ANALYZING X-RAY AND RADIATION EXPOSURE RISK UNDER SHARI'AH PATIENTS' HEALTHCARE

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Abstract
X-ray imaging holds an indispensable role in modern medical diagnostics, yet its utilization raises significant ethical and safety consideration especially in aspect of radiation exposure. Hence, this paper analyses x-ray and radiation exposure risk under Shari'ah patient healthcare by drawing on classical Islamic legal maxims such as necessity (darurah) and the imperative to prevent harm (daf' ad-darar). The study examines the traditional fiqh and how the overarching Maqasid as-Shari'ah can *ethically accommodate the use of x-rays in medicine. The analysis balances the life-saving diagnostic benefits against the potential risks of radiation, thereby illustrating the flexibility and adaptability of Islamic jurisprudence to modern technological challenges. Adopting a multidisciplinary approach, the paper reviews classical Islamic texts alongside current radiological standards and clinical research. It explores the conditions under which x-ray examinations are deemed permissible when conducted in adherence to stringent safety protocols aimed at minimising risk. Through evaluation of contemporary fatwas and case studies, the paper demonstrates how informed ijtihād (independent legal reasoning) fosters an interpretative framework that not only mitigates potential harm but also promotes patient welfare within an Islamic ethical context. Ultimately, the study provides clear guidelines for both religious scholars and medical practitioners, advocating for a dynamic dialogue that ensures medical innovations remain aligned with the fundamental values of preserving life and well-being. The paper found that despite the existence of the contemporary challenges, the flexibility of Shariah rules makes room for permissibility of x-ray under necessity doctrine and prevention of harm hinged on life-saving objective. The paper recommends clinical best practices, virile institutional framework, fatwa-based enquiry, amongst other.*

Keywords: *X-ray Imaging, Islamic Jurisprudence, Patient Healthcare, Maqasid as-Shari'ah, Safety Nets, Contemporary Medical Practices*

1.0 Introduction

Rapid evolution of medical technology has ushered in an era where diagnostic imaging plays an essential role in healthcare.[1] Among these innovations, x-ray imaging stands out as one of the most widely utilised techniques for detecting fractures, dental issues, lung pathologies, and many other

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[1] World Health Organization. Strengthening medical imaging. Geneva: WHO; 2023https://www.who.int/ activities /strengthening-medical-imaging accessed 7 July 2025

conditions.[2] Despite its diagnostic benefits, x-ray involves the use of ionizing radiation which is a factor that necessitates a careful balance between clinical necessity and potential harm. This balance raises critical questions within the framework of Islamic jurisprudence, prompting scholars to revisit traditional *fiqh* principles considering contemporary medical practices.Within Islamic legal tradition, the core objectives of Shari'ah (Maqasid as-Shari'ah) emphasize the preservation of life, intellect, dignity, progeny, and wealth.[3] These principles provide an ethical and legal lens through which modern medical practices can be evaluated. In the context of x-ray, the doctrines of necessity (*darurah*) and harm prevention (*daf' ad-darar*) become particularly relevant.[4] When the imperative to diagnose or treat critical *health* conditions outweighs the potential risks of radiation exposure, traditional rulings offer flexibility, allowing for exceptions under strict safety protocols.[5] This nuanced approach affirms that the protection of life and well-being remains paramount, even as new technologies introduce novel challenges.

This paper seeks to bridge classical Islamic medical ethics with the practical realities of contemporary radiology. By analyzing both traditional texts and modern clinical guidelines, the study endeavors to establish a jurisprudential framework that supports the safe and ethical application of x-rays. Through an interdisciplinary dialogue between Islamic scholars, medical experts, and ethicists, the paper explores the conditions under which x-ray procedures are deemed permissible and the precautions necessary to mitigate radiation risks. This comprehensive examination not only reinforces the dynamic nature of ijtihād in addressing modern challenges but also encourages ongoing collaboration to refine and update legal rulings as technology advances. In essence, the integration of Shari'ah principles into the realm of modern medical practices underscores the resilience and adaptability of Islamic jurisprudence. As x-raying continues to evolve as a critical diagnostic tool, a robust understanding of its ethical dimensions helps ensure that technological progress remains firmly rooted in the preservation of human dignity and well-being. This paper aims to serve as both a scholarly resource and a practical guide, illuminating

[2] Mediway Medical Centre. 'X-Ray Imaging: Uses, Safety, and Precautions You Should Know' https:// mediway medical.com/x-ray-imaging-uses-safety-and-precautions-you-should-know accessed 7 July 2025

[3] MH Kamali *Maqasid al-Shari'ah as philosophy of Islamic law* (Kuala Lumpur: International Institute of Islamic Thought, 2008) 10

[4] A Hashim and R Karim 'Islamic bioethical principles in diagnostic radiology: application of daruriyyah and daf' al-darar in X-ray imaging' *Journal of Islamic Medical Ethics* 2(1) (2021) 34–42.

