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THE EFFECT OF SENARIO-BASED SIMULATION TRAINING TECHNOLOGY ON KNOWLEDGE AND SKILLS OF MATERNITY NURSING STUDENTS IN TURKEY

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ABSTRACT

Objective: The objective of this study was to determine the effect of scenario-based simulation training on nursing students' maternity knowledge and clinical skills.
Methods: A randomized control and pre-test/post-test design was employed with undergraduate nursing students (n=46) from third year using the Knowledge Evaluation Form (KEF) and the Objective Structured Clinical Examination (OSCE) between 2014-2015 academic years in the university in Ankara, Turkey. The experimental group, as well as following their normal curriculum, was exposed to scenario-based simulation training. Subsequently, all students were retested and completed a questionnaire.
Results: The students mean age was 21.67±0.9 years. The experimental group improved their performance on maternity clinical knowledge and skills after the scenario-based simulation training. The mean KEF scores increased from 10.35±2.08 to 13.87±1.18 ($p<0.05$). The mean OSCE scores of experimental group is 17.84±2.07; control group is 10.76±2.83 ($p<0.05$). From the six open-ended questions in the OSCE revealed three themes: satisfaction, skills/knowledge, confidence/critical thinking. The majortiy of the students agreed that simulation was satisfaction, effective and safe method.
Conclusion: The results indicated that scenario-based simulation technology is a useful training technique in maternity nursing skills. According to nursing students, simulation was very valuable and positive experience.

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INTRODUCTION

Simulation has been defined as a situation in which a particular set of conditions is created artificially in order to study or experience something that is possible in real life; or a generic term that refers to the artificial representation of a real world process to achieve educational goals via experimental learning (Flangan *et al*., 2004). Simulation education is considered as determining the future of clinical nursing, since it plays a crucial role in nursing education. In particular, a highly functional patient simulator is able to express the physiological reactions of a patient through the operation of a computer and realize various conditions of disease, along with repetitive practice. In the view of today's development access to simulation technology is easier and affordable human patient simulators in healthcare education. Therefore, simulation for training healthcare professionals is becoming more popular as being a safe training method (Gordon *et al*., 2001).

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There is a lack of good clinical setting to participate in direct nursing care to the patients and observation of clinical procedures, it is difficult to find appropriate hospitals. Thus, nursing students often don't have the facility to provide direct nursing care to the patients. Hovewer, nursing students need to involved the all clinical process due to the low confidence in their skills (Bambini *et al*., 2009). Simulation traning provides the opportunity to perform critical decision-making without generating any risk to patients. In addition, simulation experience can be considered to be an educational alternative that can overcome the limitations of the maternity clinical skills (Gordon *et al*., 2001; Durham *et al*., 2008; Ziv, 2000; Medley *et al*., 2005 and Alinier *et al*., 2006). There are limited studies directly on simulation education in the field of maternity nursing and the results showed the educational effects leading to increased skills among the nursing students. The study was performed in order to assess the effect of scenario-based simulation educaiton on maternity nursing student's performence.

Hypothesis 1: There will be a difference in clinical competence between experimental group who participated in

the simulation-based education in maternity nursing knowledge, and control group who did not.

Hypothesis 2: There will be a difference in clinical competence between experimental group who participated in the simulation-based education in maternity nursing skill, and control group who did not.

MATERIAL AND METHODS

In this study, the participants enrolled were junior nursing students between 2014-2015 academic years in the university in Ankara, Turkey. They had taken a theoretical course in maternity nursing covering prenatal care and delivery as third semester junior in maternity nursing. The students did not have any previous simulation-based learning experiences prior to participating in this study. There are two simulations laboratory rooms equipped with low-high technology adult and pediatric simulator. However, the simulation education model has not been integrated in nursing curriculum yet. They had taken a theoretical course in maternity nursing covering prenatal care skills. In the same academic year, the control group was composed of participants who were junior nursing students. The sample size was calculated using G*Power software.[9] A medium effect size (0.50) was required for the purpose of this study. The sample size was determined according to the power level, which was 0.80, and the use of the conventional alpha = 0.05 two-tailed criterion of the significance. On this basis, 46 students were required. The students were randomly selected and then randomly assigned to either the experimental or control group (23 students in each group).

