

Accountability for Telemedicine Algorithm Errors: A Normative Analysis of Potential Regulatory Gaps in Indonesia

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Abstract:

The rapid development of information and communication technology has brought significant changes to the provision of healthcare services, particularly through the use of telemedicine. In Indonesia, telemedicine plays a strategic role in improving access to healthcare services in geographically dispersed areas. Along with this development, the use of artificial intelligence-based medical algorithms is increasingly widespread in the diagnosis process, clinical decision-making, and treatment recommendations. While offering efficiency and innovation, the use of these algorithms also raises new legal challenges, particularly regarding liability for algorithmic errors that can harm patient safety. This study aims to analyze legal liability for algorithmic errors in telemedicine services through a normative legal research approach, focusing on identifying potential regulatory gaps in Indonesia. The research methods used include statutory, conceptual, and case studies. The analysis was conducted on relevant laws and regulations in the fields of health, consumer protection, and personal data protection, and was supported by a doctrinal review and comparison with the legal framework for telemedicine in Malaysia. The results indicate that the Indonesian legal system does not explicitly regulate liability for medical algorithm errors, so the determination of liability still relies on general principles of health law and civil law. This regulatory gap creates legal uncertainty, particularly when errors stem from algorithm design flaws, training data bias, or system failures beyond the reasonable control of medical personnel. Therefore, this study proposes the implementation of a shared liability model between physicians, telemedicine platform providers, and algorithm developers, based on the roles and causal contributions of each party. This model is considered fairer, more proportional, and able to strengthen legal protection for patients in Indonesia's AI-based telemedicine ecosystem.

Keywords: telemedicine; medical algorithms; legal liability; regulatory gaps.

INTRODUCTION

The development of information and communication technology (ICT) over the past two decades has revolutionized nearly every sector of life, including the healthcare sector. Digital transformation in the healthcare sector is no longer merely a complement to conventional services but has become a strategic

infrastructure for the delivery of modern medical services. In Indonesia, the acceleration of healthcare digitalization has become increasingly evident since the COVID-19 pandemic, which has driven the optimization of remote services as a solution to the limitations of face-to-face interaction. In this context, telemedicine has emerged as an innovation that enables consultations, diagnoses, monitoring, and even the provision of therapy recommendations without the physical presence of the patient and medical personnel in the same room. This service model is highly relevant for Indonesia, an archipelagic nation with geographical challenges, uneven distribution of healthcare workers, and disparities in access to services between urban and rural areas. Telemedicine is seen as an instrument to expand the reach of services while increasing the efficiency of the national healthcare system (Arif, 2024).

The use of telemedicine in Indonesia is growing rapidly through various digital platforms that provide online consultations, e-prescriptions, second opinions, and chronic disease monitoring. Behind this convenience lies the integration of increasingly complex algorithm-based systems. Algorithms function not only as administrative support systems but also as clinical decision support systems (CDSS), processing patient medical data to generate diagnostic and therapeutic recommendations. The integration of artificial intelligence (AI) enables rapid and precise analysis of big health data, including disease pattern recognition, risk prediction, and treatment personalization. Algorithms play a significant role in influencing medical decisions, both directly and indirectly. However, the growing role of algorithms in clinical decision-making raises complex legal challenges. An algorithm is essentially a series of instructions designed by a system developer based on specific mathematical models and training data. In practice, algorithms can contain bias, programming errors (bugs), or dataset limitations, which can lead to erroneous recommendations (Prasetyo & Prananingrum, 2022). Algorithmic errors in telemedicine have the potential to lead to misdiagnosis, delayed treatment, inappropriate medication administration, and even endanger patient safety. When harm occurs, a fundamental question arises: who is responsible? Is it the doctor using the system, the platform provider, the software developer, or a combination of the two?

The issue of legal liability for algorithmic errors has become increasingly crucial due to the autonomous and adaptive nature of technology. Unlike conventional medical devices, which are static, AI-based algorithms can continuously learn (machine learning) from new data, so their decisions are not always fully predictable by humans. This raises challenges in determining the standard of care and the element of fault in civil and criminal liability regimes. In classical legal frameworks, liability is generally based on human error. However, in the context of algorithm-based telemedicine, the causal relationship between human actions and patient harm becomes more complex due to the intervention of automated systems (Mursalat et al., 2022).

