Application of Virtual Reality Teaching Combined with Flipped Classroom in Clinical Nursing Teaching - A Case Study of Junior Nurses in Cardiac Surgery

Wang Yuan, Teng Yajuan* , Ma Yaya, Ji Cui
Shaanxi Provincial People's Hospital, Xi'an, Shaanxi, China
**Corresponding Author.*

Abstract: Objective: To observe the effect of virtual reality teaching combined with flipped classroom in clinical nursing teaching for junior nurses in cardiac surgery. Methods: A total of 70 junior student nurses in the cardiac surgery department of our hospital from January to December 2024 were selected as research objects and randomly divided into two groups (control group and observation group, 35 cases each). The control group received nursing teaching in a conventional mode, while the observation group carried out nursing teaching with virtual reality combined with flipped classroom. The theoretical knowledge, practical skill assessment levels, and teaching evaluation of the two groups were compared. Results: After teaching, the theoretical and practical knowledge levels of the observation group were higher than those of the control group (P<0.05). In terms of teaching evaluation, the scores of the observation group in all dimensions were higher than those of the control group (P<0.05). Conclusion: The application of virtual reality teaching combined with flipped classroom in clinical nursing teaching for junior nurses in cardiac surgery can improve nurses' mastery of various theoretical knowledge and enhance teaching evaluation.

Keywords: Virtual Reality Teaching; Flipped Classroom; Clinical Nursing Teaching; Junior Nurses In Cardiac Surgery

1. Introduction

Clinical nursing teaching plays an important role in helping nurses apply various nursing theoretical knowledge to practical clinical nursing work. Cardiac surgery is one of the most important departments in the hospital. The patients admitted usually have severe conditions and long treatment cycles. In the process of nursing these patients, it is necessary to accurately provide various nursing support according to the characteristics of their diseases[1-2]. In the process of nursing training for junior nurses in cardiac surgery, it is more important to adopt effective clinical nursing teaching methods to help them better master various nursing skills[3-4]. This study mainly observes the effect of virtual reality teaching combined with flipped classroom in clinical nursing teaching.

2. Materials and Methods

2.1 General Data

A total of 70 junior student nurses in the cardiac surgery department of our hospital from January to December 2024 were selected as research objects and randomly divided into two groups (control group and observation group, 35 cases each). The control group received nursing teaching in a conventional mode, while the observation group carried out nursing teaching with virtual reality combined with flipped classroom. In terms of the composition of student nurses, the control group included 2 males and 33 females, aged between 20 and 23 years, with an average age of (21.22±0.45) years. The observation group included 1 male and 34 females, aged between 19 and 24 years, with an average age of (21.67±0.97) years. There was no significant difference in the basic data between the two groups (P>0.05).

2.2 Methods

The control group adopted the conventional mode for nursing teaching. The teaching teachers formulated teaching plans according to the teaching syllabus and guided nurses to preview various knowledge in advance before explaining theoretical knowledge. Teachers carried out teaching by combining centralized lectures with simulated practical operations.

The observation group adopted virtual reality teaching combined with flipped classroom.

(1) Preview stage: Before each formal class, nurses need to be guided to study in advance using various learning materials (electronic materials or books). Teaching teachers assign preview tasks for students and instruct them to keep relevant records during preview.

(2) Classroom learning stage: Before formal classroom explanation, teachers need to guide students to review the knowledge learned during preview to help them sort out various key points. Then, virtual reality technology is used to provide clinical simulation scenarios for nurses, and cases matching the course knowledge are selected for teaching. Students are guided to timely apply various theoretical nursing knowledge to practical nursing operations. After completing the virtual simulation training, nurses are instructed to discuss with each other and summarize the problems encountered in practical operations or nursing skills.

(3) After-class stage: After the course, nurses are guided to independently review the various knowledge learned in class. If there are any doubts or incomprehensible contents during the review, they can timely seek online help from teaching teachers to facilitate teachers to answer them promptly. At the same time, students are encouraged to actively participate in relevant online or offline seminars to promote their in-depth understanding of various nursing knowledge and broaden their horizons.