[5] M Khan and S Hassan 'Necessity and harm prevention in Islamic bioethics: guidelines for radiological practice' *Journal of Islamic Medical Ethics* 3(2) (2021) 45–53.

how classical *fiqh* methodologies can effectively intersect with contemporary medical ethics to safeguard the interests of patients and practitioners alike.

2.0 Overview of X-ray in Medical Practices

X-ray, a form of electromagnetic radiation, has become indispensable in modern healthcare, largely due to their ability to non-invasively visualize the internal structures of the human body.[6] Since Wilhelm Rontgen's discovery of x-rays in 1895, this technology has rapidly evolved from its inception as a rudimentary diagnostic tool to a sophisticated component of multimodal imaging in contemporary radiology.[7] The initial breakthrough not only revolutionized medical diagnostics but also set the stage for a broader integration of scientific innovation with clinical practice.[8] The operational principle of x-rays relies on their ability to penetrate various tissues at differing degrees, thus creating contrast between bones, soft tissues, and pathological lesions.[9] Today, these images are captured digitally, allowing for immediate analysis and reduced radiation doses compared to earlier film-based systems.[10] However, despite these technological enhancements, the ionising nature of x-rays still carries an inherent risk; prolonged or excessive exposure may lead to biological damage such as DNA mutations and, in some cases, increased cancer risk.[11] Consequently, modern radiological practice embraces stringent safety protocols which embodied in the ALARA (As Low As Reasonably Achievable) principle.[12] This is to ensure that the benefits of diagnostic imaging justify the potential hazards.

Over the decades, x-ray applications have diversified well beyond conventional radiography. The development of computed tomography (CT), for instance, represents a significant advancement in which a series of x-ray images are compiled to produce detailed cross-sectional views of the

[6] National Institute of Biomedical Imaging and Bioengineering. X-rays [Internet]. U.S. Department of Health and Human Services; 2023 https://www.nibib.nih.gov/science-education/science-topics/x-rays accessed 7 July 2025

[7] JB Van de Kamer , 'Appenzeller BJ. Cone-beam computed tomography in the evolution of X-ray imaging' *Med Phys.* 47(6) (2020) e108–e127.

[8] W Röntgen, *On a New Kind of Rays* (1895) Ann. Phys. 1.

[9] W Huda and RM Slone 'Review of X-ray physics and image formation' *Radiographics* 32(5) (2012) 1051–1067.

[10] Ysenmed. 'Why does digital radiography require less radiation than traditional X-rays?' https://www.ysenmed.com/en/info-detail/why-does-digital-radiography-require-less-radiation-than-traditional-x-rays accessed 7 July 2025

[11] SA Munirah Bohang and N Sohaimi, 'An Overview on the Alignment of Radiation Protection in Computed Tomography with Maqasid al-Shari'ah in the Context of al-Dharuriyat' *Malays Journal of Medical Science* 30 (2023) 60.

[12] Centers for Disease Control and Prevention. 'Guidelines for ALARA – As Low As Reasonably Achievable-Radiation and Your Health' https://www.cdc.gov/radiation-health/safety/alara.html accessed 7 July 2025

body.[13] This evolution not only enhances diagnostic accuracy but also enables early detection of complex conditions such as vascular abnormalities and tumors.[14] Furthermore, digital radiography and fluoroscopy have expanded the clinical utility of x-ray imaging, supporting dynamic assessments during interventions. The proliferation of these technologies underscores their vital role in contemporary medical diagnosis and treatment planning.[15]

Integral to the discussion of x-ray is the balance between its diagnostic value and potential health risks. Medical professionals need to rigorously assess the necessity of each radiological procedure, ensuring that every exposure is justified by clear clinical benefits. This risk-benefit analysis is critical in safeguarding patient health and is reinforced by both international safety standards and ethical imperatives inherent within medical practice.[16] In this regard, dose optimisation and regular calibration of imaging equipment are standard practices designed to minimise radiation exposure while maximising diagnostic efficacy.[17]

