International Journal of Natural Sciences Research
2013 Vol. 1, No. 4, pp. 26-29
ISSN(e): 2311-4746
ISSN(p): 2311-7435

ASSESSMENT OF THE LEVELS OF RADIATION ABSORBED BY RADIOLOGY PERSONNEL IN SOME HOSPITALS IN MAKURDI METROPOLIS

Iortile J.T.[1] --- Archibong B.E.[2] --- Chelen J.T[3]

[1,2,3]*Department of Radiology, Benue State University Teaching Hospital Makurdi,Benue State*

ABSTRACT

The levels of radiation of radiology personnel were assessed in five major hospitals in Makurdi metropolis. A data collection instrument was a semi structured self-completion questionnaire, designed in line with the objectives of the study. Personnel radiation monitoring was available in only 1 out of 5 hospitals (20%). Radiation monitors were found to be fairly read about every quarter of the year only in one (1) hospital. Radiation safety officers were available in only 3 hospitals (60%). About (32.5%, n=13) believe the hospital management do not make provision for it. Dosimetric records of staff were not given any consideration in the establishment of radiology departments. Personnel radiation monitoring in Hospitals on the whole was found to be very poor. This is a significant precautionary lapse as radiation risk cannot be assessed and corrective measures taken.

Keywords: Radiation, Radiology, Personnel, Assessment, Absorption, Risk, Makurdi.

1. INTRODUCTION

Monitoring of radiation doses received by staff in radiology department is of great importance in efforts to protect themselves from the effect of excessive radiation during and after radiological examinations of patients [1]. It is advisable that assessing radiation doses received by radiology workers at periodic intervals will ensure their occupational safety. That is the radiations exposure to, are within the internationally accepted safe limits [2].

Radiation dose is the energy absorbed by a unit mass of an absorbing medium. The S.I unit of dose is gray (Gy) and is defined as one joule of energy absorbed per kilogram of the absorbing tissue, i.e. $1Gy = 1Jkg^{-1}$. The accepted dose limits for occupational staff as reported by the International Commission on Radiological Protection (ICRP) in 1977 was 50mSv. A downward review was done in 1991 and an effective annual dose limit of 20mSv was adopted as an average for a period of five years. The downward review of annual dose limit was adopted in order to put a stricter control over the use of ionizing radiation in medicine and minimize possible hazards, especially the stochastic effects [3].

The common devices recommended for measuring of dose rate of radiation received by radiation workers are; Thermoluminescence dosimeters (TLD), film badges and pocket ionization

dosimeters, etc. Okpala [4], reported that every radiology worker is expected to wear dosimeters always while working. The dosimeter readings are kept as records for every staff for the purpose of evaluating their radiation history and possible risks that would be involved. These records help in improving radiation practices in radiology department.

Radiation badges are essential monitoring gadgets that must be applied and received before starting work involving radiation exposure. Also, personnel dosimetric record and monitoring are integral parts of radiography practice in the world [5, 6].

It has been observed that radiation doses received by workers in radiology departments are not properly monitored, even where the devices are found, monitoring records are not consistent and their provisions are irregular. This research is therefore aimed at assessing the levels of radiation absorbed by radiology personnel in some hospitals in Makurdi metropolis.

2. MATERIALS AND METHODS

The data collection instrument was a semi-structured self-completion questionnaire designed in line with the objectives of the study. A total of 50 questionnaires were distributed and 40 were duly filled by radiology workers in the hospitals under investigation and collected giving a percentage response of 80%. The data was analyzed using SPSS version (16) statistical software for the five hospitals.

Table-1. Personnel and Radiation Monitoring Records

Hospital	A	B	C	D	E
Number of workers	15	9	6	5	5
Number of workers monitored	Nil	Nil	Nil	Nil	1(20%)
Radiation monitor(s) used	Nil	Nil	Nil	Nil	Film badge
Time interval before monitored are read	Nil	Nil	Nil	Nil	>3months
Availability of Radiation safety officer (RSO)	Yes	Yes	No	No	Yes

Table-2. Analysis of Personnel Radiation Monitoring in the Hospitals

Reasons Advanced	Number of Respondents
Radiation safety officers	3 (07.5%)
Lack of funds	7 (17.5%)
None requisition of monitoring devices	4 (10.0%)
Lack of acquisition of monitoring devices by hospital management.	13 (32.5%)
Others	13 (32.5%)

3. RESULTS

The personnel and radiation monitoring records are shown in Table 1.0, the results indicate that the number of hospital with monitoring devices is only 1 hospital (20%). The availability of radiation safety officer (RSO) in the five hospitals is 3 representing 07.5%. Four out of the five hospitals investigated had no monitoring devices, while at the hospital where the device was available; the rate of monitoring was quarterly.

