Available Online through
www.ijpbs.com (or) www.ijpbsonline.com

IJPBS |Volume 3| Issue 3 |JUL-SEP|2013|371-376

Research Article
Biological Sciences

PERCEPTION OF RADIATION AWARENESS AMONG MEDICAL DOCTORS IN INDIA

Suresh Sukumar[1*], Rajagopal K. V[2], Sabu K M[3]

[1]*Assistant professor, MSc. Medical Imaging Technology, Department of Medical Imaging Technology, Manipal school of Allied Health Sciences, Manipal University, Manipal.

[2] Professor and Head, Department of Radiodiagnosis Kasturba Medical College & Hospital, Kasturba Medical College, Manipal University, Manipal.

[3]Professor and Head, Department of Dept Health Information Management, School of Allied Health Sciences, Manipal University, Manipal.

*Corresponding Author Email: suresh.medicalimaging@gmail.com

ABSTRACT

Radiologic imaging is valuable as a diagnostic tool in medicine for diagnostic and therapeutic procedures, but ionizing radiation used in the radiology examination also carries well-known potential risks. This qualitative study conducted in 2013 sought to understand the radiation awareness among the medical practitioners in India (n - 6) using purposeful sampling. A total of 6 In-depth interviews with Medical and Dental practitioners selected for the in-depth interviews. The interviews were conducted in south India, Karnataka, in a large multi-specialty, private, tertiary level hospital wherein people from all over India come to access care. It is well known for the good quality patient care and at relatively low cost. The in-depth interview was audio-taped and coded according to four major themes that emerged during the interview. This study highlighted the poor awareness among the medical doctors in India about the Justification of practices, Radiation and its hazards to pregnant woman and Pediatric patient during the radiology examination. Implementation of radiation protection courses could be an effective method to reduce the patient's dose in medical exposures.

KEY WORDS

Diagnostic tool, *therapeutic procedures, radiation protection courses.*

INTRODUCTION

In medicine, Radio-diagnosis and Imaging is one of the vital specializations, used as a tool for the diagnostic and therapeutic examination. Radiology use different imaging modalities such as Radiography, Computer Tomography, Ultrasound, Magnetic Resonance Imaging and Nuclear Medicine for the diagnosis and to treat the disease visualized within the human body. The ionizing radiation used by the radiology modalities during the radiology examination carries well known potential risk to the patient depends upon the amount of radiation dose imparted during the examination. All living beings in this world are constantly exposed to the radiation and around 18% is due to man-made source. The National Council on Radiation Protection and Measurement in United State had reported, in 18% of manmade radiation, around 15% of radiation exposures are due to the medical x-rays and nuclear medicine imaging. Radiation doses used in the medicine have increased in the United States since the early 1980s (1). Most of this dose increase is due to the 10% increase in the number of computed tomography exams performed per year (2). Similarly in the United Kingdom, 100 to 250 deaths every year due to cancers directly related to medical x-rays and nuclear medicine radiation used for imaging (3). In the resent survey reported that approximately 30% of all radiological exams prescribed by the medical doctors are not clinically helpful (4). In order to reduce the unwanted radiology examination proper justification of practices involving ionising radiation examination should be followed

among the doctors. Increasing fear has recently been expressed in studies that the referring medical doctor's awareness of biological hazards and knowledge of radiation doses received during radiological procedures by the patient is inadequate. Even though the quantitative survey's results of radiation awareness among the medical doctors performed on British physicians (5), Israeli orthopedics (6), Italian cardiologists (7), Canadian pediatricians (8) show that the majority of doctors have poor awareness of radiation and its hazards, the excite barrier for the poor awareness in unknown. In order to understand the perception of radiation awareness among Indian medical doctors, qualitative study among Indian medical doctors would help in better understanding the barriers and how to improve the radiation awareness among the practitioners. Focus group and indepth interview in qualitative study has been shown to be particularly useful for formative research (9) and they also aid in understanding acceptability and potential barriers of the radiation awareness among the medical doctors. The purpose of this research was to identify the factors and barriers regarding the radiation awareness among the medical doctors in Indian population.

AIM

To understand the Perception of radiation awareness among medical doctors in India

OBJECTIVES

- To understand the radiation awareness among the medical practitioners in India.
- To understand need for improving the medical practitioners awareness.

METHODS

The study was carried out in the South India. Qualitative methods of In-depth interviews carried out with medical practitioners after obtaining consent.

