

## Assessment of Ionizing Radiation Protection Awareness among Radiation Workers in Erbil Hospitals

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### Abstract

**Introduction:** Ionizing radiations are hazardous agents in the workplace and all forms of ionizing radiation produce some type of injury that is incurable. Therefore, application of protection against ionizing radiation exposure can play an important role in the health of workers. The objective of this study is to evaluate the application of radiation protection among radiation workers in x-ray department in Erbil hospitals.

**Methodology:** A cross-sectional study was conducted with six hospitals (General and Private) and samples of 110 workers were randomly selected from among 135 radiation workers. Data was collected through structured questionnaires. The surveyed data was coded and entered into MS Excel software. Further data has been exported to SPSS 18 for analysis. The analysis was performed by means of frequency distributions and cross-tabulations.

**Results:** The results show that there are 47 (42.7%) female and 63 (57.3%) male. A large majority of the workers 51 (46.4%) were aged between 21 - 30 years and Diploma holders 68 (61.8%). Only 49 (44.5%) had undergone primary examination while 47 (42.7%) were never done a periodical examination. According to ICRP regulation of radiation protection, it is mandatory for radiation workers to wear personal detective devices during work. But the majority 89 (80.9%) has not been supplied with such devices. The study also revealed that a large majority of radiation workers are engaged in work beyond 40 hours per week. Calibration of the X-rays machine and radiation survey of the workplace have not been regularly done. Only 30 of the samples have no awareness and knowledge about the ionizing radiation while 95 (86.4%) were said to have no health physicist.

**Conclusion:** Through the study and analysis of the data, it was found that the vast majority of radiations workers in the six hospitals we visited did not have sufficient awareness of the basis of radiation protection and did not comply with the international recommendations for radiation protection.

**Keywords:** Radiation workers, Radiographers, Radiation protection, knowledge

## Introduction

Ionizing radiations are hazardous agents in the workplace and all forms of ionizing radiation produce some type of injury that is incurable. Therefore, application of protection against ionizing radiation exposure can play an important role in the health of workers (1). Radiation is a process resulting in the emission of energy in the form of particles or electromagnetic waves (2)

Ionizing Radiation is an integral part of our lives and has been found since the beginning of creation<sup>(1)</sup>, and we live always in the center of radiant and exposed to the radiation from the sun and outer space and radioactive elements in the earth, as well as industrial sources of ionizing radiation, such as medical X-ray (diagnostic), Therapeutic Radiology, and resources of operation of nuclear facilities<sup>(3,4)</sup>

Radiation workers are at risk of greater radiation exposure especially due to their intimate contact and exposures. The nature of X-ray workers is different from the nature of working in any other field, so they need to establish rules for security, safety, and methods of measurement of radiation and the prevention of the dangers of ionizing radiation<sup>(5)</sup>

The importance of this study is to evaluate procedures for the prevention of occupational and environmental risks of ionizing radiation for workers in the Departments of Diagnostic Radiology, as stipulated in the instructions issued by the international organizations.

Previous studies have been conducted to measure annual equivalent doses for radiation workers, which was read at specified intervals and in various countries (1950 -2003 in Lithuania<sup>(6)</sup> .1986 to 2000 in China<sup>(7)</sup> .1982 to 1998 in India<sup>(8)</sup> the doses recorded in a steady decline, especially in recent years, and the reason for this is due to the application of international regulations for the radiation protection.