Inclusion criteria

The inclusion criteria for the students in the current study were (a) that the students did not attend any course regarding maternity nursing skills at a university (b) that he or she agreed to participate and (c) that students enrolled in the gynaecology and obstetric nursing course.

Exclusion criteria

Nursing students who were under the age 18, and those who did not volunteer to be in the study.

Instrument

A structured questionnaire was used to collect data to achieve the objectives of the study. The questionnaire provided a brief statement concerning the purpose of the study, included informed consent and was followed by three parts of the tool. 1) Information Form (IF), 2) Knowledge Evaluation Form (KEF) and 3) Objective Structured Clinical Examination (OSCE). The questions were drawn from different sources such as relevant literature (Fero *et al*., 2010 and Kang *et al*., 2015 Kassab *et al*., 2011; Pinar *et al*., 2015; Schoening *et al*., 2006 and Tiffen *et al*., 2009). The time needed to complete the questionnaire was 15 minutes.

IF: This form was designed to collect demographic data such as age, gender, mothers' and fathers' education level and occupation, economic level, academic achievement level and opinion about to take part in the curriculum of simulation.

KEF: This form consists of 15 multiple choice questions for evaluating PowerPoint® presentation as pre-test and post-test. The form has questions related to pregnancy, assessment fetal, physical assessment and physiology of pregnant women, application of maternity clinical skills. Each correct answer is evaluated as "1" point and the total maximum score that can be achieved is 15 (min=0, max=15).

OSCE: This form prepared in accordance with the objectives of maternity nursing course content and OSCE stations address a range of clinical and psychomotor skills of students during the maternity nursing.[10] The OSCE composed of 18 stations has been specifically designed for the study. Mark "1" for each point conducted correctly or mark "0" if the task is not done or incorrectly done and calculate the score (min=0; max=18). Examiners have been instructed not to help or give any feedback to the students concerning the different stations at this stage of the study.

Application

The experimental group took scenario-based simulation traning relating to maternity nursing, a 2-hour PowerPoint® presentation, and watched scenario-based simulation practice on an obstetrics emergencies simulator, whereas the control group attended only the presentation. The educational lecture covered the advanced skills used to manage maternity nursing. KEF was used for both groups as pre-test and post-test. The test for the experimental group was conducted in the simulation laboratory by the primary researcher, whereas it was administered in class for the control group. 23 students in the experimental group were involved in the simulation experience relating to maternity nursing and were divided into five groups. Normal delivery scenario was presented that a 24-year-old primipara, 38 weeks of gestation visited the hospital due to rupture of membranes and suffered hypertonic uterine dysfunction during delivery. According to the nursing care plans nursing students practiced such as taking vital signs, leopold maneuver, performing intravenous injections, providing oxygen therapy, monitor interpretation of uterine contraction and fetal heart sound.

The scenario lasted approximately 15 minutes, and a debriefing session, which lasted approximately 5-10 minutes, was held after each scenario. The purpose of this session was to discuss and highlight certain issues that occurred during the scenario. The researcher used a scenario about maternity nursing skills, which was created by certified literature. The scenario which was about a pregnant with normal vaginal delivery, was pilot tested by the researcher with 10 students for its relevancy, applicability and duration. The scenario was easy to apply and was easily understood by the students, and no problems were encountered during its application. The 10 students were not included in the final sample. During simulation practice OSCE was used to measure in the experimental group skills. At this time, the control group did not receive this intervention. The simulation laboratory setting was used for the purpose of the application of the simulation scenarios.

