Bridging Legal Education and Practice: An Empirical Insights Into Artificial Intelligence Accountability in Healthcare

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https://doi.org/10.24191/ajue.v20i3.27862

Received: 28 April 2024
Accepted: 16 October 2024
Date Published Online: 28 October 2024
Published: 28 October 2024

Abstract: Legal education calls for the assessment of the new dimension of Artificial Intelligence accountability. As AI revolutionises diagnostics, treatment planning, and patient care in an unprecedented way – it forces us to rethink how healthcare is delivered. Nonetheless, complex legal challenges are introduced by this integration, particularly around accountability for AI-influenced decisions that lead to patient injury or harm. Confronting these concerns ensures that legal graduates are armed with the required skills, foresight and resilience to address emerging legal disputes in a technologically driven world. Admittedly, despite extensive theoretical discussions on the challenges of and approaches to AI accountability, there remains a significant gap in their empirical validation and practical implementation in legal settings. Thus, this research aims to enhance legal frameworks for AI accountability in healthcare by empirically testing the effectiveness of existing theories and developing actionable steps, bridging the gap between theoretical discussions and practical legal applications. Adopting a mixed-methods approach, the research incorporates qualitative analysis from document review with quantitative data of perspectives from 62 legal professionals to comprehend aspects of accountability that demand further scrutiny. The findings indicate significant discrepancies between existing legal frameworks and the rapid development of AI technologies – confirming the general consensus among stakeholders on the exigency to reinvent accountability approach. This research also discovered areas that legal professionals perceived as imperative to AI accountability including but not limited to the development of guidelines on the determination of liability based on roles and responsibilities of stakeholders, training and audit protocol for the deployment of AI in healthcare, AI transparency and explainability standards, comprehensive oversight structures and integration standards of AI into medical practice. These recommendations aim to drive the legal environment with the protection of patient rights and responsible development and use of AI in healthcare at the epicentre. Thus, ensuring that technological boons are reaped safely and ethically.

Keywords: Artificial Intelligence Accountability, Artificial Intelligence in Healthcare, Artificial Intelligence and Legal Liability

1. Introduction

In the world where AI is reshaping the running of mostly critical sectors including healthcare, the implication of AI-decision making is arguably grave, especially if it conflicts with the user's fundamental rights. This entanglement introduces a new dimension of accountability surrounding AI in healthcare, one that forces legal educators to revisit how the assigning of liability can be taught in the classroom. The self learning capabilities of AI, coupled with the black-box property of the technology, are defying the fault-based mechanism underlying all traditional liability rules that was once considered the pillar of our legal system for addressing harm and assigning responsibility. Equipping future legal professionals with the knowledge and insights of this current development prepares them for the dynamic of the legal market in order to stay relevant. This way, legal professionals are slated to foster an environment where technological innovations can co-exist with societal values. The call for agile legal professionals is higher now given that AI is taking more critical roles in fields such as healthcare – where it catalyses innovations across the healthcare ecosystem.

In this context, the domain of AI represents a frontier where the full depth of both its capabilities and risks has yet to be comprehensively mapped, setting it apart from other predecessor technologies. Looking from the upside, the socioeconomic dynamic of AI in healthcare especially, compounded by proven profitable endeavours, create the appetite for its adoption within the sector (Challen et al., 2019). AI's adeptness of identifying meaningful correlation of data and thus producing invaluable and groundbreaking health-related insights are strategically positioned at the heart of the data-intensive healthcare sector. It is progressively driving innovative solutions in clinical applications, healthcare management and administration, research, and development to public and global health (Bélisle-Pipon et al., 2021). In the context of this paper, AI is making strides in clinical decision-making – from supporting medical decisions via real-time assistance (Secinaro et al., 2021), automating diagnostic processes, assessing risk profiles, to optimising therapeutic decisions (Xu et al., 2023) and advancing clinical research (Lekadir et al., 2022), AI's potential in clinical practice is monumental. Applications like IBM Watson for cancer diagnosis (Jie et al., 2021) (Taulli, 2021), IDX-DR for autonomous-detection of diabetic retinopathy, Google's DeepMind Health for advanced eye screening and treatment, automated interpretation of cardiac imaging data processing and risk assessment in cardiology, to name a few – are making us rethink of how healthcare is delivered.

Yet, despite AI's capacity to perform miracles in healthcare settings, it also walks a fine line, teetering between revolutionary benefits and risky pitfalls. In situations where AI potentially harms a patient, the question of responsibility is multifaceted. Should liability fall upon the designer of the initial algorithms, the technician who inputs the data, such as the echocardiograph operator, or the clinician who decides how much weight to give to the AI's recommendations when they conflict with other visible but unrecorded clinical evidence? The legal community is currently confronting a bottleneck caused by an influx of theories that attempt to reconcile AI-related incidents with the conventional approach of imposing liability (Mohd Shith Putera & Saripan, 2019). This is simply because the nature of AI defies every bit of our understanding of causal attribution and accountability. To apply conventional regulatory paradigms to AI, devoid of autonomous learning capabilities, proves ineffective. Due to AI being a novel technology with unprecedented risks, the notion of attributing liability that is taught in classrooms for law students has been profoundly affected. This shift forces future legal professionals to start rethinking how liability imposition can be approached when intelligent systems are introduced. Incorporating a renewed understanding of liability, along with leveraging high-tech tools such as AI and Augmented Reality to nurture students' critical thinking skills, is crucial in legal education. These advanced technologies not only enhance graduates' practical capabilities but also provide innovative platforms for developing deeper analytical abilities essential for addressing complex legal issues (Sulistyanto et al., 2024). Recent research highlights that while AI tools like ChatGPT present concerns over academic integrity, they also offer immense potential for enhancing critical thinking and intellectual integrity when used responsibly in educational contexts (Plata et al., 2023). By integrating technology-driven critical thinking into legal training, students are better equipped to handle multifaceted challenges, elevating the overall quality of education and ensuring high standards of practice in the legal profession, ultimately benefiting society and upholding legal integrity.