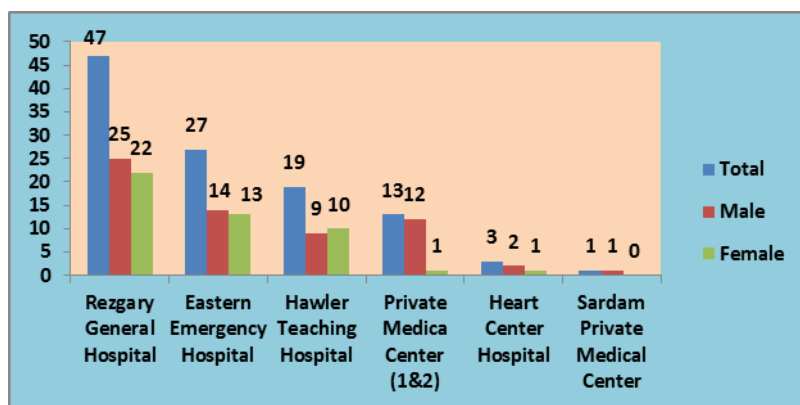
## Materials & Methods

This study was conducted at six hospitals (general & private) in Erbil, Iraq. A cross-sectional study was conducted with the sample of 110 was randomly selected from among 135 radiation workers derived from the above six hospitals.

Data was collected through structured questionnaires. The surveyed data was coded and entered into MS Excel software. Further data has been exported to SPSS 18 for analysis. The analysis was performed by means of frequency distributions and cross-tabulations.

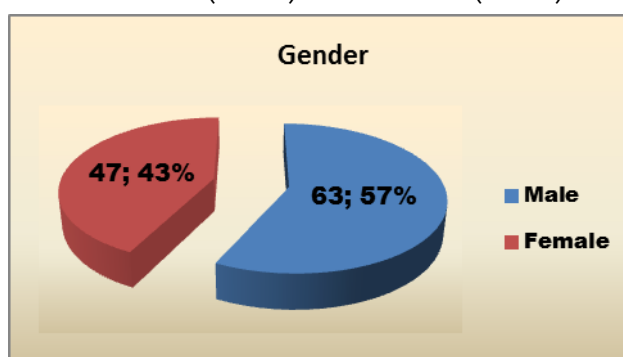
## Results

The study included six hospitals and specifications for each hospital, Gender of workers in different hospital as shown in Figure-1-



**Fig-1 Gender of Workers in Profile of sample**

The results show that there are 47 (42.3%) female and 63 (57.3%) male as shown in Figure -2-



**Fig-2- Gender**

A large majority of the workers 51 (46.4%) were aged between 21 - 30 years (28 male, 23 female) and Diploma holders 68 (61.8%) (35 male, 33 female) as shown in table -1

**Table -1 Profile of sample Age, Gender Qualification**

Gender	Age	Qualifications										Total	
		Mediatory school		Secondary School		Institute (Diploma)		University		High Degree			
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Male	21-30	3	60.0	2	100.0	13	37.1	10	50.0	0	0.0	28	44.4
	31-40	2	40.0	0	0.0	5	14.3	7	35.0	1	100.0	15	23.8
	41-50	0	0.0	0	0.0	14	40.0	2	10.0	0	0.0	16	25.4
	50-60	0	0.0	0	0.0	3	8.6	1	5.0	0	0.0	4	6.3
	Total	5	100.0	2	100.0	35	100.0	20	100.0	1	100.0	63	100.0
Female	21-30	-	-	0	0.0	15	45.5	8	66.7	-	-	23	48.9
	31-40	-	-	1	50.0	6	18.2	4	33.3	-	-	11	23.4
	41-50	-	-	1	50.0	12	36.4	0	.0	-	-	13	27.7
	Total	-	-	2	100.0	33	100.0	12	100.0	-	-	47	100.0

It was found that 58(34 male, 24 female) (52.7%) of the respondents sample their service years, ranging between 1-5 years, and 21(11 male, 10 female) (19.1%) have years of work more than 20 years table -2.

