



RESEARCH ARTICLE

EFFECT OF SIMULATION ON NURSES' KNOWLEDGE, SKILLS, CONFIDENCE AND CRITICAL THINKING

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ARTICLE INFO

Article History:

Received 15th January, 2016
Received in revised form
27th February, 2016
Accepted 28th March, 2016
Published online 26th April, 2016

Key words:

Simulation,
Nursing Education,
Knowledge,
SKILLS,
Clinical.

ABSTRACT

Introduction: simulation can mimic real clinical situation and physiologic response of a patient. So it helps students to practice in a controlled environment and improved learning experience. The purpose of this study was to examine extent of using simulation in nursing education and its effect on students' knowledge, skills, confidence, anxiety and critical thinking.

Methodology: A post-test control group, quazi-experimental design was used to study 58 second-year students selected conveniently from nursing faculty. The control and intervention group received the same theoretical materials and lab training. The intervention group additionally trained on high-fidelity simulation. A questionnaire was developed by researcher to measure variables of study. Nursing skills were measured by standard checklists.

Results: the *t* test showed a statistically significant difference ($p < 0.05$) between the experimental and the control group in knowledge, critical thinking, and skills related to the part of clinical training included in the simulation sessions. In addition, the results indicated a statistically significant difference ($p < 0.05$) in level of anxiety, self confidence and communication between the experimental group and the control group.

Discussion: the results of the current study is consistent with the results of many previous studies. Most studies showed that simulation has a positive effect on improving knowledge, skills and competency. Further studies are required with all year levels of nursing program. In addition, educator's competencies and other nursing skills are recommended to be included in the future studies.

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Citation: Dr. Khaled Abdallah Khader. 2016. "Effect of simulation on nurses' knowledge, skills, confidence and critical thinking", *International Journal of Current Research*, 8, (04), 29602-29605.

INTRODUCTION

Previous literatures shows that the majority of newly graduated nurses do not have the psychomotor competency required to perform nursing procedures. The causes may be related to absence of safe clinical areas, where the students can get adequate clinical experiences during the limited time of nursing education (Valizadeh *et al.*, 2013). Therefore, simulation was the solution to fill that gap. It gives students chances to practice the required skills several times until reaching mastery of skills in a safe, relaxing and supporting environment.

Simulation is one of the most important teaching method that can reduce students error and improve patient safety (Roh and Kim, 2014). The literature has few research conducted to determine the effectiveness of using simulation as a learning strategy for teaching basic nursing skills to new students. Many studies showed gaps between knowledge and practices in nursing programs. Simulation can fill some of these gaps and let students experience clinical situations close to the real (Seropian, Brown, Gavilanes, and Driggers, 2004). High-fidelity simulation can mimic real clinical situation and physiologic response of a patient (Hicks *et al.*, 2009). So it helps students to practice in a controlled environment and improved learning experience. In addition, students have opportunity to practice nursing skills until reaching proficiency (Medley and Horne, 2005). Thus, it increases students competency without exposing them or their patients to risk.

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Moreover, with simulation, faculty can guarantee the same experience for every student (Maran and Glavin, 2003). Simulation has become an established method for education and training of Emergency Medical Services (EMS) personnel in different skills (Hagiwara, *et al.*, 2014). Hagiwara' study indicated a significant increase in the over-all nurses results for situation awareness, patient assessment and decision making after applying simulation method in training. The review of most previous studies shows that simulation has great benefits in enhancing and integration of education (Bruce *et al.*, 2009; Long, 2005, Comer, 2005), critical thinking (Bruce *et al.*, 2009; Long, 2005), self-confidence, (Allan *et al.*, 2010, Cioffi, Purcal, and Arundell, 2005, Goldenberg, Andrusyszyn, and Iwasiw, 2005), clinical practice and judgment (Henneman and Cunningham, 2005). It also improve cognitive and psychomotor skills (Parker and Myrick, 2009). In addition, it improves patient safety (Decker, Sportsman, Puetz, and Billings, 2008, Henneman and Cunningham, 2005). Other mentioned benefits were improvement in nurses satisfaction (Roh *et al.*, 2013), performance (Buckley and Gordon, 2011), and self-efficacy (van Schaik, *et al.*, 2011). Previous studies showed that using the simulation method enforce satisfaction and self-confidence. Thus increase students' understanding and feeling of success in their clinical practices, and influence ability to accept their role as a nurse (Valizadeh *et al.*, 2013). There was just few studies in Arab countries. The Jordanian study conducted by Tawalbeh supported the positive effect of stimulation on ACLS knowledge and confidence in the experimental group compared with the control group (Tawalbeh and Tubaishat, 2014). On the other hand, in addition to the high cost, time consuming and need for trained educators; simulation does not reflect psychological and emotional response of real patients, and students may not take situation seriously. (Hicks *et al.*, 2009). Some studies had a contradicted results regarding effect of simulation on self confidence of students in performing psychomotor skills (Valizadeh *et al.*, 2013). Many factors increase need for simulation. They includes rapid changes in health technology (Yaeger *et al.*, 2004), and shortage in clinical instructors (Wilford and Doyle, 2006). Simulation proved success in various nursing topics including cardiopulmonary resuscitation (Henneman and Cunningham, 2005, Ackermann, 2009) and ACLS (Rodgers, Securro, and Pauley, 2009; Kim and Jang, 2011; Steadman *et al.*, 2006) and management skills (Steadman *et al.*, 2006). The purpose of this study was to examine extent of using simulation in nursing education and its effect on students' knowledge, skills, confidence, communication, anxiety and critical thinking.

