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Surgical technologists' knowledge and performance about radiation protection in Zahedan educational hospitals. A descriptive-analytical study

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Abstract:

INTRODUCTION: The use of ionizing radiation in various sciences, especially in medical science, has played an important role in human health. As the use of radiology tests in medical centers, including the operating room ward, is increasing, increasing the level of awareness of the operating room staff can improve their performance in this area as well as reduce the risk of exposure to radiation. The aim of this study was to determine the knowledge and performance of surgical technologists about radiation protection in Zahedan educational hospitals.

MATERIALS AND METHODS: The present study is a descriptive-analytical study that was performed on 80 surgical technologists of Zahedan teaching hospitals from January 2019 to December 2019. The Knowledge Questionnaire was used in this study, which was a researcher-made questionnaire. After filling out questionnaires and checklists, the data were analyzed by SPSS software using descriptive statistics and analytical, statistical tests, including independent *t*-test and Pearson correlation coefficient.

RESULTS: The results showed that the mean age of participants was 31 ± 7.03 years . 27% were men, and 53% were women. The mean of work experience was 7 ± 7.56. The mean score of knowledge was 6 ± 3.02 and the performance score was 12 ± 7.38. There was a correlation between age, awareness and performance of the participants ($P < 0.001$), and there was a correlation between participants' radiation protection training and awareness and performance ($P = 0.000$). There is a direct relationship between staff knowledge and performance. No significant relationship was found between the other variables ($P = 0.029$).

CONCLUSION: The results of the study showed that there is a relationship between radiation protection training courses so that the personnel who passed these courses are more aware and functioning. Given that action is needed to raise awareness through workshops.

Keywords:

Knowledge, performance, radiation protection, surgical technologists

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Introduction

Radiation has begun to be used in medicine since the beginning of radiation discovery, and about thirty to fifty percent of medical decisions, especially in critical situations, are based on findings from radiological examinations.[1,2] The rays are divided into two groups based on the amount of ionization. The first group is ionizing radiation, which contains X-rays, alpha, beta, gamma, and neutrons, which are capable of ionizing in the matter. The second group of nonionizing radiation, which includes radio waves, microwave, ultraviolet, infrared, and

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laser.[3,4] The use of ionizing radiation in various sciences, especially in medical science, has played an important role in human health. However, if the amount of radiation used exceeds the prescribed limit, it will have adverse effects for the exposed persons.[5] The biological effects of radiation exposure can be divided into two main groups. Definitive effects, which are a function of the radiation dose delivered to the organ or body area, are observed at higher radiation than the threshold dose, and these effects are exacerbated by increasing dose. Definitive effects are rarely observed in diagnostic radiology. Accidental effects that can cause cancer in patients or cause genetic disorders in their offspring are likely to increase with increased absorbed radiation.[6,7] In the UK, for example, about 2-4 cases of cancer deaths occur each year that are directly related to medical radiation.[8,9] When the tissues of the patient's body, desk, and other equipment are exposed to X-rays, they reflect the X-rays that are exposed to the environment, resulting in radiation to personnel. Therefore, the main source of radiation is scattered X-ray medical personnel.[10,11] As some of the effects of ionizing radiation appear in the distant future, the use of these beams should be observed in accordance with ALAR's law to prevent unnecessary radiation reaching personnel.[5] Medical personnel plays an important role in radiation protection because they perform radiology tests directly. Consequently, they should have adequate awareness and practice in the use of radiation dose reduction guidelines from various radiology tests to minimize the risks of radiation.[12] Radiation protection principles include: Reduce the amount of radiation, reduce the duration of radiation, increase the distance from the source, and use personal protective equipment such as lead overalls. Of these, the distance from the center of the radiation has the greatest effect on reducing the amount of absorbed radiation.[3,13,14] An integral component of radiology tests is the use of fluoroscopic ionizing radiation and radiography during some surgical procedures. The use of this type of equipment during surgery causes the operating room personnel to be exposed to ionizing radiation.[15,16] Therefore the risks of exposure to ionizing radiation are a concern for operating room personnel[14] Operating Room Personnel Due to their specific working conditions, such as restrictions on exit from the room, especially for those wearing sterile gloves and gloves as well as being close to the exposure area, and they are more prone to radiation.[10,17] As the use of radiology tests in medical centers, including the operating room ward, is increasing, the level of awareness of operating room personnel can be increased. Improve their performance in this area as well as reduce the risks of radiation exposure.[18] Moshfegh *et al*. conducted a study entitled "Evaluation of the Knowledge, Attitude, and Performance of Operating Room Personnel of Iran's Selected Hospitals in Radiation Protection." In this descriptive cross-sectional study, 332 operating room staff in different hospitals of the country were evaluated using multi-stage method. The findings of this study show that there is a significant difference between the level of knowledge, attitude, and performance of archival personnel in the field of radiation protection and the provinces of service.[19] Briggs-Kamara *et al*. Patients "and radiologists" awareness of radiation safety was assessed at three hospitals in Harcourt Port. In this study, 80 radiologists working and 70 referring patients, 75 radiologists, and 60 patients were studied. The results of this study showed that patients' awareness of the dangers of ionizing radiation is very low, and also the level of awareness of irradiators is unacceptable.[20]

