

DEVELOPING SHARIAH ACCOUNTABILITY FRAMEWORK FOR ARTIFICIAL INTELLIGENCE IN HEALTHCARE USING THE FUZZY DELPHI METHOD

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Abstract

Artificial intelligence (AI) in healthcare has transformed clinical decision-making, diagnostics and service delivery, while simultaneously raising complex ethical, legal and accountability challenges. From an Islamic perspective, these challenges are particularly significant, as AI-assisted medical decisions involve human life, dignity and moral responsibility. Existing AI ethical frameworks largely adopt secular principles and do not sufficiently address Shariah-based concepts such as accountability, ḍamān (liability) and maqāsid al-sharī'ah. This study aims to develop a Shariah Accountability Framework for Artificial Intelligence in Healthcare (SAFAIH) through expert consensus. Employing the Fuzzy Delphi Method (FDM), data were collected from multidisciplinary experts in Shariah, artificial intelligence and healthcare ethics. A seven-point fuzzy linguistic scale was used to evaluate proposed accountability elements, with acceptance determined by threshold values ($d \leq 0.2$), expert consensus ($\geq 75\%$) and defuzzification scores (≥ 0.5). The findings validated nine core elements of Shariah-compliant AI accountability: Allah SWT's Authority, Human Control over AI, AI as a Tool, Developer Responsibility, Doctor Responsibility, Hospital Responsibility, Staff Responsibility, Liability and Compensation, and AI Limitations with Collective Responsibility. Developer Responsibility and Doctor Responsibility emerged as the highest-priority elements. The study concludes that SAFAIH provides a robust, ethically grounded framework that integrates theological principles, professional accountability and institutional responsibility. This framework offers practical guidance for policymakers, healthcare institutions, AI developer and practitioners to ensure that AI deployment in healthcare remains ethically and aligned with Islamic values.

Keywords: *Artificial Intelligence, healthcare, shariah, accountability, Fuzzy Delphi.*



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INTRODUCTION

The rapid advancement of modern technology, particularly artificial intelligence (AI), which has existed since 1951, has significantly transformed various sectors. Global investment in AI healthcare is projected to reach USD 45.2 billion by 2026 (ReportLinker, 2021). Major technology companies such as Google, Microsoft and IBM are also investing heavily in this field due to its high economic potential. For Muslims, involvement in technological fields including AI is considered as a collective obligation (*fardhu kifayah*) (Al-Qaradawi, Y. 2007). Islam emphasizes that science and technology should be understood within the framework of the Islamic worldview. The use of AI is permissible as long as it does not contradict religious principles and Islamic ethics.

Although AI offers significant benefits in healthcare, various ethical and Shariah concerns arise such as issues of accountability and medical liability. One of the core challenges in AI-assisted healthcare is determining who is accountable when harm occurs. Unlike traditional medical tools, AI systems can operate semi-autonomously, producing clinical recommendations through opaque algorithms (Liu, F., et al 2025). This creates uncertainty over whether accountability lies with the physician who relied on AI output, hospital or healthcare institution, AI developer and collective responsibility.

Existing AI ethical guidelines such as the Smart Dubai AI Guidelines (2019)) do not explicitly highlight shariah accountability principles. Malaysia is also developing its healthcare AI ecosystem through policies such as the AI Roadmap 2021 - 2025 but Islamic and Shariah ethical dimensions have not yet been fully integrated. Therefore, it is essential to establish a Shariah accountability framework for AI healthcare to ensure that the use of this technology aligns with Islamic principles (Yunos, A. S., et al (2025), (Zulkifli Al-Bakri, 2023).

This study aims to develop a Shariah Accountability Framework for AI in Healthcare (SAFAIH) through expert consensus. The Fuzzy Delphi Method (FDM) is been used as a systematic and reliable approach to gather, analyse and synthesise expert opinions from multidisciplinary domains including *Shariah*, artificial intelligence and healthcare. By incorporating fuzzy logic, FDM effectively manages uncertainty and subjectivity in expert judgments, enabling the identification and validation of key accountability elements. The outcome of this study is a validated Shariah-based accountability framework that provides ethical guidance and practical direction for the responsible use of AI in healthcare. This framework is expected to support policymakers, healthcare institutions, AI developers and practitioners in ensuring that AI technologies are implemented in a manner with Islamic values.

