

## Assessment of Radiation Protection Practices in Abbas Institute of Medical Sciences Muzaffrabad

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### Abstract

**Background/objective:** There is a substantial need for radiographers to improve their awareness of radiation protection issues and their knowledge of radiological procedures. Specific actions such as regular training courses for both undergraduate and postgraduate students as well as for working radiographers must be considered in order to assure patient safety during radiological examinations. The study aimed to assess the knowledge, attitude and practices of radiology department workers towards radiation protection.

**Methodology:** This descriptive study was carried out in the Department of Radiology and Medical Imaging, Abbas Institute of Medical Sciences (AIMS) Muzaffrabad, Azad Jammu and Kashmir (AJK) from a period of August 2016 to January 2017. The calculated sample size was 29 and all the staff members and students who worked in the Radiology Department were included in the study following the inclusion and exclusion criteria. A radiation protection practice was assessed by observing the availability of all radiation protection kits.

**Results:** There were only 5 (17%) study subjects, trained and having diploma in radiology in radiology while 83% of study subjects were non-technical and untrained although educated in various science and arts qualification. Among all the study participants, 53% showed positive responses about their knowledge, attitude and practices regarding radiology procedures.

**Conclusion:** There is a substantial need for radiology department workers to improve their awareness of radiation protection issues and their knowledge of radiological procedures.

**Keywords:** Radiation exposure; Radiation protection; Dosimeter; X-rays; CT scan

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### Introduction

A number of features of modern x-ray imaging system are designed to improve radiographic quality. Many of these features are also design to reduce patient radiation dose during x-ray examination. For instance, proper beam collimation contributes to improved image contrast and is effective in reducing patient radiation dose. More than hundred individual radiation protection devices and accessories are associated with modern x-ray imaging system.

Reducing the increasing radiation exposure from medical procedures has been the principal task for many professional societies, agencies and advisory groups over the last couple of decades. The development of radiation safety and protection guidelines and recommendations were the crucial mechanisms employed by these groups to mitigate the problem [1]. Use of

ionising radiation in diagnostic radiography can lead to hazards such as somatic and genetic damages. Compliance to safe work and radiation protection practices can mitigate such risks [2].

Radiation protection is the science and art of protecting people and the environment from the harmful effects of ionising radiation. It is also described as all activities directed towards minimizing radiation exposure of patients and personnel during x-ray exposure [3]. Unbridled exposure to ionising radiation had been scientifically proved to cause damages to living tissue such as skin burns and radiation sickness at high exposures (deterministic effects) and also raises the risks of cancer, tumours and genetic damages (stochastic effects) at low exposures [4]. In

spite of this, diagnostic uses of ionising radiation have been on the increase globally since the discovery of X-Rays. Medical uses of ionising radiation now contribute >95% of man-made exposure to radiation and now ranks only second to natural background radiation [5,6].

Considering the radiation exposure safety in Pakistan, National Council on Radiation Protection and Measurement (NCRP) has recommended design and devices for standard radiation protection that must be under practice in AIMS Muzaffarabad. Radiations can cause many of fatal problems in any person exposed to these radiations. The study aimed to assess the knowledge, attitude and practices of radiology department workers towards radiation protection.

## Materials and Methods

This descriptive study was carried out in the Department of Radiology and Medical Imaging, Abbas Institute of Medical Sciences (AIMS) Muzaffarabad, Azad Jammu and Kashmir (AJK) from a period of August 2016 to January 2017. The calculated sample size was 29 and all the staff members and students who worked in the Radiology department were included in the study following the inclusion and exclusion criteria. All the staff members and Bachelor's students who work in the Radiology Department of AIMS Muzaffarabad during the study period were included in the study.

### Technique used for protection from radiations in Radiology Department

In order to find out information about Department of Radiology researcher had surveyed the Department fully to establish the fact that which devices were being used and which were not for detection and protection of radiation exposure. This is a method of checking out the quality and accessibility to the equipment for protecting the staff and public from x-rays.

