



RESEARCH ARTICLE

## Comparison of the effect of two teaching methods on nurses' awareness of occupational hazards and safety measures: Lectures versus Educational Packages

\*Leila Sadati<sup>1</sup>, Robab Foruzesh<sup>2</sup>, Zohreh Mahmoodi<sup>3</sup>, Taraneh Tahamtani<sup>4</sup>, Alireza Beirami<sup>5</sup>, Parvin Farmani<sup>6</sup>

1- Faculty Member, M.Sc. in Nursing Education, Operating Theater Department, Faculty of Paramedics, Alborz University of Medical Sciences, Karaj, Iran (**Corresponding author**)

Email: navaishams@yahoo.com

2- M.Sc. in Neonatal Nursing, B.Sc. in Operating Theater, Faculty of Paramedics, Alborz University of Medical Sciences, Karaj, Iran.

3- Assistant Professor, Faculty Member, Faculty of Nursing and Midwifery, Alborz University of Medical Sciences and Health Services, Karaj, Iran.

4- M.S.c. in Medical Education, Alborz University of Medical Sciences, Karaj, Iran.

5- B.Sc. in Surgical Technologies, Operating Theater Department, Faculty of Paramedics, Alborz University of Medical Sciences, Karaj, Iran.

6- B.S.c. in Nursing, Training Supervisor, Alborz Hospital, Karaj, Iran.

Received: 3 September 2017

Accepted: 19 October 2017

### Abstract

**Introduction:** The hospital personnel are exposed to various biological, chemical, physical and psychological hazards. Given the importance of their safety and health, this study was aimed to compare the effect of two teaching methods of lecture and educational package on the nurses' knowledge of occupational hazards and safety in a hospital in Alborz Province.

**Materials and Methods:** In a quasi-experimental study, 60 nurses from different departments of Alborz Hospital were randomly divided into educational package and lecture groups. Both groups received training in two 2-hour sessions. The data were collected using a researcher-made questionnaire at three stages of before, after and 3-4 weeks after intervention. The data were analyzed using independent t-test and repeated measures analysis of variance by SPSS-15.

**Results:** The results indicated that education increased the knowledge of both groups ( $P=0.001$ ), but there was no significant difference between the two groups immediately after the intervention, and most participants had a high level of knowledge ( $P=0.692$ ). However, the total mean score of knowledge was significantly higher in the educational package group one month after the intervention ( $P=0.04$ ).

**Conclusion:** According to the results, the provided education persisted more significantly in the educational package group than in the lecture group. Therefore, educational package is suggested to be used for health-related subjects.

**Key words:** Teaching, occupational hazards, occupational safety, awareness, educational package, lecture.

### Introduction

Occupational hazards refer to any environmental, biological, chemical, physical or mechanical factor or situation that can endanger humans' health and harm or injure them [1]. The hospital medical staffs are exposed to serious risks in the workplace and should therefore receive adequate theoretical and practical training to be able to protect themselves against these risks. These risks have been classified by various organizations responsible for maintaining the safety of nurses and workers as high-risk jobs. In one of the main classifications, these hazards have been divided into biological, chemical, physical or mechanical and psychological risks. Infection with HIV or hepatitis and getting needle stick injuries, backache and physical harms are classified as such risks. Improving the working conditions, reducing the risks and increasing the safety of medical staff through appropriate training are

crucial. Backache is one of the most important and common complications resulting from physical hazards in nursing, being more prevalent in women than in men; therefore, given the higher percentage of female nursing staff, this issue should receive more attention [2]. The complications of working in stressful environments and subsequent mental fatigue are frequently noticed in nursing. Nevertheless, technicians are also exposed to the physical harms of handling heavy objects and physical work in addition to the complications associated with nursing. These complications (both mental fatigue and physical injuries) have a direct effect on the quality of patient care [3]. It is therefore essential for people working in these disciplines, including medical students, to receive appropriate and adequate training [4].

Training the staff ensures their adequate knowledge of the professional duties they should accomplish. A large proportion of the staff's learning involves acquiring the

relevant information, skills and new ideas about the job [5].

Participation in ongoing training programs directly affects the hospital personnel's performance, leading to an increased productivity, reduced occupational hazards, reduced medical errors, increased job satisfaction and even greater patient satisfaction. The compulsory or optional participation of personnel in ongoing training programs is therefore essential [6].

Given the various training methods available, choosing the right method is crucial [7]. Nursing education can maintain its dynamism only when it tends to move toward innovation and the use of modern teaching and learning methods. Achieving this goal requires teachers to use modern teaching techniques to plan their lessons [8].