LITERATURE REVIEW

Artificial Intelligence in Healthcare Applications of AI

AI assists in organizing work schedules, preventing medical errors and improving communication among healthcare professionals. Its main applications include disease diagnosis, drug development, robotic surgery, disease prediction, as well as medical research and health management (Akzatria, 2023). AI supports physicians in identifying risks, monitoring high-risk patients, and assisting in complex treatment decisions. For example, in antiretroviral therapy, AI can predict drug resistance in HIV and disease progression (Singh, et al 2019). It enhances diagnostic accuracy and improves the efficiency of robotic surgery by reducing human error. AI also strengthens telemedicine by enabling remote patient monitoring

(Bokolo, 2020). Furthermore, AI is used to predict diseases, determine prognosis, personalize treatments and develop new drugs. It enables doctors to make faster and more accurate clinical decisions (Agrawal, 2019).

Machine learning accelerates drug development by predicting treatment effectiveness and suitability based on patient data (Lee, C., J., et al 2022). AI is also applied in administrative tasks such as updating patient records, processing insurance claims and managing medical documentation through Robotic Process Automation (RPA). Ethical concerns also arise regarding accountability specifically, who should be held responsible for errors in AI-assisted healthcare: physicians, healthcare institutions or system developers (Holm, 2021; Khullar, 2021).

Liability in Islam

Liability refers to the situation where a person is sued for an offense that causes harm to another person (Al-Zalmi, M. I. 2014) while *al-damān* (guarantee) is the obligation to pay compensation for the damage that occurred (Ibn Manzur, M. b. M. 1994). This responsibility is built on three pillars: *al-sā'il* (the party claiming, such as the court, patient or heir), *al-mas'ūl* (the responsible party, namely the doctor or institution), and *al-mas'ūl 'anhu* (the damage or harm that occurs as a result of medical action). When these three pillars exist, then medical responsibility is formed in terms of *syara'* and law (Qarābat tis'īn 'ālīman wa mutakhaṣṣisan 2023). There are four main factors that give rise to medical responsibility:

- (1) not following the correct scientific method including basic knowledge and recognized new knowledge;
- (2) unintentional error (*khaṭa'*), which is still subject to compensation;
- (3) ignorance, whether general or specific; and
- (4) intentional aggression (*i'tidā'*) that causes harm (Lajnah 'Ilmiyyah. N.d.).

Prophet SAW also said that whoever treats without knowledge, then he is responsible for the consequences.

According to the Hadith, from 'Abdullāh ibn 'Amr that the Prophet SAW said: مَنْ تَطَبَّبَ وَلَمْ يُعْلَمْ مِنْهُ طَبٌّ فَهُوَ ضَامِنٌ, meaning : whoever gives medical treatment, with no prior knowledge of medicine, is responsible (for any harm done) (Abu Dawud, No. Hadith: 4586) According to Al-Shanqiti, M. b. M. (1994), the doctor's responsibility includes moral responsibilities such as honesty, maintaining confidentiality and the patient's awrah (parts of a patient's body that are required to be covered).

In addition, there is the professional responsibility of medicine, which is the doctor's responsibility that arises when there is a violation of ethical principles or an error that causes harm to the patient. The agreement between the doctor and the patient requires the doctor to have knowledge and skills

If negligence occurs, whether intentional or not, the doctor bears responsibility. To ensure that doctors are not held liable if they meet three conditions: having expertise, obtaining permission from the patient or guardian and aiming to treat the treatment that is really needed. However, if there is encroachment (*ta'addī*) and harm (*ḍarar*) (Fathallah, W. 2011) then liability is imposed in the form of table 2.3 below:

Table 1: Section of criminal punishment in Medicine (Qarābat tis‘īn ‘āliman wa mutakhaṣṣisan 2023)

No.	Punishment	Description
1.	<i>Diyat</i>	It is imposed in completely unintentional offenses, such as offenses due to negligence, forgetfulness or lack of caution
2.	<i>Ta‘zir</i>	A punishment whose is not specified in syara', is decided by the government when it is proven that there is an element of attack or exceeding the limit. Ta‘zir can be in the form of physical, financial or moral punishment.
3.	<i>Kaffarah</i>	Which is fasting for two consecutive months, imposed in cases of accidental murder.
4.	<i>Qisas</i>	This punishment is specifically for deliberate murder in a cruel and extreme manner

Among the situations that require liability are treatment with intent to harm, ignorance, official authorization, treatment without the consent of the patient or guardian, fraud, professional error, disclosure of secrets without shariah reasons, or refusal to treat an emergency. In an emergency, refusal to treat is considered a crime because it diminishes the duty. If treatment is performed by a team, each member is responsible for his or her own actions, while the team leader also bears joint liability if he or she neglects to supervise. Health institutions can also be held liable if their failure causes harm to the patient.