2.3 Observation Indicators

(1) Comparison of theoretical and practical operation abilities: The theoretical and practical operation assessment scores of the two groups of student nurses were counted before and after teaching, both evaluated on a 100-point scale.

(2) Teaching evaluation: After the completion of internship teaching, the junior nurses of both groups were instructed to evaluate the clinical teaching, including four dimensions: improving collaboration ability, improving operation ability, stimulating learning enthusiasm, and improving problem analysis and solving ability. All were scored on a 100-point scale, with higher scores indicating better teaching effects.

2.4 Statistical Methods

All relevant data in the study were analyzed using SPSS 25.0 software. Measurement data were expressed as mean ± standard deviation ($\bar{x}\pm s$) and tested by t-test. Count data were expressed as % and tested by χ^2 test. A P value of <0.05 was considered statistically significant.

3. Results

3.1 Comparison of Theoretical and Practical Knowledge Levels

After teaching, the theoretical and practical knowledge levels of the observation group were higher than those of the control group (P<0.05), as shown in Table 1.

Table 1. Comparison of Theoretical Knowledge Level and Practical Operation Ability Between the Two Groups ($\bar{x}\pm s$)

Group	Number of Cases	Theoretical knowledge level		Practical operation ability	
		Before teaching	After teaching	Before teaching	After teaching
Observation	35	78.22±2.25	93.45±2.05	74.36±2.58	94.11±1.68
Control	35	79.15±2.35	84.35±2.52	74.25±2.45	84.05±1.45
t	-	1.587	21.425	1.728	13.088
P	-	0.625	<0.001	0.515	<0.001

3.2 Comparison of Teaching Evaluation

In terms of teaching evaluation, the scores of the observation group in all dimensions were higher than those of the control group (P<0.05), as shown in Table 2.

Table 2. Teaching Evaluation of the Two Groups ($\bar{x}\pm s$)

Group	Number of Cases	Improving collaboration ability	Improving operation ability	Stimulating learning enthusiasm	Improving problem analysis and solving ability
Observation	35	92.11±2.02	91.22±2.63	90.12±2.36	89.11±2.25
Control	35	82.68±2.15	80.58±2.74	82.25±2.45	81.05±2.35
t	-	24.252	26.774	27.045	14.152
P	-	<0.001	<0.001	<0.001	<0.001

4. Discussion

Patients in cardiac surgery usually have severe conditions and long hospital stays. Accurately carrying out relevant nursing work for these patients is of great significance for helping patients recover and improving the overall quality and effect of clinical medical treatment. In the process of carrying out clinical nursing teaching for junior nurses in cardiac surgery, it is necessary to innovate the teaching plan on the basis of the traditional teaching mode to help junior nurses more accurately master various nursing knowledge and successfully apply it to clinical nursing.

Virtual reality teaching combined with flipped classroom is a new scheme in current clinical nursing teaching. By using virtual reality technology to assist teaching, it can provide virtual teaching scenarios for junior nurses, facilitating them to more intuitively grasp various nursing knowledge and practically apply various theoretical knowledge in simulation training, thus deepening their mastery of various nursing knowledge in cardiac surgery[5-6]. According to this observation, under the effect of clinical nursing teaching with virtual reality combined with flipped classroom, the theoretical and practical assessment scores of the observation group were higher than those of the control group, indicating that this teaching mode can improve the effect of clinical nursing teaching. At the same time, further enhancing the integration of theory and practice teaching based on this mode and using virtual reality technology to assist teaching can more effectively improve teaching effects and increase junior nurses' evaluation of clinical nursing teaching.

In conclusion, the teaching mode of virtual reality combined with flipped classroom can be carried out in the clinical nursing teaching of junior nurses in cardiac surgery to improve teaching effects.

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