

Assessment of Health Care Workers Knowledge, Attitude and Practices of Radiation Safety at a Specialist Hospital, Jos, Plateau State, Nigeria

Chenko G. Y. Nimchang¹, Ndam Moses Ponsel¹, Manset W. E.², Songden S. D²

¹Plateau State University, Bokokos, Nigeria

²University of Jos, Jos, Nigeria

ABSTRACT

Radiological doses are low and the chances of long-time effect is minimal, but it should be kept as low as reasonably achievable. Therefore health workers especially Doctors requesting for imaging must be well trained in deciding when medical imaging should be carried out and should also have accurate knowledge of the associated risk involved. This can only be achieved if a proper knowledge and safety practice is adhered to. A cross-sectional study to investigate the level of health workers knowledge, about radiation safety and their attitude towards radiation safety was carried out. A self-administered questionnaire for radiation safety was sent to a purposive sample of 174 Health workers at a Specialist Hospital, in Jos, Plateau State, Nigeria. 169 questionnaires were filled and return by participant (responsive rate: 97.1%). The sample include: 8 Radiologist, 72 Nurses, 3 Oncologist, 49 Clinicians, 26 Technicians and 11 Surgeons. Majority of the participants have never attain any radiation safety related training (76%). Radiologist and oncologist who were more frequently expose to ionizing radiation, their knowledge was not far better than the other health workers. The general knowledge score ranges from 5.9% to 60.9% , with a low score among nurses and surgeons. The most alarming was the applicability and convenience of radiation protection policies and procedure. Adherence to safety precaution practices was mostly violated by participants, especially nurses and surgeons, but they attributed it to the poor application of protective measures during performing the procedures. The investigation concluded that Health workers in a Specialist Hospital, Jos Plateau State, Nigeria have fair knowledge, negative attitude and poor safety practices towards radiation safety policies and precautions.

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KEYWORDS: Health care workers, Knowledge, Attitude, Practice, Radiation Safety

1. INTRODUCTION

The exposure of human beings to ionizing radiation from both natural and artificial sources is a continuing and unavoidable part of life on earth. Today diagnostic imaging and interventional radiological techniques are increasingly used to diagnose varieties of injuries and diseases, and to provide lifesaving treatment to many diseases.

As a result the use of X-ray in imaging modalities such as mammography and Barium studies to diagnose injuries in human system is the order of the day in modern medicine. To this effect, it contribute 40% of collective dose of ionizing radiation that

causes genetic damage which is linked to cancer induction but this varies due to duration and the dose of exposure; Nowadays CT constitute 4% of medical examinations and it has the highest dose among all medical examinations. The typical exposure dose for abdominal CT is 9mSv and one chest radiograph is 0.02mSv. 15% of the average radiation dose (2.5mSv) received annually by the populace comes from related medical exposures.

The biological effect of ionizing radiation is rising a major concern, as such, the radiation dose given in any diagnostic procedure should be enough to answer

any clinical question, so that the dose given to patients should be kept as low as reasonably achievable. This can only be achieved if Doctors who request for diagnostic imaging are well trained in making such decisions, and have accurate knowledge of the associated risk. But it is quite pathetic that research shows that there is a wide spread of underestimation of radiation dose among physicians.

The principle of radiation safety and their practical application is critical to all health care workers and must be well understood. Misconceptions about radiation may cause fear and concern that will have negative impact on the patient.

The major concern may not be to address new policies and procedures, but to improve the understanding of frequency and causes of error, especially those that are most likely harmful. Our goal is not to eradicate all faults; rather should we focus our attention on conditions that can cause real havoc.

Similar surveys have been conducted in other parts of the world especially America and Europe, but on African doctors the awareness on radiation doses is not sufficient. It is therefore necessary to consider the safety of both patients and those who deliver these services. The study aimed at assessing the health workers knowledge, attitude and practices regarding radiation safety in a Specialist Hospital in Jos-Nigeria.

2. MATERIAL AND METHODS

This cross sectional study was conducted in a Specialist Hospital in Jos Plateau State, Nigeria during October-November, 2017. Confidentiality and anonymity was maintained in accordance with the regulations mandated by Research and Ethics Committee of the hospital.