Liability in Medical AI Errors

Among the unanswered questions is who should be held responsible for errors in the application of artificial intelligence technology in healthcare (Sharkey, A., et al 2012 ; Paul Y et al 2018 ; Powles, J., et al 2017). This question often arises in response to the fact that AI processes are often complex and difficult to understand and explain to many individuals, which hinders their ability to master AI output systems (Nuffield Council, 2018).

Similarly, the grounds for seeking compensation for harm suffered as a result of its use have been observed to be hindered by the proprietary nature of AI technology, as under private company ownership, the technology is not publicly accessible for inspection (Crawford K, et al 2016). Debates also often arise as to whether HCPs (Health Care Professionals) should be held liable or not for errors made by AI in healthcare, particularly in relation to errors in diagnostic and treatment decisions (Mohandas S, et al 2017).

Several records present the view that HCPs are legally and professionally responsible for making decisions in the best interests of their patients, they are responsible for the consequences of decisions assisted by AI technology (Balthazar et al 2018). However, the record outlines the responsibility of the manufacturer of an AI system to ensure the quality of the AI system including safety and effectiveness and as responsive to the needs and

characteristics of a particular patient population (O' Brolch 2019). Outside the clinical setting, accountability issues arise in the context of the use of care robots. Related questions revolve around the burden of responsibility if a recipient of a robotic care, for example, is harm caused by a robotic care provider. Is the burden of responsibility for such harm also on the robot manufacturer who created the algorithm (Decker M., 2008)? Similarly, the question arises as to who should be held responsible if a care recipient takes their own life or the life of another person under the supervision of a care robot (Luxton D.D 2014)? If a care robot is considered an autonomous agent, is this incident the responsibility of the robot?

Islam also emphasizes the concepts of trust and responsibility. However, AI cannot be held morally or religiously accountable. Who bears the trust in the eyes of Shariah when harm occurs as a result of an AI decision, whether it is the doctor, the developer, the hospital, or the authorities? The main gap is the lack of clarity on the accountability mechanisms of AI in healthcare, especially from an Islamic perspective that emphasizes the concepts of *mas'ūliyyah* and *daman*. Questions such as “who is responsible?”, “how is compensation provided?”, and “how are shariah principles applied?” have yet to be fully answered within the shariah framework.

Existing Ethical AI Frameworks

The ethical model for AI in healthcare aims to provide comprehensive guidelines for policymakers, medical practitioners, technology engineers and healthcare institutions in developing and implementing AI systems that are safe, transparent and accountable. This model integrates various ethical principles to ensure user trust in the technology. Several policies and guidelines have been identified in previous studies:

Table 2: Show the Ethical Guidelines for Artificial Intelligence (AI) in Healthcare

No.	Model Document	Institution / Year	Main Element	Applications and Focus of Ethics in Healthcare
1	Ethics Guidelines for Trustworthy AI	European Commission (HLEG, 2019)	1. Human Agency & Oversight 2. Technical Robustness & Safety 3. Privacy & Data Governance 4. Transparency 5. Diversity & Fairness 6. Social and Environmental 7. Well-being Accountability	Ensuring the safe, transparent, and trustworthy use of AI; protecting patients' rights; ensuring human oversight; and upholding the accountability of system developers and users.
2	A Unified Framework of Five	Florida & Cowls (2022)	1. Beneficence 2. Non-maleficence	Establishing a universal ethical foundation. AI

