

# Application of Deliberate Practice-Based Simulated Teaching in Clinical Teaching of Medical Nursing

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## Abstract

**Objective:** To explore the application of Deliberate Practice-based simulated teaching in clinical teaching of medical nursing. **Methods:** 160 undergraduate student nurses were divided into the experimental group (80) and the control group (80) by using the convenience sampling method. Both groups were exposed to staged nurse core competence training. In the control group, standardized patients were employed for training, after which group discussion and oral presentation were included; in the experimental group, teaching was designed based on Deliberate Practice, wherein high-fidelity simulation system was used and video-assisted guiding feedback after training was involved. **Results:** After four teaching cycles, the nurse core competence score of the experimental group was significantly higher than that of the control group ( $P < 0.05$ ). **Conclusion:** Deliberate Practice-based simulated learning can effectively improve clinical teaching performance of medical nursing.

## Keywords

Deliberate Practice, Simulated Teaching, Medical Nursing, Clinical Teaching

## 1. Introduction

Clinical practice teaching is an important link to ensure and improve the competence of medical talents. As the reserve force of the nursing workforce, the clinical competence of student nurses is directly related to patient safety [1]. Nursing clinical competence establishes professional expectations for the nurse role and sets

the template for the development of knowledge, skills, and attitudes needed for practice and the nurse's nursing competence is primarily reflected in the mastery of core competence. The core competency of a nurse refers to the professional ability to engage in nursing work, including knowledge, skills, attitudes, values, etc. It is the most basic and important comprehensive ability of a nurse [2]. Additionally, with the application of "competency-based" theory, core competence of student nurses has attracted great attention [3]. Nevertheless, a research report from China shows that the core competencies of nursing students is currently at a moderately low level ( $123.25 \pm 30.84$ ) [3], which is not in line with the nursing clinical teaching objectives of realizing the "zero-distance" employment for student nurses after graduation.

Recently, the application of Simulation-based Learning (SBL) in clinical teaching of nursing has made great progress and the application of SBL can effectively improve the clinical competence of student nurses [4]. However, there is limited data on the effectiveness of simulation-based training in improving nurse core competence [5]. Rapid Cycle Deliberate Practice (RCDP) is a relatively new simulation-based training method that may be more effective than single-session or single-scenario simulation training [6]. RCDP aims to spend more time on simulation practice [7], which focuses on the rapid acquisition of skills such as operational procedures and teamwork, and creates perfect practice by creating a safety psychology, providing efficient and timely feedback to learners, and cycling between Deliberate Practice and directed feedback [6] [8]. Currently, RCDP has been widely applied in nursing simulation training in foreign countries, but fewer studies have been conducted in China [9] [10]. The impacts of RCDP on the core competencies of nursing students remain unclear. This study will explore how it can be organically integrated and applied to medical nursing clinical teaching, so as to exercise and enhance student nurses' clinical thinking and core competence.

## 2. Materials and Methods

### 2.1. General Information

Student nurses in our hospital were enrolled. Inclusion criteria: 1) understand and voluntarily participate in the whole research process of this project, and sign the informed consent; 2) full-time enrollment of nursing college and undergraduate students; 3) understand the purpose and significance of this project; 4) photography or video recording is allowed during the research process. Exclusion criteria: 1) request to withdraw from the project in the middle of the research; 2) termination of the internship in the middle of the research due to other reasons; 3) participate in other teaching research; 4) questionnaire answering time less than 60s; 5) questionnaire with the same answer  $\geq 80\%$ .

