

Assessment of Knowledge and Awareness of Radiation Hazards and Protection among Patient's Relative in Southeast, Nigeria

VICTOR KELECHI NWODO¹, NDUBUISI OZOEMENA CHIAGHANAM², MICHAEL PROMISE OGOLODOM³, CHRISTOPHER CHUKWUEMEKA OHAGWU⁴, CHARLES UGOCHUKWU NWODO⁵, OLADOTUN ALBERT AGBADAOLA⁶, AWAJIMIJAN NATHANIEL MBABA⁷, INNOCENT CHINWEIKE EZENMA⁸, UMAR ABUBAKAR⁹



ABSTRACT

Introduction: Significant level of exposure of patient's relatives to ionising radiation during medical imaging procedures has been observed and no attention has been paid to the knowledge of radiation hazards of patient's relatives that follow the patient for a procedure.

Aim: To assess the knowledge and awareness of radiation hazards and protection among patient's relatives in Southeast, Nigeria.

Materials and Methods: This was a questionnaire hospital-based survey, which was conducted in two teaching hospitals, and one national hospital in Southeast Nigeria from January 2019 to June 2019. A 21 items semi-structured questionnaire were administered to 376 patient's relatives selected purposively based on the inclusion criteria using one-on-one method. Information on demographic variables of the respondents, knowledge of ionising radiation effect, radiation protection and source of their knowledge of ionising radiation were collected.

The obtained data were analysed using descriptive statistics.

Results: Majority of the participants were females 221 (58.78%). Most of the participants, 263 (69.95%) did not have knowledge of ionising radiation. Only 118 (31.38%) knew that ionising radiation is hazardous to health. Greater number of the participants 289 (76.86%) were informed by the radiographers about the effects of ionising radiation while 87 (23.14%) read about it. Larger number of the participants, 325 (86.44%) had no idea about the meaning of radiation protection. Majority of the participants 287 (76.33) assisted their relatives during the examination. Most of the participants, 269 (71.54%) said they have seen the radiation warning sign before.

Conclusion: This study revealed poor level of knowledge and awareness of radiation hazards and protection among patient's relatives. It is obvious that public education will contribute immensely in the promotion of awareness of the harmful effect of ionising radiation and radiation protection measures.

Keywords: Protection measures, Radiation exposure, Radiation protection

INTRODUCTION

Medical imaging, which employs the use of ionising and non ionising radiations, plays a great role in the diagnosis, monitoring and treatment of human diseases as well as early detection of diseases leading to optimum treatment outcome and prognosis. Medical imaging modalities that make use of ionising radiations constitute two-third of radiological procedures [1], thereby constituting a major source of man-made radiation exposure to the public with potential detrimental biological effects [2]. Despite the enormous benefits of medical imaging in diagnosis, the concomitant radiation hazard is of public health concern as evidence links exposure to low-level ionising radiation at doses used in medical imaging to the development of cancers [3].

In Nigeria, there is an increase in radiological armamentaria with associated increase in imaging procedures and radiation exposure of patients undergoing radiological investigations as well as health personnel who work with these equipments. Previous studies revealed poor knowledge and awareness of radiation hazards of patients as documented by Ugwuanyi DC et al., [4]. They observed that majority of the participants (67.6%) knew that most medical imaging modalities make use of ionising radiations, yet only 20.4% participants knew that radiation could be harmful. Ighodaro EO and Igbinedion BO, noted poor knowledge of radiation protection and effect of radiations among doctors who recommend radiological investigations [5]. In a related study conducted by Awosan KJ et al., showed satisfactory knowledge of radiation hazard and personal protective devices among radiologists, radiotherapists

and dentists [6]. The study by Sacks BP conducted in United States of America, reported significant level of exposure of not only patients but also patients' relative to ionising radiation [7]. However, none of these studies took cognizance of radiation exposure of patients' relative, who cater for these patients in the locality. A good knowledge of radiation hazard and safety could reduce the overall radiation exposure of the public as radiation protection practices will be judiciously implemented. Radiation protection and safety procedure, according to the International Atomic Energy Agency (IAEA), are established to ensure the protection and safety of staff, patient and patient relatives (caregivers) during their stay in the radiology department [8]. In radiology departments in Nigeria, patient relatives and caregivers are often seen inside and around the diagnostic room with unjustified extent of knowledge and awareness of potential radiation hazard and protection measures.