Normatively, Indonesia already has several regulations that serve as the basis for implementing telemedicine. Law Number 36 of 2009 concerning Health regulates patients' rights to receive safe and quality healthcare services, as well as the obligation of healthcare workers to provide services in accordance with professional standards. Furthermore, Minister of Health Regulation Number 20 of 2019 concerning the Provision of Telemedicine Services Between Healthcare Facilities provides an administrative framework for implementing telemedicine. However, these regulations do not explicitly address liability for errors in algorithms or AI-based systems used in healthcare. This lack of regulation creates a potential regulatory gap that could lead to legal uncertainty for both patients and providers. In addition to healthcare sector regulations, aspects of personal data protection and electronic systems are also relevant in the context of telemedicine. The use of algorithms relies heavily on the processing of sensitive patient health data. The legal framework regarding personal data protection has developed, but it does not specifically link the security and accuracy of algorithms to medical liability (Romdlon et al., 2021). Thus, there is a fragmentation of regulations between healthcare law, consumer protection law, and information technology law. This fragmentation has the potential to cause overlapping or regulatory gaps when disputes arise due to algorithmic errors.

From a civil law perspective, liability can be analyzed through the concepts of breach of contract or unlawful act (PMH). If the relationship between a patient and a telemedicine platform is viewed as a contractual relationship, then algorithmic errors can be classified as a violation of the obligation to provide safe and professional services. However, problems arise when the algorithm is developed by a third-party developer who does not have a direct contractual relationship with the patient. In this situation, the application of the doctrine of product liability or strict liability becomes relevant, especially when the algorithm is positioned as a technological product that can pose risks. However, Indonesian law does not

explicitly categorize AI-based software as a product within the product liability regime. From a criminal law perspective, potential liability may arise if an algorithmic error results in serious injury or death to a patient. However, proving the element of fault (*mens rea*) becomes problematic when the loss is caused by an automated system operating based on machine learning (Ernawa, 2022). The question that arises is whether negligence can be attributed to the medical personnel using the system, or to the developer who designed the algorithm. This ambiguity highlights the need for a reformulation of the concept of liability that is more adaptive to technological developments.

Comparisons with other countries can provide a constructive comparative perspective. Malaysia, for example, has developed a telemedicine regulatory framework through the Telemedicine Act 1997. While not yet fully regulating AI, it provides a more structured basis for oversight and licensing of digital service providers. Several developed countries have also begun adopting the principles of algorithmic accountability and transparency as part of AI governance in the healthcare sector. This approach emphasizes the importance of algorithm audits, risk assessments, and mandatory disclosure of information regarding the system's operation to users. Lessons learned from international practices can serve as a reference for Indonesia in refining its regulations. The urgency of this research lies in the need to formulate a clear and fair accountability framework within the telemedicine ecosystem. Without adequate regulation, patients may face difficulties in obtaining compensation for losses. Furthermore, medical personnel and platform providers also face legal uncertainty that can hinder innovation (Andrianto & Rizka Fajrina, 2022). Therefore, a normative analysis of potential regulatory gaps is crucial for identifying weaknesses in the existing legal system and formulating recommendations for reform.

The analysis will focus on identifying potential regulatory gaps, including the legal definition of algorithms, the division of responsibilities between actors, and dispute resolution mechanisms. Furthermore, this study will consider global developments related to AI governance as part of digital health law reform. Ultimately, the reform of the telemedicine legal framework in Indonesia must address the challenges of the digital era without stifling innovation. Adaptive and progressive regulations are needed to ensure that the use of algorithms in telemedicine aligns with the principles of patient safety and legal justice. By formulating a clear accountability model, Indonesia can build a safe, trustworthy, and sustainable telemedicine ecosystem. This study is expected to be a relevant academic contribution in promoting harmonization between health technology developments and the national legal system.