160 nursing students who interned at Affiliated Hospital of Xuzhou Medical University from October 2022 to March 2024 were selected as study subjects. Student nurses from October 2022 to June 2023 were in the control group, and

student nurses from July 2023 to March 2024 were in the experimental group. Using PASS11, the sample size was calculated by comparing the means of independent samples of the two groups. According to the results of the literature [5], the total score of critical thinking ability was used as the index:  $x_{\text{experiment}} = 278.61$ ,  $S_{\text{experiment}} = 5.02$ ;  $\bar{X}_{\text{control}} = 226.57$ ,  $S_{\text{control}} = 4.34$ ,  $\alpha = 0.05$ ,  $(1 - \beta) = 0.2$ , and the experimental group/the control group sample size  $K = 1.07$ . Taking into account the 10% lost visit rate, it was calculated that  $n = 80$ . This study had been approved by the Ethics Committee of our hospital (No. XYFY2024-KL380-01).

## 2.2. Method

The training was arranged uniformly by the nursing department. Training programs for both groups included nursing for patients with septic shock, nursing for digestive patients, nursing for respiratory patients, and nursing for nephrology patients, a total of 4 cases, 2 class hours per case, a total of 8 class hours. The teaching frequency of both groups was one case per week.

### 2.2.1. Experimental group

RCDP-based simulated teaching strategy was employed.

#### 1) Teaching design

With reference to the competency requirements of the Competency Inventory for Registered Nurses (CIRN) [11], a simulated teaching case for medical nursing was developed in accordance with the clinical nursing thinking process. In this paper, septic shock was used as an example and was divided into three progressive simulation scenarios as the condition evolved, and structured teaching objectives were designed, as shown in **Table 1**. In accordance with the Deliberate Practice, we provide four cycles of nurse core competence case training for student nurses. In order to minimize observation errors, two camera positions were used to film the training process of student nurses.

**Table 1.** Septic shock simulated learning objectives.

Simulated scene	Learning objectives
Scene 1	1) Infer the possible clinical diagnosis and causes of the patient based on the patient's clinical manifestations and history; 2) Systematically assess the patient, determine the patient's existing or potential health problems, and identify the first priority problems and prioritize the nursing measures to be taken; 3) Develop the nursing care plan for patients with septic shock.
Scene 2	1) Select appropriate nursing measures according to the patient's condition changes; 2) According to the different stages of the patient's condition changes, make correct clinical decisions, cooperate with team members, take appropriate nursing measures, correctly carry out intravenous infusion, oxygen inhalation, cardiac monitoring and other nursing operations; 3) Respect the patient, pay attention to protect privacy, give humanistic care, and reflect the professional quality.
Scene 3	1) Clarify the patient's existing nursing diagnosis; 2) Evaluate the effectiveness of nursing measures by assessing changes in vital signs and other important indications.

## 2) Teaching facilities

Standardized wards and high-fidelity simulation system were essential, corresponding items prepared according to different teaching cases.

## 3) Teaching team

The teaching team consisted of teaching nurses from clinical related departments and full-time teachers from the School of Nursing. Pre-teaching training included: a) clarify the simulated teaching concept, process, and the role of the instructor; b) set teaching objectives; c) optimize the teaching methods for the next course based on the feedback during the research process; d) input the case information into the system by the back-end maintenance instructor, run and debug the cases to ensure the smoothness of the teaching.

## 4) Pre-feedback training

Before training, the tutors briefly introduced the usage and functions of the high-fidelity simulation humans to the student nurses. Each group contained 4 - 6 student nurses, who participated in a 30-min teamwork training session on septic shock cases, with 5 min used for preparation of supplies.

## 5) Guiding feedback

In each simulation training, the tutors provided targeted guiding feedback based on the real-time performance of the student nurses and their performance in the video, with a minimum of 30 min for each team. By watching the video, the student nurses comprehensively reflected on their behaviors in the simulation, including operational skills, teamwork skills, communication skills, and the ability to translate knowledge into clinical practice. Tutors asked open-ended questions during the guiding feedback stage, and based on the results of the core competency assessment, they modified the content of the next lesson or guiding, such as adding: a) evidence-based nursing and research; b) legal and ethical practice; c) education, counseling, and other nurse core competency-related sections of guiding lectures.

## 6) Post-feedback training

After the video feedback, student nurses were immediately retrained for 30 min. One week later, the next case training was conducted, with a total of 4 cases in 4 weeks. At the end of each training session, the student nurses were given timely feedback.

