The Effect Of Video Based Simulation Training On Neonatal Examination Competency Among Turkish Nursing Students

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Abstract

Purpose: The aim of this study was to determine the effect of video based simulation training on nursing student's competency of neonatal examination (NE) skill.

Method: An experimental, randomized controlled design was used. This study conducted with 46 junior nursing students in Ankara, Turkey.

Results: Average of the achievement test of experimental group after the video based simulation training was 13.48±1.44 and the mean score of OSCE was 18.43±2.46. The mean score of control group achievement test was 12.00±1.22 and the mean score of OSCE was 10.09±3.17. The results showed that simulation had a statistically significant effect on knowledge and skill of NE ($p<0.05$).

Conclusion: The results indicated that video based simulation training improved NE competency in nursing students.

Keywords: Video based simulation training; nursing students; neonatal examination

1. Introduction

Neonatal deaths account for 45% of all deaths among children under five years. Up to two thirds of neonatal deaths could be prevented. The main causes of neonatal deaths are prematurity and low birth weight, infections, asphyxia and birth trauma. Neonatal is a specialized form of pediatric nursing that takes care of the smallest and most fragile patients (WHO, 2016). The first moment of life is the most critical for newborn survival. Therefore, neonatal examination (NE) must be carefully evaluated for determining the danger symptoms (Maura 2015). Maintaining the

professional's NE skills is a real challenge in maternity and pediatric courses because nursing students have little opportunity to practice NE. To obtain high quality neonatal care, simulation offers a popular teaching strategy in health provider's education in recent years.

Simulation based education for neonatal nurses might be an ideal form of clinical education. Especially, high-fidelity simulation education is relatively new for nursing only articles written within the last ten years were included (Kim & Jang 2011; Rodgers, Securro & Pauley 2009). However, there are limited studies directly comparing simulation to traditional in nursing training for improving individual skills. Therefore the study was performed to determine whether simulation was more effective than traditional education to train student's learning of NE.

2. Material and Methods

The study was performed in order to assess the effect of video-based simulation training on student's NE. The study designed as an experimental, and randomized controlled. Junior-level nursing students were included in Ankara at Yıldırım Beyazıt University, Ankara-Turkey (N=112). The school of nursing offers bachelor, masters and doctorate degrees in nursing. There are two simulations laboratory rooms equipped with low-high tech adult and pediatric simulator. However, the simulation education model has not been integrated in nursing curriculum yet. The sample size was calculated using G*Power software (Faul, Erdfelder, Lang, & Buchner, 2007). 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 NE at a university (b) that he or she agreed to participate and (c) that students enrolled in the gynaecology and obstetrics nursing course.

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), 3) Objective Structured Clinical Examination

(OSCE). The questions were drawn from different sources, such as relevant literature, textbooks, and the Internet (Harden, & Gleeson, 1979; Kang, Kim, Oh, Kim, & Lee, 2015; Kassab, & Kenner, 2011; Pinar, Knight, Gaio, Watts, Dailey, Britt, Catron, Zengul, 2015; Schoening, Sittne, & Todd, 2006; Tiffen, Graf, & Corbridge, 2009; Walton et al., 2015).

We designed an assessment based on 22-station OSCE for the study. The time needed to complete the questionnaire was 15 minutes.

1) IF: This form was designed to collect demographic data such as age, gender, mothers' and fathers' education level and occupation, economic level.

2) KEF: This form consists of 15 multiple choice questions for evaluating presentation as pre-test/post-test. The form has questions related to physical assessment and physiology and care of new-borns, Apgar-score evaluation. Each correct answer is evaluated as "1" point and the total maximum score that can be achieved is 15 (min=0, max=15).

3) OSCE: This form prepared in accordance with the objectives of NE course content and OSCE during the NE (Harden & Gleeson, 1979). Score "1" for each point conducted correctly or mark "0" if the task is not done or incorrectly done and calculate the score (0 to 22).

Application

The experimental group took part in a video-based simulation practice relating to NE, a 2-hour PowerPoint® presentation, and watched video-based simulation practice on an advanced newborn care simulator, whereas the control group attended only the presentation. The educational lecture covered the advanced skills used to manage NE.

KEF was used for both groups as pretest and post-test. The test for the experimental group was conducted in the simulation laboratory of the school of nursing 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 NE and were divided into five groups. 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 primary researcher used a scenario about NE, which was created by certified literature. The scenario was about a newborn with normal vaginal delivery. The scenario was pilot tested by the primary 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. The newborn care simulator was used for NE. Also monitors, neonatal stethoscope open bed, a neonatal warmer with a light, O_2 tubing, a bag-mask ventilator, and other basic instruments and materials for NE were obtained. The Ethics Board of University approved the study protocol. The participants received verbal and written information about the aim of the study right to withdraw and guarantee of confidentiality of the information provided to the researcher. Finally, video-based simulation training is organized to control group too.

