

Radiology Technician Radiology Safety Proficiency Evaluation

Nisha Eapen¹, Nisha Thundiyl¹ and Sheela Shenai²

¹St. Joseph's College, Tiruchirapalli, India

²MOSC Medical College Hospital, Ernakulam, India

Keywords: Service Quality, Radiology Technicians, Radiation Safety, Knowledge, Practice, Attitude, Gap Analysis.

Abstract: This study, conducted at Iqraa International Hospital in Calicut, India, utilised a descriptive research design to assess radiology technicians' knowledge, attitudes, and practices concerning radiation safety. Results revealed commendably high levels of knowledge (average score of 0.79) and practice (average score of 0.76), along with very positive attitudes (average score of 4.27) towards safety measures. However, a slight gap of 3.1% between knowledge and practice scores suggests room for improvement in translating knowledge into practical application. Moreover, a more significant gap of 9.15% between attitude and practice scores indicates the need for better alignment between positive attitudes and their practical implementation. These findings underscore the importance of strengthening the link between knowledge and practice while fostering a unified approach to implementing radiation safety measures, ultimately enhancing safety for healthcare professionals and patients alike.

1 INTRODUCTION

Radiation safety is an indispensable facet of contemporary medical practice, underscored by its profound impact on patient care and the well-being of healthcare workers. The diligent application of radiation safety protocols is essential to mitigate potential risks associated with ionizing radiation, ensuring that diagnostic and therapeutic interventions remain effective while minimizing harm. Within this context, radiology technicians are uniquely responsible for the seamless execution of procedures while adhering to stringent safety guidelines. Evaluating their knowledge, practice, and attitude regarding radiation safety becomes paramount in maintaining service quality and patient welfare.

By meticulously evaluating the alignment between theoretical understanding, practical implementation, and the attitude towards radiation safety protocols, this research endeavours to provide valuable insights to enhance safety practices within the department. In practical application, it is essential to maintain radiation levels at the lowest feasible intensity, and the notion of permissible doses should not be misconstrued as entirely risk-free (Khamtuikrua, 2020).

Furthermore, exploring potential gap disparities between knowledge and practice and between practice and attitude is an essential aspect of this study. Such disparities, if identified, can offer a

nuanced understanding of the challenges radiology technicians face in translating theoretical knowledge into everyday practice and the influence of personal attitudes and perceptions on safety-related behaviours (Falavigna et al., 2019). Addressing these gaps can pave the way for targeted interventions and training programs, ultimately fostering a safer environment for patients and healthcare providers. The study's primary goal is to investigate radiation safety awareness among radiology technicians due to the intricate and sensitive nature of radiology procedures. The study aims to evaluate the current safety protocols, identify areas for enhancement, and highlight the vital responsibility of technicians in maintaining top-notch patient care and operational standards at the hospital.

2 OBJECTIVES

- To evaluate the knowledge, practice, and attitude of technicians regarding radiation safety in the radiology department of Iqraa International Hospital, Calicut.
- To analyse any gap disparities between knowledge and practice, as well as between practice and attitude of technicians concerning radiation safety in the radiology department at Iqraa International Hospital, Calicut.

3 RESEARCH METHODOLOGY

A descriptive research design was employed for this study, in July 2020 which aimed at assessing the knowledge, attitudes, and practices of radiology technicians in the radiology department of Iqraa International Hospital, Calicut. The sample included a total of 30 respondents including X-ray technician, CT technicians, MRI technicians, Cath lab technicians, Mammogram technicians from different sections of the radiology department.

3.1 Sources of Data

Primary data was collected through structured questionnaires administered to radiology technicians, capturing their demographic details and assessing their knowledge and attitudes toward radiation safety. Direct observation, using a checklist, was employed to evaluate the technicians' safety practices. Additionally, unstructured interviews were conducted with study participants to gain insights into departmental functions and operating procedures.

3.2 Data Collection Tools

3.2.1 Questionnaire

- A structured questionnaire was designed, consisting of three sections. The first section focused on demographic variables, while the second section assessed knowledge related to radiation safety across various domains. The third section evaluated attitudes using a Likert scale.

