




Research Article

Artificial Intelligence Systems and Medical Negligence: An Overview and Perspective of a Case Study in Ghana Civil Procedure Rules, 2004 (C.I. 47)

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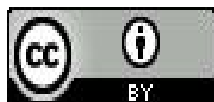
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ABSTRACT

Objective: This article discusses the evidentiary requirements for demonstrating scientific negligence under Ghana's Civil Procedure Rules 2004 (C.I. 47) in the context of emerging artificial intelligence (AI) diagnostic and treatment structures.

Method: Legal analysis examines gaps in satisfying burden of proof and standards of evidence, obstacles that restrict evidence collection on AI device deficiencies, and suggestions for adapting legal responsibility policies to AI's technical opacity.

Findings: The present inability to interrogate algorithms, limited access to proprietary training data and methods, lack of diagnosed standards of care for software-based decision-makers, and shortage of qualified professional witnesses pose massive evidentiary challenges for plaintiffs seeking to confirm AI negligence.

Conclusions/Recommendations: Standards strengthening algorithmic transparency, auditability, and explainability could ease evidentiary burdens for affected patients. Strict liability schemes and IP protections balancing public safety and innovation aims need to be considered moving forward.

Scientific Contributions: This work adapts traditional medical liability systems to today's realities of increasing reliance on AI in health care and proposes several improvements.

Keywords: Medical Negligence; Artificial Intelligence; Machine learning; Evidence, Law

1. INTRODUCTION

Artificial intelligence (AI) methods in health care are unexpectedly increasing globally [1-3]. An expected \$141.7 billion in investments in health care AI is projected by 2026 [4]. Figure 1 displays the pros and cons of applying AI systems in healthcare. In Ghana, AI tools are being advanced for programs such as scientific diagnosis, treatment adherence

monitoring, and health file evaluation [5][6]. However, using AI also introduces complicated legal responsibility issues if the structures fail and cause patient harm. Calls have been made for policies addressing clinical negligence and responsibility for flawed AI decision-making. Ghana’s framework for specifying civil liability for clinical negligence is provided under Order 38 of the High Court (Civil Procedure) Rules, 2004 (C.I. 47). The evidentiary requirements include standard of care, expertise for professional witnesses, causation for breach of responsibility and harm, and many others. Nevertheless, the nature of AI structures poses barriers to the collection of conventional evidentiary requirements for demonstrating negligence [7][8]. Thus, C.I. 47 needs to be examined in the context of apportioning liability for health care AI systems. This evaluation measures explicitly Sections 3, 7, and 8 of Order 38, which pertain to evidentiary requirements. The purposes are to:

1. Determine gaps in fulfilling the letter or cause of C.I. 47 when proving AI system defects.
2. Explore barriers to determining the root causes of failure in proprietary, non-transparent AI.
3. Advise revisions to establish flexibility in C.I. 47 for the era of medical AI.

As health care AI continues to evolve in Ghana and globally, policies must balance innovation, accountability, and public interest. Changing traditional medical liability law is an integral part of this to protect patients’ rights in this technological revolution.