Study Design: Case study design using qualitative techniques of in-depth interviews and observations

Study Sample: Medical Practitioners who are prescribing radiological examination to radiology examination.

Sample Size: A total of 6 in-depth interviews with Medical and Dental practitioners selected for the in-depth interviews. Some changes to the protocol in terms of the numbers of participants recruited were as follows:

1. Although we originally planned on interviewing 10 medical practitioners, we stopped with 6 as we reached information redundancy with this number.
2. We did not carry out any focus group discussions with medical practitioners as it was not possible to assemble the required number of medical practitioners needed to conduct an FGD.

Sampling Technique: Purposive sampling a non probability sampling method was used in the recruitment of medical practitioners.

Ethical Considerations:

- Informed voluntary written consent was obtained from the participants for the study
- Information collected used only for research purpose
- The study was approved by the institutional ethical committee.

Instrument: An In-depth Interview guide for medical practitioners was developed to ensure that all issues were consistently discussed. Efforts were also made to explicitly solicit suggestions from all participants regarding the how to improve the awareness among the medical practitioners.

The *doctor guide* included the following broad elements:

- Perceptions on what is meant by justification in radiation protection.
- Description of the justification of practiced process currently underway in the hospital and their satisfaction/dissatisfaction with it.
- Suggestions on how to further improve , medical practitioners awareness

Procedure:

Eligible medical practitioners were approached and those who gave consent to participate were recruited for the study. Medical practitioners were approached to participate in an interview and expressed their willingness to do so were included. All interviews were carried out in privacy within the hospital campus and medical practitioners were assured of confidentiality. An In-depth interview guide, for doctors was developed to guide the interview process. Semi-structured interview schedules were prepared to document the information derived from the observation of the informed consent process. All the interviews were tape-recorded after obtaining consent to enable a thorough recording of all information provided by the participants. A framework analytical approach was used for data analysis. This process involved a number of distinct though highly interconnected stages beginning with familiarization with data or data immersion, identifying a thematic framework, indexing or sifting through data and sorting out quotes, charting or selection of quotes and placing them under the appropriate thematic content, mapping and finally interpretation. Once all the interviews were coded, segments of text that were related to common themes were identified.

RESULTS

The main emerging themes of analysis are described.

Themes of Analysis

- Justification of practices *(what do they understand by Justification of practices, what are its components, how important do they think it is)*
- Radiation and its hazards *(not perceiving it important)*
- Manual for radiation awareness *(what can be done to improve it)*

Justification of practices

According to principles established by the International Commission on Radiological Protection, Medical Practitioners should judge whether the prescribed radiology examination will provide necessary information about the exposed individuals for treatment based on the benefit and risk. To practices the Justification radiology examination to the patient, medical doctors who prescribe radiology examination should have knowledge about radiations risk and benefit. From our qualitative research, less effort has been committed to Justification of practices among the Indian medical practitioners. In our study the participant reported that few of the medical practitioners prescribe the ultrasound scan for many patients even if they have small swelling and if the outcome of the ultrasound report is normal they redirect the patient to computer tomography scan as a routine procedure in which patient is getting unwanted radiation dose. Some doctors reported that patient connects the quality of patient care in the hospital with number of investigation, patient personally request for Computer Tomography scan for normal headache.since referring doctors have full knowledge of the clinical history of the patient, they should guide the patient in undergoing the procedure which use ionizing radiation and its benefit form them. Around 93% of Patients referred for a computer tomography examination do not receive any information about the risks and benefit associated with their investigation (10). Generally the practitioners fail to inform the benefit and risk of the radiology examination before sending the patient to radiology department. Over all the medical practitioners have poor understanding of justification of practice. Participant's awareness of pregnant and Pediatric radiology examination was mixed. Some Participants reported that most of the biologic responses to radiation occur during the first two weeks of pregnancy but the maximum permissible doses are not aware. They also reported that non-ionizing radiologic modality technique, like ultrasound and Magnetic resonance imaging must be used where ever it can give fair comparable information to the pregnant and the Pediatric patents. Over all the Indian medical practitioner understanding level of radiation risks to the pregnant woman and pediatric radiological examinations were moderate.