Statistical Analysis

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

3. 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. Of the 46 students at baseline, 44 (95.6%) completed the study. Of those, 23 (52.2%) were in the control group, and 23 (47.7%) were in the experimental group. 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 10.00±2.66 and 10.24±1.94 about NE respectively. An independent sample *t* test showed no statistically significant differences between groups in pre-test knowledge (*t =0.336, p<0.739*). The mean score of post-test for the information in experimental and control groups was 13.48±1.44 and 12.00 ±1.22 about NE respectively. An independent sample *t* test showed statistically significant differences between groups in post-test knowledge (*t =3.933, p<0.001*) (Table 1).

Pre-test scores of students in KEF were determined to be 10.00±2.66, while post-test scores were 13.48±1.44 in the experimental groups. A statistically significant difference was found between pre-test and post-test scores of experimental group students ($p<0.05$). In the same, pre-test scores of students in KEF were determined to be 10.24±1.94, while post-test scores

were 12.00±1.22 in the controls groups. An paired t test showed a statistically significant difference (t =6.667, $p<0.001$) between the experimental group and the control group regarding NE knowledge. A paired t test indicated that mean NE knowledge at the post-test phase was significantly higher than at pre-test for both the experimental and control groups That is, students' knowledge significantly improved after the application of either traditional training in the control group or simulation in the experimental group (Table 2).

In the table 3, statistical analyses for test scores of OSCE showed that experimental group students (18.43±2.46) obtained higher scores than control group students (10.09±3.17). A statistically significant difference was found between experimental and control group students ($p<0.05$). This result showed that scores related with NE in the experimental group were higher, and therefore better, than in the control group in terms of effective video-based simulation training. As shown in Table 3, an independent t test indicated that simulation is significantly more effective than traditional training in improving knowledge of NE.

In the table 4, following stations, a statistically significant difference was found between OSCE scores of control and experimental groups students ($p<0.05$). According to the results, OSCE scores of experimental group were higher after video-based simulation training

Open-ended question characteristics for simulation experience

From the five open-ended questions, 15 experimental group students (n= 23) and 9 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, confidence/critical thinking (Table 5). 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,'' ''I feel more confident in helping and valuing neonate. Another student "I do things in a different way in terms of my knowledge and skills," "the video- based simulation training model used in practice was effective.'' One participant addressed "I have really enjoyed the simulation 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 NE". According to this result, several participants reported an overall increase.

4. Discussion

The purpose of this study was to examine the effect of simulation on nursing students' knowledge in the provision of NE. 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 (Cordero, Hart, Hardin, & Mahan, 2013; Hallin, Haggstrom, Backstrom, & Kristiansen, 2016; Jeffries, et al., 2009).

In this study, the results indicated that the knowledge and confidence of students in the experimental group improved significantly in the first posttest, compared with the control group ($p<0.05$). This finding is consistent with the results of other studies that showed that simulation has a positive effect on enhancing learning, and competency in clinical skills and encourages knowledge acquisition and critical thinking for nursing students learning (Ackermann 2009; Brannan, White, & Bezanson, 2008; Bruce et al 2009; Kim Jang 2011; Pinar et al., 2015; Walton, et al., 2015).

Simulation based education allows for the practice of skills and techniques, for competence newborn care in lifelike situations including teamwork, communication (Cates & Wilson, 2011). WHO has provided standards for nursing education and recommends the use of innovative teaching strategy for simulation in nursing education (WHO, 2016). In addition, simulation education shows that is an effective, beneficial and innovative method of teaching in health professionals' education (Agrawal et al., 2016; Cordero et al., 2013; Fickley, 2014; Kearns, Shoaf, & Summey, 2004; Tawalbeh & Tubaishat 2014). Simulation helps students to apply clinical skills and offers students the opportunity to practice clinical skills until they become proficient in performing certain tasks.

The significant effects of simulation on knowledge of NE in the experimental group may be attributed to many factors. The main difference in the experimental group's training, which included simulation, was the presence of a realistic patient environment compared with the traditional training of the control group. Also the experimental group involved the use of video based simulation that displayed NE. The simulation environment stimulates learning methods and elicits different, more engaged responses from students, compared with the responses obtained from traditional lectures in the classroom (Brannan, White, & Bezanson, 2008; Evans & Mixon, 2015; Sharma, 2013; Steadman et al., 2006). In the literature, it emphasized the importance of simulation as an effective means of providing a realistic and practical environment (Bagnasco et al., 2016; Cates et al., 2015; Cooper, 2015). In addition, the simulation scenario in the current study

was followed by debriefing sessions that clarified students' mistakes, helping to improve knowledge of NE (Bernd et al., 2015). The result of this study is consistent with in the studies show that debriefing helps students to decompress and the debriefing session may offer the opportunity for valuable reflective learning in the simulation experience.