2.1 Subjects Recruitment was done by convenience sampling of all health workers exposed to ionizing radiation on a voluntary basis. The participants were informed that the result would only be used for scientific study.

Table1: Distribution of health care workers according to personal and work characteristics (N=169)

Age (years)	
Mean±S.D	35±1.8
Range	22-47
Sex	
Male	95 (56.2%)
Female	74 (43.8%)
Job Category	
Clinicians	49 (29%)
Nurses	73 (43.2%)
Oncologists	3 (1.8%)
Radiologists	8 (4.7%)

2.2 Questionnaire A self administered questionnaire was sent to 174 health care workers and ask to fill and return within three weeks (Appendix). They were asked about their duration of employment, training in radiation safety, exposure characteristics, knowledge, attitude and practices of radiation safety. The questionnaire was tested on 12 health care workers in a pilot survey and we excluded these 12 respondents from the study.

2.3 Statistical analysis The analysis was performed using the Statistical Package for Social Sciences version (SPSS 21), descriptive statistics including frequency distribution, mean, standard deviation and percentages. Level of knowledge, attitude and practices were calculated as percentages of correct answers in each section. Levels above 50% were considered good knowledge and safe practices.

3. RESULTS

One hundred and sixty nine questionnaires were duly filled by participants (response rate, (97.1%). The participants include: 8 Radiologist, 72 Nurses, 3 Oncologist, 49 Clinicians, 26 Technicians and 11 Surgeons. Their ages ranged from 18-24, 25-30, 31-34, 35-40, 41-44, 45 years and above. The duration of workers at current employment among participants ranged from 1-10(68.6%) 11 and above (31.4%) years. Male health workers account for 52.6% of the participants compare to 47.4% females.

Table1 shows the distribution of health care workers according to personal and work characteristics. Table2 shows the distribution of the health care workers according to their exposure and practice. Table3 shows the distribution of health care workers knowledge regarding radiation dose. Table4 shows health care workers knowledge on susceptibility of organs to ionizing radiation. Table5 shows the distribution of health care workers according to attitude regarding radiation safety and Table6 shows the distribution of scores of health care workers knowledge, attitude and practice regarding radiation safety.

Surgeons	10 (5.9%)
Technicians	26 (15.4%)
Duration of current employment (years)	
Range	
1-10	116 (68.6%)
11 and above	53 (31.4%)
Receiving Radiation Safety Training (Yes)	39 (23.1%)
Reading Radiation Safety Publications	
More than 5 articles	10 (5.9%)
1-5 articles	23 (13.6%)
1 article	33 (19.5%)
Never	103 (60.9%)

Table 2: Distribution of health care workers according to their exposure and practice (N=169)

Exposure Frequency (/Week)	No.(%)
More than 3 times	32 (18.9)
1-3 times	23 (13.7)
Less than once	31 (18.3)
None	83 (49.)
Adherence to radiation protection policies, procedures and PPE	
Adherent	3 (1.8)
Not Adherent	166 (98.2)
Applicability and convenience of radiation protection policies procedure and PPE	
Lead aprons	22 (13.0)
Leaded gloves	3 (1.8)
Thyroid shields	4 (2.4)
Eye glasses	4 (2.4)
Distance from radiological device without protection during procedure	
1 meter	10 (5.9)
2 meters	19 (11.2)
5 meters	73 (43.2)
I do not care	49 (29.0)

Table 3: Distribution of health care workers knowledge regarding radiation dose (N=169)

Radiation dose	No. (%) of correct answers
Background radiation dose (mSv)	27 (16.0)
Chest X-ray radiation dose (mSv)	30 (17.8)

Table 4: Distribution of health care workers knowledge on susceptibility of organs to ionizing radiation

	No. (%) of correct answers
Bladder	15 (8.8)
Gonads	41 (24.3)
Kidneys	23 (13.6)
Skin	39 (23.1)
CVS	19 (11.2)
Born marrow	23 (13.6)
Thyroid gland	35 (20.7)
CIT	47 (27.8)

Table 5: Distribution of health care workers according to attitude regarding radiation safety (N=169) Assessment.

