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The effects of teaching by using standardized patients on critical care nurses' clinical decision making

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ABSTRACT

Aims: Patients' unstable clinical conditions require critical care nurses to be competent decision makers. Standardized patient is a new teaching strategy which can enhance nurses' decision making ability. The purpose of this study was to examine the effects of teaching by using standardized patients on critical care nurses' decision making ability.

Methods: This two-group pretest-posttest quasi-experimental study was conducted in 2014. The study setting was ShahidKamyab and Imam Reza Hospitals, Mashhad, Iran. These two hospitals were randomly allocated to either control or experimental groups. Then, several intensive care units were randomly selected from each hospital. Nurses were recruited from the selected units. In total, 58 nurses were studied. The study intervention consisted of educations about clinical decision making. Educations in the control and the experimental groups were provided by using the lecture and the standardized patient strategies, respectively. Nurses' clinical decision making ability was evaluated both before and 45 days after the study intervention by employing the Participation Decision Activity Questionnaire. The study data were analyzed by using the SPSS16 the statistical tests of paired- and independent-samples t, Chi-square, Mann-Whitney, and Wilcoxon.

Results: Before the intervention, the means of the three steps of decision making in the experimental group (32.1±10.2, 33.4±9.3, and 32.1±9.7, respectively) did not differ significantly from the control group (31.1±7.8, 32.2±6.4, and 31.4±6.5 respectively). However, after the study, the differences between these groups regarding the means of the three steps of decision making were statistically significant ($p<0.001$). Moreover, in the experimental group, the pretest-posttest mean differences of the three steps of decision making (17.6±7.9, 18.07±7.5, and 19.1±8.1, respectively) were significantly higher than the control group (3.8±4.2, 4.0±2.9, and 5.6±3.5, respectively; $p<0.001$).

Conclusions: Teaching through standardized patients can significantly enhance nurses' clinical decision making ability. This strategy can be used for developing in-service continuing education programs and improving nurses' clinical decision making ability.

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1. Introduction

Complex clinical situations and rapid changes in patients' hemodynamic status in critical care units require nurses to be competent decision makers [1]. Critical care nurses need to support and protect patients and make right decisions and judgments in high-pressure critical situations [2].

Clinical decision making (CDM) consists of strategies which help patients move toward optimum condition. These strategies are identifying and confirming a problem, remembering and assessing possible solutions, and selecting and adopting the best solutions [3]. Critical care nurses participate in making different clinical decisions such as selecting the best mechanical ventilation mode, prescribing 'as needed' sedatives, analgesics, and intravenous fluids [4], discharging patients [5], weaning from mechanical ventilation [2 and 6], as well as making end-of-life decisions [7]. Previous studies have confirmed that nurses' right and timely decisions facilitate patients' recovery and cut healthcare costs while their unwise and untimely decisions prolong and disrupt the process of care delivery and recovery [8 and 9]. Thompson et al. (2013) reported that 34% of adverse events which happen to patients in England are related to nurses' wrong decisions. Moreover, they reported that 6% of patients which experience such events develop permanent disability and 8% of them die while half of such deaths can be prevented by making right and timely decisions by nurses [10].

Despite the growing appreciation of the necessity for including CDM in nursing curriculum, effective educational interventions have not been developed and implemented for promoting nursing students and nurses' CDM [11]. Consequently, CDM currently does not have a superior status in the profession of nursing [12 and 13]. Previous studies have also reported that nurses are not competent enough in decision making, problem-solving, and doing psychomotor activities [14 and 15]. Studies conducted in our country, Iran, have also shown that nurses' CDM skills are poor to moderate [8 and 16–18].

Educating nursing staffs about different aspect of care delivery is inevitable and important to professional practice [19]. According to the new learning theories, learning happens when learners actively participate in the process of learning. JaniGhorbani et al. (2013) and Conrick (2000) noted that appropriate teaching methods are needed for helping learners eagerly and actively participate in learning activities [20 and 21].