In this study, the results of the current study showed that competency in applying NE skills was significantly higher in the experimental group than the control group according to OSCE ($p<0.05$). This is consistent with the findings of other studies revealing that simulation as innovative teaching strategy has a significant and positive effect on the confidence and competency levels of nursing students (Akhu-Zaheya, Gharaibeh, & Alostaz, 2013; Richards et al., 2010; Tiffen, Graf, & Corbridge, 2009). Simulation teaching was effective to in psychomotor skill score.

5. Conclusion and Suggestions

This study has reported a significant effect of simulation on knowledge and skills of newborn examination. More research is required to investigate if indeed a video-based simulation training has real positive effects on newborn examination skills. Future research to evaluate other learning outcomes using innovative strategy such as simulation is recommended. The findings of these studies can support to well organize nursing education.

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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Table 1 Distribution of scores Pre-test and Post-test Knowledge Evaluation Form (KEF)

			Experimental	Control	
Topics	**Groups**	**n**	**Mean±SD**	**Mean±SD**	**Analysis ***
KEF*	**Pre-test**	23	10.00 ± 2.66	10.24±1.94	t=0.336 p=0.739
Total Score	**Post-test**	23	13.48 ±1.44	12.00 ±1.22	**t=3.933**** **p<0.001**

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

Table 2 Distribution of scores Knowledge Evaluation Form (KEF) in Experimental and Controls Groups

			Pre-test	Post-test	
Topics	**Groups**	**n**	**Mean±SD**	**Mean±SD**	**Analysis ***
KEF*	Experimental	23	10.00 ± 2.66	13.48 ±1.44	**t=6.667 p<0.001****
Total Score	Control	23	10.24 ±1.94	12.00 ±1.22	**t=4.093 P=0.001****

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

Table 3 Distribution of scores OSCE Experimental and Control Groups

Topics	Groups	n	Mean±SD	Analysis *
OSCE	Experimental	23	18.43 ± 2.46	t=9.959
Total Score	Control	23	10.09 ± 3.17	**P=0.001****

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

Table 4. List of OSCE stations used for the study

Stations	Experimental (n=23)		Control(n=23)		Analysis	
	Mean	**SD**	**Mean**	**SD**	**t**	**p**
Preparation of materials	0.98	0.10	0.76	0.33	1.13	0.262
Temperature control	0.98	0.10	0.64	0.35	4.29	**0.000***
Starting a respiratory	0.82	0.32	0.28	0.37	5.14	**0.000***
Airway suctioning	0.82	0.28	0.52	0.29	3.44	**0.001***
Evaluation of heart rate	0.91	0.19	0.61	0.31	3.78	**0.000***
Evaluation of respiratory	0.89	0.25	0.64	0.32	2.83	**0.007***
Evaluation of muscle tone	0.95	0.14	0.54	0.35	5.14	**0.000***
Evaluation of skin colour	0.93	0.17	0.50	0.31	1.65	0.114
Evaluation of response to plantar stimulation	0.82	0.35	0.59	0.33	2.19	**0.034***
Recorded to Apgar Scores	0.84	0.27	0.50	0.38	3.43	**0.001***
Determined to identification	0.89	0.29	0.38	0.38	1.69	0.098
Making the umbilical cord cardone care	0.80	0.29	0.47	0.43	2.97	**0.005***
Making the eye care	0.76	0.39	0.42	0.36	2.89	**0.006***
Vitamin K prophylaxis	0.89	0.25	0.42	0.39	4.62	**0.000***
Enjected to Hepatitis B vaccine	0.87	0.27	0.50	0.31	4.17	**0.000***
Control of weight	0.89	0.25	0.29	0.40	1.06	0.293
Control of Length	0.89	0.25	0.28	0.43	1.74	0.089
The establishment contact between mother and neonate	0.84	0.31	0.50	0.38	3.27	**0.002***
Collection of materials	0.80	0.39	0.14	0.35	6.32	**0.000***
Registration of applications	0.82	0.35	0.14	0.35	5.82	**0.000***

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.

Table 5 Feedback of students for simulation

Satisfaction	n	%
I am so glade, I enjoyed.	20	83.3
I get interesting experience	19	79.1
I motivate for more learn about my theoretical information	14	58.3
It helps me for excited learning	12	50.0
Skills/knowledge		
Simulation is effective method , It improved my knowledge	21	87.5
It developed my NE skills	18	74.0
It facilitated my theoretical knowledge into skills	11	45.8
I notice the gap between my knowledge and skills,	10	41.6
It enable fill the gap	7	29.1
Critical thinking		
It showed me that I can apply my learning	10	33.3
I recognized critical aspects	8	41.6