There is dearth of data on patient relative's/care giver's, extent of knowledge and awareness of radiation hazards and possible protective measures. This study aimed to assess the knowledge and awareness of radiation hazard and radiation protection among patient relatives in Southeast, Nigeria.

MATERIALS AND METHODS

This was a questionnaire, prospective and cross-sectional hospital-based survey, which was conducted in two tertiary teaching hospitals, and one national hospital in Southeast Nigeria from January 2019 to June 2019. Ethics approval for this study was obtained from the

Research Review Board of the Nnamdi Azikiwe University Teaching Hospital (dated 11th January 2019).

Twenty-one item semi-structured questionnaires, written in English language, with a convenience sample size of 376 participants were administered. The validity and reliability of the questionnaire was achieved by conducting a pilot study prior to this study. Thirty questionnaires were pretested with patients' relatives before the commencement of the study and the Cronbach alpha reliability test was conducted. The questionnaire had an acceptable internal consistency (Cronbach's alpha=0.81).

Inclusion criteria: Only patients' relatives that came with their patients to the selected study centres during the period of this study, were able to read and write and consented to the study were included in this study.

Exclusion criteria: Non-patients' relatives and those that did not consented to participate in this study were excluded from this study.

The questionnaires were administered to the participants using one-on-one method of administering questionnaire at the waiting areas of the Radiology Departments of the hospitals. All completed questionnaires were retrieved immediately by the researchers. Information on demographic variables of the respondents, knowledge of ionising radiation effect, radiation protection and source of their knowledge of ionisation were collected using data profoma.

STATISTICAL ANALYSIS

The obtained data were processed using Statistical Package for Social Sciences (SPSS) version 21 (IBM SPSS, United States, 2012) and analysed using descriptive statistics.

RESULTS

Majority of the participants were females 221 (58.78%). Out of the

Class	Respondent	Frequency	Percentage
Gender	Males	155	41.22
	Females	221	58.78
	Total	376	100.0
Age (years)	18-25	61	16.22
	26-35	156	41.50
	36-45	87	23.14
	46-55	48	12.77
	56 and above	24	6.37
	Total	376	100.0
Education qualification	No education	63	16.76
	Primary	37	9.84
	Secondary	162	43.09
	OND	76	20.21
	HND	21	5.59
	B.Sc	17	4.51
Total	376	100.0	

[Table/Fig-1]: Socio-demographic of the patients' relative/caregivers.

OND- Ordinary National Diploma, HND-Higher National Diploma and BSc-Bachelor of Science

376 participants, the highest percentage (41.50%) was in the age bracket of 26-35 years. Most of the participants 162 (43.09%) were secondary school leavers [Table/Fig-1].

With regards to the participants' knowledge of radiation hazards questions in [Table/Fig-2], 113 (30.05%) knew what ionising radiation was. Of the total participants, 164 (43.63%) answered that they have been exposed to ionising radiation before [Table/Fig-2]. Most of the participants 240 (63.83%) had stayed with their relative

Questions	Respondent	Frequency	Percentage
Are you a patient relative?	Yes	376	100.0
Do you know what ionising radiation is?	Yes	113	30.05
	No	263	69.95
	Total	376	100.0
Have you been expose to ionising radiation before?	Yes	164	43.62
	No	212	56.38
	Total	376	100.0
Do you know that ionising radiation is dangerous (hazardous) to health	Yes	118	31.38
	No	258	68.62
	Total	376	100.0
If the above question is yes how did you know?	Read about it	87	23.14
	Informed by the radiographer	289	76.86
	Total	376	100.0
Have you heard about anybody affected by ionising radiation exposure?	Yes	20	5.32
	No	356	94.68
	Total	376	100.0
Have you stayed with your relative during examination involving ionising radiation before?	Yes	240	63.83
	No	136	36.17
	Total	376	100.0

[Table/Fig-2]: Knowledge of radiation hazard among patients relative/caregivers.

during examination that involve ionising radiation [Table/Fig-2].