	No. (%) Agree respondents
1. The policies and procedures on radiation precautions are clear and easy to understand.	87 (51.5)
2. I feel confident about the steps I need to take when caring for patients needing radiation precautions.	77 (45.6)
3. I know whom to contact if I have questions about when radiation precautions are needed for a particular patient.	93 (55.0)
4. I feel I can clearly explain the radiation precautions needed to any patients and their visitors.	74 (43.8)
5. I feel safe when caring for patients needing radiation precautions.	71 (42.0)
6. I feel the institutional policies and procedures are based in current regulations.	59 (34.9)
7. I am confident the institution is carefully monitoring my radiation exposure.	35 (20.7)
8. I feel that I will be called if I receive higher than normal exposure.	34 (20.1)
9. I feel that working with patients receiving radiation will not affect my ability to have a child.	32 (18.9)

Table 6: Distribution of score of health care workers knowledge, attitude and practices regarding radiation safety (N=169)

Knowledge score	No. (%) of respondents
Poor knowledge	83 (49.9)
Fair/Good knowledge	86 (50.1)
Attitude score	
Negative attitude	96 (56.8)
Positive attitude	73 (43.2)
Perception	
Good	46 (27.3)
Bad	123 (72.7)
Practices score	
Safe	33 (19.5)
Unsafe	136 (85.5)

DISCUSSION

Since exposure to radiation from medical procedures has become a topic of recent public and scientific discussion, it is important that physicians should be knowledgeable on radiation protection properly so that they can protect themselves, patients and others around the patients.

The result showed that only a few of the respondents (23.1%) had attended an educational program in the country about radiation safety and the attendance was highest among radiologists. The majority of the health workers (76.9%) didn't receive any radiation safety training, and 60.9% of them don't used to read radiation safety magazine (Table1). As regard exposure frequency 18.9% of the participants recorded more than three times exposure per week. Fifty five health workers (32.6%) were exposed to ionizing radiation once per week or while only 18.3% are exposed to ionizing radiation less than once per week. Only three of the hospital workers (1.8%) were adherent to radiation protection policies, procedures and personal protection equipment (PPE). At least 19.6% of the participants thought that radiation protection policies and procedures and PPE were applicable and convenient while working. However twenty nine health workers (17.1%) were standing at

a distance of 2 meters or less from source point without protection (Table2).

Regarding health workers knowledge, this study revealed that 16.0% of Health workers correctly identify the background radiation equivalent dose and 4.1% of the hospital workers correctly identify the radiation equivalent dose in a chest X-ray. However only 24.3%, 2.4%, 3.6% and 17.8% of the health workers correctly identified the equivalent number of chest X-ray, CT, MRI and ultra sound respectively in different radiological investigations (Table3). Under estimation of radiation dose means that physicians are not aware of the radiation risk and therefore are less cautious in offering radiation related investigations to their patients, which in turn may increase their unnecessary exposure. Also there are physicians who fail to recognized MRI and ultrasound as radiation – free modalities, these alternatives to X-ray and CT may not be frequently utilized in their practice.

According to this study, physicians used lead apron more than the did other PPE and only 1.8% used lead gloves. The used of other measures such as thyroid shields and eye glasses were less frequent (Table2).

The mean knowledge score was 56.5 ± 15.2 . About 49.9% of health workers were classified as having poor knowledge, while only 50.1% were classified as having fair to good knowledge (Table 6) among which physicians score only 23.7% fair to good. The mean attitude and practice score were 46.9 ± 8.6 and 59.3 ± 3.0 respectively and 85.5% was classified as having unsafe practice (Table 6).

Many factors would have contributed to the unsafe practice of the health workers and in particular the poor knowledge of the physicians amongst which is the undergraduate never having formal training on this topic. The deficit of knowledge of basic scientific principles in post graduate education and lack of organized continuous education in hospitals on radiation safety and protection is also a factor. In addition, there were inadequate availability of radiation safety equipment such as radiation dose badges and this may be one of the major reasons for not using them. There was no regular monitoring of radiation exposure per year and therefore, it is difficult to assess the average radiation exposure in the hospital.

CONCLUSION

At the Specialist Hospital, health workers knowledge and practices towards radiation safety related to radiological imaging are fair.

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