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Patient Awareness of Radiographic Radiation in Medical Imaging: Insights from X-Ray Technicians

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Abstract

The present study explores x-ray technicians' perceptions of patient awareness regarding radiation exposure, with a focus on the sources of information patients rely on and the role of technicians in providing accurate and relevant information. A cross-sectional survey was conducted among 103 x-ray technicians in Northeastern Bulgaria - representing 78.5% of the active professionals in the region. The questionnaire included both closed and multiple-choice questions focused on patients' understanding of radiographic risks, the role of technicians in information provision, and the perceived responsibilities in obtaining informed consent. Descriptive statistics were applied for data analysis. According to surveyed x-ray technicians, the majority of patients (81.6%) are aware that some imaging procedures involve ionizing radiation, but their understanding is often limited. Nearly all respondents emphasized the importance of informing patients about both the purpose of the examination (99.0%) and the associated risks and benefits (96.1%). Despite this, technicians reported that many patients tend to seek information from non-professional sources, such as the internet (75.7%). According to the respondents, patients predominantly perceive radiologists and x-ray technicians as the primary sources of information and consent in imaging procedures. These findings underline the importance of effective communication in healthcare and the evolving role of technical professionals in promoting patient literacy and autonomy. Improving communication strategies and reinforcing the educational role of x-ray technicians can strengthen trust, reduce misinformation, and support more informed patient choices.

Keywords: medical imaging; patient awareness; radiation exposure; x-ray technicians; health communication; social responsibility; social attitudes.

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Introduction

Medical imaging plays a critical role in diagnosing and treating various diseases, with radiographic procedures being among the most frequently used methods (Abhisheka *et al*., 2023). Despite their widespread application, public awareness regarding the risks and benefits of radiographic radiation remains insufficient. Patients often lack a clear understanding of ionizing radiation, the doses to which they are exposed, and the potential long-term effects on their health (Bastiani *et al*., 2021). This raises concerns about informed consent and the need for improving communication between medical professionals and patients, especially in the context of the growing trend toward shared decision-making, which emphasizes patient involvement and trust in medical practice (Davies, Bridges, & Chung, 2021).

X-ray technicians occupy a central role in the diagnostic imaging process, with their competencies encompassing not only the technical execution of examinations but also providing information to patients (Alhelayel *et al*., 2024). In this context, their perspective on the level of patient awareness can offer valuable insights into existing gaps and opportunities for improvement. Furthermore, given their unique position in patient care, x-ray technicians hold a social responsibility to ensure that patients not only understand the procedures but also appreciate the risks associated with radiation exposure. This responsibility is particularly critical in the context of healthcare's digital transformation, where the ability to track and communicate radiation exposure is advancing rapidly. However, the question remains as to how well patients are informed about this, and what role x-ray technicians play in ensuring that this knowledge is effectively communicated.

This article reports an analysis of x-ray technicians' perceptions regarding patient awareness of radiographic radiation, focusing on the social implications of communication between professionals and patients. It explores the sources of information utilized and the practices for providing information to patients, with an emphasis on improving patient literacy in relation to radiological risks. By examining the technicians' role, the study aims to contribute to the broader conversation about social attitudes towards medical imaging and patient empowerment in healthcare.

Methodology

Aim of research

The aim of this study is to assess x-ray technicians' perceptions of patient awareness regarding radiation exposure during radiographic procedures. Specifically, it seeks to identify the main sources from which patients obtain information, to explore technicians' views on their own role in communicating radiation-related risks and benefits, and to evaluate how these perceptions influence informed consent practices and patient education in medical imaging.

Instruments

This cross-sectional study utilized an anonymous online survey, distributed via Google Forms, to gather data from x-ray technicians. The survey consisted of a combination of closed-ended and multiple-choice questions designed to assess the technicians' perceptions of patient awareness regarding radiographic radiation, their role in providing information, and their practices in tracking and communicating radiation exposure. Participants were recruited through professional networks, ensuring the diversity of the respondents while maintaining anonymity.

Participants

The study involved 103 licensed x-ray technicians currently employed in healthcare facilities across Northeastern Bulgaria. Eligibility criteria included active professional status and direct involvement in diagnostic imaging procedures. The majority were women (67.0%), with men accounting for 33.0%. The average age of respondents was 50 years (±9 years), reflecting a balanced distribution across early, mid, and late career stages. Professional experience ranged from less than one year to over four decades, with an average of 12 years (±11 years). This diversity in demographic and professional background ensured a representative overview of the regional radiographic workforce.