METHODS

Design

A post-test control group, Quazi-experimental design was used to test research variables and assess effect of simulation on students' knowledge and skills.

Sample

The convenience sampling was used to select 58 students from faculty of nursing at Taif university. They were distribute to either experimental or control group. The experimental group

was exposed to education using simulation methods before real clinical situation while control group started their clinical training directly in hospitals. The given skills were explained to the experimental and control groups. Then only the experimental group were exposed to several scenarios on advanced simulation dolls. The training was done until they mastered skills.

Instrument

A questionnaire was developed by researcher to measure variables of study. It was valid and reliable (0.86). The face and content validity were reviewed by a panel of an expert doctoral nurses while the reliability was tested by Cronbach's alpha. The instrument composed of three parts. One for demographic data related to education environment and students. The other part consists of 30 Likert-scale questions measuring students' anxiety, confidence, communication, critical thinking and knowledge. The third instrument is standard checklist used for examining students skills.

Data collection

Students were divided into 2 equal groups. GPA was calculated for each group. No significant ($p < 0.05$) differences were found between the two groups. Both groups receive same theoretical materials for all procedures. The procedures included in the study were ECG, cardiac cases (MI and arrhythmias), respiratory cases (BA and COPD), ABG's, and neurological cases (Head trauma, seizures). The intervention group practices their knowledge on a simulating dolls for all procedure while control group had no such chance. Both groups had clinical training in hospital for one semester. As a part of formative evaluation, the students were examined on real patients. Two examiners checked a list of steps required for each procedure. In addition, All students were asked to fill in questionnaire that have questions measuring knowledge, anxiety, confidence, critical thinking and communication related to the examined skills. All ethical issues were considered.

Data Analysis

Data was analyzed using the SPSS software, version 16. Descriptive and analytical statistics (t-test, ANOVA) were used to describe the characteristics of sample and to test if there are significant differences in knowledge, skills, anxiety, confidence, communication and critical thinking between the two studied groups.

RESULTS

All students were male with same age group (18-20 years). They were selected from the second-year level. The mean GPA for the students was 2.4 out of 4 (SD = 0.8). The t-test showed no statistically significant differences in GPA between both groups before intervention. After completing the education, the t-test showed a statistically significant difference ($p < 0.05$) between the experimental and the control group in knowledge, critical thinking, and skills related to the part of clinical training included in the simulation sessions.

In addition, the results indicated a statistically significant difference ($p < 0.05$) in level of anxiety, self confidence and communication between the experimental group and the control group. Analysis of each variables was performed using the independent t -test. The t -test showed that mean score at the post-test was significantly higher for the experimental group than the control group (Table 2).

Limitation and Recommendation

The sample was selected from the second-year male student, who enrolled in adult course only. There is a need for further research on all nursing students, male and female, from all year levels. In addition, there is a need for adding more procedures from different nursing courses.

Table 1. Differences between control and experimental group after intervention

	Control Group	Experimental Group	T-test	Significance
Knowledge	13	17	3.6	0.03
Skills	87	76	4.3	0.01
Anxiety	13	9	2.7	0.04
Confidence	9	6	2.4	0.03
Critical thinking	11	8	3.1	0.02
Communication	14	10	2.9	0.04

Table 2. Comparison of the mean scores for all variables after intervention between control and experimental groups

	Control Group %	Experimental Group %	T-test	Significancy
ECG	72	83	4.6	0.041
MI	78	86	4.2	0.032
arrhythmias	71	78	3.5	0.047
BA	75	89	4.3	0.026
COPD	76	78	1.4	0.38
ABG's	74	81	2.8	0.019
Suction	81	83	1.1	0.062
Head trauma	77	82	2.3	0.048
seizures	76	80	2.6	0.046

DISCUSSION

The purpose of the current study was to assess the effect of simulation on nursing students' knowledge, skills, confidence, anxiety and communication. The results showed that the students' clinical competence had increased after training by the simulation method. Combining theory with clinical training and adding simulation methods proved to increase students clinical skills and competencies. Moreover, simulation gives students the optimum opportunity to learn about various patient cases and train on skills that they may not encounter in reality for a long period of their work in hospitals. The results of the current study is consistent with the results of many previous studies. Most studies showed that simulation has a positive effect on improving knowledge, skills and confidence (Goldenberg, *et al.*, 2005) and also increasing competency and critical thinking (Bruce *et al.*, 2009; Long, 2005). The differences between the control and experimental groups may be related to effect of repeated practice in a situation resembling the real situation, in addition to effect of integrating visual and auditory methods to learning (Steadman *et al.*, 2006).

The experimental group had significant increase in knowledge and skills scores more than the control group. This is consistent with the findings of other Arabic studies (Tawalbeh and Tubaishat, 2014). Moreover, the experimental group had significant high scores of confidence, critical thinking, and communication skills in comparison with the control group. This results agree with most previous studies (Allan *et al.*, 2010; Parker and Myrick, 2009; Roh *et al.*, 2013).

The future research is recommended to include competencies of faculty members as a variable in the study. The findings of this study can help nursing faculties to integrate simulation with clinical training to maximize the students competency. Another important indication is the need for adequate simulation laboratories before training on real patients.

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