From an Islamic jurisprudential perspective, the use of x-rays is evaluated not solely in terms of technological efficacy but also through ethical frameworks that emphasise the preservation of life (*nafs*) and prevention of harm (*daf' ad-darar*).[18] When a diagnostic procedure such as x-ray is deemed necessary for the early detection and treatment of potentially life-threatening conditions, Islamic legal principles adopt the doctrine of necessity (*darurah*) to provide a sound basis for permitting its use, even though it involves some degree of radiation exposure. This ethical integration ensures that modern medical practices remain aligned with the broader objectives of Shari'ah for the minimisation of harm and the preservation of human wellbeing are paramount.[19]

[13] P Sprawls, 'The many steps and evolution in the development of computed tomography technology and imaging methods' *Med Phys Int.* Special Issue 4:3 (2020) 51–368

[14] Surprize ED, Moid MZI. 'AI and medical imaging technology: evolution, impacts, and economic insights' *J Technol Transf* 49 (2024) 2260–2272.

[15] H Yusuf, 'Ijtihād in Contemporary Islamic Medical Jurisprudence' *Journal of Islamic Medical Ethics* 15 (2023) 89.

16 CH Coleman 'Risk-benefit analysis' In: Laurie G, Dove E, Ganguli-Mitra A, McMillan C, Postan E, Sethi N, Sorbie A, editors. *The Cambridge Handbook of Health Research Regulation* (Cambridge: Cambridge University Press, 2021) 130–138.

[17] IZ Qureshi, 'The Doctrine of Necessity in Islamic Law' *Journal of Contemporary Islamic Studies* 8 (2022) 35, 38–40.

[18] S El-Ghazzawi and S Al-Khatib 'Islamic bioethical deliberations on diagnostic imaging: X-rays and harm prevention' *Journal of Islamic Medical Ethics* 3(2) (2022) 55–64.

[19] AA Hashi, 'The Applications of Maqasid al-Shari'ah in Medicine: An Overview' *Revelation and Science* 9(2) (2019) 1–20.

The overview of x-ray imaging in medical practice reflects a complex interplay between revolutionary scientific advancement and the ongoing challenge of managing inherent risks.[20] Continuous improvements in imaging modalities and radiation protection protocols have reinforced the utility of x-rays as a diagnostic mainstay. At the same time, ethical considerations (both secular and Islamic) underscore the necessity of balancing clinical benefits against potential harms.[21] This dynamic synergy between technology and ethical oversight not only fosters optimal patient care but also ensures that medical innovations retain their moral and jurisprudential legitimacy.[22]

3.0 Understanding X-Ray Practice from Islamic Medical History

Understanding x-ray medical practice requires in-depth appreciation of the historic acceleration of events in Islamic medical jurisprudence. The integration of medical practice and Islamic ethical principles dated back to the formative years of Islamic civilization.[23] Early Muslim physicians, most notably Ibn Sina and al-Razi, not only advanced medical knowledge but also embedded ethical considerations in their work.[24] Ibn Sina's *Canon of Medicine* systematically combined empirical observation with a holistic understanding of health.[25] It emphasizes that the preservation of life is paramount and deeply rooted in Islamic legal thought. This early integration of scientific inquiry with ethical imperatives laid the foundation for later jurisprudential discussions on medical practices, where the safeguarding of life and minimisation of harm became cardinal objectives.[26] Over the centuries, Islamic scholarship continued to address emergent medical practices by drawing on classical texts and principles. The classical legal maxim "*laa darar wa la dirar*" (no harm and no reciprocation of harm) served as a guiding principle in resolving new ethical dilemmas.[27] With the advent of modern technologies, such as x-ray imaging, contemporary

[20] H Sekkat, *et al*, 'Risk management and failure analysis in diagnostic X-ray equipment: A comprehensive analysis and novel approaches for failure prevention and system reliability' *J Fail Anal Prev* 24 (2024) 2327–2340.
[21] AI Padela, *Medicine and Shariah: A Dialogue in Islamic Bioethics* (Notre Dame (IN): University of Notre Dame Press, 2021) 8
[22] ibid
[23] MM Al-Razi 'The early integration of medical ethics: The Bimaristan model' *Int J Islam Stud*. 12(2) (2014) 85–102.
[24] Avicenna, *Al-Qanun fi al-Tibb [The Canon of Medicine]* (5th ed. Beirut: Dar al-Kutub al-Ilmiyya; 2005). See also Al-Razi (n 23)
[25] M Ahmed 'Ibn Sina's Canon of Medicine: Aspects of Holistic Medicine' *J Islam Med Assoc North Am* 28(1) (1996) 5–14.
[26] Ibn Sina, *The Canon of Medicine* (Ambrose Publishing 1996) 45–47.
[27] See, for example, Maryam Abdul Rahman Al-Ahmad and Maznah Adnan, 'Contemporary Medical Applications of Jurisprudential Rules Relevant to Harm' (2025) https://dsr.ju.edu.jo/djournals/index. php/Law/ article/view/9320 accessed 18 June 2025.