One of the strategies for enhancing nurses' and nursing students' CDM and critical thinking abilities is simulation [20]. Simulation is a technique or a means for creating the characteristics of real phenomena and is designed for showing processes, decision making, and critical thinking. In fact, simulation is not limited to using mechanical simulators such as mannequins and computer simulators; rather, teaching methods such as role playing, scenarios, case study, and standardized patient are examples of simulation [22].

Standardized patients are healthy people who have been trained to play the role of a patient according to the standards of the intended disease. Moreover, real patients also can be employed as standardized patients. Accordingly, they are trained to role-play their own health problems according to standards [23]. Teaching by using standardized patients improves learners' problem-solving, clinical judgment, and critical thinking abilities [22]. As critical thinking is a prerequisite to CDM [12 and 24], standardized patients can be employed in educational programs in the area of critical nursing [22].

The findings of the previous studies regarding the effectiveness of simulation-based teaching are conflicting. For instance, Sadeghnezhad et al. (2014) reported that mannequins enhanced

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nursing students' CDM while Lotfi et al. (2010) found that simulation did not have any significant effect on operating room students' CDM ability [25 and 26]. Maneval et al. (2012) also found that CDM and critical thinking scores of nurses who had been taught by using standardized patients was not significantly different from the scores of nurses in the control group [27].

Evidence regarding the effectiveness of simulation-based teaching methods is inadequate and therefore, conducting further studies for producing conclusive evidence is necessary [21 and 28]. Given the importance of nurses' right and timely decision making, this study was conducted with the aim of examining the effects of teaching by using standardized patients on critical care nurses' CDM ability.

2. Methods

This study was conducted in 2014 by using a two-group pretest-posttest quasi-experimental design. The study population comprised all nurses working in the intensive care units of ShahidKamyab and Imam Reza Hospitals, Mashhad, Iran. We randomly allocated the nurses of each of these two hospitals to either the control or the experimental groups. This type of randomization was used for preventing the contamination of nurses in the control hospital with trainings provided to nurses in the experimental hospital. Then, eligible nurses were recruited from each hospital. The selection criteria included having a Bachelor's degree or higher in nursing, being a critical care staff or head nurse, having a work experience of six months or higher in critical care nursing, and not having participated in previous educational programs on CDM.

Study sample size was calculated by using a confidence interval of 0.95, a power of 0.8, and the formula of 'determining sample size for comparing the means of two independent populations'. Initially, a pilot study was done on 20 nurses (ten nurses in each group) and its results were used for sample size calculation. As the decision making process has three main components (identifying and confirming a problem, remembering and assessing possible solutions, and selecting and adopting the best solutions), the means and the standard deviations of these three components were used and three sample size values were calculated. The highest sample size value was equal to four which was related to the third component, i.e. selecting and adopting the best solutions. However, we recruited 30 nurses to each group in order to maintain the credibility of the findings. Two nurses from the experimental group withdrew from the study.

A demographic questionnaire and the Participation Decision Activity Questionnaire (PDAQ) were used for data collection. The PDAQ assesses nurses' participation in the aforementioned three steps of CDM. This questionnaire comprises twelve scenarios accompanied by twelve questions. If a respondent chooses the 'Yes" answer, the score of the question will be equal to zero. However, if the 'No' answer is chosen, the respondent needs to refer to an embedded table about the steps of CDM pertaining to the described scenario. The table of each scenario consists of three possible reactions to the described scenario. Reactions are scored on a six-point scale from 0 (Never) to 5 (Always). Accordingly, the score of each step of decision making is 0–5. The scores of each step are summed and finally, three distinct total scores-one total score for each step-are obtained. The total score of each step ranges from 0 to 60. Scores of 0-20, 21-40, and 41-60 are interpreted as respectively weak, moderate, and meaningful participation in CDM.Ten faculty members were invited to assess and confirm the validity of the PDAQ. The questionnaire was amended according to their comments. Then, the reliability of the questionnaire was evaluated by assessing its internal consistency. Consequently, ten critical care nurses were

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asked to complete it. The Cronbach's alpha was equal to 0.89.