	Principles for AI in Society		3. Autonomy 4. Fairness 5. Explicability	must provide benefits, do no harm, preserve patient autonomy and uphold fairness and transparency in the justification of its decisions.
3	AdvaMed The MedTech Association Guidelines	AdvaMed (2025)	1. Safety & Effectiveness 2. Equitable Access & Affordability 3. Inclusivity & Human Rights 4. Privacy & Data Protection Risk 5. Accountability 6. Multi-stakeholder Collaboration 7. AI Training & Education	Emphasizing fair, auditable, and inclusive AI, with continuous training, clear distribution of liability and ethical monitoring of clinical outcomes.
4	Healthcare Information and Management Systems Society (HIMSS) Guidelines	HIMSS (2025)	1. Safety & Effectiveness 2. Equitable Access & Affordability 3. Inclusivity & Human Rights 4. Privacy & Data Protection 5. Risk Accountability 6. Multi-stakeholder Collaboration 7. AI Training & Education	Ensuring that AI is implemented with inclusive data, continuous monitoring, and human control, while reducing environmental impact through energy-efficient algorithms.
5	Xenostack Ethical AI Principles in Healthcare	Xenostack (2024)	1. Social Well-being 2. Justice & Non-Discrimination 3. Patient Data Protection	Ensuring that AI systems are fair, unbiased, explainable, respectful of human rights, and beneficial to individuals and society without

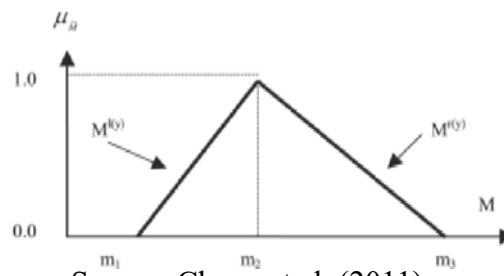
			4. System Reliability & Safety	compromising patient safety.
			5. Transparency & Decision Explainability	
			6. Respect for Human Values & Rights	
			7. Autonomy & Human Control	
6	OECD Legal Instrument on AI	OECD (2024)	1. Inclusive Growth & Sustainable Development	Establishing shared responsibility among governments, developers, and users; upholding the law, human rights, and democratic values; and ensuring that AI is safe, transparent, and accountable.
			2. Respect for Law & Human Rights	
			3. Transparency	
			4. System Safety & Resilience	
			5. Accountability & Risk Management	
			6. Environmental Protection	

Based on previous studies, both the private sector and academia have sought to align AI systems with ethical frameworks and societal values. The main objective of these guidelines is to establish ethical principles that govern the development and use of AI. However, Ghaly (2023) emphasizes that there are fundamental ambiguities in defining the ethical values that should guide moral reasoning in AI. Furthermore, while conventional ethics focuses on avoiding bias and promoting public benefit, the *Shariah* perspective offers a more comprehensive approach by balancing benefits and harms in accordance with Islamic values (Rahayu et al., 2023). Therefore, this research proposes an AI ethical model grounded in *Shariah* accountability for the healthcare sector, ensuring that AI technologies not only comply with universal ethical standards but also align with Islam.

METHODOLOGY

In analysis using FDM, there are two main things that need to be understood, namely Triangular Fuzzy Number and Diffuzification, Triangular Fuzzy Number consists of values m_1 , m_2 , and m_3 and it is represented in the form (m_1, m_2, m_3) . The value m_1 represents the minimum value, m_2 represents the most reasonable value and m_3 represents the maximum value. These three values in Triangular Fuzzy Number are represented in Figure 1 which shows a graph of triangular mean against triangular value.

Figure 1: Triangular Fuzzy Number



Source: Chang et al. (2011)

Triangular Fuzzy Number is used to produce a fuzzy scale to translate linguistic variables into fuzzy numbers (Mustapha & Darulsalam, 2018). The number of levels for the fuzzy scale is an odd number. The set of questions for this study is arranged in a fuzzy template using a 7-point linguistic variable scale (similar to the Likert scale). The selection of a 7-point scale is because the higher the scale, the more accurate and precise the data obtained (Chang et al. 2011). The scale used in this study is shown in the table below:

Figure 2: 7-point Fuzzy Scale

Expert Agreement Level	Fuzzy Scale
Very Strongly Disagree	(0.0, 0.0, 0.1)
Strongly Disagree	(0.0, 0.1, 0.3)
Disagree	(0.0, 0.3, 0.5)
Neutral	(0.3, 0.5, 0.7)
Agree	(0.5, 0.7, 0.9)
Strongly Agree	(0.7, 0.9, 1.0)
Very Strongly Agree	(0.9, 1.0, 1.0)

The fuzzy question set was distributed to 15 experts online and in person. All experts were asked to state the level of consensus on each element and item, either Very Strongly Agree, Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree and Very Strongly Disagree. All experts were also asked to provide their views, express ideas and improve the content of the items. Expert agreement on the acceptance of items that form a model based on FDM is based on 3 main conditions, namely: a. The threshold value (d) must be smaller than or equal to 0.2 (Chang, Hsu, & Chang, 2011; Cheng & Lin, 2002). b. The percentage of expert consensus must be equal to or exceed 75% (Chu & Hwang, 2008). c. The defuzzification value must be equal to 0.5 and above (Bodjanova, 2006).