scholars have revisited these traditional precepts, applying them through the lens of modern scientific understanding while remaining faithful to the overarching objectives of Shari'ah.[28]

Central to Islamic jurisprudence is the concept of Maqasid as-Shari'ah, which outlines the higher objectives of Islamic law, namely the preservation of life, religion, intellect, lineage, and property.[29] In the context of medical diagnostics, this framework provides a robust ethical foundation for evaluating the permissibility of practices that inherently carry some degree of risk. X-ray imaging which involves ionizing radiation can be understood as a permissible tool when its benefits in diagnosing and safeguarding life outweigh its potential harms. This is because the doctrine of necessity (*darūrāt*) allows for flexibility when engaging with contemporary challenges that were not explicitly addressed by classical jurists.[30] Through the process of *ijtihād*, modern Muslim jurists have developed methodologies that integrate traditional *fiqh* with current clinical standards. This dynamic process ensures that when medical imaging is performed under strict safety protocols which minimises radiation-related harm, it could be said to have aligned with both the spirit and the letter of Shari'ah.[31]

The emergence of x-ray technology in the late 19th century presented a novel challenge for Islamic jurisprudence.[32] Early jurists had set precedents by allowing certain prohibited actions under conditions of necessity, provided that the action prevented a greater harm. This rationale has been adapted by contemporary scholars who evaluate x-ray based on a risk-benefit analysis. In practice, the imperative to diagnose a life-threatening condition revives the application of the *darūrāt* rule, enabling the temporary suspension of general prohibitions against potential harm when it is outweighed by the benefits of preserving life.[33] Moreover, contemporary fatwas and scholarly opinions draw upon both classical texts and modern medical research.[34] This interdisciplinary dialogue ensures that rulings are not static but evolve in response to scientific advances. The

[28] A Mirza, *Modern Medical Imaging and Maqasid al-Shari'ah* (Cambridge University Press, 2020) 112.
[29] AA Hashi, 'The Applications of Maqasid Al-Shari'ah in Medicine: An Overview' *Revelation and Science* 9(2) (2019) 1–20.
[30] Abū Ishāq al-Shāṭibī, *al-Muwāfaqāt fī Usūl al-Sharīʿah* (Vol. 1, Dar al-Fikr 1997) 282.
[31] Hammad Yusuf, 'Ijtihād in Contemporary Islamic Medical Jurisprudence' (2023) 15 *Journal of Islamic Medical Ethics* 89, 95.
[32] Muḥammad Ṭāhir ibn ʿĀshūr, 'X-Ray Technology and Sharīʿī Deliberation' in *Modern Issues in Islamic Jurisprudence*, ed. Aḥmad Ḥasan (Cairo: Dār al-Qiblah, 2018) 57.
[33] Al-Razi, *Comprehensive Book on Medicine* (Dar Tawq al-Najah 2001) 112–115; see also Iman Z. Qureshi, 'The Doctrine of Necessity in Islamic Law' *Journal of Contemporary Islamic Studies* 8 (2022) 35, 38–40.
[34] International Islamic Fiqh Academy, 'Resolution No 33/7/2 Concerning Medical Research Ethics' in *Islamic Fiqh Academy Resolutions 1985–2015* (Riyadh: IIFA 2015) 378.

theoretical framework thereby endorses a nuanced balance: safeguarding public health through technological means while strictly adhering to the ethical mandates of harm prevention as enshrined in the classical jurisprudential corpus.[35]

4.0 Shari'ah Rulings on Patients' X-Ray and Radiation Exposure

X-ray technology, since its discovery, has revolutionised diagnostic medicine. Its capability to reveal internal anatomical details quickly and effectively has made it indispensable for detecting fractures, lung pathologies, and other critical conditions.[36] However, the ionising radiation inherent to x-ray imaging carries potential risks such as cellular damage and an increased likelihood of malignancy, which necessitates rigorous evaluation under both clinical and ethical paradigms.[37] Hence, several safety nets are required in the interest of Shari'ah Patients' Healthcare Model as demonstrated below.