Although the literature is replete with discussions on the challenges of resolving accountability issues in AI and the relevant liability rules, notably, none of these proposed theories have been empirically evaluated for their effectiveness, likely due to the scarcity of AI-related cases presented in courts. Likewise, the involvement of legal professionals in resolving these accountability issues in practice is rather nominal despite their fundamental role in shaping liability rules. Therefore, this research aims to enhance legal frameworks for AI accountability in healthcare by empirically testing the effectiveness of existing theories among legal professionals and developing actionable steps, bridging the gap between theoretical discussions and practical legal applications. The practical implications of this research lie in its attempt to integrate empirical evidence into theoretical frameworks, which thereafter facilitates the development of responsive legal structures that stay ahead of the curve in AI advancements. Ultimately, the research contributes to the broader social goal of demarcating healthcare services while safeguarding patient rights in a technologically ingrained healthcare setting.

2. Literature Review

2.1 Associated Risks of Artificial Intelligence in Healthcare

Even with the promising impact in healthcare, AI-guided clinical solutions in healthcare host a series of risks that could potentially result in safety concerns for the end-users of healthcare services. And all these stems from non-other than the intricate labyrinth of data that underpins the AI algorithms. Clinical data risks of AI algorithms span its entire life cycle, from data acquisition and collection, data quality, as well as development and use. Over time, more data-related risks are emerging to light and reflected in the unwavering commitment of the health systems that are actively seeking to reap the benefits of AI while also beginning to define principles of appropriate conduct (Macrae, 2019). Problems such as contextual differences of training dataset and real-life applications (McKee & Wouters, 2023), representativeness and completeness of data (Hamid, 2016), opacity, and inscrutability of the inner workings of AI (Nordlinger et al., 2020) as well as the practical implementation of AI into the clinical workflow and the entire healthcare system in general are challenging the law as the gatekeeper of patients' safety and security with regards to medical technologies.

A particularly illustrative example of the associated risks is found in IBM Watson for Oncology, designed to recommend cancer treatments based on both clinical expert training and an extensive database of research and cases. This innovative AI system, although offering substantial improvements to the delivery of healthcare, is daunted with news of inappropriate and potentially dangerous recommendations. For instance, since Watson primarily learns from synthetic data derived from hypothetical scenarios rather than real patient data, it consequently suggested experimental and aggressive cancer treatment for specific patient profiles (Takshi, 2021). These inconsistencies revealed a mismatch between training environments and real-world medical settings, proving the dangers of overreliance on AI without sufficient oversight. Furthermore, the generalizability of Watson's recommendations spanning various populations and healthcare providers is put to question given the system's reliance on a focused training dataset – commonly sourced from single-institution studies (Yew, 2021). This situation reflects the broader issue of ensuring data diversity and representativeness of AI applications in healthcare. Additionally, the black-box nature of the decision-making process in AI systems like Watson muddles the ability to comprehend the basis of its recommendations, thus complicating the clinician's judgement as to when to rely on an AI's output or override it (Bathaee, 2018). Table 1 below provides a range of adverse outcomes, demonstrating the diverse complications that can arise from various AI applications in healthcare settings.

Table 1. Risks and harms of AI Applications in healthcare settings

Source	AI Application	Risk/Harm Measure
(Lenskjold et al., 2023)	Knee osteoarthritis artificial intelligence (AI) algorithm	The accuracy and reliability of diagnostic tools
(Kristiansen et al., 2022)	Clinical implementation of AI	Erroneous and biased data used for training AI
(Banja, 2019)	AI in healthcare	Unintended consequences of machine learning
(Muley et al., 2023)	Pneumonia detection in chest radiographs	Variable generalization performance of deep learning model
(Choudhury & Allen, 2023)	AI-powered recommendation system used by doctors	Potential bias in the AI tool due to exposure to specific patient types
(Jongsma et al., 2024)	AI skin classifier	Deep neural networks (DNNs) make mistakes in image-based medical diagnoses that humans are less likely to make
(Saeed et al., 2023)	AI-based computer-guided surgery for implant placement in partially edentulous patients	Accuracy of implant placement
(Ahn et al., 2023)	AI system for breast cancer screening	Diagnostic performance
(Asokan et al., 2023)	AI for otolaryngology	Inaccurate and incomplete generation of information

2.2 Accountability Challenges, Approaches, and Complexities in AI-Driven Healthcare

Following the rapid evolution of Artificial Intelligence (AI) in healthcare, defining legal liability poses a challenge that calls for innovative and adaptive legal solutions. Considering the increased integration of AI technologies into diverse medical specialties, including oncology, radiology, and cardiology, the boundaries of traditional rules of accountability are stretched thin. Both scholars and practitioners worldwide are grappling with these complexities, as they develop different perspectives and proposals to ensure that the rapid advancements in medical technology align with ethical standards and legal responsibilities (Saripan et al., 2021).