Analysis

Data analysis was performed using SPSS version 20.0. Descriptive statistics were applied to summarize the frequencies and percentage distributions of the responses. The findings were then analyzed in relation to the perceptions of x-ray technicians, with a focus on their understanding of patient awareness, their role in educating patients, and the potential gaps in information dissemination.

The study protocol was approved by the Research Ethics Committee at the Medical University of Varna (Protocol No. 115/31.03.22). Participation in the study was voluntary and anonymous, and informed consent was considered implied upon completion of the online survey.

Results

The study included 103 x-ray technicians from Northeastern Bulgaria, covering 78.5% of the active professionals in the region at the time of data collection. Women constituted the majority of participants (67.0%), while men accounted for 33.0%. The average age of the respondents was 50 years (±9 years), with the largest proportion (59.3%) being under 35 years old, followed by 30% in the 36–50 age group. Only one in ten respondents were aged between 51 and 65 years.

Regarding professional experience, the average length of service was 12 years (±11 years). The shortest reported work experience was less than a year, while the longest reached 40 years. Most respondents had up to 10 years of experience, while those with 11 - 20 years of service formed the second largest group. A smaller proportion of participants had worked in the field for over 30 years.

In light of the increasing emphasis on transparency, informed consent, and patient autonomy in healthcare, the survey explored how x-ray technicians assess patient awareness related to ionizing radiation. The questionnaire included items on the perceived knowledge of patients, expectations regarding information provision, and the distribution of responsibilities among healthcare professionals.

Most respondents (81.6%) stated that patients are aware that some imaging procedures involve ionizing radiation. An even larger proportion (96.1%) believed that patients should be informed about the health-related risks and benefits of radiation before undergoing an imaging procedure. Nearly all technicians (99.0%) agreed that patients should be informed about the reason for the specific X-ray examination assigned to them (table 1).

Table 1. X-ray technicians' perception of patient awareness and information

X-ray technicians' perception	Yes	No
Patients are aware that some imaging tests are performed using ionizing radiation.	81.6%	18.4%
Patients should be informed about the risks and benefits of radiation related to a person's health when scheduling an imaging test.	96.1%	3.9%
Patients should be informed about the reason why they have been assigned a particular X-ray examination.	99.0%	1.0%

When asked about the roles of various healthcare professionals in providing information and obtaining informed consent, technicians most frequently pointed to radiologists (47.6%) and themselves (33.0%) as those responsible for informing patients about radiation risks. Regarding consent, more than half of the respondents

(53.4%) believed that x-ray technicians should be the ones to obtain it, followed by radiologists (33.9%) (Table 2).

Table 2. Roles of health professionals in providing information and obtaining informed consent

Specialist	Providing information to patients about the risks	Obtaining informed consent from patients
Medical Physicist	-	10.7%
General Practitioner	16.5%	1.9%
Radiologist	47.6%	33.9%
X-ray Technician	33.0%	53.4%
Doctor who ordered the test	2.9%	5.8%

Technicians also indicated where patients typically seek information about imaging procedures. The internet was the most commonly cited source (75.7%), followed by imaging specialists (64.1%). Fewer patients were seen as relying on general practitioners (37.9%), brochures and flyers (24.3%), or non-professional sources such as friends and family (23.3%) and books (3.9%) (Figure 1).

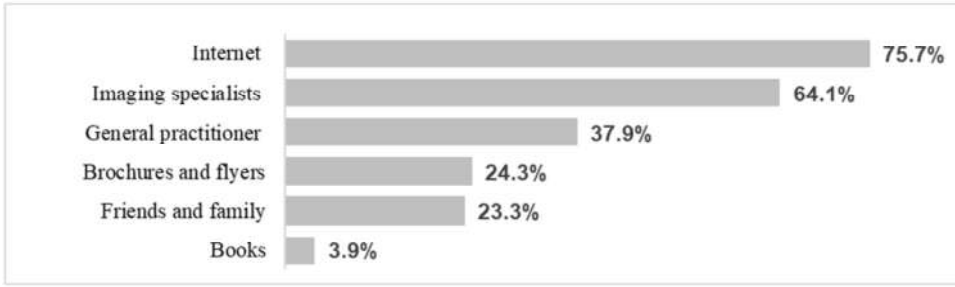

Figure 1. Sources of information for patients according to x-ray technicians

Discussion

The findings of this study highlight important aspects of x-ray technicians' perceptions regarding patient awareness about radiation exposure in medical imaging. While patients generally acknowledge that some imaging tests use ionizing radiation, there is a clear need for more comprehensive patient education about the specific risks and benefits associated with these procedures (Naderi *et al*., 2021). X-ray technicians overwhelmingly agree on the importance of informing patients about these risks before undergoing an imaging test (Mavrodinova & Chernogorova, 2024). However, it is clear that more structured and consistent

communication is required to bridge the gap in patient knowledge, particularly regarding the radiation levels involved in different imaging procedures (Alhashim *et al*., 2024).

