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Araştırma Makalesi / Research Article

Comparison of Simulation and Video Training Given to Nursing Students in Distinguishing Pathological Lung Sounds and Determining Appropriate*

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Hemşirelik Öğrencilerinin Akciğer Seslerini Öğrenebilme ve Seslere Uygun Girişimleri Belirleyebilmede Simülasyon ile Video Eğitiminin Karşılaştırılması*

Abstract

Introduction: Various studies have shown the effectiveness of simulation in educating nursing students. However, there has been no study investigating the effects of using simulations on nursing practices. Aim and **Method:** The aim of this study was to measure the effect of simulation and video education on nursing students in terms of their ability to distinguish lung sounds and determine appropriate nursing interventions. The research was designed as a quasi-experimental study. The data were collected from 56 first-year students studying in the nursing department of a university in Turkey**. Results**: When the students' ability to distinguish the sounds was analyzed, the simulated model was found to be effective in terms of normal lung sound and stridor ($p<0.05$). When planning appropriate nursing interventions was compared there was found to be no difference between planning for normal lung sounds, wheezing and stridor ($p>0.05$). **Conclusion and Suggestions**: It was found that the simulation model was more effective than video in teaching nurses to distinguish lung sounds, while there was no difference between the two methods in how students determined what nursing interventions were appropriate. It has been proposed to conduct studies comparing different types of education that will be effective in the planning of nursing interventions and to increase the number of studies related to the educational equipment used in nursing education and to focus on studies with high level of evidence.

Keywords: Nursing, Education, Physical examination, Simulation, Video

Özet

Giriş: Hemşirelik öğrencilerinin eğitiminde simülasyonun etkinliğini gösteren çalışmalar bulunmaktadır. Ancak simülasyonla eğitimin hemşirelik uygulamaları üzerine etkisini inceleyen çalışmaya rastlanılmamıştır. **Amaç ve Yöntem:** Bu çalışmanın amacı hemşirelik öğrencilerinin akciğer seslerini ayırt edebilme ve sese uygun hemşirelik girişimlerini belirleyebilmede simülasyon ve video eğitiminin etkisini ölçmektir. Çalışma yarı deneysel olarak tasarlandı. Veriler Türkiye'deki bir üniversitenin lisans hemşirelik bölümünde birinci sınıfta okuyan 56 öğrenciden toplandı. **Bulgular:** Öğrencilerin dinlediği sesi ayırt edebilme durumu incelendiğinde; video ile simülasyon karşılaştırıldığında; normal akciğer sesi ve stridor sesinde maketin etkin olduğu bulundu ($p<0,05$).. Uygun hemşirelik girişimleri planlama durumları karşılaştırıldığında ise normal akciğer sesi, wheezing ve stridorda fark olmadığı saptandı ($p>0,05$). **Sonuç ve Öneriler:** Akciğer seslerini tanımlayabilmede maketin videodan daha etkili olduğu, uygun hemşirelik girişimlerini belirleyebilmede her iki yöntem arasında fark olmadığı saptandı. Hemşirelik müdahalelerinin planlanmasında etkili olacak farklı eğitim türlerini karşılaştıran çalışmalar yapmak ve hemşirelik eğitiminde kullanılan eğitim ekipmanı ile ilgili çalışmaların sayısını artırmak ve yüksek kanıt düzeyindeki çalışmalara odaklanmak önerilmiştir.