A critical examination of the conventional liability framework reveals its inadequacy in addressing the complexities introduced by AI systems, considering that the frameworks are initially designed to address physician malpractice and fail to consider the broader ecosystem that now involves AI developers and healthcare institutions (Rimkute, 2024). This oversight becomes particularly problematic given the "black box" nature of AI, which obscures how decisions are made by the system or which data were factored in prior to output generation (Yavar Bathaee, 2018). For instance, when AI systems misdiagnose or provide incorrect treatment recommendations, the opaque nature of these algorithms makes it difficult to trace and prove causation. This blurs the otherwise straightforward lines of responsibility between actions and results.

One notable suggestion involves the adoption of legal personhood for AI, an idea that stems from the recognition that current legal frameworks are insufficiently equipped to assign responsibility when autonomous systems perform actions that have legal consequences (Eldakak et al., 2024). Advocates for legal personhood argue that this approach enables them to be directly sued and thus potentially simplifying the liability equation (Bottomley & Thaldar, 2023). Critics of legal personhood caution against its potential implications that this approach might oversimplify the profound ethical and legal implications of comparing non-sentient systems with human or corporate entities (Ai, 2019). There is also a pressing matter regarding the feasibility of exercising judgement against AI entities, particularly in relation to matters of compensation and deterrence (Nurus Sakinatul Fikriah et al., 2016).

Arguably, such a framework could either hold AI systems accountable, or it would only shift liability away from human operators and developers responsible to monitor these technologies (Chen & Burgess, 2019). In response to these criticisms, the concept of common enterprise liability has been proposed as an alternative, which aims to hold all stakeholders in the AI ecosystem—developers, healthcare providers, and institutions—jointly responsible for any harm caused by AI technologies (Chan, 2021). Notwithstanding the dynamic approach of assigning collective accountability that ensures all parties retain high standards of care and diligence, it has faced criticism for possibly watering down individual responsibility (Marotta, 2022). Distributing liability across multiple entities would also undermine the identification of specific areas of negligence or malfeasance. There are concerns too that smaller participants in the ecosystem, such as startups, might find themselves disproportionately impacted by legal actions aimed at larger, better-resourced entities.

Given these challenges and the sensitivity of healthcare applications, there is a growing call to modify the standard of care when it comes to AI in healthcare, recognizing the capabilities and limitations of AI (Li et al., 2022). This adaptation aims to clarify the legal responsibilities of healthcare providers when using AI technologies. In particular, the establishment of clear guidelines pertaining to the incorporation of AI into clinical practice is hoped to better refine the evaluation of malpractice claims and assuring that care standards are maintained (Soyer & Tettenborn, 2022). However, this initiative certainly comes with a cost. The intricacy and opacity of AI algorithms complicate efforts to comprehend and document the causes behind their clinical recommendations, posing a barrier to setting clear, universally applicable standards (Amrita Vasudevan, 2024). Compounding this issue, the rapid evolution of AI technology often outpaces the adjustments of legal frameworks and clinical guidelines, which results in discrepancies in maintaining care standards (Lior, 2020). Addressing these challenges necessitates not only achieving a broad consensus on these guidelines but also securing extensive collaboration between the medical and communities—a task which itself is no small feat. Additionally, the implementation of these standards introduces further difficulties, requiring robust mechanisms for monitoring compliance and managing violations. This complex interplay emphasises the need for substantial resources and enhanced coordination.

Another significant theme involves enhancing algorithmic transparency and accountability. For instance, Rowland et al. highlight the importance of developing AI-powered clinical decision support tools that are both interpretable and transparent (Rowland et al., 2022). This enables healthcare providers to understand the basis of AI recommendations, nurturing trust and facilitating better-informed clinical decisions. The initiative aligns with the European Union's General Data legal Protection Regulation (GDPR), which emphasises transparency in automated decision-making (Wachter et al., 2020). Its aim is to ensure that individuals can understand and question the outcomes of AI systems, potentially serving as a model for similar regulations in the healthcare sector. Likewise, Rainmondo et al. motioned the establishment of strict protocols to continuously monitor and audit AI systems, ensuring their reliability and safety. The need for robust oversight mechanisms echoes initiatives like the U.S Food and Drug Administration's (FDA) proposed regulatory frameworks for AI/Machine Learning (ML)-based Software as a Medical Device (Harvey & Gowda, 2020). These frameworks emphasise the importance of ongoing assessment and reassessment of AI applications after deployment to effectively manage risks. The protocols are not only crucial for ensuring the expected performance of AI systems but also for preventing any unintended harm caused by these systems (M Gassner & Juknat, 2019). Ultimately, they will protect patient safety and maintain the integrity of healthcare practices. This push for greater algorithmic transparency and rigorous auditing practices reflects a broader recognition of the complex interplay between technology and accountability in healthcare, suggesting that the development and refinement of legal standards must keep pace with technological advancements to address AI's critical concerns effectively (Minssen et al., 2020). The scholarly recommendations for clearer guidelines and stronger oversight are not merely academic but resonate with practical, regulatory actions being implemented or considered in various jurisdictions, pointing to a consensus on the path forward in managing AI's integration into healthcare settings.

