

**THE EFFECT OF EDUCATIONAL INTERVENTION ON THE KNOWLEDGE AND PERFORMANCE OF OPERATING ROOM NURSES TO WORK SAFELY WITH ULTRAVIOLET RADIATION IN THE EDUCATIONAL HOSPITALS**

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**ABSTRACT**

**Background:** Ultraviolet radiation is one of the operating room risk factors. This study aimed to investigate the relationship between knowledge and performance of operating room nurses to work with ultraviolet radiation in the selected educational, in 2012. **Methods:** This interventional research was done on 60 operating room nurses in two groups. The educational intervention was carried out only on the intervention group. The informed consent questionnaires, criteria for inclusion, demographic information, and knowledge and performance to work safely with ultraviolet radiation were completed by both groups before and after intervention and three months after intervention in two sessions for 45 min. Data were analyzed by SPSS software version 16. **Results:** Mann-Whitney test showed that there was no significant difference between two groups in Knowledge ( $P = 0.243$ ) and performance ( $P = 0.821$ ) before the intervention to work safely with ultraviolet radiation, but, there was a significant difference between two groups in knowledge ( $P = 0.001$ ) and performance ( $P = 0.000$ ) after the intervention to work safely with ultraviolet radiation. According to the Pearson correlation coefficient there was a significant positive correlation between the scores of knowledge and performance before and after the intervention ( $P = 0.000$ ). **Conclusions:** Considering the positive results of this study, continuing educational workshops are recommended based on the educational needs of nurses.

**KEYWORDS:** knowledge, performance, nurses, ultraviolet radiation.**INTRODUCTION**

Background: Nurses are almost the major health system workforce in all countries (in some centers up to 80%).<sup>[1]</sup> Workplace is considered as the second home; and the nurses spend the main hours of the day in their workplace. Therefore, it is obvious that work environment must also meet the minimum mental health and security requirements for staff.<sup>[2]</sup> The safety and health of the work environment is crucial. In the operating room nurses are at the threatening risks.<sup>[3]</sup> Operating room hazards are occurred in in the operating room, including (1) physical hazards, (2) chemical hazards; (3) biological and infectious hazards, and (4) psychological hazards. Physical hazards included radiation, noise, electrical and mechanical hazards. Ionized, non-ionized, X-rays, alpha, laser, ultraviolet, beta, and gamma, radiations can be seen in the operating room. They can cause thermal degradation, teratogenic and variety of genetic defects, cancers and cataract. The occurrence is more likely in the fluoroscopy and angiography operations.<sup>[4]</sup> Using ultraviolet radiation for disinfection is one of the hazards in the operating room.<sup>[3]</sup> It is believed that sunlight can help to prevent the spread of infections. In 1877, the English researchers

(Danz and Blunet) found that the proliferation of microorganisms can be stopped when irradiated with sunlight. Antimicrobial effects of sunlight depend on the rate and the distance of radiation. When the rate of radiation is higher and in the less distances, the number of destroyed bacterial cells can be increased.

Ultraviolet light is not considered as a sterilizer, but it used as a disinfection agent. Bacteria can absorb a large amount of ultraviolet radiation due to their protein and nucleic acid and they will be died. As a result, ultraviolet lights are used for disinfection of the crowded areas, operation rooms, culture preparation room, laboratories, hospitals, and drugs packaging apparatus.<sup>[4]</sup> Burning, dry and itchy skin, irritated eyes, corneal damage and conjunctivitis are the short-term effects of UV radiation exposure; whereas skin cancer, cataract, aging and losing the skin freshness, a rough and leathery and wrinkled skin are the long-term effects of UV exposure.