After the questionnaire was collected, the data was analyzed using Microsoft Excel Fuzzy Delphi software. The data from the Likert scale obtained was then translated into a fuzzy number data form and given a score according to the fuzzy score. All data was converted into the Triangular Fuzzy Number form which uses seven points. All data was converted into the Triangular Fuzzy Number form to obtain Fuzzy values (n_1, n_2, n_3), fuzzy average value, threshold value, expert consensus percentage, defuzzification and item ranking. The threshold value is very important in determining agreement between experts. For the Threshold value, it is determined based on the formula in Figure 3. According to Chang et al. (2011), if the threshold value (d) is less than or equal to 0.2, and the expert agreement percentage exceeds 75%, then expert agreement has been achieved.

Figure 3: Threshold value formula

$$d(\tilde{m}, \tilde{n}) = \sqrt{\frac{1}{3}[(m_1 - n_1)^2 + (m_2 - n_2)^2 + (m_3 - n_3)^2]}.$$

Source: Chang et al. (2011)

After expert consensus is obtained, the aggregate level of fuzzy evaluation is added to the fuzzy number for each item (Mohd Jamil et al. 2017). The following formula is used for calculating and determining the fuzzy value: $A_{max} = \frac{1}{4} (m_1 + 2m_2 + m_3)$. This defuzzification value is the fuzzy score value that determines the priority position of the item. The higher the fuzzy score value, the higher the priority of the item in a construct (Mustapha & Darulsalam, 2018). There are three formulas in this process, namely: $A = \frac{1}{3} (m_1 + m_2 + m_3)$. The α -cut value = the median value of '0' and '1', where α -cut = $(0+1)/2 = 0.5$. Items will be rejected if the resulting A value is less than the α -cut value = 0.5, because it does not show expert agreement because it takes the view of Bojdanova (2006) that the alpha cut value should exceed 0.5. The position of the element is determined based on the defuzzification value, i.e. the highest value is determined as the most important position.

FINDINGS AND DISCUSSION

Eight elements of Shariah Accountability Framework for Artificial Intelligence in Healthcare were proposed. All elements of this model were modified from previous studies. This is based on the view of Jamil et al (2023) that the formation of elements in model development can be done through methods such as literature reviews, expert interviews, researcher experiences, pilot studies and focus groups. Then all elements were evaluated by experts based on the Fuzzy Delphi approach and analyzed using Microsoft Excel software. Table 5 shows all the SAFAIH elements that were agreed upon by experts. All these elements are classified into eight main constructs

Table 5: Fuzzy Delphi Analysis Results for Evaluation Elements

Element Experts	K1	K2	K3	K4	K5	K6	K7	K8
P1	0.04 3	0.05 8	0.024	0.03 8	0.04 8	0.05 8	0.04 8	0.063
P2	0.04 3	0.05 8	0.024	0.03 8	0.04 8	0.05 8	0.04 8	0.063
P3	0.13 0	0.11 5	0.149	0.13 5	0.12 5	0.11 5	0.12 5	0.111
P4	0.04 3	0.05 8	0.024	0.03 8	0.04 8	0.05 8	0.04 8	0.063
P5	0.13 0	0.11 5	0.034	0.13 5	0.12 5	0.11 5	0.12 5	0.111
P6	0.04 3	0.05 8	0.024	0.03 8	0.04 8	0.05 8	0.04 8	0.063
P7	0.04 3	0.05 8	0.024	0.03 8	0.04 8	0.05 8	0.04 8	0.063
P8	0.04 3	0.05 8	0.024	0.03 8	0.04 8	0.05 8	0.04 8	0.063