The participant's knowledge of radiation protection in [Table/Fig-3], revealed that larger number of the participants 325 (86.44%), had no idea about the meaning of radiation protection. Out of 51(13.56%) participants who knew about the meaning of radiation protection, 41 (10.90%) were informed by radiographers [Table/Fig-3]. Majority of the participants 287 (76.33) assisted their relatives during the ionising radiation examination. Of those that assisted their relatives, 235 (81.88%) said they were given something to wear [Table/Fig-3]. Out of 81.88% of the participants who were

Questions	Respondent	Frequency	Percentage
Do you know what radiation protection means?	Yes	51	13.56
	No	325	86.44
	Total	376	100.0
If yes how did you know?	Read about it	10	2.66
	Informed by the radiographer	41	10.90
	No	325	86.44
	Total	376	100.0
Have you ever assisted your relative during examination involving ionising radiation room?	Yes	287	76.33
	No	89	23.67
	Total	376	100.0
If the above question is yes, did they give you to put anything on when you are assisting your patient during examination?	Yes	235	81.88
	No	52	18.12
	Total	287	100.0
If the above question is yes, did you know why they ask you to put the thing on	Yes	60	25.53
	No	175	74.47
	Total	235	100.0
Have you ever been asked to stay outside the examination room and you refuse maybe because of your relative?	Yes	102	27.13
	No	274	72.87
	Total	376	100.0

[Table/Fig-3]: Knowledge of radiation protection among patients relative/caregivers.

given something to wear while staying with their relative in the X-ray examination room, 60 (25.53%) knew why they were asked to wear

the protective apron. Majority of the participants 274 (72.87%) stayed outside the examination room whenever they were asked to do so [Table/Fig-3].

With regards to the participant's knowledge of radiation signs as captured in [Table/Fig-4], showed that out of 376 participants, 269 (71.54%) said they have seen the radiation warning sign before. Most of the participants who had seen the radiation warning sign 167 (62.08) did not know the meaning of the sign. Out of those that knew the meaning of the sign, 83 (81.37%) of the participants said they were informed about the meaning of the sign by radiographers [Table/Fig-4]. A total of 269 (71.54%) participants had seen the radiation warning sign, out of which, 101 (37.55%) said they usually obeyed the sign [Table/Fig-4].

Questions	Respondent	Frequency	Percentage
Have you seen this radiation warning sign before?	Yes	269	71.54
	No	107	28.46
	Total	376	100.0
If the above questions are yes, do you know the meaning of the sign?	Yes	102	37.92
	No	167	62.08
	Total	269	100.0
If the above questions are yes, how did you know the meaning of the sign?	Informed by the radiographer	83	81.37
	I understand the warning signs	19	18.63
	Total	102	100.0
Is the sign in this radiology department?	Yes	269	71.54
	No	107	28.46
	Total	376	100.0
Do you always obey the sign?	Yes	101	37.55
	No	168	62.45
	Total	269	100.0

[Table/Fig-4]: Knowledge of radiation signs among patients relative/caregivers.

DISCUSSION

This study was the first to evaluate the patient's relative knowledge and awareness of radiation hazards and protection to the best of the knowledge. The findings revealed that about 70% of the participants lack knowledge of ionising radiation despite their relatives (the patients) been referred for ionising radiation examinations. This poor knowledge and awareness of ionising radiation by present study population is similar to the finding of the study conducted by Hobbs JB et al., who found poor knowledge about radiation exposure and risk among their participants [9]. According to Hobbs JB et al., the participants' level of knowledge about radiation exposure and risk improved after educational presentation [9]. Contrary to the index study finding, the study by Ugwuanyi DC et al., reported that majority of the respondents (67.6%) were aware of the uses of radiations medical imaging [4]. The differences could be attributed to the different sample sizes and the educational experiences of the participants recruited.

Majority of the participants in this present study did not know that ionising radiation is hazardous to health. This finding is not a surprise as over 56.38% of the participants said they were not exposed to ionising radiation before. This finding is in agreement with the finding of the study conducted by Ugwuanyi DC et al., in which majority of their participants 226 (79.58%) did not know that ionising radiation is hazardous to health [4]. Over 75% of the participants were informed about the radiation hazards on health by the radiographers in this study. This implies that most radiographers give patients and their relatives more attention, which enables them to explain the effects of radiations to them.