3.2.2 Checklist

- A checklist was utilized for direct observation of safety practices, encompassing general safety, environmental safety, employee safety and patient safety. Scores were assigned based on compliance with safety criteria.

3.2.3 Dairy

- A dairy was used to record data obtained during unstructured interviews, documenting insights into departmental functions and procedures.

3.3 Data Analysis

Data collected through the questionnaire and observation were analysed, calculating interval points

which involves dividing the range between the highest and lowest scores assigned to questionnaire responses by the number of categories designated for score interpretation to calculate average scores for knowledge, attitudes, and practices. Gap analysis was performed by comparing the percentage scores between knowledge and practice, as well as between attitude and practice.

4 RESULTS AND ANALYSIS

The study findings provided insights into their high level of knowledge and practice, along with a uniformly positive attitude toward safety in Table 1 to 3. Gap analysis emphasized the importance of bridging the gap between attitudes and practical implementation and between knowledge and practice for more effective radiation safety measures in Table 4 and 5.

The results presented in Table 5 show a 9.15% gap between the percentage scores for attitude and practice, implying the need for further alignment between positive attitudes and practical implementation.

Radiation safety emerges as a critical concern spanning both patients and healthcare professionals across diverse departments. Having a high level of knowledge, attitude and practice (KAP) about radiation can reduce the harmful effects of radiation. KAP has strong direct effects on technical protection against health hazards associated with radiation exposure. Dose limitation for occupationally exposed individuals is necessary to reduce the level of risk and ensures safety for radiographers. The study discusses the radiation safety measure through scoring system of Knowledge, Attitude and Practice of study participants which are presented in tables (1-5).

As seen in Table 1 that radiology technicians exhibited a commendably high level of knowledge regarding radiation safety, with an average score of 0.79. This finding resonates with previous research (Roberts & Bull, 2020) who found that physicians had higher significant knowledge regarding radiation safety which emphasizes the importance of comprehensive training and education for healthcare professionals in radiation-sensitive fields.

The findings from Table 2 notably showcase the dedication of radiology technicians to radiation safety practices. This outcome is consistent with earlier studies that emphasize the importance of practical skills in safeguarding both patients and staff. Likewise, the research conducted by Harris et al. (2019) unveiled the utilization of dosimeters (instruments for measuring ionizing radiation exposure) by physicians and technologists,

showcasing their commitment to radiation safety protocols. A significant portion of the staff consistently practiced radiation safety programs, emphasizing the fundamental significance of rigorously adhering to safety protocols within radiology departments.

The uniformly very positive attitude among all technicians toward radiation safety, as evidenced by an average score of 4.27 in (Table 3) resonates with the studies emphasizing the influence of a positive safety culture on the overall effectiveness of safety measures. Another study (Barnawi et al.,2018) found the majority of participants working in the radiology department have high attitudes regarding radiation safety and also found that they had high standards regarding radiation safety. The level of attitude regarding radiation safety among physicians, nurses, staff, and technicians could be an initial step to reduce its harmful side effects and establish a positive correlation between attitude and the implementation of safety guidelines.

Table 1: Total Average Score of Knowledge Regarding Radiation Safety.

No. of Respondents	No. of Questions	Total Score	Average	Remarks
30	30	714	0.79	High level of knowledge

Table 1 reveals that radiology technicians exhibited a commendably high level of knowledge regarding radiation safety, with an average score of 0.79.

Table 2: Total Average Score of Practice in Radiation Safety.

No. of Respondents	No. of Questions	Total Score	Average	Remarks
30	24	462/606	0.76	High level of practice

As shown in Table 2, the radiology technicians demonstrate a high level of practice in ensuring radiation safety achieving an average score of 0.76.

Table 3: Total Average Score of Attitude towards Radiation Safety.

No. of Respondents	No. of Statements	Total Score	Average	Remarks
30	12	1537	4.27	Very positive attitude

The findings from Table 3 reveal a uniformly very positive attitude toward radiation safety among all technicians by an average score of 4.27.