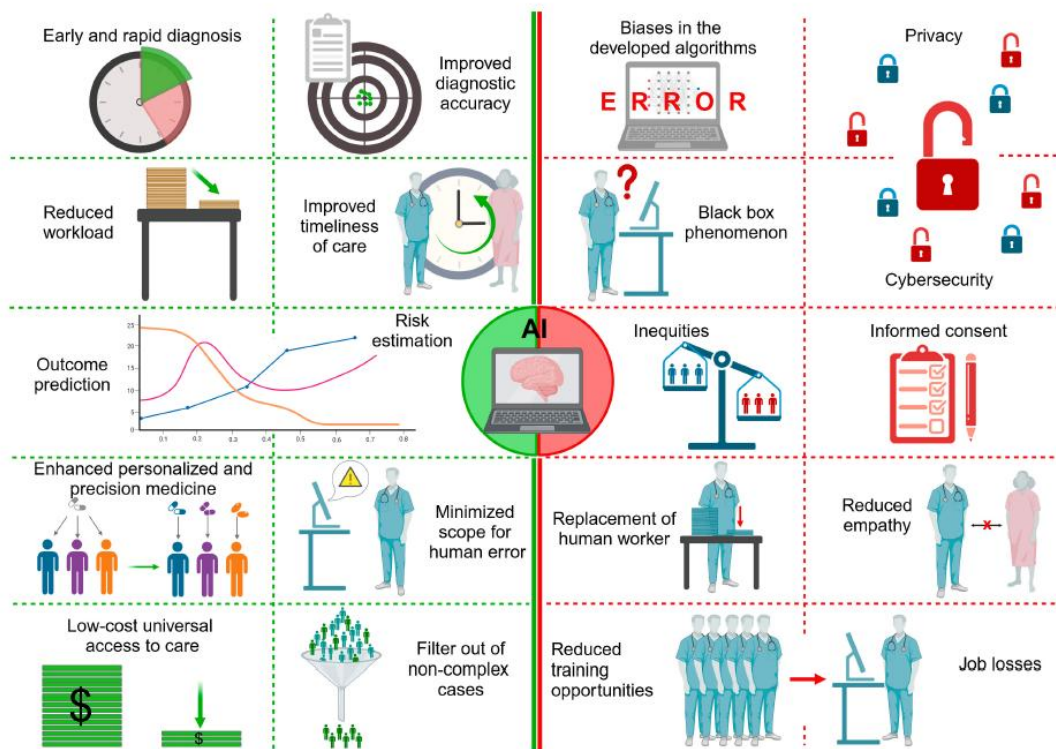


Fig. 1. Pros and cons of AI in health care [17]

- **Scientific Contribution**

This legal review makes several vital scientific contributions to the emerging policy debate on medical liability for AI systems. First, it presents a jurisdictional theoretical analysis of critical Ghanaian legal rules for determining medical negligence liability, examining provisions on the burden of proof, expert evidence, and the standard of complete care in health care AI applications. This work fills the gap in the legal scholarly literature on AI accounting systems developed for the Ghanaian context. Second, the evaluation offers authentic proposals aligned with ongoing global coverage discussions on multiple options for adapting traditional liability rules to ease evidentiary requirements for harmed patients in a generation of black-box algorithms. Evaluating opportunities such as incorporated transparency mandates and strict legal responsibility informs policymaking on balanced AI governance. The evaluation proposes a replicable methodological blueprint for further analyzing health care AI liability readiness in other countrywide prison frameworks.

- **Practical Utility**

This study offers practical value to stakeholders who are navigating the interface between patient safety, health care innovation, and medical AI in Ghana. For policymakers and legislators, it provides an evidence-based analysis of current regulatory gaps in health care AI obligations and a range of reforms representing international best practices for adopting this technology. The study guides the judiciary in interpreting and applying liability rules in ambiguous AI cases. For health care professionals, the findings will clarify emerging liability risks from integrating AI tools and corresponding risk management strategies, such as searching for explicit manufacturers or selecting enterprise-developed solutions that allow for more in-house algorithmic calculations. These insights into modernizing medical negligence law for the algorithmic age benefit various decision-makers at the frontiers of AI and the law.

2. LEGAL ANALYSIS METHODOLOGY

This paper applied principled legal analysis, which is a dominant method for examining legal questions in academia and policy. Theoretical analysis involves systematically studying and interpreting law, policy, case law, and legal knowledge to identify critical issues, conflicts, ambiguities, or differences in the legal landscape on a particular problem. The original Ghanaian Code of Civil Procedure for Medical Negligence Liability Practices, C.I. 47, is detailed herein. The appropriate burden of proof passages, such as Sections 3 and 7, which outline the requirements for proving a breach of duty, were consulted for clarity and completeness in the case of AI systems. Examples of actual cases, such as *Duah v Tema Hospital*, were analyzed for provisions regarding the work of expert witnesses. The study presented scholarly literature examining the emerging issues at the intersection of health care AI accountability and medical liability law worldwide. Comments on proposals such as changes to transparency requirements and strengthening interpretive frameworks provide key examples of potential legislative changes to address highlighted evidence gaps. In general, this theoretical approach combines analysis of the binding rules, real-world applications, and policy discussions by legal scholars to strategically assess legal readiness for change a technology causes, such as the development of healthcare AI or discovered and replicated by proposing modifications based on a scholarly discussion and comparative developments in other countries.

3. RESULTS AND ANALYSIS

An overview of evidentiary requirements in Ghana's Civil Procedure Rules, 2004 (C.I. 47) regarding the burden of proof, standards of proof, and types of evidence submitted in medical negligence cases is presented below.