One of the traditional methods still more or less used in many classrooms is giving lectures. Giving lectures is one of the most common and traditional teaching methods that, in addition to having such benefits as being economical, allowing the logical and direct presentation of the subject and improving speech and note-taking skills, has some drawbacks such as being passive, inefficient in teaching practical skills, incapable of improving mental skills at higher levels of learning and ignoring the individual differences that are at play. Moreover, there is a possibility that the subjects taught are subjected to early forgetting [9].

According to education psychologists, learning is most effective and lasting when accompanied by a greater activation and participation on the part of the students in the process of acquisition. Education experts therefore emphasize the use of modern, active and acquisition-based techniques [10].

Since learning varies from learner to learner, it is essential to make use of different teaching methods. Meanwhile, there are many problems in providing training to hospitals' nursing personnel due to the rotating shifts, nurse shortages and the part-time status of some nurses; thus, a more flexible program is required to meet the educational needs of those in health professions, taking into account the number of patients allocated to each nurse per shift, their work hours and any unexpected emergency events. An ideal training program should be easily implementable at the workplace, should provide the possibility of being held whenever the personnel have some free time and should also have a limited duration (15-20 minutes), so that the personnel can study and discuss the subjects during their coffee break or when their workload is light, thereby improving their knowledge [11]. It is also necessary to use distance learning methods alongside traditional learning methods or to completely replace them in retraining programs. Traditional teaching methods require expenditure on place, equipment, teaching staff and paperwork and place a greater emphasis on quantity (certain

hours and sessions shall be met during a certain timeframe), leading to the loss of precious time that could be spent more usefully. The obligation for presence in the classroom at a specific time, the constant traffic in large cities, the overlapping work and class hours, the presence of individuals with different learning styles and levels of knowledge in the same classroom and many other problems have provided the ground for development of distance teaching methods [12]. Given the recent technological advances and the possibility of using multimedia educational software, the use of educational packages has become an effective common educational method in many educational settings. This low-cost method of education, which provide the possibility of being repeated in several sessions without the need for a lecturer or several hours of classroom attendance in locations such as hospitals where the personnel are pressed for time, promises the enhancement of the scientific base of medical personnel. Considering the consequences of poor knowledge of occupational hazards and the principles of workplace safety in hospitals, and the need for providing training to personnel through effective and practical methods, the present study was designed and conducted to compare the effects of training through lecture and educational packages on the nurses' awareness of occupational hazards and safety.

## Methods

The present quasi-experimental study was conducted to compare the effects of two methods of teaching, i.e. lecture and educational packages, on the personnel's awareness of occupational hazards and safety at work at a hospital in Alborz province in 2014. The study population consisted of the nurses with advanced diplomas and higher qualifications and the ability to use a computer and CD-player who worked at different departments of Alborz hospital. Samples were selected by census method and then randomly divided into a lecture group and an educational package group based on their different job categories (i.e. operating theater and anesthesia technicians, nurses, midwives, head nurses and supervisors). Depending on the subjects' characteristics and their consent to take part in the study, the sample size was determined to be 80 participants for the two groups; 5 participants were again randomly selected from each group and separated from the rest for conducting a pilot study and calculating the reliability of the study tool, making the sample size 35 for each group and 70 in total.

Data were collected using a questionnaire, prepared according to the study objectives and using a review of literature and educational content. The questionnaire consisted of two parts, one part about the demographic characteristics of participants with 2-20 specific questions with no negative marks. Every correct answer received

a score of 1, with the minimum total score of 0 and the maximum score of 20. The validity of the questionnaire was verified using the content validity and the views expressed by 10 experts and faculty members. The reliability of the questionnaire was determined using Cronbach's alpha, upon the completion of 10 questionnaires distributed in the pilot study. Cronbach's alpha was calculated to be 89%, and the remaining questionnaires were then completed according to the study procedures.

In the process of training, assessments were conducted in three occasions: 1) before the training program; 2) after the training program; and 3) 4 weeks after the beginning of training.

The first group attended the training class, completed a pretest and then attended a 2-hour lecture on occupational hazards and safety at work. The lecturer presented his material using a whiteboard and a projector to show the slides. The second part of the questionnaire was completed by participants immediately after the retraining. The mean scores obtained before and after the training were compared using the Mann-Whitney and Wilcoxon tests.