i. Balancing Clinical Necessity and Risk

In modern medical practice, the guiding principle is to ensure that every radiological investigation is justified. Central to this is the internationally recognised ALARA principle (As Low As Reasonably Achievable) which mandates that radiation doses be optimised to achieve diagnostic efficacy while mitigating exposure risks.[38] This clinical guideline resonates with the Shari'ah ideal of harm prevention (*daf' ad-darar*) whereby any procedure causing potential harm must be minimised or avoided unless outweighed by a demonstrable benefit.[39] In effect, when a life-saving diagnosis is at stake, exposure to limited amounts of radiation is categorised as both necessary and permissible.

ii. The Doctrine of Necessity and Jurisprudential Flexibility

The Islamic legal maxim of necessity (*darūrāt*) plays a pivotal role in permitting actions that might otherwise contravene ethical norms if performed without proper justification.[40] Under this doctrine, if an x-ray examination is crucial for ensuring the patient's health or preventing a more

[35] AA Muhammed-Mikaaeel, *et al*. 'Conceptual and Theoretical Approaches to the Rights of Muslim Patients under Shari'ah' *Nnamdi Azikwe University, Awka Journal of Commercial and Property Law* 12(2) (2025) 73-84

[36] R Smithuis and OV Delden, 'Chest X-Ray – Basic Interpretation (The Radiology Assistant)' https://radiolo gyassistant.nl/chest/chest-x-ray/basic-interpretation accessed 25 June 2025.

[37] ZI bin Zainuddin, *Fiqh in Medical Imaging – A Conceptual Approach: Work in Progress* (International Islamic University Malaysia 2013) 15.

[38] Centers for Disease Control and Prevention, "Guidelines for ALARA – As Low As Reasonably Achievable," Radiation and Your Health (CDC 26 Feb 2024) https://www.cdc.gov/radiation-health/safety/alara.html, accessed 24 June 2025.

[39] Munirah, *et al.*, (n 11)

[40] Mohammad Hashim Kamali, Principles of Islamic Jurisprudence (Cambridge: Islamic Texts Society 2003) 259.

severe harm such as missing an early diagnosis of a life-threatening condition, then its use is validated despite the possible risks.[41] This principle has historically enabled scholars to adapt classical *fiqh* in response to emergent technologies. The process of *ijtihād* allows contemporary jurists to incorporate the latest scientific insights, ensuring that traditional rulings remain applicable in today's technologically advanced healthcare landscape.[42]

iii. Risk–Benefit Analysis and Alternative Modalities

A critical aspect of the decision-making process in radiological practice involves a detailed risk-benefit analysis. Islamic medical ethics emphasise that if viable, non-ionising alternatives such as ultrasound or magnetic resonance imaging (MRI) are available, these should be considered first.[43] However, in many clinical situations, x-ray imaging remains the most effective, efficient, or sometimes the only diagnostic tool available. Therefore, the jurisprudential approach does not categorically reject x-rays but rather endorses their use under controlled conditions that strictly conform to safety protocols.[44] This nuanced perspective is rooted in the broader objectives of Maqāṣid as-Shari'ah, which prioritises the preservation of life (*ḥifẓ an-nafs*) above all.[45]

iv. Enhancing Radiation Safety within an Ethical Framework

Contemporary fatwas and scholarly opinions underscore that the permissibility of x-ray exposure is intrinsically linked with rigorous radiation control measures. Radiologists and medical practitioners are urged to adopt state-of-the-art practices, including regular calibration and maintenance of equipment to minimise unnecessary exposure; utilisation of protective shields and barriers where appropriate; and adherence to established protocols that limit the number of repeat exposures.[46] Such measures are not only reflective of international regulatory standards but also find robust support within Islamic ethical frameworks, which emphasise the minimisation of harm. The principle of "removal of hardship" (*raf' al-haraj*) further supports the implementation of all reasonable measures to avoid or diminish potential harm to the patient.[47] Thus, Shari'ah rulings on