Table 4: Gap Analysis between Knowledge and Practice Scores.

Maximum Score of Knowledge	Total Acquired Knowledge Score	% Score of Knowledge	Maximum Score of Practice	Total Acquired Practice Score	% Score of Practice	Gap (%)
900	714	79.33	606	462	76.23	3.1

Table 4 indicates a 3.1% gap between the percentage scores for knowledge and practice, suggesting some room for improvement in translating knowledge into practice.

Table 5: Gap Analysis between Attitude and Practice Scores.

Maximum Score of Attitude	Total Acquired Attitude Score	% Score of Attitude	Maximum Score of Practice	Total Acquired Practice Score	% Score of Practice	Gap (%)
1800	1537	85.38	606	462	76.23	9.15

The gap analysis presented in Table 4 and Table 5 reveal distinct areas where improvements can be made to enhance the alignment between knowledge, attitude, and practice in radiation safety. This gap suggests that while participants have demonstrated a substantial level of knowledge acquisition, there is still room for enhancement in translating this knowledge into effective practical implementation. By addressing this gap, the participants can enhance the effectiveness of their radiation safety measures, thereby minimizing potential risks and promoting a safer environment for both technicians and the patients. This echoes with the conclusions conducted by (Tsapaki et al., 2018), emphasizing the importance of bridging the gap between theoretical understanding and its real-world application to ensure optimal safety outcomes.

In summary, the participants who integrated structured questionnaires, direct observation, and interviews, comprehensively assessed the knowledge, attitudes, and practices of radiology technicians concerning radiation safety. The findings substantiated a commendably high level of knowledge and practice, along with a uniformly positive attitude toward safety. The identified gaps between attitudes, knowledge, and practice emphasize the significance of targeted interventions to ensure the effective translation of theoretical understanding into practical safety measures.

5 CONCLUSION

In conclusion, the study's comprehensive analysis of radiation safety among radiology technicians revealed encouragingly high levels of knowledge and practice, underscored by a uniformly positive attitude. However, the identified gaps between attitudes and practical implementation, as highlighted in the gap analysis, emphasize the importance of bridging this divide for more effective radiation safety measures. The study calls for focused efforts to translate positive attitudes into concrete practices, thereby enhancing overall radiation safety protocols.

REFERENCES

- World Health Organization. (2016). *Ionizing Radiation, Health Effects and Protective Measures*. WHO.
- Wrixon, A. D. (2008). New ICRP recommendations. *Journal of Radiological Protection*, 28, 161-168.
- Roberts, G. A., & Bull, R. K. (2020). Review of the effectiveness of internal dosimetry monitoring regimes. *Journal of Radiological Protection*, 40, 381-392.
- Harris, A. M., Loomis, J., Hopkins, M., & Bylund, J. (2019). Assessment of Radiation Safety Knowledge Among Urology Residents in the United States. *Journal of Endourology*, 33, 492-497.
- Barnawi, R. A., Alrefai, W. M., Qari, F., Aljefri, A., Hagi, S. K., & Khafaji, M. (2018). Doctors' knowledge of the doses and risks of radiological investigations performed in the emergency department. *Saudi Medical Journal*, 39, 1130-1138.
- Tsapaki, V., Balter, S., Cousins, C., Holmberg, O., & Miller, D. L. (2018). The International Atomic Energy Agency action plan on radiation protection of patients and staff in interventional procedures: Achieving change in practice. *Physica Medica*, 52, 56-64.
- Khamtuikrua, C. (2020). Awareness about radiation hazards and knowledge about radiation protection among healthcare personnel: A quaternary care academic center-based study. *SAGE Open Medicine*, 8, 205031212090173.
- Falavigna, A., Ramos, M. B., Iutaka, A. S., Menezes, C. M., Emmerich, J., Taboada, N., & Riew, K. D. (2019). Knowledge and Attitude Regarding Radiation Exposure Among Spine Surgeons in Latin America. *World Neurosurgery*, 112, e823-e829.