The educational simulation scenarios for the study were developed through interviewing critical care nurses and head nurses and based on the most prevalent conditions among patients hospitalized in intensive care units (i.e. agitation and respiratory distress). The validity of the scenarios was confirmed by seven specialists in medical education and critical care. A similar educational content was developed for both groups based on the CDM resources.

After obtaining formal approval from the Ethics Committee of Mashhad University of Medical Sciences, Mashhad, Iran, as well as letters of introduction and permission from the Research Council of Mashhad Faculty of Nursing and Midwifery, we referred to the study setting for conducting the study. We initially explained the aim of the study to the participants, guaranteed the confidentiality of their data, and asked them to provide written informed consent. Then, the PDAQ and the demographic questionnaire were completed by the participants and the pretest was done. Nurses in the control group received educations in a two-hour session. Educations included of the definition, importance, and steps of CDM as well as examples from the developed scenarios which were provided by using the lecture and the question-and-answer methods. Then, nurses were invited to ask their probable questions about the provided educations. On the other hand, a six-hour educational workshop by using standardized patients was held for nurses in the experimental group. We completely explained CDM and its steps to the participants in the workshop. Then, three standardized patients presented the developed scenarios to the participating nurses who had been grouped into small groups. Standardized patients were three healthy nursing students who voluntarily agreed to contribute to the study. They had been trained in three sessions based on the developed scenarios to play the role of standardized patients in the workshop. Nurses in each small group communicated with a standardized patient for 15–20 minutes. Accordingly, one or two nurses from each group assessed patient's clinical condition and went through the three steps of CDM. Then, all nurses of each small group discussed with each other about patient's problems, differential diagnoses, appropriate nursing interventions, and how to make right clinical decisions. Workshop leaders supervised and guided the nurses during their communications with standardized patients. Finally, a posttest was performed 45 days after the study intervention.

Statistical analysis was performed by using the SPSS v. 16.0. Primarily, the Shapiro-Wilk and the Kolmogorov-Smirnov tests were conducted for assessing the normality of the study variables. Moreover, the independent-samples t, the Chi-square, and the Fisher's exact tests were done for ensuring the similarity of the study groups regarding nurses' demographic characteristics. On the other hand, within-groups comparisons regarding PDAQ scores were made by conducting the paired-samples t and the Wilcoxon tests while between-groups comparisons were performed by using the independent-samples and the Mann-Whitney tests. Descriptive statistics measures (such as mean, standard deviation, and frequency) were used for presenting the data. It is noteworthy that the scores of the first step of CDM did not have a normal distribution. We employed several standard methods for changing the distribution of these scores to normal which were not successful. Accordingly, non-parametric statistical tests were used for analyzing these scores. The level of significance was set at below 0.05.

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3. Results

The number of nurses participating in this study was equal to 58 (28 nurses in the experimental and 30 nurses in the control groups). The means of participants' age in the control and the experimental groups were 30.4±4.8 and 29.2±5.9 years, respectively. The means of total work experience in nursing in these two groups were respectively 5.5±4.5 and 5.03±5.7 while the mean of their work experience in critical care units was 3.6±3.2 and 3.4±3.9, respectively. All nurses in the experimental group (100%) held Bachelor's degree while in the control group, 29 nurses (96.7%) had Bachelor's and one nurse (3.3%) had Master's degree in nursing. Study groups were similar in terms of demographic characteristics (Table 1).

Before the study, there were no significant differences between the study groups regarding the means of the three steps of CDM. However, the independent-samples t and the Mann-Whitney tests revealed that after the study, all these differences were statistically significant ($p<0.001$).