Anahtar kelimeler: Hemşirelik, Eğitim, Fizik muayene, Simülasyon, Video

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INTRODUCTION

Physical examination skills are a component of health evaluation. They are an important element in nursing care processes. These skills play a key role in collecting objective data to determine the problems of patient sand meet their needs(West, 2006).It is vital to teach nurses physical assessment skills to ensure that they are competent. The American Association of Colleges of Nursing defines the physical examination as one of the most important basic skills which needs to be improved in vocational nursing education and recommends the use of simulated methods (Luctkar-Flude, Wilson-Keates, & Larocque, 2012). The lack of opportunity for nursing students to practice on patients due to the physical location of nursing schools, and issues of patient rights and patient safety, prevent them from gaining enough practical experience (Ryoo, Park, & Ha, 2013). Yet it has been emphasized that active and participatory learning approaches are important so that nurses are well prepared when they graduate (Casey & Wallis, 2011). For this reason, clinical practice courses in nursing education have rapidly been replaced by simulation-based practice hours (Arthur, Kable, & Levett-Jones, 2011). Simulation-based education (SBE) is a practical and interactive learning method that uses a simulator and includes a variety of clinical scenarios (Groom, Henderson, & Sittner, 2014).

Students can acquire occupational and nursing skills via SDE (J.-H. Lee, Kim, Yeo, Cho, & Kim, 2009). SDE is effective on analyzing complex clinical problems extensively and enhancing clinical competence. Bythisway, students can acquire critical thinking skills concerning nursing, as well as knowledge, satisfaction with training and self-confidence (Reid-Searl, Eaton, Vieth, & Happell, 2011). They can explore their mistakes and learn how to fix them in simulation-basedtraining. Learning outputs of SDE are usually academic achievement and clinical competence (Sanford, 2010). Thus, nursing trainers use simulation along with conventional training approaches and sometimes in place of them (Garrett, MacPhee, & Jackson, 2010; Humphreys, 2013).

Literature simulation techniques also reveal how students have developed their physical examination skills (Levett-Jones, Lapkin, Hoffman, Arthur, & Roche, 2011; Luctkar-Flude et al., 2012; Tiffen, Corbridge, Shen, & Robinson, 2011). It has been revealed that utilization of simulators has developed knowledge levels and skills of students while doing physical examination and given them an opportunity of learning in a realisticand risk freeenvironment. As a consequence, more sensitive evaluations will lead to an accurate nursing diagnosis and increase the quality of nursing care. Thus, it is of vital importance to teach nurses physical evaluation skills in order to provide them competences (Hibbert et al., 2013). The SBE method allows nursing students to learn by trial and error without harming patients in clinical settings(J. C. Lee, Boyd, & Stuart, 2007). The students can discover what errors they have made when using SBE and learn how to fix them (Sanford, 2010). Thus, the students' nursing skills, nursing-related critical thinking skills, educational satisfaction, self-confidence (Dilaveri, Szostek, Wang, & Cook, 2013), knowledge levels and clinical competence all improve (Simonetti, Comparcini, Flacco, Di Giovanni, & Cicolini, 2015).

In the study conducted by Hatala et al. (2008), real patient and simulation trainings were compared during the cardiac physical examinationand it was determined that there was no difference between them (Hatala et al., 2008). In the study conducted by Tiffen et al. (2011) under the title of “usingpatient Simulator in the skills of nursing students to evaluate heart-lung sounds”, it was found that students receiving simulation training had higher knowledge levels (Tiffen et al., 2011). In the study conducted by Luctkar-Flude et al. (2012), the skills of nursing students to role play and discern respiratory sounds on real patients were evaluated. It was determined that role play caused lesss tress in the skill development of beginner students(Luctkar-Flude et al., 2012). In their study, Tawalbeh and Tubaishat (2013) evaluated the knowledge levels of nursing students in providing cardiac life support with simulation training. It was concluded that simulation training was more effective than conventional training (Tawalbeh & Tubaishat, 2013). Nursing trainers applied several simulation scenarios to nursing students and it was found that simulation application increased both knowledge and confidence (Akhu-Zaheya, Gharaibeh, & Alostaz, 2013). Two studies were found in the Cochrane database as a result of searching for the keywords ‘physical examination’ and ‘simulation’; these studies were conducted on breast examination and pelvic examination(Dilaveri et al., 2013; Tawalbeh,

2017). There is a need for studies assessing the effect of SBE on physical examination, as these studies did not investigate the effects of the result of training in physical examination on nursing interventions. The aim of this study was thus to assess the effects on nursing students of simulation and video training in distinguishing pathological lung sounds and in their determination of appropriate nursing interventions in the light of this information.