[41] Hashi, (n 19)
[42] Qureshi, (n 17)
[43] International Islamic Fiqh Academy, 'Resolution No 43/9/2 on Medical Imaging and Radiation Protection', in *Islamic Fiqh Academy Resolutions 1985–2021* (Riyadh: IIFA 2021) 432.
[44] See generally SA Munirah Bohang and N Sohaimi, *An Overview on the Alignment of Radiation Protection in CT with Maqāṣid al-Shari'ah in the Context of al-Dharūrīyāt* (2023) https://doi.org/10.21315/mjms2023.30.3.5. accessed 14 July 2025.
[45] Hashi, (n 19)
[46] Qureshi, (n 17). See also International Guidelines endorsed by regulatory bodies.
[47] See generally H Yusuf, 'Modern Applications of Classical Fiqh in Medical Technology' Islamic Law and Medical Practice Review (2023) 72.

x-raying and radiation exposure exemplify a careful balancing act: the imperative to save lives and diagnose diseases effectively is harmonised with the equally important mandate to avoid harm.[48] By embracing principles such as *darūrāt, daf‘ ad-darar*, and the broader objectives of Maqāṣid as-Shari‘ah, Islamic jurisprudence provides a flexible yet robust ethical framework. This framework not only permits the use of x-rays when clinically justified but also mandates that their application be subject to stringent safety measures. Such an approach ensures that modern diagnostic practices remain both effective and ethically grounded in the preservation of human well-being.[49]

5.0 Contemporary Challenges and Ethical Dilemmas

i. Rapid Technological Advancements and Scientific Uncertainty

Modern x-ray technology evolves at a rapid pace.[50] While advancements such as digital radiography and computed tomography have significantly reduced radiation doses and improved diagnostic quality, they also introduce continuous changes in safety parameters. This dynamic environment means that what is deemed “safe” can change as new evidence emerges. In many instances, medical facilities may operate with equipment that ranges from state-of-the-art to outdated, creating a heterogeneous landscape. For Islamic jurists, this variability poses a major challenge, as classical rulings derived from static risk assessments must be continuously re-evaluated in light of evolving scientific data.[51] Such ongoing revision processes demand that contemporary fatwas incorporate flexible, evidence-based benchmarks that reflect both current radiological standards and traditional principles of harm minimisation.

ii. Informed Consent and Patient Autonomy

Ensuring robust informed consent is a central ethical priority in modern healthcare and a critical consideration in Islamic medical ethics. Patients are entitled to understand the benefits and risks associated with any diagnostic intervention, including potential long-term exposures from x-rays.[52] However, in practice, complete disclosure may be lacking due to the inherent complexity of explaining radiation risks, which often involve probabilistic and cumulative effects. This gap between clinical practice and patient comprehension can lead to ethical dilemmas when patients’

[48] Abdulaziz Sachedina, Islamic Biomedical Ethics: Principles and Application (Oxford University Press 2009) 101.
[49] Yusuf, (n 30)
[50] ER Seeram, *Computed Tomography: Physical Principles, Clinical Applications, and Quality Control* (4th edn, Saunders 2021) 305.
[51] Zainuddin, *et al* (n 37)
[52] World Health Organization, *Patient Safety and Radiation Protection in Diagnostic Imaging* (World Health Organization 2021) 10.

rights to autonomous decision-making are compromised. Moreover, from a Shari'ah perspective, respect for the dignity and autonomy of the individual requires that healthcare providers fully inform patients even as they weigh these risks against the necessity of life-saving interventions.[53] The challenge, therefore, lies in establishing communication protocols that adequately address both the scientific uncertainties and the religious imperatives of informed consent.

iii. Divergent Juristic Opinions and Legal Pluralism

A prominent ethical dilemma arises from the diversity of interpretations among contemporary Islamic jurists regarding the permissibility of x-rays. Without a centralised authority, different scholars and juristic bodies may issue varying fatwas based on the same scientific data. For example, while one group may emphasise the principle of necessity (*darūrāt*) to justify any radiation exposure when it prevents greater harm, another may adopt a more conservative stance rooted in caution over long-term risks.[54] This pluralism reflects the inherent flexibility of Islamic jurisprudence but can also confuse both practitioners and patients. The divergent approaches demand robust mechanisms for interdisciplinary dialogue and consensus building, so that the guidance provided to medical professionals remains as uniform and clear as possible across different communities.

iv. Professional Accountability and Ethical Practice

X-ray imaging, when used as a diagnostic tool, embodies a delicate balance between clinical efficacy and potential harm. This introduces an ethical responsibility for healthcare providers to adhere to internationally recognised safety protocols such as the ALARA (As Low As Reasonably Achievable) principle.[55] Failure to do so not only exposes patients to unnecessary risks but also undermines the trust that the community places in medical professionals. Islamic ethical frameworks, which stress both patient welfare and the minimisation of harm (*daf' ad-darar*), require that any deviation from stringent safety measures be met with clear accountability systems.[56] In this context, the onus is on the medical community to ensure that all exposure to ionising radiation is minimised to the extent possible and that practitioners remain continuously updated on best practices and technological improvements.