Table 1: Frequency distribution of participants' demographic characteristics

Groups / Variables		Experimental N (%)	Control N (%)	Total N (%)	The Chi-square and the Fisher's exact tests
Gender	Male	5 (17.9)	11 (36.7)	16 (27.6)	p=0.109
	Female	23 (82.2)	19 (63.3)	42 (72.4)	
Marriage	Single	12 (42.9)	13 (43.3)	25 (43.1)	p=0.971
	Married	16 (57.1)	17 (56.7)	33 (56.9)	
Official position	Head nurse	1 (3.6)	1 (3.3)	2 (3.4)	p=0.627*
	Staff nurse	1 (3.6)	3 (10)	4 (6.9)	
	Practicing nurse	26 (92.9)	26 (86.7)	52 (89.7)	
Employment	Official (permanent)	2 (7.1)	0 (00.0)	2 (34.2)	p=0.296*
	Official (provisional)	5 (17.9)	10 (33.3)	15 (25.9)	
	Post-graduation service	11 (39.3)	7 (23.3)	18 (31)	
	By contract	10 (35.7)	13 (43.3)	23 (39.6)	
Working shift	Morning	3 (10.7)	5 (16.7)	8 (13.8)	p=0.471*
	Evening	1 (3.6)	4 (13.3)	5 (8.6)	
	Night	7 (25)	7 (23.3)	14 (24.1)	
	Rotation	17 (60.7)	14 (46.7)	31 (53.4)	
Previous experience of being punished for decisions	Yes	13 (46.4)	11 (36.7)	24 (41.4)	p=0.451
	No	15 (53.6)	19 (63.3)	34 (58.6)	
Interest in continuing working in intensive care unit	Yes	20 (71.4)	17 (56.7)	37 (63.8)	p=0.242
	No	8 (28.6)	13 (43.3)	21 (36.2)	

* The results of the fisher's exact test

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Table 2: The mean of CDM score in both groups before and after the intervention

The steps of CDM		Group		The independent-samples t and the Mann-Whitney tests
		Experimental	Control	
		Mean±SD	Mean±SD	
Step 1	Pretest	32.1±10.2	31.1±7.8	p=0.666; df=50.7; t=0.4
	Posttest	49.7±5.7	34.9±6.5	p<0.001; z=5.8
	The paired-samples t ar the Wilcoxon tests	p<0.001; df=27; t=11.7	p<0.001; z=3.7	
Step 2	Pretest	33.4±9.3	32.2±6.4	p=0.587; df=47.8; t=0.5
	Posttest	51.5±5.2	36.2±5.6	p<0.001; df=56; t=10.5
	The paired-samples t ar the Wilcoxon tests	p<0.001; df=27; t=12.6	p<0.001; df=29 t=7.4	
Step 3	Pretest	32.1±9.7	31.4±6.5	p=0.747; df=46.8; t=0.3
	Posttest	51.2±5.7	37.1±5.2	p<0.001; df=56; t=9.7
	The paired-samples t ar the Wilcoxon tests	p<0.001; df=27; t=12.4	p<0.001; df=29 t=8.6	

Moreover, within-group comparisons by using the paired-samples t and the Wilcoxon tests showed that in both groups, posttest readings of all three steps of CDM were significantly higher than their pretest readings (Table 2). Finally, the results of the independent-samples ttest indicated that in the experimental group, the pretest-posttest mean differences of the three steps of CDM were significantly higher than the control group (Table 3).

4. Discussion

Study findings revealed that both teaching strategies significantly improved nurses' PDAQ scores. However, the mean differences of the three steps of CDM in the experimental group were significantly higher than the control group. The mean differences of the steps 1, 2, and 3 in the experimental were respectively 4.5, 4.5, and 3.5 times more than the control group. Yoo and Yoo (2003) and Owen and Ward-Smith (2014) also reported that teaching by

Table 3: The pretest-posttest mean differences of the three steps of decision making

The steps of CDM	Group		The independent-samples t and the Mann-Whitney tests		
	Experimental	Control			
	Mean±SD	Mean±SD	t	df	p
Step 1	17.6±739	3.8±4.2	8.1	40.4	< 0.001
Step 2	18.07±7.5	4.0±2.9	9.1	34.5	< 0.001
Step 3	19.1±8.1	5.6±3.5	8.1	36.6	< 0.001

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using standardized patients was significantly effective in improving nursing students' clinical judgment, patient assessment, CDM, and communication skills [29 and 30]. Robinson-Smith et al. (2009) also conducted a study to assess the effects of using standardized patients on nursing students' abilities in assessing mental state and the risk for suicide among patients with depression and found that this teaching method significantly promoted students' satisfaction, self-confidence, and critical thinking [31]. According to Worrel and Profetto-McGrath (2007) and Lotfi et al. (2010), critical thinking is the fundamental prerequisite to CDM and enables nurses to make right decisions in complex clinical situations [32 and 26].