As the conversation around governance evolves, the role of international collaboration in managing liability related to AI is increasingly recognised, as evidenced by Price et al. in their study, suggesting that physicians should enhance their knowledge of AI algorithms and actively participate in

assessing and shaping AI technologies to ensure that clinical requirements comply with legal standards (Price et al., 2022).

3. Methodology

This study employed a mixed-methods approach, incorporating qualitative analysis from document review with quantitative data of perspectives from legal professionals to comprehend the accountability challenges posed by AI in healthcare. Initially, the qualitative phase involved a systematic examination of academic and legal documents, outlining five primary themes: legal and ethical standards; responsibility and liability allocation; transparency and communication; integration of AI with medical practice; and regulatory oversight mechanism. These themes were then operationalized into a structured 5-point Likert scale questionnaire, targeted at 62 legal professionals serving a critical role in framing legal frameworks around AI in healthcare. This survey assessed their perceptions of the adequacy and effectiveness of these approaches to AI accountability. The data analysis triangulates findings from both the document review and the survey to confirm and deepen the understanding of the identified themes. This method both addresses consensus and dissent among legal experts as well as ensuring that the conclusions were robust, aligning theoretical frameworks with practical perspectives. It offers a comprehensive overview of current strategies and innovations in handling AI accountability in healthcare.

4. Results and Discussions

The questionnaire survey managed to secure a total of 60 respondents. Respondents represented a variety of legal professions, including lawyers, legal counsels, academics, regulators and officials in the judiciary. Results for the questionnaire survey are summarised in Table 2, given as a percentage of respective answers.

Table 2. Summary of Questionnaire Results

	Questionnaire Items	1	2	3	4	5
	Legal and Ethical Standards					
1.	The current legal frameworks adequately protect patient rights in the deployment of AI in healthcare.	12.7%	27.3%	50.9%	7.3%	1.8%
2.	There is an urgent need to modify existing laws to address the unique challenges posed by AI technologies.	0.0%	1.8%	10.9%	38.2%	49.1%
3.	New legal protocols are essential for managing AI-related ethical dilemmas in healthcare settings	0.0%	1.8%	9.1%	40.0%	49.1%
4.	The opacity of AI algorithms in healthcare significantly complicates legal accountability	0.0%	0.0%	28.3%	45.7%	26.1%
5.	Ethical guidelines in healthcare sufficiently cover the emerging issues related to AI.	10.9%	26.1%	39.1%	17.4%	6.5%
6.	Patients' confidentiality and privacy are at risk due to AI integration in healthcare.	0.0%	2.2%	37.0%	43.5%	17.4%
7.	The current ethical training for healthcare professionals adequately addresses AI issues.	13.0%	23.9%	52.2%	10.9%	0.0%
8.	Stronger regulations are needed to control the use of AI in sensitive healthcare areas.	0.0%	2.2%	15.2%	45.7%	37.0%
9.	There is enough legal guidance to handle disputes involving AI in healthcare.	23.9%	26.1%	41.3%	6.5%	2.2%
10.	Legal professionals are adequately prepared to deal with AI-related cases in healthcare.	17.4%	37%	34.8%	8.7%	2.2%
	Responsibility and Liability Allocation					

	Questionnaire Items	1	2	3	4	5
1.	Liability for errors made by AI in healthcare should primarily fall on the shoulders of AI developers.	0.0%	12.7%	40%	27.3%	20.0%
2.	Healthcare providers should be held accountable when AI tools fail to perform as expected.	3.6%	10.9%	29.1%	38.2%	18.2%
3.	The current liability laws are sufficient for addressing AI-induced errors in healthcare.	7.3%	32.7%	40.0%	14.5%	5.5%
4.	A common enterprise liability framework would effectively distribute responsibilities among all stakeholders in AI healthcare.	2.2%	2.2%	45.7%	21.7%	28.3%
5.	Insurance policies should be revised to better cover AI-related claims in healthcare.	0.0%	2.2%	13.0%	41.3%	43.5%
6.	There should be mandatory liability insurance for providers using AI technologies.	2.2%	2.2%	15.2%	39.1%	41.3%
7.	The roles and responsibilities of each party involved in AI healthcare should be clearly defined and regulated.	0.0%	4.3%	6.5%	32.6%	56.5%
8.	A transparent mechanism for reporting AI failures and errors should be established in healthcare settings.	0.0%	4.3%	8.7%	26.1%	60.9%
9.	Healthcare institutions should bear the greatest responsibility for AI-related mishaps.	2.2%	15.2%	50.0%	15.2%	17.4%
10.	Stakeholders are currently well-informed about their legal responsibilities in AI applications in healthcare.	8.7%	26.1%	47.8%	13.0%	4.3%
	Transparency and Communication					
1.	AI algorithms used in healthcare should be fully transparent to both users and patients.	0.0%	1.8%	14.5%	40.0%	43.6%
2.	Sufficient information about AI technologies is provided to patients to make informed decisions.	3.6%	16.4%	23.6%	25.5%	30.9%
3.	Healthcare providers fully understand the risks associated with the use of AI in their practices.	3.6%	27.3%	36.4%	23.6%	9.1%
4.	Communication about the benefits and risks of AI is clear and frequent among healthcare teams.	6.5%	19.6%	50%	17.4%	6.5%
5.	Patients have adequate access to recourse if AI technologies fail to perform as expected.	6.5%	30.4%	39.1%	17.4%	6.5%
6.	There is a high level of trust in the information provided about AI technologies in healthcare.	8.7%	17.4%	43.5%	23.9%	6.5%
7.	Transparency in AI decision-making processes strengthens patient trust in healthcare services.	0.0%	2.2%	37.0%	39.1%	21.7%
8.	The potential adverse effects of AI are well communicated to all healthcare stakeholders.	6.5%	21.7%	52.2%	13.0%	6.5%
9.	AI developers are transparent about the limitations of their technologies.	6.5%	28.3%	52.2%	8.7%	4.3%
10.	Adequate mechanisms are in place to update patients and providers about changes in AI technologies.	6.5%	32.6%	45.7%	10.9%	4.3%
	Integration of AI with Medical Practice					
1.	AI technologies should only assist, rather than replace, healthcare professionals in making clinical decisions.	0.0%	3.6%	18.2%	32.7%	45.5%