The second group was divided into 3 sub-groups with prior arrangements and their evening and night shifts were distributed over 3 consecutive days. Before the shift hand-over, they completed the questionnaires in the nursing office and received a CD on the subject and were advised on the study method and the test that was going to be held in the morning after the shift. The next morning before leaving the hospital, they completed the second part of the questionnaire in the nursing office. The mean scores obtained before and

after the training were compared using the Mann-Whitney and Wilcoxon tests.

Four weeks later, arrangements were made with the nursing office, and without prior notice, all participants attended the class and completed the second part of the questionnaire once again. The mean scores obtained at this stage and the mean scores obtained immediately after the training were compared in each group. The mean scores obtained in the two groups in the previous assessment, immediately after the training and one month later were compared using the Friedman test.

After the extraction of results from the questionnaires and according to the data recorded on the personnel's awareness of occupational hazards and safety at work, the score of  $\leq 10$  indicated a poor awareness, the score of 11-15 showed a moderate awareness and the score of  $\geq 16$  demonstrated high-level awareness. The present study used descriptive statistics to describe the participants' characteristics.

### Results

The study participants consisted of 70 hospital personnel who were randomly divided into two groups. According to the findings, the mean age of participants was  $34.6 \pm 4.67$  years in the lecture group and  $34.68 \pm 4.44$  years in the educational package group. As for the gender distribution, 24 participants from the lecture group and 22 from the educational package group were female. The two groups were homogenous in terms of age, gender, occupation, work experience and education [Table 1].

**Table 1:** Comparison of the personal-social variables of participants in the two training groups (the lecture and educational package groups) in the selected hospital of Alborz province in 2014.

Variable	Lecture Method (group 2) (n=35)	Educational Package Method (group 2) (n=35)	P
(Age) years	$4.76 \pm 34.60$	$4.44 \pm 34.68$	0.938
Gender			0.615
Female	(68.6%) 24	(62.9%) 22	
Male	(31.4%) 11	(37.1%) 13	
Occupation			0.957
Nurse	(68.6%) 24	(65.7%) 23	
Operating Theater	(20.0%) 7	(11.40%) 4	
Midwife	(11.40%) 4	(22.9%) 8	
Work	$3.51 \pm 10.56$	$3.51 \pm 10.66$	0.812
Experience (years)			
Education			0.550
Advanced Diploma	(17.1%) 6	(22.9%) 8	
B.Sc	(82.9%) 29	(77.1%) 27	

They were also homogenous in terms of their pre-intervention awareness of occupational hazards and safety at work. Further, 34.3% from the lecture group and 25.7%

from the educational package group had a poor awareness, 60% from the lecture group and 68.6% from the educational package group had moderate awareness, and 5.7% from

both groups had high-level awareness [Table 2]. The levels of awareness were separately compared in the two groups before, immediately after and one month after the training.

According to the results, there were significant differences in both groups between the level of awareness before and (immediately and one month) after the training [Table 2].

**Table 2:** Comparison of the participants' level of awareness in the selected hospital of Alborz province before, immediately after and one month after the training by group.

Awareness	Lecture Group			Educational Package Group		
	Before training	Immediately after training	One month after training	Before training	Immediately after training	One month after training
Low	(34.3%) 12	0	0	(25.7%) 9	0	0
Moderate	(60.0%) 21	(8.6%) 3	(45.7%) 16	(68.6%) 24	(11.4%) 4	(14.3%) 5
High	(5.7%) 2	(91.4%) 32	(54.3%) 19	(5.7%) 2	(88.6%) 31	(85.7%) 30
Test Result	P<0.001			P<0.001		

In the comparison of the levels of awareness between the two groups by the occasion of assessment, no significant differences were observed between the groups immediately after training, and the majority of participants in both groups

showed high levels of awareness at this stage. However, one month after the training, significant differences were observed between the levels of awareness in the lecture group and the educational package group [Table 3].

**Table 3:** Comparison of the participants' level of awareness in the selected hospital of Alborz province by assessment occasion..

Awareness Level	Before training		P	Immediately after training		P	One month after training		P
	Lecture Group Number(%)	Educational Package Group Number(%)	0.489	Lecture Group Number (%)	Educational Package Group Number(%)	0.692	Lecture Group Number (%)	Educational Package Group Number(%)	0.04
Low	(34.3) 12	(25.7%) 9		0	0		0	0	
Moderate	(60.0) 21	(68.6) 24	0.489	(8.6%) 3	(11.4) 4	0.692	(45.7) 16	(14.3) 5	0.04
High	(5.7) 2	(5.7) 2		(91.4) 32	(88.6)31		(54.3) 19	(85.7) 30	

## Discussion

The results of the present study showed that the majority of participants had a moderate awareness of occupational hazards before the training, which was consistent with the results of a study by Kazerouni et al. on the nurses' and paramedics' awareness of HIV in Shiraz [13]. Moreover, a study by Choubineh et al. on the nurses' awareness of the risk factors associated with backache revealed half of the nurses had a poor to moderate awareness while the other half had a good awareness [2].