Obstetrics simulator was used for manternity nursing skills. Also monitors, neonatal stethoscope, open bed and other basic instruments and materials for maternity nursing were obtained. The study protocol was approved by the Ethics Board of Yıldırım Beyazıt University for the conduct of the study. The students participating in the study received written information about the aim of the study the right to withdraw and the guarantee of confidentiality of the information provided to the researcher. In addition to, In the end of study, scenario- based simulation training is organized to control groups too.

Statistical Analysis

Data were analyzed using SPSS version 17.0 (Chicago, IL, USA). In statistical analysis number, percentage, mean and standard deviation, were used. Comparison between groups was performed with independent-samples t test and paired samples t test. Significance level was defined as $p<0.05$ in this study.

RESULTS

Forty-six students (81.8% female and 18.2% male) were randomly assigned either to the control (n=23) or experimental group (n=23). Students in the experimental and control groups are similar in terms of their characteristics. The students' mean age was 21.7±0.9 (min=20, max=24). 98.4% of academic achievement level of the students was medium and all of them wanted to take part in the curriculum of simulation course. 88.6% of them economic level were middle. While 18.2% of them mother' education level were university or higher graduates, 70.4% of father education level was university or higher. The mean score of pre-test for KEF in experimental and control groups was 10.35±2.08 and 9.52±1.67 about maternity nursing respectively. An independent sample *t* test showed no statistically significant differences between groups in pre-test knowledge (t=1.483, p=0.145). The mean score of post-test for the knowledge in experimental and control groups was 13.87±1.18 and 11.70±1.60 about maternity nursing

Table 1. Distribution of scores Pre-test and Post-test KEF

		n	Experimental Mean±SD	Control Mean±SD	Analysis *
KEF*	Pre-test	23	10.35±2.08	9.52±1.67	t=1.483; p=0.145
Total Score	Post-test	23	13.87±1.18	11.70±1.60	t=5.228**; p<0.001**

** t test , **p-value < 0.05*

Table 2. Distribution of scores KEF in Experimental and Controls Groups

	Groups	n	Pre-test Mean±SD	Post-test Mean±SD	Analysis *
KEF*	Experimental	23	10.35 ± 2.08	13.87 ±1.18	t=8.555; p<0.001**
Total Score	Control	23	9.52 ±1.67	11.70 ±1.60	t=8.000; p=0.001**

**t test , **p-value<0.05*

Table 3. Distribution of scores OSCE Experimental and Control Groups

OSCE	Groups	n	Mean±SD	Analysis *
Total Score	Experimental	23	17.84±2.07	t=9.672; p<0.001**
	Control	23	10.76±2.83	

**t test, **p-value<0.05*

Table 4. List of OSCE Stations Used for the Study

Stations	Experimental (n=23) Mean±SD	Control (n=23) Mean±SD	Analysis
Starting effective communication	0.91±0.19	0.95±0.14	t=0.864; p=0.393
Washing of hands	0.89±0.25	0.65±0.48	t=2.079; p=0.043*
Informing of pregnant	0.91±0.24	0.78±0.33	t=1.517; p=0.136
Assesment emptying of bladder	0.80±0.28	0.60±0.49	t=1.523; p=0.135
Ensuring the privacy of pregnant women	0.89±0.25	0.69±0.36	t=2.111; p=0.041*
Position of the pregnant woman	0.76±0.36	0.60±0.47	t=1.217; p=0.230
Taking positions face to face with mother	0.93±0.17	0.78±0.29	t=2.137; p=0.038*
Placed appropriately of hand on abdomen	0.95±0.14	0.63±0.30	t=4.580; p=0.000
Determination of fetal part on fundus	0.89±0.29	0.60±0.36	t=2.855; p=0.007*
Palpation examination of the abdomen	0.89±0.27	0.73±0.29	t=1.853; p=0.071
Identification of fetal back and extremities	0.84±0.25	0.54±0.36	t=3.010; p=0.004
Assesment of rate of fetal heart	0.89±0.29	0.63±0.48	t=2.204; p=0.033*
Assesment the of parts of the fetus	0.87±0.27	0.58±0.35	t=3.019; p=0.004*
Taking face to feet positions with mother	0.84±0.31	0.43±0.37	t=4.010; p=0.000*
Placing of bottom hands under abdomen	0.91±0.24	0.63±0.37	t=3.019; p=0.005*
Evaluation of the part being fixed of the fetus	0.93±0.22	0.39±0.42	t=5.397; p=0.000*
Giving information to pregnant women	0.91±0.24	0.89±0.21	t=0.322; p=0.749
The registration of the application	0.93±0.22	0.73±0.44	t=1.862; p=0.069