**MATERIALS AND METHODS**

This interventional study (2013) was done on 60 operating room nurses working in the educational hospitals in two groups. Using available sampling, 60

nurses out of 75 operating room nurses were consciously collaborated. Inclusion criteria included: (1) hospitals operating room nurse, 2. informed consent to participate in the study, (3) using UV apparatus for disinfection in their practice room. The study tools were 1- inclusion criteria questionnaire (3 questions), 2-demographic questionnaire (10 questions), 3- the operating room personnels' knowledge (20 questions) and performance (7 questions) questionnaire to work safely with UV, 4-the informed consent form. Validity of the demographic questionnaire: it was a researcher-made questionnaire consisting 10 questions about demographic information. Its validity was obtained with content validity using five members of the faculty of Medical Sciences view. The demographic questionnaire considered as a sustainable tool due to its extensive use in other questionnaires and no changes in the study, such as age, gender, etc. The questionnaire to work safely with UV (knowledge) was a researcher-made questionnaire consisting 20 questions about different aspects of the working safely with UV radiation apparatus. Its validity was obtained by content validity using some members of the faculty of Medical Sciences. Its reliability was obtained  $r = 0.72$  using test-retest by 15 nurses in the operating room with the one week interval. It consists of 20 questions with Yes and No options. The scoring was using zero and one. For questions including 2, 4, 6, 8, 12, 14, 17, 18 and 20 the correct answer was yes (one) and in other questions the correct answer was no (one). Scores ranged from 0 to 20. Scores ranged 0-6 were considered as the low awareness, 7-12 indicated the mediate awareness, and 13-20 indicated the good knowledge of operating room nurses. The questionnaire to work safely with UV (performance) was a researcher-made questionnaire consisting 7 questions about how to use UV apparatus by an operating room staff. The validity of the questionnaire was obtained by content validity using some members of the faculty of Medical Sciences. Its reliability was obtained  $r = 0.78$  using test-retest by 15 nurses in the operating room with the one week interval. It consists of 7 questions with 4 options. In this study, the wrong answer scored zero and a correct answer scored one. Scores ranged from 0 to 7. Zero, 1 and 2 scores indicated the poor performance, 3, 4 and 5 scores indicated the mediate performance and 6 and 7 showed the good performance of operating room nurses. Using a coin, the subjects were divided randomly into two groups ( $n = 30$ ). The control group had no intervention, whereas, the intervention group had two 45-minute training sessions at the Paramedical Sciences Faculty of the University of Medical Sciences. Before the intervention, both groups completed the demographic questionnaire, inclusion criteria, informed consent and pre-test using the knowledge and performance questionnaire about how to work safely with UV. At the training sessions the subjects trained about the nature of UV radiation, its environmental impact, the advantages and disadvantages of UV, its different indications, the appropriate methods and principles of using UV for sterilization of operating room for nurses by speech, discussion and slide playing.

Three months after the intervention, both groups were examined by post-test with the knowledge and performance questionnaire about how to work safely with UV radiation. Data were analyzed by SPSS 16 software using statistical tests.

## RESULTS AND DISCUSSION

There was no significant difference in the studied variables between two groups and both groups were homogenous before the intervention (Table 1).

**Table 1: Situation of variables in groups.**

variable	P. value
age	20-30
	31-40
	40<
sex	male
	female
marital status	single
	married
	divorcee
	widow
grade	diploma
	associate
	bachelor
income	<8000000
	>8000000
Employment Status	Project for
	Contractual
	Treaty
	Official

Mann-Whitney test showed that in both groups there was no significant difference in the knowledge before the intervention ( $P = 0.243$ ). In both groups, the poor knowledge on how to work safely with UV radiation was the most common level of subjects' knowledge (Table 2).

**Table 2: The knowledge of nurses about how to work safely with radiation in the intervention and control groups.**

knowledge	Treated group		Control group	
	frequency	%	frequency	%
low	5	16.7	15	50
moderate	14	46.7	14	46.7
high	11	36.6	1	3.3
total	30	100	30	100
Mann-Whitney test result,				Z=3.28
P=0.001				

According to Mann-Whitney test, after intervention, there was a significant difference in the knowledge in both groups ( $P = 0.001$ ). The mediate knowledge on how to work safely with the UV radiation was the most frequent level of knowledge of the subjects in both groups. According to Mann-Whitney test, in both groups there was no statistically significant difference in the

performance before the intervention ( $P = 0.821$ ) (Table 3).

