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Brief report

Effect of Simulation-Based Debriefing on Nursing Students' Competence in Medication Administration: An Experimental Study

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Abstract

Background: Medication error represents one of the parameters of patient safety.
Objectives: The aim of present study was to investigate the effect of the effect of simulation-based debriefing on adherence to correct principles and medication administration competence in nursing students.
Methods: Internship nursing students entered this experimental study using the census method. Afterward, the participants were assigned to intervention (n=18) and control (n=17) groups. Two methods were employed for data collection, namely observation and self-report questionnaires. The collected data were analyzed using STATA software (version 12) and non-parametric statistical tests.
Results: A significant statistical difference was found between the mean scores of adherence to correct principles of medication administration and medication administration competence before, 2, and 5 weeks after the simulation in the intervention group (P=0.0001).
Conclusion: The results revealed that the simulation-based debriefing improved the nursing students' competence in medication administration. Therefore, this method in various groups of students and a clinical and practical environment is highly recommended for other students in clinical settings.
Keywords: Students, Nursing, Medication Errors, Simulation Training

Background

Nurses allocate more than 40% of their working hours to medication administration (1). Nursing students are likely to commit medication errors due to a lack of adequate experience in clinical settings (2). The findings of studies indicated that 16.4-58.1% of nursing students committed medication errors (1, 3). Therefore, medication administration is part of the training program and different sections of the nursing curriculum (4). Currently, due to numerous educational topics and limited time, professors are more inclined to teach in the traditional way, especially lecturing (5). However, it is a complicated process, a combination of skills in pathophysiology, pharmacology, and pharmaceutical calculations (6).

Simulation can be characterized as the pilot experience of learning, which ameliorates training programs (7). Simulation-based debriefing lets the learners get immediate feedback relevant to their specific learning needs (8). For ensuring a successful simulation process and learning experiences, the educator is to provide a situation in which learners would be supported (9) and allowed to share their experiences (7).

Objectives

Accordingly, considering the likelihood of medication errors made by nursing students and the necessity to raise adherence to correct principles of medication administration, this study was designed and conducted.

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Methods

This experimental study was carried out on 43 internship nursing students of Kurdistan University of Medical Sciences, Kurdistan, Iran, within September 2019 to February 2020. The study subjects were selected through the census method and then allocated to the intervention or control groups, randomly. The inclusion criteria were passing theoretical and practical pharmacology courses, lack of experience of attending individual simulation about medication errors, and informed consent. The exclusion criteria were reluctance to continue participating, failure to cooperate in simulation-based debriefing, and failure to answer all Tthe questionnaire's items. wo methods of observation and self-report questionnaires were employed for data collection. The observation method included a 10-item checklist designed based on previous studies (10, 11). The self-report questionnaire of medication administration competence in clinical practice, designed by Johansson et al., contains 37 items scored according to the Likert scale (1=strongly disagree to 5=strongly agree) (12).

First, the nursing students completed the self-report questionnaire; then, the researcher completed the checklist observing the students administrating medicine in the skill laboratory and 2 and 5 weeks after the initial completion in clinical practice course. The face and content validity of the checklist and questionnaire was confirmed. The Cronbach's alpha coefficient of the questionnaire was 0.71, and the intraclass correlation coefficient of the checklist was 0.75.

In the control group, the students were required to administer the medication according to a scenario. Meanwhile, the researcher completed the checklist. In the intervention group, the students were required to do the medication administration according to the same scenario. Meanwhile, the researcher completed the checklist; then, the intervention occurred. At each step of the simulation-based debriefing, the student completed each medication administration step, and if it was wrong, the lecturer posed some questions and led the student to do the correct way. Debriefing was continued until the student's learning was completed. The participants in the control group had the opportunity to benefit from a similar intervention at the end of the study.

The collected data were analyzed by STATA software (version 12) using the Mann-Whitney U test, repeated measures analysis of variance, Chi-square test, and Fisher's test.

Results

The mean age of participants was was 23.9±2.79 years in the intervention and 22.47±0.71 years in the control group. Most participants were female (66.67% and 58.82% in the intervention and control groups, respectively). The study results indicated that the two groups were homogenous in terms of demographic characteristics (e.g., age, gender, and marital status) and medication administration competence before the intervention. (P>0.05).