Table 2. shows the reasons for performing personnel radiation in the hospitals. Majority of the radiology workers (32.5%, n = 13) thought the hospital managements do not make provision for the devices. Other miscellaneous reasons were advanced by a percentage of (32.5%; n =13) of the radiology workers. The result in table 1 and table 2 implies that dosimeter records of staff are not given consideration during recruitment exercise.

4. DISCUSSION

Personnel radiation monitoring is an important safety precaution in the practice of radiology. Its main purpose is to measure radiation dose received by radiology workers, to ensure that doses received are within permissible limits [1]

The result of the study shows that personnel radiation monitoring is available only in one hospital. This indicates that, radiation monitoring gadgets was abruptly in non-existence in most of the hospitals in the metropolis. The level of absorption of radiation by staff becomes difficult as risk to exposure cannot be assessed. According to Rosenbloom [7], determination of radiation dose received by personnel will ensure reduction in biological and occupational effects to radiation and its protection, which is geared towards reduction of stochastic effects (which likelihood is assessed by the magnitude of the absorbed dose). United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAN) [6] reported that cancer can be deposited in personnel of the department due to long exposure to radiation which implies that a genetic effect of radiation is smaller than the risk of cancer induction, so it is the latter that is the principal concern in determination of the dose limits.

Thermoluminscent dosimeter (TLD), film badges, packet ionization dosimeters devices used in radiation monitoring in hospitals are fairly regularly both in supply and use. Thermoluminiscent dosimetry can be defined as a phenomenon by which solid state detectors can be used to detect and measure exposures to ionizing radiations. When exposed to these radiations, free electrons in the TLD crystals become trapped in lattice imperfections and when heated to about 300 ^{o}C, the electrons escape the traps and emit light. The amount of light emitted is proportional to the dose of radiation absorbed.

TLDs are portable and lightweight radiation monitoring devices that are expected to be worn by radiology workers during work session. It has advantage in that, it measures total radiation dose over a period of time, and also has high sensitivity and reusability.

Radiation safety officers in the centres surveyed were just 3 (07.5%) out of the five hospitals when ideally they should be in every radiology department of the hospital setting. Radiographers who are in short supply should be paired with medical physicist and trained to take part in the radiation monitoring process.

Table 2. which shows the percentages of 17.5, 10.0, 32.5 and 32.5 and a population of 7, 4, 13 and 13 for various reasons as: Lack of funds, radiology workers do not request for personnel radiation monitoring, hospital management do not provide for it and others, have led to job dissatisfaction and discouragement to even a few workers who have choose to go into this profession because of lack of adequate attention giving to this area which is concern with human

health. Other reasons are that dosimeter records not considered during staff recruitment is another lapse on the part of the hospitals. Elsewhere in the world, it is recommended and practiced that persons who have worked with radiation in the past should make dosimetric records available to new employers [8].

5. CONCLUSION

The study has revealed that the levels of absorption of radiation by radiology workers in most hospitals surveyed in Makurdi metropolis are pretty very poor as such, precautionary motives and radiation risks cannot be purposely assessed and corrective measures will become difficult. The implication of which is that most radiology works are expose to some health risks that are not sufficiently perceived by health authorities.

6. ACKNOWLEDGEMENT

The authors are grateful to all the staff of radiology in the various hospitals for which this research was based for their contributions towards the success of the study.

REFERENCES

[1] A. O. Okaro, C. C. Ohagwu and J. Njoku, "Evaluation of personnel radiation monitoring in radiodialnostic centres in South Eastern Nigeria," *AfricanJjournal of Basic and Applied Sciences*, vol. 2, pp. 49-53, 2010.

[2] F. O. Ujah, N. B. Akaagerger, E. H. Agba and J. T. Iortile, "A comparative study of patients radiation levels in federal standard diagnostic reference levels in federal medical centre and bishop murray hospitals in Makurdi," *Archives of Applied Science Research*, vol. 4, pp. 800-804, 2012.

[3] International Atomic Energy Agency, *Dosimetry in diagnostic radiology*, An international code of practice IAEA Vienna, pp. 113-125, 2007.

[4] O. C. Okpala, "Survey of radiation protection facilities in some parts of Nigeria (Enugu and Anambra States)," *Journal of Biomedical Investigation*, vol. 2, pp. 17-21, 2004.

[5] Washington State University, *Safety policies and procedures, manual or radiation safety*, 2000.

[6] United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAN), *Hereditary effects of radiation. Report to the general assembly*, United Nations, New York, 2001.

[7] M. Rosenbloom. *Theoretical background to radiation protection*, In: P. Mayles, A. Nahun andJ.C. Rosenwald, (Eds). Handbook of radiotherapy physics: Theory and practice. Florida, USA: Taylor and Francis Group, 2007.

[8] M. C. Jean, *Community legislation on medical radiation protection in the context of internal market*, Radiation protection derision, DG XI, Commission of the European Communities, Luxemburg, 1998.