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Evaluation of Compliance to Radiation Safety Standard Amongst Radiographers in Radiodiagnostic Centres in South West, Nigeria

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Abstract: The use of ionizing radiation has become very common in medicine since its discovery more than a century ago. Radiation protection has been the concern of national and international bodies because of the potential hazardous effects associated with ionizing radiation if not properly controlled. Radiographers, who are the major dispenser of ionizing radiation, need proper monitoring for safe practice. In Nigeria, Nigerian Nuclear Regulatory Authority (NNRA) is saddled with the responsibility to regulate and monitor the use of ionizing radiation the country. International Commission on radiation Protection (ICRP), international commission on Radiation Units and Measurements (ICRU) in conjunction with International Atomic Energy Agency (IAEA) had provided series of documents on radiation safety standards. One hundred radiographers from public and private radiodiagnostic centres administered questionnaires on compliance rate of safety standard as described by national and international commission on ionizing radiation. The result reveals high compliance rate in majority of radiodiagnostic centres located in south west Nigeria. Conclusively, this study showed that radiographers working in both private and public establishments in south west, Nigeria were been monitored and they strictly followed the radiation protection standard rules to be within radiation workers dose limits.

Key words: Compliance · Radiographer · Radiation · Protection · Safety · Standard

INTRODUCTION

Ionizing radiation has been putting to use in diagnosis of various diseases and treatment since its discovery in 1895 by Wilhelm Conrad Rontgen. There are many types of ionizing radiation available for either treatment or diagnosis worldwide. Despite wide radiation applications in medicine, it can be hazardous if not properly handled. After interaction of ionizing radiation with biological tissues through various mechanisms, the ions caused by such interactions can affect normal biological processes. Improper protection against ionizing radiation can lead to death, cancer, skin burn, cataract, infertility and genetic effects [1].

The International Commission on Radiological Protection (ICRP) recommended [2] a system for limiting the doses received by radiation-exposed workers. Its report addresses radiation safety practices in industrial and medical institution, control of radionuclide in the environment, protection of the public and assessment of radiation risk. A key part of managing radiation safety is through education. Everyone involved in radiation usage needs to know what radiation is and how to handle it because the number of diagnostic radiology procedures performed continues to grow yearly. With this growth, there should be concern for practice radiation safety.

It is essential to monitor radiographers as they discharge their duties to the public. Radiographer needs to be aware their roles in ensuring total compliance to standard radiation safety in their institution. Personnel radiation monitoring is essential to ensure that dose limits for staff not exceeded. The dose limit for staff is specified in the International Commission on Radiological Protection (ICRP) report [2]. In the ICRP report, the effective annual dose for occupationally exposed radiation workers should not exceed 50 mSv averages

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Table 1: Response of radiographers to radiation safety compliance.

Description		Positive response (%)	Negative response (%)
Knowledge of radiation safety		98	2
Knowledge of radiation safety standard		96	4
Good knowledge of radiation safety and standard		95	5
Important of radiation safety		99	1
State of radiation safety in the working place	Excellent	16	1
	Good	65	
	Poor	18	
Establishment of protocol	Written	47	0
	Unwritten	53	
Making radiation safety standard compulsory		97	3

Table 2: Availability of radiation safety devices.

Protection devices	Yes(frequency and percentage)	No (frequency and percentage)
Lead jackets	96(96%)	4(4%)
Gonad shields	68(88%)	32(12%)
Lead curtains	6(36%)	64(64%)
Lead shields/barrier	77(77%)	23(23%)
Thyroid shields	24(24%)	76(76%)
Lead glass shield	86(86%)	14(14%)
Lead gloves	19(19%)	81(81%)
TLD badges	97(97%)	3(3%)
Caution lights	98(98%)	2(2%)
Lead goggles	23(23%)	77(77%)
Breast shields	19(19%)	81(81%)

over five years. The values which was downwardly reviewed in 1991 to 20 mSv average over five year to put stricter control over the use of ionizing radiation in medicine, are guidance levels which show what is achievable by good practice established for use by medical practitioners [3-6].

Film badges, thermolumiscent dosimeters and pocket ionization dosimeters are the recommended radiation devices for monitoring radiation exposed workers.

This study aims at assessing and evaluating the level of compliance of radiographers in various health institutions in Lagos state, to radiation safety as stipulated in articles of national and international bodies [7- 10].

The scope of the study includes the knowledge of radiation safety and the availability of personnel protection equipments in radiological practices as observed in radio-diagnostic centres [11].

METHODS AND MATERIALS

We carried out this study in some selected private diagnostic centres and government hospitals. The total number of radiographers (respondents) for this study was 100.The centres were responsible for providing clinical training as well as job opportunities to qualified radiographers. A simple random sampling method was used to select the radiographers that were based in radiology centres in south west, Nigeria. The sampling frame was from different locations in the metropolitan areas of the state. Data collected were analyzed using Epi-info (version 3.5.1). Moreover, results were presented in Tables 1 and 2.

RESULTS AND DISCUSSION

The aim of this study was to assess the knowledge of radiographers about radiation safety standard as well as the compliance to the radiation safety standard in selected radiodiagnostic centres in South West, Nigeria.

The respondents comprised of 100 radiographers recruited for the study from teaching hospitals (58%), general hospitals (19%) and private diagnostic centres' (23%). The ages of respondents were between 20- 60 years. From the result, 98% of respondents had good knowledge of radiation protection probably because of their academic qualifications to practice as qualified radiographer. Almost 99% of respondents believe that radiation safety standard is important and 97% wanted the standard to be compulsory indicating that majority have good knowledge of safety standard.

All the 23 radiographers in private diagnostic centres' were satisfied with the level of safety devices provided for them because it met the standard of protection compared

to the satisfaction showed in both government hospitals where a good number 18 showed dissatisfaction in the safety devices provided due to its inability to meet the standard required. This result contradicts the study carried out by Lemley *et al* [12] whose results showed that larger hospitals were more likely to offer radiation safety than smaller hospitals (83 %and 57%, respectively).

The result further showed that knowledge and compliance did not depend on years in practice according to Tilson [13] because out of 97% that had good knowledge of safety standards, 80% had less than 10 years in practice and majority were involved in continuing education [14, 15].

Concerning the assessment of safety devices most of the diagnostic centres studied were able to provide the caution lights, lead aprons, lead doors, gonad shields, lead-lined walls, lead screen/ shield. The lead goggles, lead gloves, breast shields and thyroid shields were seen in most private centres. Most of the provided devices in government hospitals were obsolete and worn out such as lead doors that was no longer at entrances. Majority of the centres adhered strictly on the use of TLD as a monitoring device.

CONCLUSION

The study showed high rate of awareness and compliance of radiographers in South West, Nigeria to radiation safety standards as stipulated by national and international bodies [2-4, 8]. The radiation protection devices present in most centres were impressive indicative of employers' willingness to abide by radiation safety standards [16].

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