Chronic Diseases Journal

DOI: 10.22122/cdj.v10i4.667 Published by Vesnu Publications

Comparison of two training methods on nurses' skills in using ventilators in medical-surgical departments

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Original Article

Abstract

BACKGROUND: Regarding the importance of nursing education promotion, there is a need to use methods to create nurses' knowledge and skills. This study aimed to compare two training methods on nurses' skills in using ventilators in medical-surgical (Med-Surge) department.

METHODS: This quasi-experimental study was performed in the internal and surgical wards of Amir Al-Moemenin Hospital in Arak City, Iran, in August 2019 to May 2020. The samples were 100 nurses who were selected through convenience sampling and were randomly divided into two groups of 50 samples. After the pretest administration, nurses in the control group were educated using face-to-face or usual method education; in the experimental group, they were trained using video-based education. After ten days, the post-test was completed. Finally, data analysis was done using SPSS software.

RESULTS: The mean total score of the performance was significantly different among the two groups after the intervention ($P < 0.001$), so that after the intervention, the mean of performance score in video-based education was higher than the usual method.

CONCLUSION: It seems that the use of video-based education enhanced the clinical skills of nurses. Therefore, it is recommended to use more video-based education to enhance clinical nurses' learning.

KEYWORDS: Education; Nurse; Skill; Mechanical Ventilator

Date of submission: 14 Dec. 2021, ***Date of acceptance:*** 29 Jan. 2022

Citation: Mousavi MS, Golitaleb M, Vakilian P, Mahmoudi M. **Comparison of two training methods on nurses' skills in using ventilators in medical-surgical departments.** Chron Dis J 2022; 10(4): 189-95.

Introduction

Human resource improvement has a very long history and includes activities to increase clinical knowledge and skills to provide better clinical services.[1] Medical equipment is an essential tool for nurses to provide quality nursing care.[2] one of the clinical education system's worries and concerns, especially nurses, is learning practical courses and working with a ventilator in the hospital.[3,4] One of the dangers of using a ventilator is the improper use of this device. In Iran, statistics show that 45.3% of nursing staff do not know how to use medical equipment properly. One of the important responsibilities of the education department is to help nurses to progress and improve their job ability.[5] Face-to-face teaching can be considered the first and most traditional teaching method widely used in the past, but now with the significant advances made in educational

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technology, a wide variety of teaching methods have been created.[6-8] Studies have shown that of the total information received by individuals, 75% is received and remembered through sight, 13% through hearing, and the rest of the data through other senses.[9-11]

Sadeghi et al. state that in most cases, education is provided through lectures, and 80% of the learned material is forgotten after eight weeks. Still, it is better to use educational tools such as pictures, models, videos, and demonstrations.[12] Mohammadi and Dadkhah study reported that more than half of the nurses rated the presentation status as moderate. Only 10% of the nursing staff were satisfied with the student's participation in the public discussions related to the lecture.[5]

Bridge et al. showed that the use of videos not only enhanced students' learning but was also recommended as a necessary method in education.[13] However, the results of some other studies have shown that teaching in a conventional way had a greater impact on students' learning than the video method.[14,15] At the same time, other studies in this field reported that video education was more effective in promoting students' clinical ability than conventional methods.[16,17] Therefore, there is a contradiction regarding the effect of video on clinical education.

A ventilator is a device that performs breathing work for patients. Failure to work properly with this device can cause increased patient dependence on the device, oxygen poisoning, increased respiratory infection, and death.[18]

The results of Farmani and Zeighami Mohamadi study also reported that 67.44% of nurses working in different wards of the hospital in the survey of educational needs priorities, the method of working with various devices, including ventilators, among the educational priorities.[19] The theoretical subjects presented in the form of lectures are less transferred to clinical situations. In increasing the awareness of nursing staff about working with ventilators, today, there is an emphasis on teaching clinical skills in real-world space.[20] On the other hand, due to the problems mentioned in the face-to-face training method, nurses' severe work stress, and the lack of suitable classroom attendance conditions to learn how to use ventilator, the researchers decided to use video media to improve ventilator training and evaluate this method's effectiveness compared to the face-to-face training method. For this purpose, this study aimed to compare two training methods on nurses' skills in using ventilators in medical-surgical (Med-Surge) departments.

Methods

This research is a quasi-experimental study that was conducted in two groups before and after the intervention. The study population consisted of nurses (100 people) working in the internal medicine and surgery wards of Amir Al-Momenin Medical Center of Arak City, Iran, who entered the study by simple random sampling. This study was conducted in August 2019 to May 2020. Inclusion criteria included having at least six months of experience in the clinic, working in the Med-Surge wards of the hospital, nurses of both sexes, and having at least a bachelor's degree in nursing. Exclusion criteria included an unwillingness to participate in this study and participation in training courses related to the study's research topic. The samples were selected using a convenience sampling method and randomly divided into two groups of 50 people: face-to-face training (control group) and video-based training (intervention group). Before sampling, a random design was prepared using SPSS software (version 16, SPSS Inc., Chicago, IL, USA); for this purpose, numbers from 1 to 100 per page using the option "random numbers" in "compute" and "function group box" in the transform menu were entered. Then we randomly divided

100 samples into two groups. The numbers in each list were sorted, and the lists were used to assign patients to face-to-face or video-based training groups.