Therefore, radiation protection is essential for the health of operating room personnel including surgical technologists, and Due to the lack of attention of surgical technologists to this issue as well as the limited studies in this area, we decided to conduct this study to determine the extent and knowledge of surgical technologists regarding radiation protection.

Very long introduction and much like a text book. Kindly rewrite it with relevant info of the study. In the last para write objective with rationale.

Materials and Methods

The present study is a descriptive-analytical study that was performed on 80 surgical technologists of Zahedan teaching hospital from January 2019 to December 2019. Having at least 1 year of work experience was the inclusion criteria. Exclusion criteria were the lack of consent to participate in the study. Sampling was done by census method. The Knowledge Questionnaire was used in this study. It is a researcher-made questionnaire that was validated by experts in the paper by Dr. Shafi *et al*. and its reliability with Cronbach's alpha of 0.86.[18] This questionnaire has two parts. The first section contains demographic information, including age, sex, work experience, education, and retraining, and the second section contains 21 questions. The scores on this questionnaire range from 0 to 21, with a score of 1 for each correct answer and zero for each wrong answer. Scores of 0–7 have poor awareness, 8–14 moderate awareness, and 15–21 good knowledge. A checklist of performance-based investigators has been compiled on the basis of the International Committee for the Protection of Radiation Protection. The content validity of this questionnaire is confirmed in the article by Tohidniya *et al*.[21] This checklist has 26 options. Each of the options in the checklist is assigned a score of one if it is adhered to by the surgical technologist and zero if it is not. The scores on this checklist are between 0 and 26, with a score of 0–8 poor performance, a score

of 9–17, and a score of 18–26. After approval of the plan and submitted to the University Ethics Committee, the Knowledge Questionnaire and Performance Checklist were reproduced in 80 sheets. Zahedan teaching hospitals, including Ali bin Abi Talib Hospital and Khatam Al Anbia Hospital and Al-Zahra Ophthalmology Hospital, were recruited for data collection in three shifts in the morning, evening, and evening. After completing the necessary coordination with the management system and obtaining permission from the nurse, in order to complete the questionnaires, he identified those surgical technologists who met the inclusion criteria and after obtaining consent from them to participate in this study. The purpose of this study, as well as the confidentiality and safety of filling out the questionnaire described above, was explained to them, and the questionnaire was presented to them, and we monitored the completeness of the questionnaire. Also, to complete the checklists, we monitored the performance of surgical technologists while working with portable devices three times and recorded the most frequent operation. After filling in the questionnaires and checklists, IBM *SPSS* Statistics *V*22.0 USA software was used for data analysis, and descriptive and inferential statistics, including independent *t*-test and Pearson correlation coefficient were used.

Results

The results showed that the mean age of the surgical technologists participating in this study was 31 ± 7.039. Also, 27% are women and 53% are men. About 93% of personnel did not attend radiation protection training. 82% have undergraduate education and 18% have postgraduate education. The work experience is 7 ± 7.56, respectively. The staff studied in Khatam al-Anbia, Ali Ibn Abi Talib, and Al-Zahra hospitals are 28%, 43%, and 27%, respectively. Also, the performance score is 12 ± 7.38, which is average performance. There is a relationship between age, awareness, and performance (P = 0.000). Knowledge and performance increased as age increased. Also, there was a relationship between work experience awareness and performance (P = 0.000) so that knowledge and performance increased as work experience increased. Also, gender with knowledge and performance of personnel. It is related to radiation protection (P = 0.000) in the sense that the mean score of awareness is higher in men and the average performance is higher in women. They have passed these courses. They have more awareness and practice. There is a direct relationship between the knowledge and performance of the staff. So that awareness is also increasing performance. No significant relationship was found between the other variables (P = 0.029).