**Table 3: The performance of nurses about how to work safely with radiation in the intervention and control groups.**

yield	Treated group		Control group	
	frequency	%	frequency	%
low	4	13.3	15	50
moderate	15	50	14	46.7
high	11	36.7	1	3.3
total	30	100	30	100
Mann-Whitney test result, $Z=3.766$		$P=0.000$		

In both groups, the poor performance on how to work safely with the UV was the most frequent level of performance of the subjects. Mann-Whitney test showed that after intervention there was a significant difference in the performance in both groups ( $P = 0.000$ ). In both groups, the mediate performance on how to work safely with the UV was the most frequent level of performance of the subjects Pearson correlation test showed that there was a statistically significant correlation between the scores of knowledge and performance on how to work safely with UV before the intervention ( $P = 0.000$ ) with a positive coefficient correlation ( $r = 0.718$ ). Therefore, for each score in the nurses' knowledge on how to work safely with UV a 0.718 score was added to their performance. Pearson correlation test showed after intervention, that there was a statistically significant correlation between the scores of knowledge and performance on how to work safely with UV with a positive correlation coefficient ( $r = 0.875$ ) ( $P = 0.000$ ). Therefore, for each score in the nurses' knowledge, a 0.875 score was added to their performance on how to work safely with UV.

In both groups, the poor knowledge on how to work safely with the UV was the most frequent level of the subjects' knowledge before the intervention. Mann-Whitney test showed that in both groups there was a significant statistical difference in the knowledge ( $P = 0.001$ ) and performance ( $P = 0.000$ ) after the intervention. In both groups, the mediate knowledge on how to work safely with the UV was the most frequent level of subjects' knowledge. Bagheri et al. (2007) found that nurses' knowledge on the ignition resources and resources for prevention in the operating room was at a moderate level (60.4%).<sup>[5]</sup> Ghorbani et al. (1385) demonstrated that nurses' knowledge about AIDS was at a moderate level (43%).<sup>[6]</sup> Jamshidi et al (1387) found that nurses' knowledge on the standard precautions and isolation was at a good level (57.6%).<sup>[7]</sup> However, in this study, before the intervention, the good knowledge was 3.3% and 6.7% in the intervention and control groups, respectively. The inconsistency can be due to the differences in the studied variables, sample size and differences in the research environments. In Hoot et al. study, before intervention, the nurses' knowledge and attitude also reported at a poor level, but it increased

after 4 hours educational intervention about pain management.<sup>[8]</sup> In Omar Khalid et al. study, the nurses' knowledge and attitude about pain management was insufficient and the educational interventions were recommended.<sup>[9]</sup> In Aghai and Su Ching studies educational interventions were reported effective to increase nurses' knowledge, which was consistent with the results of this study leading to increase the nurses' knowledge on how to work safely with the UV.<sup>[10, 11]</sup> In both groups, the poor performance on how to work safely with UV was the most frequent level of subjects' performance. In both groups, the mediate performance on how to work safely with UV was the most frequent level of subjects' performance. Pearson correlation test showed that before the intervention, there was a statistically significant between the scores of knowledge and performance on how to work safely with UV ( $P = 0.000$ ) with a positive correlation coefficient ( $r = 0.718$ ). Therefore, for each score in the nurses' knowledge on how to work safely with UV, a 0.718 score was added to their performance. Pearson correlation test showed that after intervention, there was a statistically significant correlation between the scores of knowledge and performance on how to work safely with UV with a positive correlation coefficient ( $r = 0.875$ ) ( $P = 0.000$ ). Therefore, for each score in the nurses' knowledge, a 0.875 score was added to their performance on how to work safely with UV.

## CONCLUSIONS

According to the positive results of this study, continuing educational workshops based on the educational needs of nurses is recommended.

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