In line with our findings, Sadeghnezhad et al. (2014) also found that clinical simulation by using mannequins significantly improved CDM ability among medical emergency students [25]. Cioffi and Purcal (2005) noted that midwifery students who are trained by using simulation are more competent in making right decisions [33]. According to Siassakos et al. (2011), teaching by using standardized patient promotes emergency midwives' clinical performance and teamwork when managing patients with eclampsia [34].

In our study, when nurses' assessed standardized patients, workshop leaders and other participating nurses supervised them and provided them with feedbacks. Endacott et al. (2012) also noted that simulation and informal feedbacks are the key strategies for developing CDM skills in emergency situations [35]. In another study, Cheraghi et al. (2011) evaluated the effects of an educational workshop conducted by using lecturing and mannequin simulation techniques on nursing students' knowledge of cardiopulmonary resuscitation and found that the workshop significantly improved students' resuscitation knowledge [36]. Our intervention also consisted of the lecture and the simulation techniques. However, our simulation technique was standardized patient which, compared with other simulation strategies, creates a more actual situation for learners. In a study conducted by EbrahimiFakhar and Hekmatpou (2013), students who had been taught by using standardized patients were more competent in doing injections and had more satisfaction compared with students in the control group [37].

Study findings also revealed that nurses in the experimental group acquired significantly higher decision making scores than nurses in the control group. This finding denotes that using simulation-based teaching in nursing education can improve learners' knowledge, skills, and performance [38]. Pickard et al. (2003) also reported the same finding [39]. Martin and Chewning (2011) found that using standardized patients helped significantly improve pharmacists' ability to provide counseling services [40]. In another study, Bredmose et al. (2010) trained emergency nurses by using scenarios and simple mannequin models. They provided scenarios to learners and asked them to practice care delivery and CDM on mannequin models and gave them feedbacks. Their findings showed that simulation-based training and most importantly, providing informal feedbacks significantly improved learners' psychomotor, decision making, and teamwork skills [41]. Great consistency of our findings with the findings of the previous studies denotes that student-centered teaching methods such as simulation are more effective than traditional methods in promoting learning.

The results of some of the previous studies conflict with our findings. For instance, Lotfi et al. (2010) reported that simulation-based training combined with teaching critical thinking strategies was not effective in improving operating room students' CDM ability [26]. Moreover, Kleinman et al. (1996) reported that using standardized patients for

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teaching pelvic examination skills to medical students produced no significant results [42]. Maneval et al. (2012) also found that high-fidelity simulation had no significant effect on new graduate nurses' critical thinking and CDM abilities [27]. In another study, Gordon et al. (2006) found that although both simulation-based teaching and traditional lecturing methods produced significant effects, there was no significant difference between these two strategies [43]. The conflict between our findings and the findings of these studies can be related to the differences in the educational contents, samples, designs, and interventions of the studies.

One of the limitations of the present study was that we had limited time—only one session—for implementing the study intervention. CDM is among nurses' most fundamental tasks and hence, considerable amount of time is needed for teaching and practicing it. However, because of our participants' heavy workload and their inability to participate in further educational sessions, we needed to provide our educations in a single session. Moreover, we could not invite all nurses to attend a unified Objective Structured Clinical Examination (OSCE) and therefore, we assessed their CDM ability by using a self-report questionnaire. Although the PDAQ consists of simulated scenarios and creates a quasi-actual learning environment for respondents, we recommend future studies to use OSCE and standardized patients for assessing CDM ability.

5. Conclusions

Using standardized patients can significantly enhance nurses' CDM ability. The traditional lecturing method is also effective in improving nurses' decision making scores. However, beside knowledge, simulation-based teaching strategies also enhance mental abilities such as analysis, problem solving, critical thinking, and lifelong learning. The findings of this study can be used for developing in-service continuing education programs for critical nurses and thereby, improving the quality of critical care.

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