The development of telemedicine and the integration of artificial intelligence (AI) into healthcare has sparked significant legal debate, particularly regarding liability for algorithmic errors. International literature demonstrates that AI in healthcare is not simply a technical tool, but rather a system that has a causal impact on diagnosis and therapy (Yu et al., 2018). Therefore, when prediction errors or algorithmic bias occur, the question of who is responsible—the doctor, the platform, or the developer—has become a central issue in contemporary healthcare law discourse. From an ethical and human rights perspective, the use of AI should not undermine patient protection standards. AI healthcare governance must be based on the principles of transparency, accountability, and non-maleficence (Morley et al., 2020). This aligns with the principles of consumer protection and the right to health and legal certainty guaranteed within the human rights framework. Therefore, discussions regarding liability for algorithmic errors are not limited to the technical realm of proving errors but also touch on ethical and constitutional dimensions.

Studies on algorithmic bias further reinforce the urgency of adaptive regulation. Health algorithms can reproduce racial inequalities due to biased training data. These findings demonstrate that systemic failures in AI design can directly impact the quality of care and patient safety. In a legal context, this situation opens up the possibility of liability not only for medical personnel as end users, but also for system developers and administrators. From a technology law perspective, it emphasizes that autonomous systems challenge the traditional fault-based liability paradigm. The technical complexity of AI makes it difficult to prove negligence, thus encouraging discussion about models of shared liability and strict liability for high-risk technologies. The principle of proportional causation becomes relevant in distributing responsibility according to the level of control and contribution of each actor in the digital ecosystem.

In the Indonesian context, research on telemedicine generally focuses on service effectiveness, personal data protection, and the professional responsibilities of medical personnel. Several studies highlight the importance of informed consent in online consultations and the need for clear standard operating procedures. However, studies specifically addressing the legal implications of algorithmic errors are still limited (Budiyantri & Herlambang, 2021). In fact, the increasing adoption of AI in the national healthcare

system has the potential to increase the risk of legal disputes, especially if a digital system-based misdiagnosis occurs. Furthermore, Price and Cohen emphasize that the digital transformation of healthcare requires a reconstruction of the regulatory framework to ensure patient protection in the era of big data (Price & Cohen, 2019). Regulations that focus solely on medical personnel without addressing the responsibilities of developers and platforms have the potential to create a normative gap. The lack of specific regulations regarding medical AI in Indonesia indicates that the legal system is still in the early stages of adapting to technological disruption.

This gap in the literature and regulations indicates an urgent academic gap that needs to be filled. This research seeks to contribute through a normative approach that examines national laws and regulations, the doctrine of civil liability, consumer protection principles, and the human rights framework. By positioning technology as an instrument subject to the principles of prudence, transparency, and accountability, this study emphasizes that digital innovation should not proceed without adequate legal oversight. Ultimately, the analysis of accountability for telemedicine algorithm errors is part of a broader effort to ensure that advances in health technology remain aligned with justice, legal certainty, and the protection of patient rights.

METHOD

This study employed a normative legal research method. This method was chosen because it aligns with the research objectives of analyzing the legal aspects of liability for telemedicine algorithm errors, identifying potential regulatory gaps, and providing recommendations for improvement (Miles et al., 2014). Normative legal research focuses on analyzing applicable legal norms, both written and unwritten, to understand, explain, and provide solutions to legal problems. This study employed three main approaches: the statute approach, the conceptual approach, and the case approach. A legislative approach is used to analyze various regulations related to telemedicine, including Law Number 36 of 2009 concerning Health, Regulation of the Minister of Health Number 20 of 2019 concerning the Provision of Telemedicine Services Between Health Service Facilities, Law Number 8 of 1999 concerning Consumer Protection, Law Number 27 of 2022 concerning Personal Data Protection (PDP Law), and other related regulations, with a focus on interpretation, application of legal norms, and identification of potential regulatory gaps (Susilo, 2022).

A conceptual approach is used to examine relevant legal concepts such as legal liability, malpractice, personal data protection, and medical professional ethics through a review of legal literature and doctrine. Furthermore, a case study approach is used to analyze court decisions related to these legal issues, particularly in cases of malpractice, privacy violations, and consumer disputes, to identify patterns of judicial interpretation and the legal principles applied in judicial practice. The data used in this study consists of primary and secondary data. Primary data was obtained from laws and regulations, court decisions, and other official documents related to the implementation of telemedicine. Meanwhile, secondary data was obtained from various literature sources, such as books, scientific journals, articles, papers, research reports, and other relevant documents, which were used to enrich the analysis and provide a more comprehensive perspective on the legal issues studied (Creswell & Clark, 2018; Sugiyono, 2020).