P9	0.04 3	0.11 5	0.024	0.01 9	0.04 8	0.11 5	0.12 5	0.111
P10	0.04 3	0.05 8	0.024	0.03 8	0.01 0	0.05 8	0.04 8	0.111
P11	0.13 0	0.11 5	0.034	0.01 9	0.12 5	0.11 5	0.01 0	0.005
P12	0.04 3	0.05 8	0.024	0.03 8	0.04 8	0.05 8	0.04 8	0.063
Threshold value (d)	0.06 5	0.07 7	0.036	0.05 1	0.06 4	0.07 7	0.06 5	0.074
Threshold value (d) (Construct)	0.0605							
Percentage expert agreement %	90%	90%	95%	90%	95%	100 %	95%	85%
Average Percentage of expert agreements	92 %							
Defuzzification values	0.92 5	0.90 0	0.958	0.93 3	0.91 7	0.90 0	0.91 7	0.892
Ranking	3	6	1	2	4	6	4	8

Conditions:

- 1) threshold value (d) ≤ 0.2
- 2) Expert agreement percentage $\geq 75\%$
- 3) Fuzzy score (A) $\geq \alpha$ -cut value = 0.5

Based on the analysis conducted, all elements are suitable for use where the threshold value (d), percentage of agreement and Fuzzy score (A) meet the specified conditions. All elements that were evaluated received expert agreement and consensus, which is greater than $>75\%$, meaning that they met the expert agreement requirements for this item (Chang & Chang, 2011). The findings shown in Table 5 have met the conditions, namely all constructs show an average threshold value (d) < 0.2 , which is between the range of 0.036 to 0.077. While the fuzzy score value (defuzzification) exceeds 0.5, which is between 0.892 to 0.958. The percentage of expert agreement is greater than 75%, which is 85 to 100 percent, meaning that they met the expert agreement requirements. A high percentage of expert agreement shows that each construct is an important aspect for the development of SAFAIH elements. This shows that all elements have received the agreement of the experts involved. The agreed elements are arranged according to the position as shown in Table 6. The position of the elements is determined based on the highest defuzzification value to the lowest defuzzification value

Table 6: Expert Assessment of Defuzzification values (A)

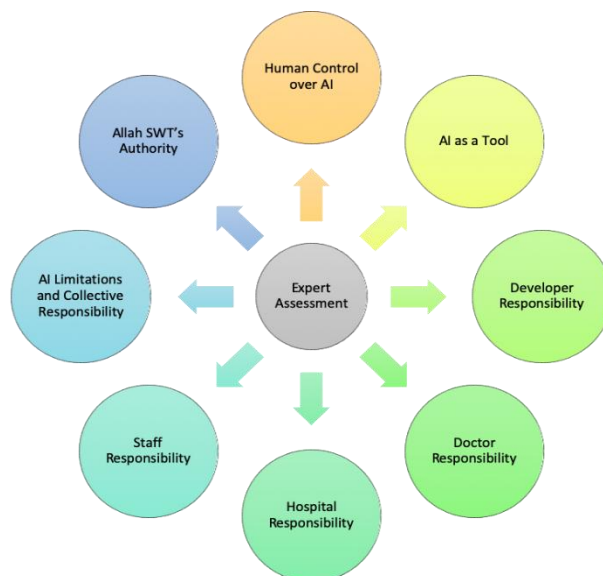
	Item	Percentage of Expert Agreement (%)	Defuzzificati on Value (A)	Item Ranking	Evaluation Status
1	Allah SWT's Authority	85	0.892	6	Accepted
2	Human Control over AI	90	0.925	3	Accepted
3	AI as a Tool	90	0.900	5	Accepted
4	Developer Responsibility	95	0.958	1	Accepted

5	Doctor Responsibility	90	0.933	2	Accepted
6	Hospital Responsibility	95	0.917	4	Accepted
7	Staff Responsibility	100	0.900	5	Accepted
8	AI Limitations and Collective Responsibility	85	0.892	6	Accepted