Materials and Methods

Universe and Sample

A total of 250 students in all classes of the nursing department make up the universe. Students taking the relevant course and meeting the inclusion criteria were included in the study. The sample of the study consisted of 1st year students (n=56) in the nursing department of one university.

Inclusion Criteria

- Being a 1st year student in the nursing department

- Having had a clinical practice experience in hospital

- Having a maximum pre-test score of 10

Exclusion Criteria

- Having previously received education on lung sounds

- Having a family member who was employed in healthcare

- Having previously assisted in the care of a patient

Data Collection Tools

To collect data, a sociodemographic questionnaire prepared by the researchers recording the characteristics of the students, the simulation model, a medical video and the skill assessment form were used.

Sociodemographic Questionnaire: This questionnaire consisted of questions about the students' gender, age, type of alma mater (high school), their willingness to become a health worker, their previous experience of patient care, and whether they had had any pre-university hospital experience.

Simulation Model: A computer-aided simulator was used to listen to heart and lung sounds and to distinguish pathological sounds. This model produced 12 different sounds together with the sound of a healthy lung. The model had its own stethoscope. When this stethoscope was placed in the right place on the model, the lung sound was heard. The sound output was provided by a loudspeaker. In this way, other people in the environment also heard the lung sounds.

Skill Assessment Form: This form was prepared by the researchers in accordance with the related literature in the form of a checklist including the steps of the process [10-16]. This form included the nursing interventions decided on by the students for each specific lung sound. The students were asked to mark on the form the nursing interventions that corresponded to the lung sounds they had heard. For example, putting a patient in a comfortable breathing position was marked as a nursing intervention for a wheezing sound. The students were able to mark more than one nursing intervention for each lung sound. 16 nursing interventions, prepared from the literature, were listed.

Implementation of the Study

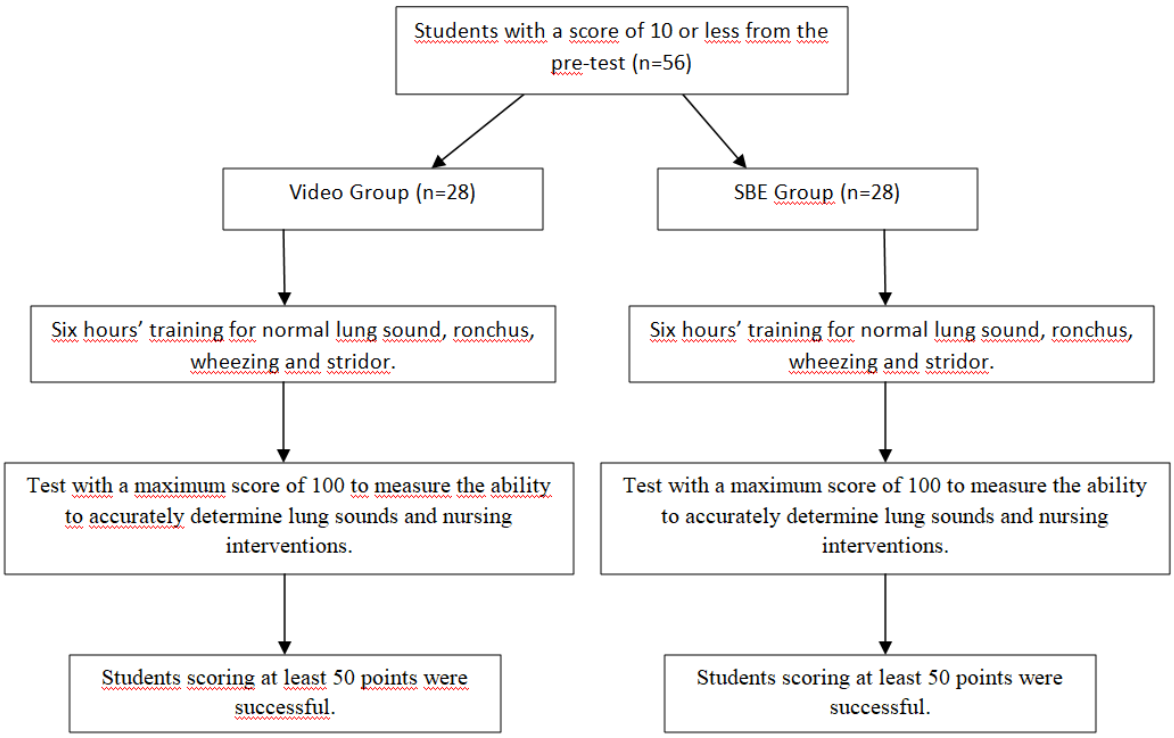
Before the study, the 1st year nursing students were given a test to assess whether they had students previously learned the lung sounds or had knowledge of these sounds. The pre-test had a maximum score of 100. Only students who obtained 10 points or fewer in the pre-test were included in the study. These students were divided into two groups: the video group and the SBE group.