Radiation and its hazards

The majority of Indian Participants has poor awareness of the radiation doses and corresponding

cancer risks. According to the Participants reported the term radiation covers a wide spectrum of energy, most of which have been suspected to cause ill health to living population. Radiology department use different types of radiation for the examination e.g. X – Ray, ultrasound, radio-frequency etc for the diagnostic investigation (both ionizing and non ionizing radiation). The Medical doctors reported that Computed tomography exposes patients to relatively high doses in comparison to other diagnostic imaging modalities but quantitative knowledge of doses of various radiology examination and its radiation hazards are poor. Few Medical practitioners in our study do not realize that ultrasound and Magnetic Resonance Imaging does not use ionizing radiation for the radiological investigation. The patient's poor literacy levels and language which interfered with medical doctor ability to help patients to understand the radiation hazards due to the radiological procedure. Some doctors reported that Very few patients actively questioned their doctor about their radiology procedure; they mostly left it to the doctor to tell them what they needed to do to get better and there were those who preferred not to know to avoid unnecessary anxiety. These cultural influences cut across different sections of society and being educated did not always imply being more proactive. Quite a few educated people also refrained from asking questions to the doctor for these very same reasons.

Manual for radiation awareness

Doctors who participated in our in-depth interview reported that curriculum about the radiation and its hazards are covered very less in their Bachelor and Master Degree programme and awareness can improve by conducting discussions at clinical-radiological conferences and by presenting appropriate information in structured educational modules. Radiology has now been introduced training programme for junior doctors in some parts of the United Kingdom. The European Commission Medical Exposures encourages the inclusion of radiation protection into the basic curriculum of medical and dental schools (11).Participants in our study expressed that introducing the appropriate topics and manual for the radiation dose and its hazards will be more useful in creating awareness among the doctors.

DISCUSSION

The findings from this study revealed poor understanding of radiation awareness among medical Indian doctors. From the survey of awareness of radiation dose among Northern Ireland doctors, clinician has poor awareness of the radiation doses and Radiologists have good knowledge of radiation doses and risks (10). Among the Iranian physicians (12), Ethiopia physicians (13) and Palestine physicians (14) adequate training to doctors was required to reduce the patients' radiation dose. In India curriculum about the radiation and its hazards are covered very less and step have to be taken to include more courses on radiation. In order to reduce the patient dose, implementation of radiation protection courses and education of practical issues, could be an effective method to reduce the patient's dose in medical exposures.

As per the international commission on radiological protection, the principle of justification applies at three levels (15)

a) use of radiation in the health care should benefit rather than harming the patient,
b) use of radiation in the specified procedure should be defined by justification and
c) the application of the examination to an individual patient should be justified

Radiological examination for the patient has to be justified through the consultation between the radiologist and the medical practitioner (16). The survey suggested that the referring practitioner, rather than the radiologist, would be a more suitable person to discuss these issues and the necessity of performing a radiology investigation (17). In order to facilitate the justification of radiological examination it is desirable that medical doctors should be knowledgeable about the maximum permissible radiation dose to the patient and its hazards.

The justification of radiological procedure for the pregnant woman and Pediatric patient, the radiologist and the medical doctors should know the benefit and risk of the patient and decide whether a imaging examination should be prescribed or the clinical

problem may be solved by any other non-imaging examination. However the use of the imaging examination may be carefully justified by achieving the optimized information by keeping the radiation dose to the foetus at low. The patient who undergoing the imaging procedure should made aware of the possible risk and benefit of the radiation exposure to the foetus and the informed consent should be taken from the patient. During past 20 years international and national organizations published guidelines for proper justification of radiological procedures. The UK Royal College of Radiologists publication *"Making the best use of clinical radiology services"*(18) has been in print since 1989. The American College of Radiology published its guidelines and Department of Health of Western Australia under taken similar efforts to publish the guidelines for proper justification. These guide the medical doctors in the selection of the optimum radiology examination for the certain clinical problems. In order to facilitate the justification of radiological examination, developing country has to take step in publishing the guidelines for proper justification. Even though the Indian medical doctors follow the justification of radiological examination the proper knowledge of the radiation dose and its hazards are poor.

Over all compare to other country, Indian medical doctors have moderate knowledge of radiation dose and its hazard due to the radiation imparted during the radiological examination. This barrier can be overcome by implementing the radiation courses in the medical degree programme. In terms of the strengths of the study, qualitative method like In-depth is a useful tool to obtain insight into medical doctor's perception of radiation awareness. Such methods enhance the validity of finding by virtue of their nonthreatening and open ended approach. Study limitation were that, We couldn't carry out any focus group discussions with doctors as it was not possible to assemble the required number of doctors needed to conduct an FGD. Further research should consider addressing these issues.

