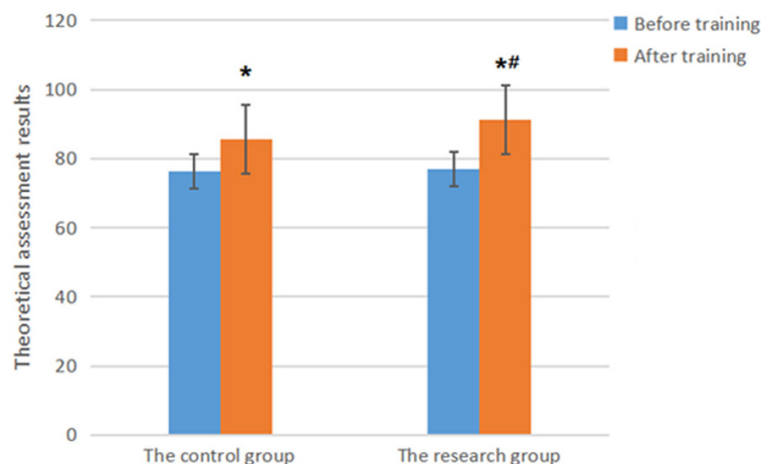


Figure 1. Comparison of theoretical examination results between two groups. (Note: Compared with before training, * $P<0.05$; Compared with the control group, # $P<0.05$).

ing were significantly improved ($P<0.05$), and the scores of theoretical assessment and specialized operations of the research group after training were higher than those of the control

group ($P<0.05$), see **Table 3**; **Figures 1** and **2**.

Comparison of satisfaction rate with the teaching mode between the two groups

The satisfaction rate of the teaching mode in the study group was higher than that in the control group ($P<0.05$), see in **Table 4**.

Analysis on the evaluation of teaching mode by nurses in the research group

The study group had a higher evaluation of the hierarchical teaching mode combined with scenario simulation, and believed that this teaching mode could improve abilities, consolidate theoretical knowledge, and stimulate learning interest. See **Table 5** for details.

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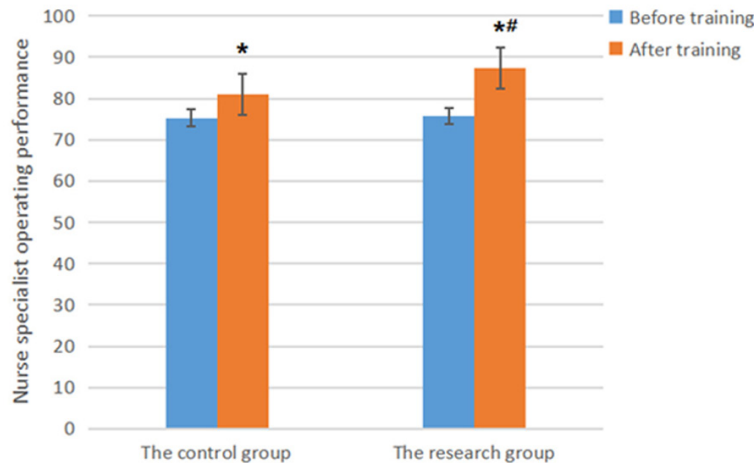


Figure 2. Comparison of specialist scores between two groups of nurses. (Note: Compared with before training, * $P < 0.05$; Compared with the control group, # $P < 0.05$).

Discussion

A hierarchical teaching method can combine teaching and learning to achieve optimization of training effects. The corresponding and necessary theoretical knowledge and operating skills were taught to different ranks of nurses to enable the educational training to occur in a much more clearer way [6]. Through regular hierarchical training, junior nurses gradually transit from the basic theoretical knowledge and operation skills to more masterful higher-level skills, and become more regular in the arrangement and coordination of the operation [7]. Through hierarchical teaching methods, OR nurses in training make steady progress, enrich their theoretical knowledge and operation skills, and improve their abilities, which greatly promote the nursing level in operating room [8-10]. The data shows that after training by hierarchical teaching methods, the theoretical examination scores and professional operation scores of nurses in the control group were significantly improved.

The scenario simulation teaching mode, a bridge between clinical practice and teaching, is an effective way to make up for the shortage of clinical teaching resources. On the basis of the medical record teaching mode, scenario simulation teaching allows OR nurses to conduct simulated training, analyze the case from different positions by assuming different roles to understand the teaching content more de-

ply. Compared with traditional teaching methods, scenario simulation teaching mode provides OR nurses with a simulation practice platform, promotes the understanding and memory of knowledge of skills, and stimulates their interest in learning and theoretical knowledge [11-13]. The hands-on operating room-experience can improve the comprehensive ability of junior nurses, and enable them to combine practice and theory in order to learn and think. Therefore, the scenario simulation teaching mode is an innovative teaching mode [14-16].

The research data showed that the performance, examination results and satisfaction of teaching modes in the study group were higher than those of the control group. The results are similar to those reported by other scholars [17], indicating that the combined training of nurse-teaching methods with scenario simulation made OR nurses at all stages of learning much more skilled at mastering corresponding knowledge and operational skills. Under the guidance of instructors, their ability to analyze and solve problems has improved, and their hands-on and thinking skills have been fully exercised [18]. Under the scenario simulation teaching mode, the OR nurses assumed different roles and experienced different obligations and responsibilities, which was conducive to the cultivation of team spirit; besides, they could experience the pride of self-realization and the joy of solving problems, which inspired their enthusiasm and learning interests. The combined training of hierarchical nurse-teaching with scenario simulation has two-way interactions, which can not only improve the practical ability of nurses, but also deepen the impression of their theoretical level, so that their overall comprehensive ability has been greatly improved [19-22].

However, some deviation may exist in the research results due to the limited sample size in this study. Therefore, future research will expand the sample size to obtain more reliable clinical research conclusions in subsequent studies.

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Table 4. Comparison of satisfaction with teaching mode between the two groups (number of cases, %)

Group	Number of cases	very satisfied	relatively satisfied	dissatisfied	Satisfaction Degree
The control group	20	7 (35.0)	6 (30.00)	7 (35.00)	13 (65.00)
The research group	21	12 (57.1)	10 (47.6)	1 (4.8)	20 (95.2)
X ² Value	/				4.194
P Value	/				0.041

Table 5. Analysis on the evaluation of teaching mode by training nurses in research group (Number of cases, %)

Items	Number of cases	Proportion
Improvement of practical work ability	19	90.5%
Improvement of practical and emergency response ability	20	95.2%
Improvement of problem solving and problem analysis ability	20	95.2%
Consolidation of theoretical knowledge	20	95.2%
Stimulation of learning interest	21	100.0%
Delighted with the teaching mode	21	100.0%

In conclusion, the application of combined training of hierarchical nurse-teaching methods with scenario simulation modes can effectively improve the operation ability and clinical work ability of OR nurses, deepen the mastery of theoretical knowledge, and enable junior nurses to master varied professional skills required in the operating room, better and faster. Meanwhile, the satisfaction of OR nurses with this teaching mode is also high, which makes it worthy of clinical teaching application.

Disclosure of conflict of interest

None.

Address correspondence to: Yanling Zhou, Operating-Room of The Second Affiliated Hospital of Soochow University, No. 1055 Sanxiang Road, Gusu District, Suzhou 215004, Jiangsu, China. Tel: +86-0512-67783883; E-mail: yanlingzhou3425@163.com

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