The relationship between gender knowledge and performance is shown in Table 1.

The relationship between knowledge and practice of surgical technologists is shown in Table 2.

Discussion

Results showed that the mean score of awareness was 6 ± 3, which was poor. Also, the performance score is 12 ± 7, which is average performance. In a study conducted by Dr. Shafi *et al*. In 2016, 72 nurses working in the operating room of Shahid Beheshti and Yahya Nejad hospitals in Babol were found to be poor in their knowledge of radiation protection principles. In a 2013 study by Briggs-Kamara *et al*., 80 radiologists working and 70 referring patients, 75 radiologists, and 60 patients were studied. The results of this study showed that patients' awareness of the dangers of ionizing radiation is very low, and the level of awareness of irradiators is unacceptable.[20] It was also found in a 2013 study by Adam Tok *et al*., Which included 183 urology operative staffs in public hospitals, private hospitals, and teaching and training hospitals in Turkey. They do not have an ionizer and do not take the necessary protective measures,[22] which are consistent with the results of the present study. Therefore, given the important role nurses and surgical technologists play in the operating room, further training of nurses and retraining courses. Radiation protection appears to be essential.[18] The results of the present study also showed a significant relationship between age and consciousness. There is a relationship between performance and knowledge that increases with age as well as performance. There is also a relationship between work experience with awareness and performance that increases with experience and awareness. In the study of Dadsetadi Asl *et al*., Conducted on 80 radiologists in 1977, there was a weak correlation between age with radiation protection and functional knowledge as well as education with radiation protection knowledge, functional knowledge, and motivation.[23] The present study is consistent. In the study of Ali Chaparian *et al*. in 2012, 112 radiologists working in radiology centers were studied. It was found that with increasing age and work experience as well as decreasing degree of radiologists,

Table 1: The relationship between gender and knowledge and performance of surgical technologists on radiation protection

Sex	Mean score	
	Awareness	Performance
Male	6±3.20	10±6.3
Female	5±3.12	13±7.2
P	0.00001	0.0001

Table 2: Relationship between knowledge and practice of surgical technologists regarding radiation protection

Mean score	Awareness	Performance	*P*
Surgical technologists	6±3.02	12±7.38	0.029

their knowledge about the subject of research. It also declined.[6] Also, in the study of Davoudian Talab *et al*. In 2014, 185 radiographs were taken. Finally, there was no significant relationship between age, sex, and work experience with knowledge, practice, and attitude,[24] which is inconsistent with the results of the present study. Therefore, it can be said that due to the direct role of surgical technologists in operating room environment and risk, Beams in this environment have been able to gain more awareness of radiation protection by gaining experience in the operating room. The results of this study showed that there is a direct relationship between knowledge and performance of personnel so that with increasing awareness, performance also increases. Finds in Karami *et al*.'s 2014 study on all radiologists working in their radiology centers A survey conducted in Sanandaj showed that with increasing age and decreasing educational qualifications, the awareness of radiologists in the field of research decreased and there was a direct relationship between the awareness of radiologists and their performance in radiation protection[25] which is in line with the results of the present study. The results of the study showed that there is a relationship between radiation protection training courses so that the personnel who passed these courses are more aware and functioning. In the study of justice and associates, which included 80 people in the year 1397. Radiologists found that between attending classes with awareness, Performance and attitude positive and significant correlation was found.[23] The strength of this study could be the duration of that which is almost 1 year. This can be really effecting the bios of previous studies.

Conclusion

As the results of the study showed that there is a relationship between radiation protection training courses so that the personnel who passed these courses are more aware and functioning. Given that action is needed to raise awareness through workshops.

Acknowledgment

Researchers appreciate all the authorities who made a cooperation to conduct this study. Also, all the surgical technologists who have participated in this study are highly appreciated. This study was part of a proposal proven by the ethical committee of Zahedan University of Medical Sciences and used ethical code numbers 1, 2, 4, 7, 13, 14, 17, 20, 22, 25 and 27 of this committee.

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Conflicts of interest

There are no conflicts of interest.

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