Gholamali Ghorbani et al. studied the effect of training on the nurses' attitude and awareness of HIV 20 years after the HIV epidemic in Iran. The results of their cross-sectional study on 115 nurses revealed an unacceptable level of awareness before the training [14].

Since nurses and paramedics are directly in contact with HIV contaminants and victims, they should have a high-level awareness of HIV in order to be able to properly conduct patient care and to keep themselves safe. As a result, holding systematic retraining courses is imperative to improve their awareness [15].

The results obtained from the first assessment, conducted immediately after training, revealed the effectiveness of both training methods in raising the awareness level of both groups, which was consistent with the results obtained by Ciccato & Casazza in a study on the effect of training through lecture and educational computer package methods

on nutritional behavioral changes in adolescents in the U.S., which showed significant differences in the students' awareness of nutrition during puberty before and after the training [16]. The results of a study by Majlesi et al. on the effect of training through lecture and educational package methods revealed positive effects for both methods in enhancing the students' awareness of puberty health [17]. Aly et al. compared the lecture and educational computer package methods in orthodontics training program for dental students and showed both methods to be equally effective in raising their awareness [18]. A study by James et al. on the effect of training through lecture and educational package methods on raising the students' awareness of evidence-based education showed that, although both methods led to an improved awareness in the students, the use of the educational package method was preferred due to its lower costs and greater viability in training physicians and hospital personnel [19].

In another study carried out to assess the awareness of 42 nursing students regarding the oral administration of drugs using a computer self study and lecture methods, both groups were shown to be equally adept in performing the skills; however, the computer group had spent less time on achieving the same degree of learning and 96% of the learners fulfilled the program in two hours or less, while the lecture group had spent three hours on the same program [20]. The results of a study by Ebadi also confirmed the equal efficacy



of the lecture and multimedia CD methods in improving the practical skills of nurses. Given the shortage of nursing staff and the challenges of providing the nurses with in-service training programs as well as the importance of being up-to-date for the proper provision of care services, Ebadi emphasized the importance of developing electronic training programs, owing to capabilities of these media in presenting educational content in various forms (text-picture, film, etc.) and providing in-service distant learning for nurses [5].

Other studies conducted by Khakbazan, Jabbari and Khandan have also emphasized the effectiveness of virtual training over training through lectures [7]. The results of a study by Reihani et al. on teaching through lectures and teaching through notes, as a distant teaching method, showed the superiority of the notes method over the lecture method in communicating knowledge to the students and meeting the students' satisfaction [8]. The difference might be due to the subjects' level of knowledge and capabilities in making use of virtual and multimedia learning methods.

According to the results of the present study in the second stage of the assessment, i.e. one month after the training, the good level of awareness in 86% of the educational package group and 72% of the lecture group showed the more lasting effect of learning through the educational package method than through the lecture method. This result is in line with the results of the study by Vahabi et al. on the effects of triage training through lecture and multimedia software methods on nurses' degree of learning in Baqiyatallah University of Medical Sciences, indicating the higher mean scores, obtained in the recollection stage of the study, in the multimedia software group compared to the lecture group [21].

### Conflicts of Interest

There are no conflicts to declare.

### Acknowledgements

The authors would like to express their gratitude to all the participating nurses, the authorities of the nursing office and the director of Alborz hospital and all the professors who helped in assessing the validity and reliability of the questionnaire and preparing the software.