### **2.2.2. Control**

Problem-Based Learning (PBL) was used for traditional case teaching. Feedback consisted of oral discussions and group presentations by the student nurses around the questions posed by the teacher, with guidance from the teacher. Teachers assigned the case, task requirements, and thinking questions to the student nurses in advance. Before teaching, they introduced the case, learning objectives, content, process, and timetable (2 h) to student nurses, familiarized the student nurses with the simulated ward's equipment and items, and organized the student nurses to carry out the role assignments. A total of four cases were

in four weeks.

### 2.2.3. Evaluation method

#### 1) Competency Inventory for Registered Nurses (CIRN)

The CIRN was developed by Liu Ming [11] based on the “nurse core competence framework” published by ICN in 2003 and using qualitative research methodology in conjunction with the characteristics of the nursing profession in China. It comprised 55 items in seven dimensions, including critical thinking and research (8 items), clinical nursing (10 items), leadership (9 items), interpersonal relationship (8 items), ethics and legal practice (8 items), professional development (6 items), and educational consultation (6 items). The Cronbach’s coefficient of CIRN was 0.908, which had a good reliability. The result was scored on a Likert 5-point scale, with 0—complete lack of ability; 1—a little competence; 2—some competence; 3—sufficient competence; 4—significant competence. The total score of the scale ranged from 0 to 220, with the higher scores indicating the stronger the core competence. The results were categorized into three levels according to the scores: high—mean score  $>3$  or total score between 166 and 220; medium—mean score between 2 and 3 or total score between 110 and 165; and low—mean score  $<2$  or total score  $<110$ . Student nurses were assessed by a questionnaire at the time of enrollment, and after the first, second, third and fourth teaching sessions.

2) Student nurses completed a basic information questionnaire to collect information on gender, age, and intern period at the time of enrollment.

### 2.2.4. Statistical Analysis

SPSS 27.0 was employed for data processing. Measurement data that satisfy normal distribution were represented by mean  $\pm$  SD ( $\bar{x} \pm s$ ), and t-test was used for comparison between two groups. Measurement data that do not satisfy normal distribution were represented by median (interquartile range, IQR), and non parametric test was used for comparison between two groups; The count data was described using frequency, rate, and composition ratio. The comparison between two groups was performed using  $\chi^2$  test, with a test level of  $\alpha = 0.05$ , and  $P < 0.05$  denoted statistically significant difference.

## 3. Results

### 3.1. Baseline Information of the Two Groups

The two groups each excluded 2 invalid questionnaires, and collected 78 valid questionnaires. The age, gender, education, intern period of the two groups had no statistically significant differences ( $P > 0.05$  in all cases), as shown in **Table 2**.

### 3.2. Core Competence of the Two Groups

The core competence of the two groups of the nurse are shown in **Table 3**.

**Table 2.** General information of the two groups.

Group	Sample size	age (years old, $\bar{x} \pm s$ )	gender		education		intern period			
			M	F	Bachelor	junior college graduate	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
control group	78	20.31 $\pm$ 1.036	21	57	19	59	20	21	11	26
experimental group	78	20.33 $\pm$ 1.040	22	56	22	56	19	21	10	28
$t/\chi^2$		-1.54	0.032		0.298		0.147			
<i>P</i>		0.878	0.858		0.585		0.986			

Note: *a*: 3- ( $\leq$ ) 6 months; *b*: 6- ( $\leq$ ) 9 months; *c*: 9 - 12 ( $\leq$ ) 12 months; *d*: 9 - 12 ( $\leq$ ) 12 months.