Under C.I. 47 Order 38 Rule 3, the burden of proof rests on the plaintiff to demonstrate that the defendant medical practitioner failed to exercise "reasonable skill and care" in providing diagnosis, advice, or treatment [10]. Per established case law, defendants are not expected to possess the "highest expert skill" but rather provide care "in accordance with a practice accepted as proper by a reasonable body of medical men skilled in that particular art." The standard of proof applied is the balance of probabilities rather than beyond reasonable doubt, with plaintiffs required to show defendant negligence was "more probable or likely than not." However, given the complex subject matter of medical cases, courts have historically required a higher standard in evaluating evidence so as not to incorrectly find liability. Order 38 Rule 7 specifies certain directions regarding expert evidence in medical negligence suits given the technical nature of the subject matter. Rule 7(2)(f) states that expert witnesses must provide honest, independent opinions grounded in their professional field and area of expertise [9]. Medical expert testimony often constitutes a central piece of evidence establishing standard of care. Other common evidence includes medical records documenting advice or care provided to patients [11], records relating to credentials or training of treating physicians [12], procedural manuals or protocols that defendants would be expected to follow [13], and scientific literature relied upon in determining appropriate treatments [14]. Photographic evidence, radiology scans documenting extent of injuries [15], and sworn eyewitness testimony that corroborates facts may supplement cases. Contributory negligence can also be argued by defendants with evidence indicating patient noncompliance with medical advice and worsening conditions [16]. While C.I. 47 provides established rules on burden and standards of proof in medical negligence lawsuits, open questions remain with regard to the adaptation of these guidelines to cases involving AI technologies given significant differences from claims only involving human practitioners. Invoking these rules to demonstrate AI defects or breaches poses additional evidentiary challenges that are analyzed in subsequent sections.

- **Evidentiary Requirements for AI Systems Under Ghana's C.I. 47**

A defining challenge with assigning liability for AI systems is their inherent lack of transparency. The data processing and logic underlying AI decision-making is often proprietary and obscured from view within what is often termed a “black box.” This situation poses barriers for plaintiffs seeking to prove negligence or defects under C.I. 47.

- **Demonstrating Breach of Duty and Causation**

Under C.I. 47 Rule 3(a), establishing breach of duty requires showing the defendant “failed to exercise reasonable skill and care” per “accepted practice” in their field. However, unlike with human practitioners, AI has no professional fields or commonly recognized practices to reference. An AI’s approach to analyzing patient data and generating diagnostic or treatment suggestions may be invented by engineers and be unlike established medical protocols. Plaintiffs would rely significantly on expert testimony to demonstrate flawed reasoning by an AI algorithm. However, finding genuinely independent experts on proprietary commercial systems could prove difficult. Accessing the necessary audit records from AI developers to ascertain causes of failure is also a significant barrier, which is detailed further below.

- **Standards of Care and Expert Testimony**

C.I. 47 Rule 7(2)(f) directs experts to demonstrate opinions grounded in the norms and literature of their professional field [9]. Again, no established fields or best practices exist for most AI technologies used in medicine; they represent wholly novel approaches to tasks that are traditionally exclusive to human professionals. With no historical literature or precedents regarding acceptable functionality, questions emerge as to how to define what constitutes acceptable design, programming, and performance monitoring to demonstrate a breach of duty for AI. Moreover, finding expert witnesses to testify on these complex software engineering questions poses difficulties given the small pool of genuine specialists.

- **Audit Trails and Root Cause Analysis**

A core barrier with applying C.I. 47 to assess AI negligence is the lack of access to detailed activity logs showcasing step-by-step logic behind AI-generated diagnoses or treatment plans. Developers tightly hold these training data and audit trails, covering data inputs analyzed and outputs produced as trade secrets. Without transparency on how faulty recommendations exactly arose from faulty programming or stale training data, demonstrating a breach becomes difficult. Still-evolving technical skills for reliably auditing AI decisions for root biases also constrain expert analysis on causes of failure; special witness testimonies could struggle to definitively trace injuries back to certain coding problems or data errors. Calls are emerging internationally for “explainable AI” mandates that require increased visibility into AI logic, which could ease evidentiary challenges. Overall, C.I. 47 as written lacks mechanisms that facilitate a reliable examination of core AI functionality required to prove breach or causation. As AI permeates health care, accompanying policy reforms are necessary so that liability frameworks designed for human providers remain relevant and applicable. Additional proposals in this direction are provided in subsequent sections.

- **Barriers to Evidence Collection and Submission**

1. **Inability to Interrogate AI Systems Directly**

A significant obstacle to investigating harmful AI decisions is the inability to directly inspect the software itself for problems. Unlike questioning human experts on faulty logic, complex neural networks defy intuitive analysis, with millions of interconnected parameters that are unclear even to creators. This situation forces overreliance on black-box testing, which involves probing many permutations of inputs to flag inconsistent outputs, without visibility on exactly which programming components are malfunctioning internally. However, black-box techniques have limited reliability and analytical depth. When seeking to demonstrate negligence as required by C.I. 47 Rule 3, options are constrained without access to probe the AI “mind” directly, so to speak.