In the video group, six hours of training were given on how to listen for lung sounds, what sounds were pathological and what nursing interventions could be used. This training included a healthy lung sound, rhonchi, stridor and wheezing sounds. Medical training videos were used for the sounds. At the end of six hours, a test was given to the students to assess whether they could accurately determine lung sounds and nursing interventions. The maximum possible score was 100 and students who got at least 50 points were deemed successful.

The students in the SBE group also received six hours of training on how to listen for lung sounds, what sounds were pathological and what nursing interventions could be used. During this training, how to accurately determine lung sounds and their locations were shown using a simulated model. At the end of the training, the students in the SBE group took the same test as the

students in the video group. As before, the maximum possible score was 100 and students who scored at least 50 points were deemed successful. The flow chart of the study is given in figure 1.

Flow Diagram



RESULTS

56 participants were included in the study. 28 (50%) of them were in the video group and 28 (50%) of them were in the SBE group. 25 (44.6%) of the students were aged 19 while their mean age was 19.04 ± 0.85 (years). 42 (75.0%) of the students were female; 46 (82.1%) of them had graduated from high schools that were not medical vocational high schools. 45 (78.6%) of them had voluntarily chosen the department; 44 (78.6%) of them were content with the education they were receiving from their department (Table 1).

Table 1. Distribution of students' sociodemographic

Variable (N=56)	N	%
Group		
Model	28	50.0
Video	28	50.0
Age [$\bar{X}$ ± S. S. →19,04 ± 0,85 (years)]		
18 and below	15	26.8
19	25	44.6
20 and over	16	28.6
Gender		
Female	42	75.0
Male	14	25.0
High School		
Medical vocational high school (Being a graduate of a vocational health high school)	10	17.9
Other high school	46	82.1
Voluntarily choosing this department		
Yes	45	80.4
No	11	19.6
Content with the education provided in the department		
Yes	44	78.6
No	12	21.4

*As multiple answers were given to the question, 'n' increased and percentages were calculated according to the new value of 'n'.

There was no significant relationship between the groups according to the students' gender, high school, their having voluntarily chosen the department and their contentedness with the education provided (p>0.05) (Table 2).