One of the most important confounders was the probability of information bias, and for controlling it, first, the control group information was completed by samples, and then video-based training samples were completed. Data collection tools in this study included a demographic information form and a skill assessment checklist. The demographic profile form evaluated variables such as age, sex, length of stay in the clinic, and length of stay in the ward. Sampling was done by the researcher. The researchers used the Direct Observation of Procedural Skills (DOPS) checklist to assess skills. This questionnaire has 28 items that are scored on a 5-point Likert scale from 0 to 4. The lowest score is 28, and the highest score is 140. The content of the checklist is taken from the book of Standards of Iranian Nursing Services. For validity, the content validity method was used, which was done by applying the opinions of 10 experts (faculty members of the Department of Internal and Special Nursing, Arak University of Medical Sciences). For reliability, the internal consistency method and test-retest were used. First, the designed checklists were given to 15 samples, and after ten days, the checklists were completed again, and finally, Pearson's correlation test was checked. Then internal consistency was calculated and finally, Cronbach's alpha result was 0.917, indicating the optimal reliability of the designed checklist. After assessing the demographic variables, the skills assessment checklist (DOPS) was completed by both groups. The hospital educational supervisor performed training in both groups. First, in the control group, training on how to work with a ventilator was done by a face-to-face method by the hospital educational supervisor, who was predominant in training with a ventilator, during a two-hour session. After ten days,[16] they were once more evaluated by using the DOPS checklist.

In the experimental group, the researcher-made film on the subject of working with the ventilator was prepared as an educational CD and provided to each member of the intervention group. The experimental group nurses received the video provided by the hospital's educational supervisor and watched it at home. Video could be used on all computer systems and smartphones. Nurses were allowed to watch the film as many times as they wished. Two days after the film was presented, they were contacted to ensure that the nurses were able to practice and watch the film and be reminded to watch. After ten days, the nurses' performance was re-evaluated using the DOPS checklist.

In all stages, performance evaluation was performed by one of researchers along with the educational supervisor of the hospital in both groups. It is noteworthy that all assessments were performed by researchers in the morning shift from 8 to 11 AM. The collected data were analyzed using SPSS software (version 16, SPSS Inc., Chicago, IL, USA) at a significance level of $P < 0.05$.

The normal distribution of data was investigated using the Kolmogorov-Smirnov test. Due to the lack of normal data distribution, descriptive statistics were expressed for quantitative variables with mean and standard deviation and for qualitative variables as frequency and percentage. Inferential statistics for quantitative and qualitative variables in two modes in the independent group using the Mann-Whitney U test, as well as comparing the mean before and after the intervention, using the Wilcoxon test, and for qualitative variables using the chi-square test (to check demographic variables) and the exact test Fisher was used.

The Ethics Committee of Arak University of Medical Sciences approved this study

(IR.ARAKMU.REC.1395.402). The first author selected qualified nurses, introduced himself to them, and explained the purpose of the study and confidential management, and provided them with voluntary participation in the study and cancellation of the study whenever they want. The researchers obtained written consent from all nurses.

Results

In this study, 100 nurses participated in two intervention groups (video-based training) and control (face-to-face training). The mean age of nurses was 30.56 ± 4.90; in terms of sexual distribution, 1 subject was man, and 99 were women. In terms of working status, 96 people were shift workers, and 34 people were contract workers.

The comparison of the two groups in terms of contextual variables is given in table 1.

The type of employment of nurses by the educational group is shown in table 2.

As shown in table 1, there was no difference between the mean age, sex, and duration of clinical history in the two groups of face-to-face training and video-based training. In other words, the two groups were selected in terms of homogeneous demographic variables.

Table 2, which used the nonparametric Wilcoxon test, showed that a statistically significant difference was observed between the mean scores of nurses working with ventilators before and after intervention in the experimental group (video-based training) and the control group (face-to-face training).

The mean score of nurses' performance in working with ventilators before the study was not statistically significant in both groups; it means both groups were at the same level in terms of work performance with a ventilator (P = 0.187).

However, after the intervention, the mean skill score showed a statistically significant difference (P = 0.029). This result indicates the effectiveness of both training methods to work with a ventilator, but considering that the average number of nurses score in the video-based training group was much higher than the face-to-face training method, it can be concluded that the video-based training method is far better and more cost-effective than face-to-face training.

Discussion

This study aimed to compare the effect of two educational methods on improving nurses' performance in Med-Surge wards in the use of ventilators.

The present study results showed that the performance level of both groups was homogeneous before the intervention. The results showed a statistically significant difference between the mean performance score before and after in both groups. This means that both methods (face-to-face training and video-based training) improve nurses' performance in using a ventilator device. However, this increase was observed more in the video-based training group. The study by Lee et al. reported that the use of simulation and filming simultaneously increased performance in the intervention group,[17] which is in line with the present study.