Table-2 Gender&amp; working years

Gender	Working years										Total	
	1-5 years		6-10 years		11-15 years		16-20 years		More than 20 years			
	No	%	No	%	No	%	No	%	No	%	No	%
Male	34	58.6	8	53.3	4	57.1	6	66.7	11	52.4	63	57.3
Female	24	41.4	7	46.7	3	42.9	3	33.3	10	47.6	47	42.7
Total	58	100.0	15	100.0	7	100.0	9	100.0	21	100.0	110	100.0

### Radiation Protection

It was found that 49 (44.5%) of the samples completed the primitive medical examinations before starting work, while 47 (42.7%) of the sample did not conduct the periodic medical examinations for the duration of their work. 95 (86.4%) answered that there is no radiation protection specialist (Health physicist) and 89(80.9%) are not equipped with personal dosimeter to measure the level of radiation exposure as shown in table -3

Table -3 primitive and periodic examination, radiation responsible, and

<b>primitive Medical Examination</b>	<b>No.</b>	<b>%</b>
Yes	49	44.5
No	61	55.5
<b>Total</b>	<b>110</b>	<b>100</b>
<b>periodic Examination</b>		
2-6 months	10	9.1
7-12 months	19	17.3
1-2 years	31	28.2
2-5 years	3	2.7
Never Done	47	42.7
<b>Total</b>	<b>110</b>	<b>100</b>
<b>Radiation protection Responsible</b>		
Yes	15	13.6
No	95	86.4
<b>Total</b>	<b>110</b>	<b>100</b>
<b>Supply radiation dosimeter</b>		
Yes	21	19.1
No	89	80.9
<b>Total</b>	<b>110</b>	<b>100</b>

Radiation survey and calibration of x-ray machines are necessary to protect workers from radiation exposure but found that 73(66.4%) of sample answered don't done radiation survey while 42 (38.2%) answered not been calibrated devices table -4.

Done periodic radiation Survey	No.	%
Yes	37	33.6
No	73	66.4
<b>Total</b>	<b>110</b>	<b>100</b>
Done X-ray machine Calibration		
Once monthly	6	5.5
1-6 months	21	19.1
6-12 months	13	11.8
1-5 years	28	25.5
Never Done	42	38.2
<b>Total</b>	<b>110</b>	<b>100</b>

## Discussion

According to the Recommendations of the International Commission on Radiological Protection(ICRP)<sup>(9)</sup>, the medical surveillance of workers exposed to radiation should be based on the general principles of occupational medicine, which aim "to assess the workers' health, to help in ensuring initial and continuing compatibility between the health of the workers and the conditions of their work; and to provide a baseline of information useful in the case of accidental exposure or occupational disease. The medical surveillance programmed should be related to the job nature and the health conditions required of the worker for the effective performance of the task<sup>(10,11)</sup>. In hospitals study the measurement of radiation exposure for workers did not record because all workers have no protective equipment. Medical examinations of workers did not do. No warning sign of radiation in radiation place.

Radiation protection is part of the fields of the International Labor Organization (ILO's) action on the protection of workers against sickness, disease, and injury arising out of his employment as mandated by the Organization's constitution. The ILO's activities on radiation protection cover the protection of workers against both ionizing and non-ionizing radiations, (e.g. Convention No. 115 and Recommendation No. 114). The protection of these personnel has to be monitored using appropriate dosimeters in order to assess whole-body and skin exposure<sup>12</sup>. For proper radiation protection, the detection and measurement of radiation is necessary. The monitoring of workers working in radiation area by using film badge is one of the vital gadgets to measure the radiation dose for personal dosimetry<sup>13</sup>.

## Conclusion

After studying and analyzing the data, it is concluded that the ionizing radiation workers protection (X-Ray workers) and the medical management of exposure are complex. A good occupational health programmed for radiation workers should include medical surveillance, personal dosimeter monitoring, accident investigation, and medical intervention where necessary. This requires a coordinated approach by the work safety professional, the health physicist, the occupational physician and other health workers, and the radiation workers themselves.

## Recommendation

1. The employees need to have a short-term education about ionizing radiation hazards and should establish training courses on radiation protection to follow the recommendation of the international commission on radiation protection (ICRP).
2. The workers education level must be improved and short courses are to be implemented such as dosimetry and radiation protection performance.
3. Calibration and survey of the x-ray machine should be done regularly or periodically.

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