Summary of Expert Consensus and Study Discussion

Based on the expert consensus obtained through the Fuzzy Delphi Method (FDM), all proposed elements of the SAFAIH model achieved a high level of agreement among the expert panel. The percentage of expert agreement for all items ranged from 85% to 100%, exceeding the minimum consensus threshold commonly adopted in FDM studies. In addition, all defuzzification values (A) were above the acceptable cut-off value, indicating strong expert endorsement of each element. The results demonstrate that the expert panel unanimously agreed on the inclusion of all nine elements in the proposed SAFAIH model. These elements are: Allah SWT's Authority, Human Control over AI, AI as a Tool, Developer Responsibility, Doctor Responsibility, Hospital Responsibility, Staff Responsibility and AI Limitations and Collective Responsibility. All items were therefore accepted and ranked according to their respective defuzzification values. Among the elements, Developer Responsibility recorded the highest defuzzification value, indicating its priority importance in the model, followed by Doctor Responsibility and Human Control over AI. Although Allah SWT's Authority and AI Limitations and Collective Responsibility received comparatively lower rankings, both elements still achieved strong expert consensus and were accepted as essential components of the SAFAIH model. Overall, the findings confirm that the proposed SAFAIH model is conceptually sound and supported by multidisciplinary experts. The high level of consensus reflects the relevance and appropriateness of integrating theological principles, human oversight, professional responsibility, and ethical accountability in the governance of AI within the healthcare context. Figure 4 illustrates the final structure of the nine elements of the SAFAIH model validated through expert consensus.

Figure 4: Shows the Shariah Accountability Framework for Artificial Intelligence in Healthcare



Allah SWT's authority

Allah SWT is the ultimate authority over the human body because He is the one who created, owns and governs human life completely. The human body is not the absolute property of an individual, but is a trust from Allah SWT that must be cared for and used according to the provisions of the Islamic law. Therefore, any intervention on the body, including treatment, surgery and the use of medical technology, must be in line with the will and prohibitions of Allah SWT. In this regard, doctors are not only professionally and legally responsible, but also bear responsibility towards Allah SWT. Every medical action will be questioned in the afterlife, especially if it involves violations of Islamic principles such as causing unnecessary harm, neglecting life, or violating the limits of halal and haram. This principle is in line with the concept of *mas'uliyah* in Islam which emphasizes that every trust will be held accountable. Furthermore, the human body has honor (*ḥurma*) and the status of Islamic protection (*ma'sūmiyya*), both during life and after death. This honor demands that the human body be protected from any abuse, torture, exploitation or manipulation that is not permitted by the Islamic law. Therefore, any medical treatment or procedure is only permissible when there is a legitimate need (*darūrah* or *ḥājah*), is carried out ethically, and aims to the *maqasid shariah*, especially the preservation of life (*ḥifẓ al-nafs*) and human dignity (*ḥifẓ al-'ird*).

Human Control over AI

Islam insists that AI cannot operate autonomously without human control, especially in contexts that involve the human body and life. Therefore, AI-based experiments on humans whose effects and outcomes are unknown are not permissible, as they contradict the principle of preventing harm (*dar' al-mafāsīd*) and the prohibition of taking uncontrolled risks. Humans remain the holders of authority over their own bodies, and any use of AI in medicine must respect informed consent and the patient's right to make decisions. In this regard, doctors are obliged to make AI a support tool, not a substitute for professional judgment, as AI only functions based on data and algorithms. Accordingly, doctors must retain the ultimate authority over diagnostic and clinical decisions, so that accountability remains with humans who are rational, ethical, and responsible under Islamic law.

AI as a Tool

AI itself does not have any responsibility or liability, but the responsibility remains with the humans who use it. Therefore, compensation for harm is a manifestation of justice, to restore the rights of the victim and cover the effects of harm that occurred. If a doctor makes a mistake when using AI that results in injury or death, then the doctor is subject to *ḍamān al-itlāf*, because the harm occurs through his actions even though he is assisted by technology. Similarly, a doctor who is ignorant or does not understand the AI system and causes harm is also subject to *ḍamān al-itlāf*, because ignorance does not relieve responsibility in matters that affect life. In addition, a doctor who is not skilled or inexperienced and still carries out treatment with the help of AI is subject to *ḍamān* with the obligation to return all wages received, because the service does not meet the legal standard of expertise. If the failure of AI is due to the negligence of the hospital, then the liability shifts to the institution through *ḍamān al-'aqd*, in line with the contractual responsibility for the safety and quality of services.

Developer Responsibility

Developers bear the primary responsibility for ensuring that AI systems are developed and used ethically and safely. This includes adherence to the principle of non-harm and the need to protect life. In this regard, developers are required to thoroughly test and validate AI systems before they are used in a clinical setting to avoid unknown risks. Any defects in the design or manufacture of AI systems that lead to harm place the responsibility on the developer as the causal party (*tasabbub*). In addition, developers are responsible for providing clear warnings, guidelines and safety instructions, so that users understand the limits, risks and how to use AI correctly. Developers are also obliged to provide adequate training to hospital staff, so that the use of AI is carried out by competent and informed parties. All of these responsibilities emphasize that developers cannot escape liability on the grounds that technology is autonomous, because sharia and ethical responsibilities remain tied to the humans who develop it.