### References

1. Ramsay J, Denny F, Szirotnyak K, Thomas J, Corneliuson E, Paxton K.L. Identifying nursing hazards in the emergency department: A new approach to nursing job hazard analysis. *Journal of Safety Research* 2006; 37 (1): 63–74.
2. Choubineh A, Kazerouni MB, T, Tabatabaee SH, Kamali M. Study of nurses' knowledge and attitude about Risk Factors Associated with low back pain in Hospital of Shiraz University of Medical Sciences. *Journal of Health and Safty*. 2012; 3 (3): 55-62. [Persian]
3. Shimizu H, E, Couto D, T, Hamann E, M, Branco A.B. Occupational Health Hazards in ICU Nursing Staff. *AAOHN J*. 2009; 57 (4): 149–157.
4. Seyedi M, Yaghubi Z. Designing and implementing blended learning in the field of rehabilitation. *Media Journal*. 2012; 3 (2): 42-50. [Persian]
5. Ebadi A, Yousefi Goshtasb Sh, Khaghanizadeh M, Hosseini S, Raisifar A, Masoumi M, Mahmoudzadeh F, Mallahadi M. Comparison the effect of conventional and distance training on nurses clinical skills. *Iranian Journal of Military Medicine*. 2010; 12 (2): 71-74. [Persian]
6. Fahidy F, Zeighami Mohamadi Sh. Nurse's attitude toward supportive work climate effect on transfer of learning to job. *Iranian Journal of Medical Education*. 2011; 7 (1): 128-139. [Persian]
7. Khakbazan Z, Jamshidi F, Mehran A, Damghanian M. Effect of Lecture Presentation and Presenting by Educational Packages on Girls' Knowledge about Adolescence health. *Journal of Faculty of Nursing and Midwifery, Tehran University of Medical Sciences (Haiat)*. 2008; 14 (1): 41-48. [Persian]
8. Reihani, T, Pourghaznein, T, Ajam, M, Hasanzadeh, F. A Comparative study of lecturing and providing booklet on student learning and satisfaction. *Modern care, scientific Quarterly of birjand nursing and midwifery faculty*. 2012; 9 (4): 285-291. [Persian]
9. Joyce B, R, Weil M. Models of teaching. Translated by Behrangy M. Publisher: Kamale tarbiat. 2006: 112.
10. Aein F, Nourian K. Problem –based learning: a new experience in education of pediatric nursing course to nursing students. *Journal of shahrekord university of Medical Science*. 2006; 8 (2): 16-20. [Persian]
11. Farmani P, Mohamadi S, Z. V viewpoints of the nurses in social security hospital of Karaj and Shahriar on nursing continuing education. *Iranian Journal of Medical Education*. 2011; 3: 366-368. [Persian]
12. Ghafouri H, B, Saravani Sh, Shokraneh F. Feasibility of Medical Education through Email: Darsnameh e-Learning System as a National Pattern Res Dev Med Educ. 2012; (1): 25-30. [Persian]
13. Kazerouni P, A, Heidari A, Amini M, Saiadi M, Sabet M. Evaluation of nurses' knowledge and attitude about HIV in Shiraz. *Science Journal of Nursing & midwifery Faculty of Hamedan*. 2010; 18 (2): 28-37. [Persian]
14. Ghorbani Gh, Joneydi N, Esfahani A, A, Javadhosseini S. Effect of education on nurses' attitudes and awareness about the AIDS, twenty years after its epidemic in Iran. *Iranian Journal of Infectious Diseases*. 2006; 11 (35): 85-89. [Persian]
15. Branney P, Newell M.L. Back pain and associated healthcare seeking behavior in nurses: A survey. *Clinical Chiropractic*. 2009; 12 (4): 14.

16. Casazza K, Ciccato M. The methods of delivering of nutrition and physical activity information may play or role in eliciting behavior changes in adolescents. *Eat behavior*. 2007 Jan; 8 (1):78-82.
17. Majlesi F, Mahmoudi M, Rahimi A, Hosseinzadeh P. The impact of Lecture and educational package methods in knowledge and attitude of girls on puberty health. *Journal of Medical of Hormozgan*. 2012; 15 (4): 327-331. [Persian]
18. Aly M, Elen J, Willems G. Learner-control vs. program-control instructional multimedia: a comparison of two interactions when teaching principles of orthodontic appliances. *Eur J Dent Educ*. 2005; 9: 157-163.
19. James, D. Evichryss, A. Javier Z. David D.Khalid, K. Arri, K. computer –based teaching as good as face to face lecture –based teaching of evidence based medicine. A randomised controlled trial. *BMC Medical Education*. 2007; 7 (23):1-6.
20. Spedding R, Jenner R, Potier K, Mackway-JONESk, Carley S. Blended Learning in pediatric emergency medicine:preliminary analysis of a virtual learning environment.*Eur J Emerg Med*. 2013 Apr; 20 (2): 98-102. doi: 10.1097/MEJ.0b013e3283514cdf.
21. Siavash-Vahabi Y, Tadrissi SD, Ghaieem Sh. Comparing the Effect of Triage Education in Lecture and Multimedia Software on Nurses Learning.*Iranian Journal of Critical Care Nursing*. 2011; 4 (1): 7-12. [Persian]