CONCLUSION

This study has highlighted the poor awareness among the medical doctors in India about the Justification of practices, Radiation and its hazards to pregnant woman and Pediatric patient during the radiology examination. Implementation of radiation protection courses during medical education programs could be an effective method to reduce the patient's dose in medical exposures. Further research on quantitative study on radiation awareness and its hazards should consider addressing these issues.

REFERENCES

1. National Council on Radiation Protection and Measurements. Ionizing radiation exposure of the population of the United States: recommendations of the National Council on Radiation Protection and Measurements. Report no. 160. NRCP, Bethesda, MD, 2009. Available at: http://www.ncrponline.org/Publications/160press.html. Accessed March 18, 2011.
2. McCusker MW, de Blacam C, Keogan M, McDermott R, Beddy P. Survey of medical students and junior house doctors on the effects of medical radiation: is medical education deficient? Ir J Med Sci .2009; 178:479–483.
3. Bury B. X-ray dose training: are we exposed to enough. Clin Radiol .2004; 59:926.
4. Society of Pediatric Radiology. The ALARA concept in pediatric CT intelligent dose reduction. Panel discussion at: Multidisciplinary conference, 18-19 August 2001. Pediatr Radiol. 2002; 32:242–244.
5. Lee CI, Haims AH, Monico EP, Brink JA, Forman HP. Diagnostic CT scans: assessment of patient, physician, and radiologist awareness of radiation dose and possible risks. Radiology. 2004; 231:393–8.
6. Mettler FA Jr, Wiest PW, Locken JA, Kelsey CA. CT scanning: patterns of use and dose. J Radiol Prot .2000; 20:353–9.
7. Paterson A, Frush DP, Donnelly LF. Helical CT of the body: are settings adjusted for pediatric patients? Am J Roentgenol .2001; 176:297–301.
8. Hollingsworth C, Frush DP, Cross M, Lucaya J. Helical CT of the body: a survey of the techniques used for pediatric patients. AJR Am J Roentgenol. 2003; 180:401–6.
9. Ulin PR, Robinson ET, and Tolley EE.Qualitative Methodology in public Health: A field guide for applied research.san Francisco, CA: Jossey – Bass; 2005.

10. A SOYE and A PATERSON (2008) sur vey of awareness of radiation dose among health professionals in Northern Ireland. The British Journal of Radiology, 2008. 81:725–729.
11. Ec.europa.eu. European Commission. Council Directive 97/43/EURATOM of 30 June 1997 on health protection of individuals against the dangers of ionizing radiation in relation to medical exposure. Official Journal 1997; L180:22.
12. Ghazikhanlou Sani (2009) Iranian physicians' knowledge about radiation dose, received by patients in diagnostic radiology. *Iran. J. Radiat. Res. 2009; 6 (4): 207-212.*
13. Daniel Zewdneh(2012) A Study of Knowledge & Awareness of Medical Doctors Towards Radiation Exposure Risk At Tikur Anbessa Specialized Referral And Teaching Hospital, Addis Ababa, Ethiopia. ISSN: 2278-3008 Volume 2, Issue 4 (July-August 2012), PP 01-05.
14. Hamarsheh and M. Ahmead (2012) Assessment of physicians' knowledge and awareness about the hazards of radiological examinations on the health of their patients. EMHJ. 2012. Vol. 18 No. 8.
15. International Commission on Radiological Protection, 2007. Recommendations of the ICRP, Publication 103, Pergamon Press, Oxford (2007).
16. International Atomic Energy Agency. International Basic Safety Standards for protecting people and the environment. Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards. General Safety Requirements Part 3. No. GSR Part3 (Interim), IAEA, Vienna (2011)
17. Jacob K, Vivian G, Steel JR. X-ray dose training: are we exposed to enough? Clin Radiol. 2004; 59:928–34.
18. Royal College of Radiologists. Making the best use of clinical radiology services. Referral guidelines. Sixth edition, London 2007.

***Corresponding Author:**
Suresh Sukumar
Department of Medical Imaging Technology,
Manipal College of Allied Health Sciences,
Manipal University, Manipal. Udupi – 576104.
Email suresh.medicalimaging@gmail.com