Doctor Responsibility

In the use of artificial intelligence (AI) in medicine, doctors remain fully responsible for clinical decisions, even if those decisions are influenced by the support of AI technology. AI functions as an aid, not the ultimate determinant, therefore professional and ethical liability does not transfer to technology. In addition, doctors are obliged to use AI in accordance with established clinical, ethical and legal standards, to ensure patient safety and the accuracy of treatment. Doctors are also responsible for ensuring that the staff involved are competent and trained in handling AI technology, so that the risk of errors due to misuse or misinterpretation can be avoided. In addition, doctors are obliged to avoid unnecessary procedures, especially those that are only based on AI recommendations without strong clinical justification. This approach complies with the principles of sharia to prevent harm and preserve the life and dignity of patients.

Hospital Responsibility

Hospitals have an institutional responsibility to ensure the safe use of this technology. Therefore, marketing of AI technology must be done honestly and transparently, without excessive claims that may mislead patients or undermine informed consent. In addition, hospitals are responsible for maintaining the cleanliness, maintenance and sterilization of AI machines to avoid the risk of infection, malfunction or harm to patients. This responsibility includes ensuring that the equipment is always in a safe condition and complies with clinical standards. In addition, hospitals are obliged to provide adequate training to doctors and staff, so that the use of AI is carried out by competent and qualified individuals. All of these responsibilities emphasize the role of hospitals as a party that guarantees safety, quality of service and preservation of life in accordance with ethical principles and *maqasid syariah*.

Staff Responsibility

The responsibility is also not limited to doctors and hospitals alone, but also involves support and regulators. The Information Security Unit is responsible for reviewing and identifying weaknesses in security procedures, particularly regarding patient data protection, privacy and integrity of AI systems. In addition, maintenance engineers are responsible for carrying out periodic maintenance and technical inspections, to ensure that AI systems function properly and do not pose security risks or operational failures.

AI Limitations and Collective Responsibility

Any actions or decisions of AI are considered as losses that have been agreed upon in the space of use of the technology, and do not give rise to legal liability on the AI itself. In situations where the fault is solely caused by the function of AI, liability is not placed on the machine, but rather imposed as a collective responsibility (joint and several liability) on the relevant parties such as the hospital, the system developer and the management. This collective responsibility obliges them to bear the *daman* determined by the court based on the contract, without the need to prove the fault or negligence of a specific individual. This approach emphasizes the limitations of AI and ensures that justice and the protection of patient rights are maintained.

CONCLUSION

In summary, the integration of artificial intelligence (AI) in healthcare must be guided by a comprehensive ethical framework that aligns with the principles of shariah. Islam emphasizes that technology, as a human creation, should serve the higher objectives of preserving life, ensuring justice, protecting human dignity. While AI offers great potential to enhance diagnostic accuracy, efficiency, and accessibility, it must remain under human supervision and moral accountability. Doctors, developers, hospitals, and policymakers each carry distinct yet interconnected responsibilities to ensure that AI is safe, transparent, equitable and used with integrity. Ultimately, the Islamic ethical approach views AI not merely as a technical innovation but as a moral trust (*amanah*) that demands wisdom, accountability and God-consciousness. Upholding these values ensures that the use of AI in medicine contributes to human well-being, advances the common good, and remains in harmony with the divine purpose of knowledge, mercy, and justice.

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Authors' contributions

Ahmad Safwan Bin Yunos : Conceptualization, methodology, formal analysis, investigation, writing, original draft. Muhammad Danial Hakimi bin Nor Shaifulizam : Data curation, funding acquisition. Mohammad Naqib bin Hamdan: Supervision, validation. Zahin bin Mohamad Tahir : writing, review and editing. All author(s) read and approved the final manuscript.

Data Availability

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

Competing Interest

The author(s) declare that they have no competing interests.

Ethics Approval

Informed consent was obtained from all expert panelists involved in the Fuzzy Delphi study.

Use of Artificial Intelligence

ChatGPT was used solely to assist with language editing and to improve the clarity of the manuscript. All content, analysis, arguments, and conclusions were reviewed, verified, and approved by the author(s), who remain fully responsible for the final manuscript.

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