Table 1. Comparison of two groups in terms of contextual variables

Variable	Group		P
	Face-to-face	Video-based education	
Age (year)	30.70 ± 4.47	30.42 ± 5.34	0.658*
Clinical performance	6.72 ± 4.11	6.51 ± 4.21	0.923*
The amount of work experience in the present section (year)	3.92 ± 3.53	4.87 ± 4.33	0.352*
Sex			
Men	0 (0)	1 (2)	> 0.999**
Women	50 (100)	49 (98)	

*Mann-Whitney U test; **Fisher test

Data are presented as mean ± standard deviation (SD) or number and percentage

Table 2. Mean performance score in two groups before and after intervention

Types of education	Mean score		P
	Before	After	
Face to face	36.44 ± 9.73	72.98 ± 17.29	< 0.001
Video-based	39.46 ± 11.91	80.08 ± 14.34	< 0.001
P	0.187	0.029	-

Data are presented as mean ± standard deviation (SD)

Aghababaeian et al., in a similar study, evaluated the effect of triage video training on the level of awareness of emergency personnel and showed that staff awareness and skills after training increased significantly, and this difference was significant.[21] Fidalgo-Neto et al. also showed in their study that the use of videos, images, designs, and text in content effectively increased the learning of pharmacy students.[22]

Moreover, Managheb et al. stated that educational videos were more effective than traditional teaching methods such as lectures to improve medical students' communication skills.[23] Peters et al. also reported that educational videos led to a significant increase in knowledge of people with secondary and higher education.[24] These studies are consistent with the present study, and have shown the importance of using the film or educational video method. Indeed, it is noteworthy that the studies conducted video training in the public and the teacher's classroom. In contrast, in the present study, educational CDs were provided to each nurse. They have been learning at certain times individually without the teacher's presence, and after watching the educational video, they practiced and repeated the instruction in their wards.

While Naseri et al. reported in their study that there was no significant difference in terms of knowledge and practical skills after training and using the educational multimedia program, the use of this program led to reduced teachers' visits to fix the problems significantly.[25] Besides, Omran et al., comparing the effect of group training and hand dressing video training on nurses' knowledge and practice, showed that the mean scores of knowledge and performance in both group and video training groups increased significantly after training, and the comparison of the two groups showed no significant difference between the two methods of the group and video training before and after training,[26] which was contrary to the present study. As mentioned in the studies, video training will not always lead to improved performance, and sometimes other better training methods can improve nurses' performance.

The present study showed that the video-based training method had a higher average score than the face-to-face training method, while in the study of Adib-Hajbaghery and Karimi, who compared the two methods of face-to-face training and video-based training in using nebulizers, the face-to-face training method was able to increase the performance of patients in using the nebulizer device.[9] In the study of Abbaszadeh et al., the face-to-face training method was considered much more effective than video training in promoting knowledge and attitude of patients with stroke.[11] But perhaps the reason for this discrepancy was the results in the target group. Because most nurses have a university degree, the use of video-based training that can be viewed at any time is much more effective than the method of regular attendance and is stable at a certain time of its requirements.

In the present study, despite the results obtained, increasing nurses' motivation and interest to train and work with a ventilator may lead to a more effective method than face-to-face training. Omran et al. state that film makes the lecture more attractive, increases the students' attention, and strengthens the concepts to improve their learning and

knowledge retention abilities.[26] In a study to maintain interest in lectures, Lim et al. stated that one-third of lectures should contain video. This finding means that out of 50 minutes in a typical lecture, approximately 17 minutes should be devoted to videos.[27] Falahinia et al. in a study aimed at comparing basic cardiopulmonary resuscitation training with two practical methods with modeling and film screening reported that although both methods were equally effective, film training was recommended due to benefits such as free time, no need for classes, ease to use, and cost-effectiveness.[28] The findings of this study show that the use of technology can enhance learning. This result could indicate that video-based training greatly impacts the success of nurses' performance and gives them a second chance to watch films as many times as they want, resulting in better learning. One of the limitations of this study was the small sample size and the focus of the studies on a therapeutic training center; thus, it is suggested to conduct a similar study with a larger number of samples and even in a multicenter and wider manner.

Conclusion

Considering that the health system transformation plan in educational and medical centers has led to an increase in the number of patients and, consequently, a decrease in the time of nurses for training in clinics and training classes, it is suggested that video-based training method with different clinical topics be used to improve nurses' performance.

Conflict of Interests

Authors have no conflict of interests.

Acknowledgments

The present study was extracted from a research project approved by the Research Center of Arak University of Medical Sciences. Researchers consider it necessary to express their gratitude to Amir Al-Moumenin Hospital's educational supervisor and all the nurses participating in this study.

Financials support and sponsorship

This study was financially supported by Arak University of Medical Sciences.

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