It is only for the practical stations that students are observed by an examiner. The marking of the theoretical stations is done after the session.

respectively. An independent sample *t* test showed statistically significant differences between groups in post-test knowledge (t=5.228, p<0.001) (Table 1). "There will be a difference in clinical competence between experimental group who participated in the simulation-based education in maternity nursing knowledge and skills, and control group who did not." The maternity nursing knowledge of the experimental group that participated in simulation-based education increased 3.52 points from 10.35±2.08 to 13.87±1.18 (t=8.555, p<0.001) and the score for the control group increased 2.18 points from 9.52±1.67 to 11.70±1.60 (t=8.000, p=0.001). Thus, hypothesis 1 was supported (Table 2). The maternity nursing skills score of the experimental group that participated in simulation-based education is 17.84±2.07 and the score for the control group is 10.76±2.83, indicating a significant difference between the two groups (t=9.672, p<0.001). Thus, hypothesis 1 was supported (Table 3). In the table 4, following stations, a statistically significant difference was found between OSCE scores of control and experimental groups students (p<0.05). That stations are washing of hands, ensuring the privacy of pregnant women, taking positions face to face with mother, placed appropriately of hand on abdomen, determination of fetal part on fundus, ıdentification of fetal back and extremities, assesment of rate of fetal heart, assesment the of parts of the fetus on the pubis simfizis, taking face to feet positions with mother, placing of bottom hands under abdomen, evaluation of the part being fixed of the fetus. Moreover, no statistically significant difference between starting effective communication, ınforming of pregnant, assesment emptying of bladder, position of the pregnant woman, palpation examination on both sides of the abdomen, giving information to pregnant women. The registration of the application OSCE scores of control and experimental groups students (p>0.05). According to this result, OSCE score of experimental group students were higher after scenario-based simulation training. Thus, hypothesis 1 was supported (Table 4).

Open-ended question characteristics for simulation experience

From the six open-ended questions, 7 experimental group students (n=23) and 11 control groups students (n=23) responses were submitted. A qualitative content analysis of students' responses to these open-ended questions revealed that these responses clustered around three themes: satisfaction, skills/knowledge and confidence/critical thinking. "There will be a difference in clinical competence between experimental group who participated in the simulation-based education in maternity nursing skill, and control group who did not." Students' indicated that the experience helped them think more positively about simulation. One student says that: ''I feel more confident of everything that I'm doing''; another student "I do things in a different way in terms of my knowledge and skills''; ''the scenario-based simulation training model used in practice was effective.'' One participant addressed "I've enjoyed this learning experience''. Others reported that the training increased their knowledge: ''I feel secure when I make decisions because I have the knowledge'' and ''My knowledge was reinforced and increased, and I feel more secure.'' Still others commented on how the training changed their practice: ''It is different. I was doing it a certain way, and after the training I changed how I do things, I feel good enough for using the skills.''; ''I can make decisions about the management of maternity nursing". According to this result; several participants reported an overall increase. Thus, hypothesis 2 was supported.