2. **Proprietary Nature of Commercial AI**

Most health care AI leverages proprietary platforms such as IBM Watson, limiting access to critical training datasets and code. Developers invoke trade secrecy to shield economically valuable IP from exposure. However, this restricts plaintiff capacity to reconstruct AI decision trails for identifying root defects and constrains the availability of fully independent, impartial experts on proprietary platforms required by C.I. 47 Rule 7. Judges themselves lack technical AI expertise to authenticate credentials or critique testimony quality on complex software engineering concepts such as algorithm bias. Heavy reliance on developer-selected experts could skew objectivity on whether appropriate design safeguards were implemented. Tensions emerge between justice objectives, innovation incentives, and contractual IP protections in accessing materials.

3. Data and Model Access Limits

Health care AI depends on training datasets that can propagate biases if these datasets are insufficiently diverse or cleansed of partial patterns. However, the exact makeup of commercial datasets constitutes sensitive IP with limited access. Plaintiffs face barriers when investigating if errors arose from skewed data without accounting for local demographics or biological norms. Similar constraints apply to examining mathematical model parameters—the weights or neural network “intuitions” derived from data patterns are also proprietary trade secrets in commercial systems. Without auditing the models directly for signs of overfitting or concept distortion, confirmation of root causes behind AI negligence is restricted.

- **Addressing the Issues**

1. Proposals to Modify C.I. 47

To enable genuine investigation of AI failures, C.I. 47 could expand rules on evidence disclosure, mandating developers to furnish access to restricted IP such as data and models in lawsuits where significant patient harm resulted from product use. Allowances that protect developer IP interests could include non-disclosure agreements for plaintiff experts, sealed court records permissions, or in-camera document reviews excluding public access. Standards could also be strengthened around expert witnesses in AI cases, requiring them to demonstrate direct expertise in the specific AI technology named in the claim or else they will be excluded from testifying on its defects. The expert pool should be expanded to include non-medically credentialed but qualified software auditors assist cases involving complex algorithmic failures.

2. Requiring Explainable AI and Audit Trails

C.I. 47 could also simply compel health care AI systems to demonstrate a baseline degree of algorithmic auditability and explain ability, mandating access to training data characteristics, set input/decision vectors, and model parameters in cases of significant patient harm. Standards introduced in jurisdictions such as Canada and EU on documenting AI data provenance and encoding explainable facilities even in commercial systems could inspire Ghanaian law reforms as well.

3. Strict Liability for AI Medical Products

Some scholars argue that liability regimes based on demonstrating negligence are incompatible with AI’s black-box reality. A recently proposed alternative framework leverages strict liability attached to the product itself when harms occur, rather than requiring proof of human or algorithmic faults. This situation incentivizes developers to proactively address risks within design controls versus externalizing blame. However, tradeoffs with innovation could arise, mandating safety burdens that exceed current industry norms. Further policy debate is warranted on recalibrating liability models for AI’s distinctive risks. In sum, applying key data, algorithms, and design safeguards to auditing is crucial for meaningful legal inquiry into AI failures that cause patient harm. Reasonable measures that balance proprietary, accountability, and public welfare interests can help adapt Ghana’s liability rules to the health care AI age.

4. CONCLUSIONS

An analysis of Ghana’s Civil Procedure Rules, 2004 (C.I. 47) for determining medical negligence liability reveals significant gaps when applied to emerging AI diagnostic and treatment tools. Unique to AI systems are challenges related to the inability to directly inspect algorithms, limited access to proprietary training data or models, lack of recognized standards of care for software-based decision-makers, and inability to meet expert witness rules when available specialists are scarce. Together, these barriers restrict the capacity of harmed patients to demonstrate through reliable, impartial evidence that a breach of duty occurred due to defects in AI design, unlike traditional claims that involve human physicians only. Uncertainty exists around what constitutes reasonable precautions and safety assurance controls during AI development. Without adaptations to liability rules, the path to legal recourse and compensation grows tenuous as AI permeates health care.

5. RECOMMENDATIONS FOR LEGAL FRAMEWORKS

To promote accountability as AI advances, standards on explainable and transparent design could be strengthened, requiring detailed auditing infrastructure in live systems monitoring for biases and errors. Regulatory mandates that guarantee access to key data or algorithms in lawsuits where serious patient harm resulted, with allowances protecting IP, can facilitate the determination of root causes. Expanding expert witness eligibility beyond medical professionals assists software defect claims.