After the intervention, a significant difference was found between the two groups in the mean score of medication administration competence in the self-report method after 2 (P=0.0001) and 5 (P=0.0001) weeks (Table 1). After the simulation-based debriefing in the observation method, there was a statistically significant difference regarding adherence to the correct principles of medication administration between the two groups in 2 (P=0.0001) and 5 (P=0.0001) weeks (Table 2).

Table 1. Comparison of Adherence to Correct Medication Administration Principles in Self-report Method and Its Dimensions in Intervention and Control Groups

Variable	Time / Group	Before Mean(SD)	2 weeks Mean(SD)	5 weeks Mean(SD)	P*
Theoretical knowledge	Intervention	28.38(4.25)	34.22(3.70)	34.50(3.56)	0.001
	Control	27.35(4.49)	26.58(4.56)	26.58(4.56)	0.04
	P**	0.42	0.001	0.001	
Assessment and decision-making	Intervention	38.00(16.37)	47.05(4.06)	47.83(4.09)	0.001
	Control	37.70(6.86)	36.76(6.51)	36.76(6.51)	0.04
	P**	0.94	0.001	0.001	
Practical skills	Intervention	19.00(3.34)	25.50(12.96)	22.83(1.38)	0.01
	Control	18.00(4.38)	17.41(4.13)	17.41(4.13)	0.004
	P**	0.58	0.001	0.001	
Medication safety	Intervention	21.44(5.74)	35.00(5.15)	40.11(4.57)	0.001
	Control	23.47(12.28)	23.05(11.98)	23.35(12.92)	0.36
	P**	0.71	0.003	0.001	
Medication competence in clinical practice	Control	106.52(14)	103.82(13.33)	104.11(13.69)	0.008
	Intervention	106.83(15.22)	141.77(15.72)	145.27(9.27)	0.001
	P**	0.76	0.001	0.001	

SD, standard deviation
* Repeated measures analysis of variance
** Mann-Whitney U test

Table 2. Comparison of Adherence to Correct Medication Administration Principles in Observation Method in Intervention and Control Groups

Variable	Time / Group	Before Mean (SD)	2 weeks Mean (SD)	5 weeks Mean (SD)	P*
Correct principles of medication administration	Control	17.47(1.58)	18.88(6.14)	18.64(5.20)	0.31
	Intervention	16.77(2.12)	10.05(0.23)	10.00(0.00)	0.001
	P**	0.346	0.001	0.001	

SD, standard deviation
* Repeated measures analysis of variance
** Mann-Whitney U test

Discussion

The current study results revealed that the simulation-based debriefing was effective in improving the evaluation and decision-making aspects of medication administration competence. The effectiveness leads to higher self-confidence of students, improvement in clinical judgment, problem-solving ability, and correct decision-making (13). Simulation-based debriefing has been effective by providing an opportunity for discussion. Poor practical skills are among the causes of medication errors (14). In the simulation method, by taking care of a model or a simulator, the students receive feedback, and they observe it directly while experiencing it (15). Accordingly, students will be provided with an opportunity to practice a procedure several times (16). The fact that simulation-based debriefing contains questions and answers and instructs correct performance to the students causes a rise in patient safety and medical side effects reporting.

In a study conducted by Marvell et al., 59.5% of participants in the intervention group had a higher rate of medication administration competence (10). In comparison to traditional methods, simulation equips students with more realistic practices (17). Moreover, the properties of simulation-based debriefing have positive effects on students' skills and provide a conducive environment for learning the correct principles of medication administration.

Study Limitations

Receiving education from other ways except simulation-based debriefing is one of the limitations of this study. Furthermore, the current study was carried out on only intern students of one class.

Conclusion

The findings of the current indicated the effects of education using simulation-based debriefing on adherence to correct principles and medication administrative competence as the students who have been taught by this method achieved higher scores in comparison to the students who have been taught by the routine method.

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Conflict of Interests: The Authors declares that there is no conflict of interest.

Ethical Approvals: This study is adapted from the first author's master's dissertation that was approved by Kurdistan University of Medical Sciences ethics board under the no.IR.MUK.REC.1398.056, with the informed consent obtained from the participants.

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