Radiation Safety Awareness in Medical Staff

Sağlık Çalışanlarında Radyasyon Güvenliği Farkındalığı

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Özet

Amaç: Günümüzde, radyolojik görüntüleme yöntemlerinin kullanımındaki artış, bu yöntemleri kullanan sağlık personelinin daha fazla radyasyona maruz kalma riskini arttırmaktadır. Çalışmamızda sağlık çalışanlarında radyasyon güvenliği farkındalığı ve bu farkındalığa etki eden faktörler araştırılmıştır. Gereç ve Yöntem: Tanımlayıcı olarak planlanan bu çalışmada dört farklı merkezde; Nükleer Tıp, Radyoloji ve Radyasyon Onkolojisi ünitelerinde çalışan sağlık personeline araştırmacılar tarafından hazırlanan anket soruları yöneltildi. Bulgular: Çalışmaya 4 farklı merkezden toplam 184 sağlık çalışanı dahil edildi. Katılımcıların sağlık görevlerine bağlı olarak, kurşun yelek kullanımı ve güvenliği açısından anlamlı bir fark saptandı (p<0.001, p:0.013). Dozimetre kullanımı ve katılımcıların görevleri arasında anlamlı ilişki tespit edildi (p:0.006). Katılımcıların görevleri ve radyasyon eğitimi açısından anlamlı ilişki vardı (p<0.001). Tartışma: Radyasyona maruz kalan sağlık personelinin daha kaliteli hizmet verebilmesi için personel radyasyondan nasıl korunacağını öğrenmelidir. Radyasyon güvenlik komiteleri aktif şekilde çalışmalı, çalışanlara radyasyon eğitimi vermeli, doktorların bu eğitime katılmalarını sağlamalıdır.

Anahtar Kelimeler

Radyasyon; Güvenlik; Farkındalık; Sağlık Çalışanları

Abstract

Aim: The increase in the usage of radiologic imaging methods today increases the risk of medical staff to be exposed to more radiation. In our study, the radiation safety awareness of medical staff and factors affecting this awareness were examined. Material and Method: In this study planned as descriptive, the medical staffs, who work in nuclear medicine, radiology and radiation oncology departments at four different centers, were asked survey questions prepared by researchers. Results: A total of 184 medical staff was involved in the study from 4 different centers. There was significant difference determined regarding the usage and safety of lead vest related to the duties of attendants (p<0.001, p:0.013). There was a significant relation determined between dosimeter usage and the duties of attendants (p:0.006). There were a significant relation between the duties of attendants and radiation training (p<0.001). Discussion: In order for the medical staff exposed to radiation to give more quality service, the staff should learn how to protect from radiation. Radiation safety committees should work actively, give radiation training to the staff, and provide that doctors also participate in these trainings.

Keywords

Radiation; Safety; Awareness; Medical Staff

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Introduction

Radiation is the dispersion of energy from a source in the form of particles or electromagnetic waves. Here are two different forms of it, ionized and non-ionized. Radiation can disperse from natural sources such as radon or cosmic; or from artificial sources such as X-rays which are used for the diagnosis and treatment of patients.

The average annual radiation dose exposed to individuals except for radiation workers is 2.5 mSv and 15% of this is resulting from medical applications [1]. The increase in the usage of radiologic imaging methods today increases the risk of medical staff to be exposed to more radiation [2,3].

In our study, the radiation safety awareness of medical staff and factors affecting this awareness were examined.

Material and Method

In this study planned as descriptive, the medical staff, who work in nuclear medicine, radiology and radiation oncology departments at four different centers, which are 2 university hospitals (Akdeniz University School of Medicine, Suleyman Demirel University School of Medicine), one education and research hospital (Antalya Education and Research Hospital) and a state hospital (Antalya Atatürk State Hospital), were asked survey questions prepared by researchers. The socio-demographic features, radiation exposure, training level regarding protection ways from radiation were questions with surveys.

Data obtained were collected at a single center. Statistical analyses were done by using SPSS (Statistical Package for the Social Sciences) version 15 software. The relation between the duties of attendants and the usage of lead vests, safety of lead vests, usage of dosimeter and radiation safety education was given by using cross-tables. Differences between groups were examined with chi square test. Cases where P-value was below 0.05 were considered as statistically significant.

Results

A total of 184 medical staff was involved in the study from 4 different centers, 87 of which (47.3%) were male, 95 of which (51.62%) were female. Hundred thirty-five (73.4%) of the attendants were between ages of 21-40. Hundred and five (57.1%) of the attendants were technicians, 41 (22.3%) of them were doctors, 22 (12%) of them were nurses, 9 (4.9%) of them were medical physicists and 4 (2.2%) of them were other medical staff. Seventy-three (39.7%) of them worked at university hospital, 88 (47.8%) of them worked at education and research hospital and 19 (10.3%) of them worked at state hospital (Table 1). Seventy-nine of the staff (43.6%) had been working at the same institution for longer than 10 years.