DISCUSSION

Clinical simulations are gaining more attention in the field of maternal health to assess clinical skills of students. Many factors have contributed to the development of simulation as a teaching method. These factors include the shortage of clinical setting, an increasing number of different health care professions and advances in health care technology, which may affect the quality of education. Therefore, use of simulation is needed to cope with the gap created by these problems. Simulation based education allows for the practice of skills and techniques, for competence newborn care in lifelike situations including teamwork, communication (Cates *et al*., 2011). The World Health Organization (WHO) has provided standards for nursing education and recommends the use of simulation in nursing education (World Health Organization *et al*., 2009). Maternity nursing educators are faced with difficulties when trying to support the student learning experiences. There are simply clinical days when no babies are born. Thus many students leave their maternity-newborn rotation without ever seeing a delivery or even caring for newborn. This lack of exposure may new graduates and leaves the hospital nurse educator with the challenging of bridging these educational gaps. Clinical simulation have the potential to bridge gaps in maternal child nurse educate and provide learners with the opportunity to prepare for real world clinic situation (Jeffries *et al*., 2006). In maternity nursing, the students frequently receive dicattes about their role and responsibilirty rather than active provider of care after simulation experience students are encouranged to gain the role of nursing practice for maternity health.

We found that, the maternity nursing knowledge and skills of the experimental group that participated in simulation based education increased. This result supported the finding by Champagne *et al*. (1989), Ewy *et al*. (Ewy, 1987) and Dayal *et al*. (Dayal, 2009) that simulation improved maternity nursing knowledge and skills after completing simulation-based education in obstetric nursing. In addition to, students adressed that encouraged to learn the necessary activities, increased motivation for application related to maternity nursing and seen what they can do as a nurse by scenario-based simulation training. Most of students suggested that integration the entire curriculum of simulation course, ensuring a more modern anatomical models-visual materials and diversity of case. This result supported the finding by Birch *et al*. (Birch *et al*., 2007) and Lee and Kim (Lee *et al*., 2011) that simulation improved communication skill after completing simulation-based education in obstetric nursing. Simulation has a positive effect on enhancing learning, and competency in clinical skills (Alinier *et al*., 2006; Jeffries *et al*., 2006; Yamada *et al*., 2016; Bornais *et al*., 2012; Butler *et al*., 2009; Kim-Godwin *et al*., 2013; Reid-Searl, 2012; Rodgers, 2009; Smith, 2006 and Tosterud *et al*., 2013), and encourages knowledge acquisition and critical thinking for nursing students learning (Alinier, 2006; Jeffries, 2006; Dayal *et al*., 2009; Ackermann, 2009;

Bruce *et al*., 2009; Kim *et al*., 2011 and Wang, 2013). The students' basic nursing performance improved because the simulation-based education included practice with taking vital signs, performing intravenous injections, and providing oxygen therapy in its first session, which preceded the actual simulation in the second session.

In different study was conducted that delivery nursing practice education utilizing simulation had been shown to improve the interpretation of results of electronic fetal monitoring, the assessment of uterine contraction patterns, and confidence regarding recording in clinical competence (Chung *et al*., 2011). In the present study, nursing students stated that, simulation was very fun and positive experience, Mould *et al*. (2011) contend that simulation was to be an effective and benefical method in clinical education. Wang *et al* (2013). present that simulation experience has been found a realistic and innovative method of teaching for gaining clinical skills. A study conducted to evaluate nursing students perceptions about simulations, findings showed that this experience was very valuable for generating the self-confidence and improving the self-assessment (Wellard, 2007). Champagne *et al*[18] reported a significant effect of simulation on criticial thinking and knowledge of professional practices.

Conclusion and Suggestions

This study has reported a significant effect of simulation on knowledge and skills of maternity nursing as an alternative to clinical training education. More research is required to investigate if indeed scenario based simulation training has real positive effects on maternity skills. Based on the study' results, it was suggested to apply a wide variety of scenarios developed for use in simulation-based education in the area of maternity nursing.

Limitations

The sample was limited to baccalaureate nursing students in this university. It is recommended that this study be replicated on a larger scale to investigate whether the significant findings can be sustained in a more generalized sample.

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