Strict liability schemes detached from demonstrating negligence may spur improved internal controls that integrate safety considerations through the AI build process. Overall, the law must thoughtfully balance multiple competing aims of preserving innovation, securing patient rights, and delivering justice in formulating policies fit for the algorithmic age. Further discourse and multidisciplinary perspectives can enrich proposals on modifying liability rules for the modern realities of AI in health care.

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Conflicts of Interest

The authors' disclosure statement confirms the absence of any conflicts of interest.

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References

- [1] G. Ali, M. M. Eid, O. G. Ahmed, M. Abotaleb, A. M. Z. Alaabdin, and B. A. Buruga, "Artificial intelligence in Corneal Topography: A Short Article in Enhancing Eye Care," *Mesopotamian Journal of Artificial Intelligence in Healthcare*, vol.2023, pp.31–34, June 2023. <https://doi.org/10.58496/MJAIH/2023/006>
- [2] J-P. O. Li, H. Liu, D. S. J. Ting, S. Jeon, R. V. P. Chan, J. E. Kim, et al., "Digital technology, tele-medicine and artificial intelligence in ophthalmology: A global perspective," *Progress in Retinal and Eye Research*, vol.82, pp.100900, May 2021. <https://doi.org/10.1016/j.preteyeres.2020.100900>
- [3] L. A. Celi, J. Cellini, M-L. Charpignon, E. C. Dee, F. Dernoncourt, et al., "Sources of bias in artificial intelligence that perpetuate healthcare disparities—A global review," *PLOS Digital Health*, vol.1, no.3, pp.1-19, March 2022. <https://doi.org/10.1371/journal.pdig.0000022>
- [4] B. K. M. Wong, S. Vengusamy, and T. Bastrygina, "Healthcare digital transformation through the adoption of artificial intelligence," In *Artificial Intelligence, Big Data, Blockchain and 5G for the Digital Transformation of the Healthcare Industry*, pp.87-110, 2024. <https://doi.org/10.1016/B978-0-443-21598-8.00014-2>
- [5] G. B. Mensah, M. M. Mijwil, and M. Abotaleb, "Examining Ghana's National Health Insurance Act, 2003 (Act 650) to Improve Accessibility of Artificial Intelligence Therapies and Address Compensation Issues in Cases of Medical Negligence," *Mesopotamian Journal of Computer Science*, vol.2024, pp.28–33, March 2024. <https://doi.org/10.58496/MJCSC/2024/003>
- [6] K. Källander, J. K. Tibenderana, O. J. Akpogheneta, D. L. Strachan, Z. Hill, et al., "Mobile Health (mHealth) Approaches and Lessons for Increased Performance and Retention of Community Health Workers in Low- and Middle-Income Countries: A Review," *Journal of Medical Internet Research*, vol.15, no.1, pp.e17, 2023. <https://doi.org/10.2196/jmir.2130>
- [7] P. Hacker, "The European AI liability directives – Critique of a half-hearted approach and lessons for the future," *Computer Law & Security Review*, vol.51, pp.105871, November 2023. <https://doi.org/10.1016/j.clsr.2023.105871>
- [8] E. Marchisio, "In support of "no-fault" civil liability rules for artificial intelligence," *SN Social Sciences*, vol.1, no.54, pp.1-25, January 2021. <https://doi.org/10.1007/s43545-020-00043-z>
- [9] *Duah v Tema General Hospital*, "Suit no AP/121/2018," High Court of Ghana, 2019.
- [10] *Amoako v Komfo Anokye Teaching Hospital*, "Suit no CA/21/06," Court of Appeals of Ghana, 2006.
- [11] *Nyarko v Korlebu Teaching Hospital*, "Suit no GJ/121/2019," High Court of Ghana, 2021.
- [12] *Awotwe v Metro Hospital Authority*, "Suit no PC/152/2017," High Court of Ghana, 2019
- [13] *Quarcoo v Nyaho Medical Centre*, "Suit no AC/159/2018," High Court of Ghana, 2019.
- [14] *Takyiwa v Nyaho Medical Centre*, "Suit no GJ/295/2019," High Court of Ghana, 2021.
- [15] *Abbey v Trust Hospital*, "Suit no AL/229/2017," High Court of Ghana, 2017.

[16] Abban v Asempa Herbal Clinic, “Suit no GJ/121/2018,” High Court of Ghana, 2018.

[17] C. Cestonaro, A. Delicati, B. Marcante, L. Caenazzo, and P. Tozzo, “Defining medical liability when artificial intelligence is applied on diagnostic algorithms: a systematic review,” *Frontiers in Medicine*, vol.10, pp.1-12, 2023.
<https://doi.org/10.3389/fmed.2023.1305756>