Radiation protection practices were assessed by observing the availability of all radiation protection kits such as total number of lead rubber aprons in x-ray room, Fluoroscopy and Ct-Scan, gonadal shield, personnel radiation monitors such as film badge dosimeters, lead gloves, lead goggles, x-ray field limiting devices such light beam diaphragm (LBD), display of x-ray warning signs.

Moreover x-ray machines were visually inspected: KV and MA selectors as well as availability of automatic exposure control (AEC) were all checked in a department.

### Statistical analysis

Data were entered and analysed using SPSS 20.0. Frequencies and percentages were calculated for quantitative variables. A p value of  $\leq 0.05$  was taken as statistically significant.

## Results

Considering the gender related findings of study subjects males were in majority (62%) while number of female participants was low (38%) as compared to males (Table 1).

Regarding the area of expertise of study participants, majority of the workers of Radiology Department were expert in performing X-rays (79%) while quite a low number of study participant were expert in performing CT scan (Table 2).

Another major deficiency that had been noticed by the researcher were unavailability of trained technical staff in the Radiology Department. There were only 5 (17%) trained and having diploma in radiology while 83% of study subjects were non-technical and un-trained although educated in various science and arts qualification (Table 3).

Table 1: Gender distribution for the study subjects.

Gender	No. of workers	Percentage
Male	18	62%
Female	11	38%
Total	29	100%

Table 2: Area of expertise of Radiology Department Workers.

Area of Expertise	No. of workers	Percentage
X-Rays	23	79%
CT Scan	8	21%

Table 3: Educational background of study subjects.

Education	No. of workers	Percentage
Diploma Holders	05	17%
Post-Graduate	11	38%
Under-Graduate	13	45%
Total	29	100%

Table 4: The distribution of participant's responses to informative questions.

Questions	Positive response	Negative response
Do you have any knowledge of annual radiation dose?	30%	70%
Do you think that x-rays are life threatening rays?	72%	28%
Do you think that protective measures used in your department are up to the prescribed by International Level?	30%	70%
Do you think lead aprons fully protect you or not?	37%	63%
What is the Dose limit of chest x-ray?	35%	65%
Can ionizing radiation cause cancer?	85%	15%
Examination of pregnant patients should be performed or not?	2%	98%
Do you know about the ALARA Principle?	74%	26%
Is ionizing radiation moderately safe or not?	55%	45%
Do you think that CT scan and radiography have a significant risk or not?	90%	10%

**Table 5:** Availability of radiation protection devices.

Sr.no	Radiation Protection instruments	No. of Devices Available
1	Lead Goggles	0
2	Lead Aprons	01
3	Film badge Dosimeter	0
4	Lead Gloves	0
5	Warning Signs	01
6	Lead Curtains	0
7	Specific Anatomical Regions Shield	0
8	Cassette Covers	0
9	X-ray Mobile Barrier	02

When the researchers asked different questions as per designed proforma for the assessment of knowledge, attitude and safe practices from the workers of Radiology Department, 53% showed positive responses about their knowledge, attitude and practices about radiology procedures. The details of interview questions and their responses are given in **Table 4**.

Unfortunately, radiation protection practices assumed to be poor because only lead aprons and lead glass were available in a department. Moreover, neither film badge dosimeter nor personal radiation monitors were present in department. X-ray warning signs were only present in CT-scan room, while other safety devices were not present in the Radiology Department.

Average score on assessment of knowledge was 35%. Most modern radiation protection instruments were lacking in all the centers studied. Application of all shielding devices for protection was neglected in a hospital except Lead Apron, X-ray Mobile Barrier and leaded doors and walls (**Table 5**).

## Discussion

We found that most of participants were unaware of all the devices used for radiation protection. The education level of the workers is not enough, so they need weekly workshop to get updated with new ways of handling patients and other public.

We found that the number of correct answer to question related to the average background radiation dose that a person may be exposed to an annual basis. Furthermore, only more than half off participants were able to give correct answer that the examination of pregnant patient should not be performed unless or until too much necessary. It was a surprising result that the majority of respondents did not know that what the annual dose limit of ionizing radiation is. A study carried out among radiographers in

Lagos, Nigeria, exhibited a very good understanding of the issues pertaining to radiation protection. They scored an average of 73% in the assessment of their radiation protection knowledge [2]. This is better than what was reported in current study.