	Questionnaire Items	1	2	3	4	5
2.	It is important that AI technologies in healthcare settings maintain a high standard of patient care without compromising human oversight.	0.0%	5.5%	21.8%	25.5%	47.3%
3.	There should be clear guidelines on how AI tools integrate into the healthcare providers' daily workflows to ensure consistency and safety.	0.0%	1.8%	16.4%	27.3%	54.5%
4.	Ongoing training programs should be mandated for healthcare providers to keep pace with the deployment of new AI technologies.	0.0%	4.3%	15.2%	19.6%	60.9%
5.	Healthcare providers should receive comprehensive information on how AI tools can minimize diagnostic errors and improve patient outcomes.	0.0%	4.3%	15.2%	21.7%	58.7%
6.	Regular performance audits and system updates should be mandatory for AI technologies to maintain safety and reliability in clinical settings	0.0%	2.2%	13.0%	23.9%	60.9%
7.	There should be structured feedback mechanisms from healthcare professionals to AI developers to ensure continuous improvement of AI technologies.	0.0%	4.3%	17.0%	25.5%	53.2%
8.	Support mechanisms should be robust and readily available for healthcare providers who encounter challenges in using AI technologies.	0.0%	2.1%	10.6%	27.7%	59.6%
9.	Protocols should be established to ensure that all AI-generated recommendations are reviewed by qualified healthcare professionals before implementation	0.0%	2.1%	12.8%	25.5%	59.6%
10.	There should be established benchmarks for AI performance in clinical settings to ensure it meets traditional standards of care.	0.0%	2.1%	12.8%	21.3%	63.8%
	Regulatory and Oversight Mechanisms					
1.	Effective regulatory mechanisms are in place to monitor the safety and effectiveness of AI systems in healthcare.	7.1%	21.4%	48.2%	12.5%	10.7%
2.	Specialized bodies overseeing AI in healthcare improve compliance with regulations.	0.0%	3.6%	33.9%	32.1%	30.4%
3.	Cross-disciplinary collaboration has been effective in addressing the challenges of AI in healthcare.	0.0%	7.1%	44.6%	25.0%	23.2%
4.	There are sufficient audits of AI systems to ensure they do not deviate from approved ethical standards.	8.5%	17.0%	61.7%	4.3%	8.5%
5.	The current regulations are adequate to promote innovation while ensuring patient safety.	10.6%	25.5%	51.1%	8.5%	4.3%
6.	Healthcare providers are regularly informed about regulatory changes affecting AI technologies.	10.4%	20.8%	50.0%	8.3%	10.4%
7.	Patient feedback is incorporated into the regulation of AI healthcare technologies.	4.2%	12.5%	60.4%	14.6%	8.3%
8.	Continuous training on regulatory compliance is provided for all stakeholders in AI healthcare.	6.3%	6.3%	56.3%	14.6%	16.7%
9.	Regulations are promptly updated to reflect technological advancements in AI.	8.3%	22.9%	45.8%	14.6%	8.3%
10.	Oversight bodies effectively manage conflicts of interest in AI applications in healthcare.	2.1%	12.5%	60.4%	16.7%	8.3%

Legal and Ethical Standards:

As the influence of AI in healthcare continues to expand, so do the concerns regarding the need for more comprehensive legal frameworks and ethical guidelines. Survey results illustrate that a significant majority find the current law fails to sufficiently protect patient rights (58.2% disagreeing) and their data confidentiality (60.9% agreeing), explaining the academic calls for reform. Particularly, 87.3% of respondents urge the modification of existing laws to the nuances of AI as well as establishing new legal protocols (89.1% agreeing) to effectively manage AI-related ethical dilemmas. In particular, regarding the issue of transparency as 71.8% agree that the opacity of AI complicates legal accountability.