X-ray technicians also emphasize the importance of explaining to patients why a particular x-ray examination is being performed. This indicates that technicians recognize the significance of helping patients understand not only the procedure itself but also its purpose (Alrasheed & Alammar, 2024). Such communication can enhance patient involvement in their healthcare decisions and improve overall satisfaction with the care they receive.

From a broader social perspective, clear and accessible information about medical imaging has implications not only for patient autonomy but also for equity in healthcare. Misinformation or lack of information may disproportionately affect vulnerable groups - such as those with lower health literacy, limited access to digital resources, or special communication needs (e.g., deaf patients) - potentially leading to increased anxiety, poor decision-making, or reduced adherence to medical advice (Reynolds & Davis, 2024). Ensuring that patients are properly informed supports more inclusive and person-centered care and reinforces trust in healthcare professionals.

Regarding the responsibility for providing radiation-related information, the findings suggest a shared role between radiologists and x-ray technicians, though x-ray technicians are often seen as a key resource for information directly related to the imaging process (Obayda *et al*., 2023; Chew *et al*., 2020). This collaborative approach underscores the importance of a team effort in patient education, with x-ray technicians playing a pivotal role in ensuring that patients are well-informed about the procedures they undergo (Ribeiro *et al*., 2020).

The study also reveals that many patients rely heavily on the internet as a primary source of information about medical imaging procedures. This dependence on potentially unreliable sources of information highlights the need for healthcare professionals, especially x-ray technicians, to direct patients to trusted, scientifically accurate resources (Roubidoux *et al*., 2019). Given that misinformation is widespread online, radiology professionals have a responsibility to guide patients toward reliable information, helping them make well-informed decisions about their care (Serpa *et al.*, 2025; Sherratt *et al*., 2020).

From a societal standpoint, the centrality of digital media in patient education poses challenges to social justice in healthcare. Not all individuals have equal access to digital health resources, nor do all patients possess the skills needed to evaluate information critically. This reinforces the role of medical professionals - especially those with direct patient contact - in acting not only as technical experts but also as intermediaries who reduce health inequalities by offering clear, person-centered communication.

In addition, the study points to the necessity for improved communication practices and standardized procedures for informing patients about radiation risks

and obtaining informed consent (Alshihri *et al*., 2024). X-ray technicians play a significant role in this process, and it is clear that further training in effective communication and informed consent practices could enhance their ability to address patients' concerns and improve the overall patient experience.

While the study provides valuable insights into x-ray technicians' perceptions of patient awareness regarding radiographic radiation, it is important to acknowledge the subjective nature of the results. The data reflects the personal observations and experiences of the radiology technicians, which may not fully align with the actual knowledge levels of patients. Since the study relies on self-reported perceptions, it is possible that certain discrepancies exist between how technicians perceive patient awareness and the reality of patients' understanding. Additionally, the study does not account for possible variations in awareness across different patient demographics, which could further influence the generalizability of the findings.

Conclusion

This study explores the perceptions of x-ray technicians regarding patients' awareness of radiation exposure in medical imaging. The results highlight a significant gap between the information available to patients and their actual understanding of the risks associated with radiographic procedures. Despite recognizing the importance of patient education, x-ray technicians report that many patients continue to seek health-related information from unreliable sources, especially the internet. This finding underscores the need for radiology professionals to play a more proactive role in informing patients about the procedures they undergo, particularly in terms of radiation exposure. The study suggests that improving patient awareness should be a shared responsibility within healthcare settings, where radiologists, physicians, and radiology technicians can collaborate to ensure that accurate, comprehensible information is provided. Strengthening the communication skills of x-ray technicians through targeted training programs could enhance their ability to bridge the knowledge gap and empower patients to make well-informed decisions about their care.

References

Abhisheka, B., Biswas, S. K., Purkayastha, B., Das, D., & Escargueil, A. E. (2023). Recent Trend in Medical Imaging Modalities and Their Applications in Disease diagnosis: a Review. *Multimedia Tools and Applications*, *83*, 43035–43070; https://doi.org/10.1007/s11042-023-17326-1

Alhashim, M., Aladel, F., Bukhamseen, M., & Alhariqi, A. (2024). Awareness of Interventional Radiology and The Associated Radiation Exposure Risk Among The Public Population and Primary Care Physicians in Saudi Arabia. *Saudi Journal of Radiology*, *3*(1), 30-48; https://doi.org/10.55038/t0h27176

Alhelayel, H. A., Aldosari, G. M., Abdullah Alsuayb, A. F., Alosaimi, A.A., Aldusary, H.J., Alshahrani, W.H., *et al*. (2024). The critical role of x-ray technicians in optimizing radiation safety and enhancing diagnostic radiology outcomes. *J. Int. Crisis Risk Commun. Res*, *7*(S9), 2536–2544.