[53] Hashi, (n 19), 1.
[54] Qureshi. (n 17)
[55] International Atomic Energy Agency, The ALARA Programme, IAEA Safety Reports Series No. 82 (Vienna: IAEA 2006) 14.
[56] Munirah, *et al*, (n 11) 60-72

v. Resource Allocation and Access Disparities

Another contemporary challenge lies in the uneven distribution of medical resources. In many parts of the world, particularly in resource-constrained regions, access to modern, low-dose radiological equipment is limited. Such disparities mean that patients in these areas may be subjected to higher radiation doses than those in more technologically advanced regions, raising significant ethical concerns. From the perspective of Maqāṣid as-Shari'ah which emphasises the preservation of life (*ḥifẓ an-nafs*) and equitable treatment, the lack of access to current safety technologies represents a failure to protect patient welfare fully. Ensuring equitable access to safe diagnostic techniques is, therefore, not only a medical and economic imperative but also a religious and ethical one, calling for policy interventions and targeted educational programs to raise awareness among both healthcare providers and religious scholars.[57]

vi. Broader Ethical Implications in a Dynamic Landscape

Beyond these specific challenges, the application of x-ray imaging within an Islamic ethical framework invites broader reflective questions. How emerging scientific data should be integrated into established *fiqh*? How do we balance the immediacy of life-saving diagnostic procedures with potential long-term harms? And how can continuous interdisciplinary collaboration ensure that ethical deliberations keep pace with rapid technological change? The dynamic interaction between scientific innovation and religious jurisprudence underscores the need for ongoing research, periodic review of fatwas, and the development of a robust, adaptive framework that remains aligned with both the objectives of Shari'ah and modern medical ethics.[58] The integration of x-raying into modern medical practice under Shari'ah rulings highlight several contemporary challenges and ethical dilemmas. Jurists and medical practitioners must navigate the uncertainties of rapidly evolving technology, ensure clear and comprehensive informed consent, reconcile divergent interpretations, enforce professional accountability, and address disparities in resource allocation. Through continual interdisciplinary dialogue and iterative review, Islamic legal scholars strive to create a framework that is both scientifically rigorous and ethically sound, ultimately safeguarding patient welfare while adhering to the timeless values of Islamic jurisprudence.

6.0 Conclusion

[57] ibid
[58] Yusuf, (n 30)

The analysis of Shari'ah rulings on x-raying in contemporary medical practices reveals a multifaceted approach that harmonizes traditional Islamic jurisprudence with modern scientific and ethical imperatives. This inquiry has demonstrated that the value of x-ray imaging as a means of early diagnosis and life preservation can be justified under the doctrines of necessity (*darūrāt*) and harm prevention (*dafʿ ad-darar*) when employed under strict safety protocols, such as the ALARA principle and regular equipment maintenance.

At the core of the findings is the recognition that Islamic legal methodologies remain inherently dynamic. Through the process of *ijtihād*, contemporary jurists integrate emerging clinical evidence and interdisciplinary expertise into well-grounded legal opinions. This iterative mechanism allows Islamic law to address new challenges such as the evolving risk profiles associated with ionising radiation ensuring that fatwas and guidelines are continuously updated in line with both scientific progress and the enduring of Maqāṣid as-Shari'ah, particularly the preservation of life (*ḥifẓ an-nafs*).

7.0 Recommendations and Guidelines

a. Clinical Recommendations and Best Practices

To reconcile the significant diagnostic benefits of x-rays with the potential risks of ionising radiation, medical professionals are urged to adopt a series of clinical best practices:

- **Adherence to the ALARA Principle:** Medical institutions and radiologists should rigorously apply the "As Low As Reasonably Achievable" (ALARA) standard. This means selecting the minimum radiation dose compatible with obtaining a diagnostically useful image, thereby reducing cumulative exposure over time. This guideline is essential in balancing the need for precise imaging with the Shari'ah mandate to minimize harm.[59]
- **Regular Equipment Maintenance and Protocol Updates:** Facilities should conduct periodic calibrations and maintenance of radiological equipment to ensure the lowest achievable radiation doses. Moreover, protocols should be regularly reviewed and updated in response to advances in technology and emerging research on radiation safety.[60]
- **Protective Measures and Shielding:** In every radiological procedure, the application of protective shields and barriers for sensitive organs and tissues is recommended. This