The movement to enhance existing legal frameworks to mitigate AI risks in healthcare is neither novel nor recent.The United States in this context, stands at the forefront of AI-related health law by proposing the total product life-cycle approach, fostering the culture of safety and effectiveness of machine learning-based medical devices throughout its entire product development and post-market adoption (Sampson et al., 2019). This approach appreciates the self-learning and adaptive nature of AI, suggesting that developers are responsible to observe and document possible modifications of their product after being delivered and used. Globally, various regions are advancing their legal frameworks to effectively manage AI in healthcare. The European Union ("EU") introduces the Artificial Intelligence Act to pioneer in setting stringent regulations for high-risk AI applications, including in healthcare (van Oirschot, 2022). The vision behind the Act is to ensure transparency, data governance, and accountability, thereby acting in an analogous fashion to the established guidelines established by the UK's National Health Service (Morley et al., 2022). Similarly, Singapore has implemented the Model AI Governance Framework, emphasising human-centric, transparent, and accountable AI applications, particularly in healthcare settings (Zahra & Nurmandi, 2021). The modernisation of legal framework measures are seen as a unified global front towards secure and responsible AI integration in health sectors. For a developing country like Malaysia, acknowledging the shortcomings of the current legal framework offers a sense of hope for the future legal community as it encourages increased dialogue regarding the matter, especially as the technology becomes more prevalent across various sectors. For a developing country like Malaysia, acknowledging the shortcomings of the current legal framework implies a promising future for the legal community as it encourages increased dialogue regarding the matter, especially as the technology becomes more prevalent across various sectors. This proactive stance not only anticipates future challenges but also positions Malaysia to adapt effectively in a rapid digital evolution.

Despite mixed responses on the adequacy of current ethical guidelines, a notable portion feels existing guidelines fail to address specific AI challenges (34.8% disagreeing), suggesting a gap that needs filling with more detailed ethical frameworks. This is consistent with Prem as he pointed out that the ethical frameworks for AI often lag behind the rapid advancement of AI technologies, making it challenging to ensure that AI development and deployment align with ethical principles, especially concerning transparency and patient autonomy (Prem, 2023). The survey results also align with the arguments presented by Jordon et al., confirming that traditional approaches to data privacy fall short in the face of AI's ability to synthesise and re-identify anonymized data (Jordon et al., 2020). Such abilities adversely affect patient confidentiality (60.9% agreeing), thereby supporting the need for enhanced data protection measures that consider the constant evolution of technological advancements to safeguard sensitive health information effectively.

The survey also indicates a significant demand for stronger regulatory oversight in sensitive healthcare areas. According to Forcier et al, the rapid integration of AI into healthcare necessitates robust governance frameworks with flexible and responsive regulations that can effectively manage risks without impeding innovation (Forcier et al., 2019). They emphasise the need for regulations that are both flexible and responsive, a view supported by the 82.7% of survey respondents pressing for stronger oversight, primarily in sensitive healthcare domains. Furthermore, Civaner et al. argued the inadequacy of the existing training routines in medical and health informatics to educate practitioners for the complexities introduced by AI technologies, thus strengthening the call for enhanced training for healthcare professionals (Civaner et al., 2022). They proposed the necessity for educational reforms

surrounding AI literacy as a core component of medical education, reflecting the concerns of 63.1% of survey participants who find current training inadequate. Likewise, the respondents are divided on the preparedness of legal professionals to handle AI-related cases, with 52.2% sharing that current capabilities are inadequate, pointing to an essential need for tailored educational initiatives to equip future legal professionals with the required AI expertise. Evidently, the statistics show that the rapid integration of AI in healthcare urgently requires targeted reform to ensure legal and ethical frameworks are adequately equipped to handle the complexities introduced by these technologies.

Responsibility and Liability Allocation

Survey results on liability and accountability in AI healthcare deployment reveal a complex landscape that reflects diverse opinions on the need for updated legal frameworks and insurance policies. There is a distinguished consensus on the inadequacy of current liability laws, with 72.7% indicating a need for revision, notwithstanding the mixed sentiment on whether AI developers or healthcare providers should bear primary responsibility for errors (with 47.3% inclined towards agreement on developer liability and 56.4% on provider accountability). The conflicting view reflects Abbott's concern, suggesting that current liability frameworks are inadequate for AI's exceptional challenges and pleading for a shared or shifted liability model according to each party's role and contributions (Abbott et al., 2020).

This view is corroborated by survey data registering that a robust 89.1% agree on the necessity of clearly defining roles and responsibilities, coupled with a strong demand (87%) for transparent reporting mechanisms for AI failures, demonstrating a collective shift towards greater transparency and accountability that aligns with Abbott's recommendations. Building on this consensus, a substantial majority also support revising insurance policies (84.8%) and mandating liability insurance for providers using AI technologies (80.4%), emphasising a preventive approach to managing potential repercussions and further enhancing accountability within the field (Bechtold et al., 2021). Interestingly, radical reforms are underway such as endowing AI with legal personhood linked with mandatory insurance, thereby making algorithms capable of both owning assets and being sued in court, owing to shifted focus of the public policy dialogue now gradually looking at negative externalities of algorithms (Ai, 2019).

Moreover, the majority of respondents express a considerable lack of understanding concerning legal obligations, as evidenced by 82.6% reporting inadequate knowledge. This shortfall of stakeholders knowledge indicates an urgent need for improved educational and regulatory measures to safeguard responsible AI deployment in healthcare. This reflects a broader call for a collective approach to liability, suggesting that responsibilities should be distributed among all stakeholders involved in AI healthcare.

Transparency and Communication:

The survey responses indicate varied perceptions on the transparency and understanding of AI technologies in healthcare. 83.6% of respondents believe that algorithms should be fully transparent to both users and patients, indicating a strong majority viewing the importance of transparency in building trust and enabling informed decision-making. This finding is supported by scholarly discussions, such as those by Deshmukh & Rathi, asserting transparency as a foundational element in building trust in AI systems (Deshmukh & Rathi, 2022). Transparency in AI is deemed essential to enable informed decision-making by both users and patients.