Table 2. Comparison of students' sociodemographic characteristics by group

Variable	Group			p*
	Model (n=28)	Video (n=28)	Total (N=56)	
Gender				
Female	22 (78.6%)	20 (71.4%)	42 (75.0%)	χ^2=0.095
Male	6 (21.4%)	8 (28.6%)	14 (25.0%)	p=0.758
High School				
Medical vocational high school	6 (21.4%)	4 (14.3%)	10 (17.9%)	χ^2=0.122
Other high school	22 (78.6%)	24 (85.7%)	46 (82.1%)	p=0.727
Voluntarily choosing this department	24 (85.7%)	21 (75.0%)	45 (80.4%)	χ^2=0.453
Yes	4 (14.3%)	7 (25.0%)	11 (19.6%)	p=0.501
No				
Content with the education provided in the department	25 (89.3%)	19 (67.9%)	44 (78.6%)	χ^2=2.652
Yes	3 (10.7%)	9 (32.1%)	12 (21.4%)	p=0.103
No				

* "χ^2-cross tables were used to analyze the relationships between two qualitative variables according to the expected value levels.

A statistically significant relationship was found between the groups in term of recognizing a normal lung sound (χ2= 8.654; p = 0.003). It was determined that 20 (71.4%) students in the SBE group recognized a normal lung sound while 19 (67.9%) in the video group did not. When the results were analyzed according to the group, it was found that more students in the SBE group recognized a normal lung sound. A statistically significant relationship was found between the groups and the students' recognition of stridor (χ2 = 9.987; p = 0.002). 19 (67.9%) of the students in the model group recognized stridor while 9 (100.0%) of the students in the video group did not recognize it. When the results were analyzed according to the groups, it was found that all of the students recognizing a normal lung sound were in

the model group while nobody in the video group recognized stridor (Table 3).

Table 3. Comparisons of the students' skills in distinguishing lung sounds by group

Variable	Group SBE (n=28)	Video (n=28)	Total (N=56)	p*
Normal lung sound				
Recognized	20 (71.4%)	9 (32.1%)	29 (51.8%)	χ^2=8.654
Did not recognize	8 (28.6%)	19 (67.9%)	27 (48.2%)	**p=0.003**
Wheezing				
Recognized	23 (82.1%)	5 (50.0%)	28 (73.7%)	χ^2=2.443
Did not recognize	5 (17.9%)	5 (50.0%)	10 (26.3%)	p=0.118
Rhonchi				
Recognized	22 (78.6%)	4 (44.4%)	26 (70.3%)	χ^2=2.339
Did not recognize	6 (21.4%)	5 (55.6%)	11 (29.7%)	p=0.126
Stridor				
Recognized	19 (67.9%)	-	19 (51.4%)	χ^2=9.987
Did not recognize	9 (32.1%)	9 (100.0%)	18 (48.6%)	**p=0.002**

Table 4 shows the students' ability to recognize lung sounds accurately and to conduct appropriate nursing interventions according to their group. There was no statistically significant difference between the groups in terms of the scores for normal lung sound, wheezing and stridor (p>0.05). There was a statistically significant difference between the groups in terms of the score for rhonchi (t=2.906; p=0.007). The rhonchi score of the SBE group was statistically significantly higher than that of the video group (Table 4).

Table 4. Comparison of the ability to conduct appropriate nursing interventions by students who recognized the lung sounds accurately

Variable	Group Model (n=28)		Video (n=28)		p*
	$\bar{X}$±S.D.	M [IQR]	$\bar{X}$±S.D.	M [IQR]	
Normal lung sound	82.60±19.25	88.0 [31.0]	80.67±10.55	81.0 [13.0]	Z=-0.721 p=0.471
Wheezing	67.04±21.23	75.0 [38.0]	57.08±20.45	56.5 [31.0]	t=1.334 p=0.191
Rhonchi	72.64±14.77	75.5 [16.8]	51.14±23.32	50.0 [43.0]	t=2.906 **p=0.007**
Stridor	73.37±19.51	77.0 [69.0]	42.50±4.95	42.5 [40.0]	Z=-1.819 p=0,086

*The independent sample-t test was used in the comparison of the two independent groups with normal distribution while the Mann-Whitney U test was used to compare the two independent groups without normal distribution