Majority of the participants in this present study, which accounted for 94.68% have not heard of anybody affected with ionising radiation injury. This could be ascribed to the fact that majority of the participants were secondary school leavers whom might have limited access to internet and other social media sources to obtain information on radiation injuries.

Most of the participants in this current study were not knowledgeable of the meaning of radiation protection and those that knows the meaning of the radiation protection, were informed by radiographers. Most of the participants usually stayed outside the examination room whenever they were asked to do so, but when needed to assist their relatives (the patients), greater number responded to have stayed inside the X-ray room during the investigations. This implies that in some situations, depending on the patients' health challenge, the radiographers may either require the assistance of the patient's relatives in the X-ray rooms or asked to stay outside the examination room while the investigation is ongoing. Present study finding was in agreement with the finding of the study conducted by Aldossari H et al., reported that of the total participants, 45.53% were aware that their relatives should be asked to stay outside the X-ray room during X-ray investigations to avoid unnecessary exposure to ionising radiations [10].

This study also found that most participants had seen the radiation warning sign before, although, majority of them do not know the meaning of the sign. This findings indicate that the radiation warning signs in most X-ray units were normally placed at strategic places making it more visible to all those that visited the unit. There are little or no inscription of signs, which explained the meaning of the warning signs, while larger numbers of those that have seen the radiation warning sign said they, obeyed the sign whenever they see it. This could be attributed to the fact that the frequent display of this signs on the x-ray door informed them of the associated dangers with ionising radiation.

Limitation(s)

With regards to the participants who claimed to have had prior ionising radiation exposure, this study did not capture information on the previous ionising radiation sources as this information would have further convinced the authors upon the participants' knowledge of ionising radiation and its protection measures.

CONCLUSION(S)

This study revealed poor level of knowledge and awareness of radiation hazards and protection among patient's relatives. It is obvious that public education will contribute immensely in the promotion of awareness of the harmful effect of ionising radiation and radiation protection measures. The study therefore recommend that aside the radiation warning sign which is often placed conspicuously, there should be inscription explaining the meaning of the sign. Government, health professional and regulatory bodies should intensify efforts in creating public awareness of radiation hazards.

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PARTICULARS OF CONTRIBUTORS:

- Lecturer, Department of Radiography and Radiological Sciences, Nnamdi Azikiwe University, Awka, Anambra, Nigeria.
- Lecturer, Department of Radiography and Radiological Sciences, University of Calabar, Cross River State, Nigeria.
- Student, Department of Radiography and Radiological Sciences, Nnamdi Azikiwe University, Awka, Anambra, Nigeria.
- Lecturer, Department of Radiography and Radiological Sciences, Nnamdi Azikiwe University, Awka, Anambra, Nigeria.
- Student, Department of Radiography and Radiological Sciences, University of Calabar, Cross River State, Nigeria.
- Student, Department of Radiography and Radiological Sciences, Nnamdi Azikiwe University, Awka, Anambra, Nigeria.
- Lecturer, Department of Radiology, Rivers State University Teaching Hospital, Port Harcourt, Nigeria, and not Department of Radiography, Nnamdi Azikiwe University, Awka, Anambra, State, Nigeria.
- Student, Department of Radiography, Nnamdi Azikiwe University, Awka, Anambra, Nigeria.
- Lecturer, Department of Radiography, Faculty of Clinical Sciences, College of Health Science, Usmanu Danfodiyo University, Sokoto, Nigeria.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Michael Promise Ogolodom,
Department of Radiography and Radiological Sciences, Nnamdi Azikiwe University,
Awka, Anambra, Nigeria.
E-mail: mpos2007@yahoo.com

PLAGIARISM CHECKING METHODS: [Jain H et al.]

- Plagiarism X-checker: Apr 29, 2020
- Manual Googling: May 13, 2020
- iThenticate Software: Jul 24, 2020 (15%)

ETYMOLOGY: Author Origin

AUTHOR DECLARATION:

- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? Yes
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. NA

Date of Submission: **Apr 28, 2020**

Date of Peer Review: **Jun 04, 2020**

Date of Acceptance: **Jul 03, 2020**

Date of Publishing: **Aug 01, 2020**