However, a differing view is evident on whether patients are sufficiently informed about AI technologies to make informed decisions, with only 56.4% agreeing that adequate information is provided. This corresponds to concerns raised by various scholars pertaining to the "black box" nature of AI. This characteristic of AI could complicate the decision-making process by making it more obscure, introducing uncertainty for patients and providers alike (Straw, 2020) (Li et al., 2022)(Singh & Segaran, 2022). There is also concern regarding the safe integration of AI in clinical settings considering the possible gap in knowledge regarding AI risks as only 32.7% of healthcare providers feel fully informed. Petersson et al. recognised that this gap involved understanding the practical

implementations of AI technology and addressing the varying levels of acceptance of this technology among healthcare leaders, professionals, and patients (Petersson et al., 2022).

The survey also reveals that the majority (76.1%) find communication regarding the benefits and risks of AI within healthcare teams inadequate and fail at being clear and frequent. Similarly, just 23.9% believe that patients have adequate recourse if AI technologies fail, pointing to a significant area for improvement in patient rights and protection. There is moderately low trust in the information provided about AI technologies, with only 30.4% expressing a high level of trust. Thus, underscoring the need for greater transparency and clearer communication. While 60.8% of the respondents agree that transparency in AI decision-making processes is crucial for strengthening patient trust, 19.5% believe that the potential adverse effects of AI are well communicated to all stakeholders. The numbers support Scherer's advocacy for stronger mechanisms to oversee and communicate AI risks to all the parties involved (Scherer, 2015). Additionally, only 13% agree that AI developers are transparent about the limitations of their technologies, and a mere 15.2% view that there are adequate mechanisms to update patients and providers about changes in AI technologies. These results collectively highlight significant challenges in communication, transparency, and understanding, all of which are critical for the ethical integration of AI into healthcare practices.

Integration of AI with Medical Practice

According to the responses, it appears that there is a strong consensus for the supplementary role of AI in healthcare, requiring its function to remain as an assistive tool rather than substituting healthcare professionals, with 78.2% of respondents agreeing. It can be inferred that human oversight remains crucial, evidenced by 72.8% of respondents supporting the importance of maintaining high standards of patient care without compromising human control. The responses reaffirmed the discussions presented in Allain's work, emphasising AI's potential to augment the capabilities of healthcare providers, rather than diminish their roles (Allain, 2013). This perspective is also supported by Bekbolatova et al. which focuses on the importance of AI in enhancing diagnostic accuracy while still underlining the irreplaceable value of human oversight (Bekbolatova et al., 2024).

Additionally, a streamlined integration of AI into daily healthcare workflows is dependent on the establishment of clear guidelines, as supported by 81.8% of the respondents. Most healthcare providers recognize the importance of continual education, with over 80% supporting the requirement for compulsory training programs to match the speed of AI integration

Similarly, 80.4% of respondents called attention to better expertise and resource sharing in the healthcare applications of AI by providing comprehensive information on AI's core competencies. The information extends to regular performance audits and updates for AI systems which is considered crucial for maintaining clinical safety and reliability and thus receiving strong support, with 84.8% agreement. Besides that, around 87.3% agreed that support mechanisms for healthcare providers handling AI and protocols for interpreting AI AI-generated recommendations by qualified professionals ought to be in place, representing a clear consensus on the need for robust support and procedural safeguards. Moreover, setting performance benchmarks for AI in clinical settings to comply with traditional standards of care, is supported by 85.1% of respondents, reinforcing the significance for accountability and measurable effectiveness in AI applications in healthcare.

On the other hand, a majority of respondents are in agreement that structured feedback mechanisms from healthcare professionals to AI developers is imperative, suggesting a collaborative approach to continuous improvement of AI technologies. In this sense, Martínez-García believed that such measures are essential to leverage AI applications in real-world clinical settings (Martínez-García, 2022). They support the establishment of ongoing feedback cycles between AI developers and healthcare providers to enhance AI technologies according to the real-world complexities and difficulties in medical settings.

Regulatory and Oversight Mechanisms

The survey results for this particular theme garnered mixed perceptions among stakeholders. For instance, literature such as Johnson et al. (2021) and Shaheen (2021) criticise the responsiveness

and adequacy of current regulatory approaches in the face of rapidly evolving AI technologies (Johnson et al., 2021) (Shaheen, 2021). Interestingly, although a plurality of respondents (48.2%) agreed that current regulatory mechanisms moderately monitor the safety and effectiveness of AI systems in healthcare, only a combined 23.2% shared stronger confidence in these regulations, signifying room for improvement in regulatory frameworks. Auditing, which is key to ensuring adherence to ethical standards, is reported to be inadequate, with only 12.8% feeling that current initiatives are satisfactory. The establishment of specialised bodies to oversee AI in healthcare is welcomed positively, with 62.5% of respondents affirming that such bodies improve compliance with regulations. This correlates with recommendations from academic and policy circles demanding for more dedicated governance architectures to enhance compliance and oversight efficacy (Schmitt, 2022). The call is aligned with the need for dedicated bodies to address the complex ethical and regulatory challenges posed by AI through tailored governance in techno-regulation (Muley et al., 2023). Similarly, cross-disciplinary collaboration integrating diverse expertise is perceived as fundamental and effective by 48.2% of participants in resolving the multifaceted challenges of AI in healthcare,