A study conducted in Pakistan has reported that the knowledge about basics of ionizing radiations and protection of both staff and patients before the sessions was not satisfactory as it should be. They observed that the mean scores of all radiation workers in pre-sessions assessment was 39.35% which improved to 61.95% after attending the dedicated course designed with a mean difference of 22.6% ( $p < 0.000001$ ). An improvement was found amongst the radiation workers about their knowledge and understanding after attending the dedicated course on radiation awareness designed according to their needs [7]. Almost similar recommendations have been given in an Italian study, they were of the opinion that there is a substantial need for radiographers to improve their awareness of radiation protection issues and their knowledge of radiological procedures. Specific actions such as regular training courses for both undergraduate and postgraduate students as well as for working radiographers must be considered in order to assure patient safety during radiological examinations [8].

A number of previously conducted studies have confirmed prior studies assessing awareness of radiation protection issues and knowledge of radiation doses in different groups of specialists [9-12]. This lack of knowledge means that the health care professionals are unable to effectively protect either themselves or their patients from ionizing radiations. In AIMS Hospital Muzaffarabad, no standard courses on radiation safety for health professionals exist.

Based on result reported here, it appears that improved education planning for health care professionals regarding safety measures associated with ionizing radiation is required. A series of studies discussing the radiation exposure during radiological imaging techniques are expected to be beneficial in reducing the number of patients exposed to potentially harmful ionizing radiation.

## Conclusion

There is a substantial need for radiographers to improve their awareness of radiation protection issues and their knowledge of radiological procedures. Specific actions such as regular training courses for both undergraduate and postgraduate students as well as for working radiographers must be considered in order to assure patient safety during radiological examinations.

## References

- 1 Bineyam Gebrewold B (2017) Assessment of current radiation protection practices to minimize radiation exposures from medical imaging. *J Nucl Med* 58: 796.
- 2 Eze CU, Abonyi LC, Njoku J, Irurhe NK, Olowu O (2013) Assessment of radiation protection practices among radiographers in Lagos, Nigeria. *Niger Med J* 54: 386-391.
- 3 Johnston J, Killion JB, Veale B, Comello R (2011) U.S. echnologists' radiation exposure perceptions and practices. *Radiol Technol* 82: 311-320.
- 4 Mallam SP, Akpa MD, Oladipupo MD, Sa'id A (2004) Reappraisal of existing expressions for estimating radiation output from diagnostic x-ray machine. *Niger J Phys* 16: 30.
- 5 New York: United Nations; UNSCEAR 2008. Sources and Effects of Ionising Radiation. UNSCEAR Report: Volume I: Annexes A and B.
- 6 New York: United Nations; UNSCEAR 2010. Sources and Effects of Ionising Radiation. UNSCEAR Report.
- 7 Nishtar T, Yaseen M, Ali A (2018) Radiation awareness amongst radiation workers in diagnostic radiology department of a public sector hospital in Khyberpakhtunkhwa, Pakistan. *Pak J Rad* 28: 40-44.
- 8 Paolicchi F, Miniati F, Bastiani L, Faggioni L, Ciaramella A, et al. (2016) Assessment of radiation protection awareness and knowledge about radiological examination doses among Italian radiographers. *Insights Imaging* 7: 233-242.
- 9 Yurt A, Cavuşoğlu B, Günay T (2014) Evaluation of awareness on radiation protection and knowledge about radiological examinations in healthcare professionals who use ionized radiation at work. *Mol Imaging Radionucl Ther* 23: 48-53.
- 10 Brown N, Jones L (2013) Knowledge of medical imaging radiation dose and risk among doctors. *J Med Imaging Radiat Oncol* 57: 8-14.
- 11 Thomas KE, Parnell-Parmley JE, Haidar S, Moineddin R, Charkot E, et al. (2006) Assessment of radiation dose awareness among pediatricians. *Pediatr Radiol* 36: 823-832.
- 12 Lee CI, Haims AH, Monico EP, Brink JA, Forman HP (2004) Diagnostic CT scans: assessment of patient, physician, and radiologist awareness of radiation dose and possible risks. *Radiology* 231: 393-398.