DISCUSSION

This study was carried out with 56 students who were 1st year students in the nursing department and who were listening to lung sounds for the first time (Table 1). The training on lung sounds was given by using a medical video or simulation model. The students were then asked to determine appropriate nursing interventions for the lung sounds. There was no difference in terms of sociodemographic characteristics of the students in the study (Table 2). The study found that the students in the SBE group were able to understand a normal lung sound and stridor better than the students in the video group (Table 3). It was concluded that the SBE was more effective in teaching the students to distinguish lung sounds. Gürol et al. (2016) conducted a study in order to measure the effect of simulations on students' skill levels. They stated that SBE increased students' skill levels (Gürol, Akpınar, & Apay, 2016).

In another study, Liw et al. (2012) reported that students who were trained with a simulation had more knowledge and skills than students in the control group (Liaw, Scherpbier, Rethans, & Klainin-Yobas, 2012). The findings of our study are in parallel with the literature (Dilaveri et al., 2013; Hatala et al., 2008; Levett-Jones et al., 2011; Luctkar-Flude et al., 2012;

Simpson, 2014; Tawalbeh, 2017; Tawalbeh & Tubaishat, 2013; Tiffen et al., 2011; Wayne et al., 2008). There was no difference between the students in each group in terms of wheezing and rhonchi (Table 3). The lack of difference between the groups for the wheezing and rhonchi sounds can be attributed to the fact that students in the study do not respond to what these sounds are and therefore the data loss is high.

When the students' skills in determining the appropriate nursing interventions for lung sounds were compared it was found that the students who had trained with the model were more likely to plan appropriate interventions for rhonchi (Table 4). There is no other study in the literature about the effectiveness of using a model to teach nursing interventions. In their study determining the effectiveness of a simulator in thorax, lung, and heart examination Tuzer et al. (2016) reported that the persons who received SBE were more successful in patient care (Tuzer, Dinc, & Elcin, 2016). In another study, Ricketts and Barry (2011) found that SBE increased the students' clinical adaptation and clinical skills (Ricketts, 2011).

As a result of our study, the fact that the ability of the students who received training using models to plan a care for the rhonchi sound is higher is similar to the literature. No difference was found between the groups in terms of the normal lung sounds, wheezing and stridor sounds (Table 4). This is not similar to the literature. According to the information in Table 4, it was found that a difference was present in only one of the four sounds, given the ability of the students to give the proper care for the sounds listened. The lack of difference in the majority of the sounds in our study may indicate a low success in terms of planning care in the model group. This suggests that there is no difference between the successes of the students who received training using model and video. The cost of a simulation model can be quite high. In addition, a qualified instructor is required to use a simulation model. In this study, it was found that training with video was as effective as training with a model in planning appropriate nursing interventions for lung sounds. Pathological lung sounds can be easily accessed from medical videos found on the internet. This result showed that it is not meaningful to use high-cost simulation models to plan appropriate nursing interventions.

CONCLUSION AND SUGGESTIONS

In this study, the nursing undergraduate students were taught by video or simulation how to accurately determine lung sounds and plan appropriate nursing interventions. As a result of the study, when the ability of the students who received training using video and model to distinguish four sounds was examined, it was found that the students in the model group were more successful in terms of the normal lung sound and stridor sound. No difference was found between the groups for the other two sounds. When the abilities of the students in the model and video group to determine the appropriate nursing interventions related to the lung sounds were compared, it was found that the success in the model group was high for the stridor sound and there was no difference between the groups in terms of the normal lung, wheezing and rhonchi sounds. According to these results, we think that there is no difference in the effect of training with model and video on the ability of the students to provide care according to the lung sounds.

Accordingly, it is recommended;

to use simulation models for distinguishing the lung sounds, or to use almost cost-free medical videos for teaching the appropriate nursing interventions,

to conduct studies comparing different types of training that will be effective in planning nursing interventions,

to increase the number of studies related to the training equipment used in the nursing education and to be focused on the studies with a high level of evidence.

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