Lead vest was used by 75 attendants (41.2%) and 104 attendants did not use it. Among 82 attendants who answered the question whether lead vest was protective or not, 52 of them (63.4%) trusted the protectiveness of lead vest, 30 of them (36.5%) stated they did not trust it. There was significant relationship determined regarding the usage and safety of lead vest related to the duties of attendants (p<0.001, p:0.013). Sixty-eight point three percent of the doctors used lead vests and this ratio was 34.6% among technicians. The ones who found lead vests among doctors were 76.7% and this ratio was 47.5% among technicians (Table 2).

Table 1. Participant characteristics

		N(%)
Gender		
	Male	87 (47.3)
	Female	95 (51.6)
	Missing	2 (1.1)
Age		
	21-40	135 (73.4)
	Above 40	49 (26.6)
Attendant		
	Technician	105 (57.1)
	Doctor	41 (22.3)
	Nurse	22 (12)
	Medical physicists	9 (4,9)
	other medical staff	4 (2.2)
	Missing	3 (1.5)
Working Place		
	University hospital	73 (39.7)
	Education and research hospital	88 (47.8)
	State hospital	19 (10.3)
	Missing	4 (2.2)

Table 2. According to duties of attendants lead vest usage and reliability

	Doctors (%)	Technicians	P Value
Lead vests used	68.3	34.6	<0.001
Lead vest reliable	76.7	47.5	p:0.013

Dosimeter usage ratio was 89.6% and 80% of the attendants stated that it measured correctly and was reliable. There was a significant relationship determined between dosimeter usage and the duties of attendants (p:0.006). Entire medical physicists used dosimeters, 9.8% of doctors, 6.7% of technicians and 13.6% of nurses did not use dosimeters.

Even though there were radiation safety committees at all centers, when attendants were asked about the awareness of this committee, 43.4% did not know and 9.3% stated that such a committee did not exist. Ninety-eight point one percent of attendants knew the ALARA (As Low As Reasonably Achievable) principle. When attendants were asked whether they were exposed to radiation above safety limits or not, 52.8% of them answered, they were sometimes exposed to high dose of radiation. When attendants asked what they would do in case of a radiation accident, 14.9% of them stated they would leave the location, 23.6% stated they would report the case and 61.5% of them answered they would continue to carry out their duties. Eighty-three point one of attendants had routine blood analyses, 70.1% of them had routine eye examinations and 37.3% of them had routine thyroid examinations done. Among the working environments, 50.9% of them had sufficient ventilation, 28.4% had all wastes cleaned, 34.1% of them had an emergency plan and 38.7% of them had a safety program. 45.6% of the attendants thought they were working at a radiation safe environment and 54.4% of them thought they were not working at a safe environment.

Sixty-two point four percent of the attendants had radiation safety training and 37.6% of them did not have such training. There was a significant relation between the duties of attendants and radiation training (p<0.001). While all medical physicists had radiation safety training, this ratio was 72% among technicians, 55.3% among doctors and 18.2% among nurses. The awareness of an informative handbook about radiation safety was 72.4%.

Discussion

We have determined significant differences among medical staff that is exposed to medical radiation more than the general population is regarding protection from radiation. We have determined that technicians were more careful to wear lead vests for radiation safety than doctors and nurses.

In a study by Quinn et al. in which they questioned the radiation protection awareness of non-radiologist medical staff, they demonstrated a lack of training in this regard [4]. Friedman et al. claimed that there was lack of information among urologists about radiation protection and there should be actions taken to improve this regionally and nationally [5]. In a study conducted among pediatricians, there was also a lack of knowledge demonstrated [6].

Besides the deterministic effect of radiation causing organ dysfunction resulting from the necrosis that occurs at a certain limit of radiation, it has stochastic effects causing changes and accumulative damage in the cell. There can be mental disorders, hereditary effects and cancer developments in medical staff resulting from the chronic exposure to radiation [7]. In order to reduce the exposure to radiation, time, distance and shielding should be cared for. The staff should behave in accordance with the ALARA principle while considering economic and social factors [8]. Majority of the attendants knew about the ALARA principle.

Problems resulting from the working life affect the health of the employee. When the medical staff is healthy, this affects the quality of the health service [9]. In order to medical staff exposed to radiation to give more quality service, the staff should learn how to protect from radiation. Radiation safety committees should work actively, give radiation training to the staff, and provide that doctors also participate in these trainings.

Competing Interests

The authors declare that they have no competing interests.

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