**Table 3.** The nurse core competence scores of the two groups before and after teaching ( $\bar{x} \pm s$ ).

Group	Sample size	Before teaching	After first teaching	After second teaching	After third teaching	After fourth teaching
control group	78	121.96 $\pm$ 16.59	122.18 $\pm$ 16.60	124.03 $\pm$ 16.83	126.76 $\pm$ 15.73	129.41 $\pm$ 13.89
experimental group	78	122.46 $\pm$ 16.59	123.95 $\pm$ 16.93	128.12 $\pm$ 14.47	134.92 $\pm$ 17.28	140.39 $\pm$ 13.95
<i>t</i>		-0.188	-0.659	-1.628	-3.068	-4.855
<i>P</i>		0.851	0.551	0.106	0.002	<0.001

#### 4. Discussion

The results of this study showed that at the time of enrollment, the mean CIRN total score of the two groups was at a moderately low level (121.96  $\pm$  16.59 vs 122.46  $\pm$  16.59), with no statistically significant differences ( $P > 0.05$ ), which was comparable. This was consistent with previous studies [3]. The results indicated that after theoretical study in school and clinical practice in hospitals for a period of time, the student nurses had a certain level of core competence, but the level of core competence was somewhat lower than the reported upper middle level of the newly recruited nurses [12] (154.22  $\pm$  17.15), suggesting that there was a need to strengthen the training of student nurses' core competence to meet clinical needs.

The CIRN scores of the two groups after intervention were improved at all time points compared to the pre-intervention period, indicating that both RCDP and PBL were effective strategies. However, since the third teaching session, the RCDP scores were significantly better than those of the control group, with statistically significant differences ( $P = 0.002$ ), suggesting that RCDP method was more helpful in improving learning outcomes. Karageorge *et al.* [6] reported that compared with the control group, four sessions of RCDP could effectively improve the professional knowledge, confidence and clinical teamwork collaboration performance scores of pediatric ICU nurses. Cory *et al.* [13] found that the use of RCDP among pediatric residents could effectively enhance their confidence in the management of septic shock patients, which was consistent with the present study. Tucker *et al.* [14] reported that compared with a single training session, RCDP did not enhance student

nurses' self-efficacy, which was inconsistent with the results of the present study and may be related to the use of RCDP more frequently in the present study.

In this study, the control group used PBL, which was a widely used teaching method internationally, aiming to exercise student nurses' analytical ability and clinical thinking ability, whereas students and tutors lacked enthusiasm when using it [5]. The experimental group strictly followed the RCDP theory for teaching design, set up clear structured objectives, adopted objective evaluation methods, conducted staged training under the guidance of tutors, provided timely feedback, and allowed participants to repeatedly hone their skills in progressive simulation scenarios to gradually improve student nurses' nurse core competence, so that the competence acquired in a specific environment could be consolidated and further transferred to a new environment.

Additionally, RCDP is more effective than PBL in improving student nurses' learning efficiency, possibly due to the following reasons: first, the principle of increasing difficulty. RCDP breaks down training objectives into several relatively independent sub-objectives with increasing difficulty according to their professional characteristics, and improves the performance of nurse core competence by modifying situational factors and controlling professional behaviors and thinking [9], so that student nurses are able to perform the whole simulation situation completely and correctly step by step. Second, based on the principle of feedback and safety in real-time simulation with objective evidence, the operation of student nurses may be interrupted or paused several times during the simulation without negative connotations in order to give immediate feedback, which creates a safe learning atmosphere that is more "guided" than "tested", and the students will gradually become relaxed and look forward to simulation pauses and real-time feedback. Also, the RCDP group uses video-assisted feedback, in which student nurses can identify problems with their personal and subconscious behaviors from a third-party perspective, which facilitates the establishment of correct mental representations that can be transferred to new situations [5].

## 5. Conclusion

In this study, the teaching design is based on the RCDP theory. By comparing the effects of PBL and RCDP on nurse core competence in the medical nursing practical course, it is concluded that the RCDP strategy can improve the core competencies of internal medicine intern nursing students, and thus this strategy is conducive to improving the teaching quality and effect of the medical nursing practical training course. However, there are issues with this study being limited to single center research and lacking in teaching cases, which require further refinement of the cases and validation across multiple centers.

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## Conflicts of Interest

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

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