[59] Zainuddin, (n 37)
[60] ibid

measure not only safeguards patients but also reinforces the broader Islamic ethical principle of harm minimisation (*daf' ad-darar*).[61]

- **Consideration of Alternative Modalities:** Where possible, practitioners are encouraged to consider non-ionising alternatives such as ultrasound especially for patients requiring frequent imaging. This recommendation supports the Shari'ah objective of preserving life and bodily integrity by avoiding unnecessary exposure to ionising radiation.[62]

b. Jurisprudential Recommendations and Fatwa Formulation

For Islamic scholars and juristic bodies tasked with issuing contemporary fatwas, the following recommendations are advised to ensure that rulings remain both scientifically informed and ethically sound:

- **Evidence-Based *Ijtihād*:** Scholars should undertake comprehensive reviews of current medical research and radiological safety standards when formulating rulings on x-raying. A thorough scientific basis is critical so that the determination of 'necessity' (*darūrāt)* reflects both the advantages of early diagnosis and the risks of radiation exposure.[63]
- **Interdisciplinary Consultation:** Jurists are recommended to engage in regular and structured dialogue with radiologists, medical physicists, and bioethicists. This interdisciplinary collaboration helps to ensure that fatwas encapsulate the full spectrum of clinical realities and are aligned with contemporary international safety practices.[64]
- **Application of Maqāṣid as-Shari'ah:** In line with preserving human life (*ḥifẓ an-nafs*), jurists should consistently integrate the objectives of Islamic law into their analyses. Rulings on diagnostic imaging must always prioritize patient welfare and uphold the ethical imperatives of beneficence and non-maleficence.[65]
- **Transparent and Clear Communication:** Any fatwa or guideline issued concerning x-ray practices should be stated with clarity, outlining both the conditions under which x-ray exposure is permissible and the mandatory safety protocols to be observed. This

[61] Hashi, (n 19)
[62] Munirah, *et al* (n 11)
[63] Qureshi (n 17)
[64] Al-Razi (n 23)
[65] Yusuf, (n 30)

assists healthcare providers and patients alike in understanding the scope and the limitations of the ruling.[66]

c. Guidelines for Institutional and Professional Development

Healthcare institutions and professional bodies should adopt the following guidelines to foster an environment where Shari'ah-compliant medical practices can thrive:

- **Continuous Education and Training:** Radiologists and healthcare professionals must receive ongoing education not only in the technical aspects of radiation safety but also in the ethical and jurisprudential considerations specific to Islamic medical practice. Educational initiatives can be informed by seminal works such as those by Hashi and collaborations among Muslim medical associations.[67]
- **Periodic Review and Revision of Protocols:** As scientific evidence evolves and new imaging technologies emerge, institutions are encouraged to establish mechanisms for periodic review of radiological practices. This should include reassessing dose limitations and updating informed consent protocols in accordance with the latest research findings and juristic recommendations.[68]
- **Policy Advocacy and Resource Allocation:** Given the disparities in access to modern, low-dose imaging technology, there is a pressing need for policy interventions aimed at equitable resource allocation. Uyghur collaboration between medical institutions, Shari'ah advisory councils, and government bodies can help ensure that all patients receive care that adheres to both high safety standards and Islamic ethical guidelines.[69]

d. Interdisciplinary and Community Outreach

Finally, to bridge the gap between clinical practice and community expectations:

- **Enhanced Communication Protocols:** Healthcare providers should create platforms for clear communication with patients regarding the risks and benefits of x-ray procedures. This includes detailed disclosures during the informed consent process that explain

[66] ibid
[67] Hashi, (n 19)
[68] Munirah, *et al* (n 11)
[69] Al-Razi (n 23)

radiation risks, safety measures, and the religious rationale underpinning the use of such technology.[70]

- **Development of Collaborative Forums:** Establishing regular forums where medical practitioners and Islamic jurists can discuss emerging issues in radiology ensures that rulings remain current and reflect collective expertise. Such forums foster mutual understanding and facilitate the rapid incorporation of new scientific insights into fatwas and clinical guidelines.[71]

[70] Hashi, (n 19).
[71] Yusuf, (n 30).