Additionally, only a small fraction of respondents (12.8%) consider that current regulations provide adequate balance between innovation and patient safety. This suggests a perceived need for regulatory frameworks that drive innovation while protecting patients – a rather far-reaching vision that the world strives to achieve. Even with the relatively gradual regulatory adaptation of AI, only 18.7% of respondents reported that healthcare providers are regularly informed about regulatory changes, and 31.3% confirm that continuous training on regulatory compliance is provided. The statistics reverberate with studies by Federspiel et al., highlighting mismatch in education and communication about rapidly changing regulations (Federspiel et al., 2023). On the subject of adaptability, only 22.9% of respondents believe that regulations are quickly revised to keep up with technological progress, potentially slowing the integration of new AI solutions. Moreover, only a quarter of those surveyed view the management of conflicts of interest by oversight bodies as effective, raising questions about the integrity of regulatory processes within AI healthcare applications. Together, these responses paint a picture of cautious scepticism regarding the current effectiveness and sufficiency of regulatory measures for AI in healthcare, pointing out areas where improvements could better match the swift advancements in technology and ethical demands.

5. Recommendations and Way Forward

Resolving the issue of AI accountability in healthcare is indeed complex, with various perspectives to address that include an overwhelming array of technical details and legal propositions. The intricacy often results in the topic becoming more of a theoretical discourse rather than producing actionable solutions. This research expands from previous studies by empirically evaluating the perspectives of legal professionals on a range of proposed approaches, as summarised in Table 3 below. While it is acknowledged that these approaches are somewhat generic, this study serves as a foundational step, paving the way for more detailed investigations in future research to refine and specify these initial frameworks.

Table 3. Focus Area of Recommendations for AI Accountability

Area	Recommendations
Legal and Ethical Standards	1. Legal frameworks should be updated to address AI-specific nuances (transparency, self-adaptiveness and system modifications post-market). 2. New legal protocols are to be developed for managing AI-related ethical dilemmas. 3. Robust data protection measures should be implemented to ensure patient confidentiality 4. Targeted educational initiatives should be implemented to equip legal professionals for handling AI-related cases.

Area	Recommendations
Responsibility and Liability Allocation	1. Liability laws and insurance policies specific to AI use in healthcare should be revised. 2. Clear roles and responsibilities for all stakeholders involved in AI deployment should be defined. 3. Transparent reporting mechanisms for AI failures should be implemented. 4. Knowledge and information on legal responsibilities and regulatory measures should be enhanced.
Transparency and Communication	1. Full transparency of AI algorithms to users and patients should be ensured. 2. Communication about AI risks and benefits within healthcare teams should be improved. 3. Clearer communication strategies should be developed to inform patients about AI technologies. 4. Mechanisms for regular updates about changes in AI technologies to all stakeholders should be established.
Integration of AI with Medical Practice	1. AI should be maintained as an assistive tool, not a replacement for human professionals. 2. Clear guidelines for integrating AI into daily healthcare workflows should be developed. 3. Ongoing training on new AI technologies should be mandated for healthcare providers. 4. Regular performance audits and updates for AI systems should be established. 5. Structured feedback mechanisms between healthcare professionals and AI developers should be created.
Regulatory and Oversight Mechanisms	1. Regulatory frameworks should be improved to better monitor AI safety and effectiveness. 2. Specialized oversight bodies for AI in healthcare should be established. 3. Cross-disciplinary collaboration to address AI challenges should be fostered. 4. Sufficient ethical audits of AI systems should be ensured. 5. Conflict of interest management by oversight bodies should be enhanced.

It is pertinent to note that contributions from various stakeholders are the key to solving the accountability issues of AI in healthcare and it is not confined within the legal fraternity. Understandably, this is not specific to AI technology, but extends to all facets where technology intertwines with public good. This collaboration could generate more industry-oriented proposals, such as establishing safety and oversight standards. Law schools are progressively joining this ecosystem, living to its pivotal role in the discussion of AI regulation. For instance, the Faculty of Law at Universiti Teknologi MARA offers an elective on AI and Law to equip students with the fundamentals of AI risk, including its associated legal, technical, and societal risks. Furthermore, future studies could build from this research by detailing the focus area of recommendations by engaging with experts from other disciplines such as data science, healthcare informatics, policy study. Broadening the research focus with contributions from relevant stakeholders ensures that future studies are able to transition from developing theoretical models to practical implementations of AI accountable frameworks.

This paper contributes to the discussion on AI accountability in healthcare by identifying guidelines and regulatory recommendations that strengthen accountability mechanisms. It reinforces the need to rethink the concept of accountability when a novel contrivance is concerned, a development that is rather significant for legal education. A critical examination of this topic not only deepens our understanding of AI's implications on the legal framework but also propels the need for legal curricula

to adapt. Educating future legal professionals on these complexities is essential to ensure that law remains relevant in the face of a technologically driven era.

6. Co-Author Contribution

The authors declare no conflict of interest in this article. Author 1 was responsible for conducting the literature review and overseeing the overall planning and execution of the research project. Author 2 developed and validated the instrument used for quantitative data collection. Author 3 and 4 managed the actual data collection process. All authors contributed significantly to the drafting and final write-up of the manuscript, ensuring a cohesive presentation and discussion of the research findings.

7. Acknowledgement

The authors acknowledge that this article is part of a PhD thesis undertaken at the Faculty of Law, Universiti Teknologi MARA (UiTM). The authors extend sincere gratitude to UiTM for its support, which has significantly contributed to the progression of this research.

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