Alrasheed, A.A., & Alammar, A. M. (2024). What Patients Want to Know About CT Radiation Exposure Harm and What Doctors Actually Tell Them: A Gap in Patient-Doctor Communication. *Research Square;* https://doi.org/10.21203/rs.3.rs-3956987/v1

Alshihri, A.A., Hadadi, I., Alqahtani, B., Alshahrani, A., Alahmari, N., Assiri, M., *et al*. (2024). Assessing the Awareness of Medical Ionizing Radiation Exposure among General Public in Saudi Arabia: Aseer Region. *King Khalid University Journal of Health Sciences.*, *9*(2), 150–156; https://doi.org/10.4103/KKUJHS.KKUJHS_23_24

Bastiani, L., Paolicchi, F., Faggioni, L., Martinelli, M., Gerasia, R., Martini, C., *et al*. (2021). Patient Perceptions and Knowledge of Ionizing Radiation From Medical Imaging. *JAMA Network Open*, *4*(10), e2128561–e2128561; https://doi.org/10.1001/jamanetworkopen.2021.28561

Chew, S., Ang, W., Lim, X., Tan, Q., & Wee, Z. (2020). Assessment of knowledge and perceptions of medical radiation among caregivers and adolescent patients in the paediatric emergency department. *Singapore Medical Journal*, *62*(11), 582–587; https://doi.org/10.11622/smedj.2020071

Davies, E. M., Bridges, A. J., & Chung, E. M. (2021). Does radiology require informed consent for radiation risk? *The British Journal of Radiology*, *94*(1127), 20210620; https://doi.org/10.1259/bjr.20210620

Mavrodinova, S., & Chernogorova, Y. (2024). Insights into patient awareness and preferences in medical imaging procedures involving ionizing radiation. *Polish Journal of Medical Physics and Engineering*, *30*(3), 108–119; https://doi.org/10.2478/pjmpe-2024-0013

Naderi, M., Salehi, F., Maleki, S., Zahabi, K. S., & Zahabi, S. S. (2021). The need to increase patient awareness of radiation exposure in imaging modalities: A study on the awareness and attitude of patients. *Journal of Medical Imaging and Radiation Sciences*, *52*(3), 450–455; https://doi.org/10.1016/j.jmir.2021.05.006

Obayda, M. A., Ahmed, S., Parvin, T., & Muneem, M. A. (2023). Enhancing Effective Verbal Communication Between Radiologic Technologists and Patients: Assessing the Impact of Service Delivery in Hospitals of Dhaka City. *European Journal of Medical and Health Sciences*, *5*(5), 110–116.

Reynolds, R., & Davis, M. (2024). An enquiry into the usefulness of an information portal for Deaf and hard of hearing people prior to x-ray examinations and improvement ideas. *Radiography*, *30*(6), 1508–1516; https://doi.org/10.1016/j.radi.2024.08.017

Ribeiro, A., Husson, O., Drey, N., Murray, I., May, K., Thurston, J., *et al*. (2020). Ionising radiation exposure from medical imaging e A review of Patient's (un) awareness. *Radiography*, *26*(2), e25-e30; https://doi.org/10.1016/j.radi.2019.10.002

Roubidoux, M. A., Jeffries, D. O., Patterson, S. K., Bailey, J. E., & Joe, A. I. (2019). The Breast Radiologist as a Public Educator: Designing an Effective Presentation for a Lay Audience. *Journal of the American College of Radiology*, *16*(3), 350-354; https://doi.org/10.1016/j.jacr.2018.09.054

Serpa, G. F., Maracci, L. M., Ortigara, G. B., Spin-Neto, R., & Liedke, G. S. (2025). Patient knowledge and misconceptions about imaging exams and X-rays: the need for clearer guidance in dental care. *Oral Radiology, 41,* 460-466; https://doi.org/10.1007/s11282-025-00817-2

Sherratt, F. C., Brown, S. L., Haylock, B. J., Francis, P., Hickey, H., Gamble, C., *et al*. (2020). Challenges Conveying Clinical Equipoise and Exploring Patient Treatment Preferences in an Oncology Trial Comparing Active Monitoring with Radiotherapy (ROAM/EORTC 1308). *The Oncologist*, *25*(4), e691-e700; https://doi.org/10.1634/theoncologist.2019-0571