The data collection techniques in this study were conducted through library research and document analysis. Literature study was used to collect secondary data from various literature sources, such as books, scientific journals, articles, papers, research reports, and other relevant documents through a systematic literature search to obtain information related to the research topic. Furthermore, document analysis was used to examine laws and regulations, court decisions, and other official documents related to telemedicine using content analysis methods to identify themes, patterns, and relationships within the data. Data analysis techniques in this study were conducted through qualitative analysis and legal interpretation. The collected data were analyzed qualitatively using content analysis methods to systematically and in-depth identify themes, patterns, and relationships between data to understand complex legal issues, particularly those related to accountability for algorithmic errors in telemedicine. Furthermore, legal interpretation of relevant laws and court decisions was conducted using various interpretation methods, including grammatical, systematic, historical, and teleological interpretations, to obtain a comprehensive and argumentative understanding of the law (Creswell, 2016).

This research procedure begins with the establishment of a normative legal research method to examine accountability for telemedicine algorithm errors, followed by the determination of a research approach that includes legislative, conceptual, and case approaches. Next, the researcher collected primary data in the form of laws and regulations, court decisions, and related official documents, and secondary data through library research from various relevant legal literature. The collected data were then analyzed qualitatively using content analysis methods to identify themes, patterns, and relationships between legal norms, accompanied by legal interpretations of regulations and court decisions through grammatical, systematic, historical, and teleological interpretations. The final stage of the research was carried out by drawing systematic conclusions to identify regulatory gaps and formulating comprehensive and argumentative legal improvement recommendations related to accountability for algorithm errors in telemedicine (Hasan, 2008).

RESULTS AND DISCUSSION

Based on a normative analysis of applicable regulations, health law literature, and international hypothetical and empirical case studies, it was found that algorithmic errors in telemedicine can be classified into several main forms. First, algorithm design flaws, which arise from inadequate algorithm modeling, including the use of incorrect variables, clinically irrelevant data processing methods, or reliance on inappropriate proxies. The case of a medical needs assessment algorithm in the United States demonstrates that using treatment costs as an indicator of medical need results in systemic bias that disadvantages certain groups. Second, training data bias, which occurs when the data used to train the algorithm is not representative of the user population. In the context of Indonesia, with its diversity of ethnicities, skin tones, and biological characteristics, this bias has the potential to be highly detrimental. Examples of algorithm failures in detecting skin cancer or breast cancer demonstrate that data bias can directly impact patient safety. Third, algorithm misuse or overreliance by medical personnel. The results of this study indicate that although algorithms are intended as assistive tools, in telemedicine practice there is a tendency for doctors and medical personnel to rely too heavily on algorithmic recommendations without adequate clinical verification, particularly in application-based services with time pressures and high patient volumes. Fourth, systemic platform errors, which include system integration failures, technical glitches, user interface limitations, and data security system failures. These types of errors don't always originate from the algorithm itself, but rather from the technological ecosystem that supports telemedicine (Rustam & Sidipratomo, 2024).

The analysis shows that the current Indonesian legal system does not explicitly regulate liability for medical algorithm errors, so the determination of liability must still be derived from the general principles of health law, civil law, and consumer protection law. Within the framework of civil liability, doctors remain positioned as the primary legal subjects who bear professional obligations (duty of care) towards patients. Law Number 17 of 2023 concerning Health does recognize the provision of information and communication technology-based health services, as regulated in Articles 56 and 57. However, this recognition is still general and does not specifically regulate the use of algorithms or artificial intelligence in the diagnosis process or medical decision-making (Dharma, 2020).

Minister of Health Regulation Number 20 of 2019 concerning the Provision of Telemedicine Services Between Healthcare Facilities emphasizes that medical responsibility remains with physicians. However, this regulation was formulated in the context of telemedicine between healthcare facilities and did not anticipate the use of AI algorithms as diagnostic aids that interact directly with patients. As a result, algorithms are still treated as part of a support system without a separate accountability mechanism. This absence of specific norms creates a legal vacuum, especially when algorithms play a significant role in generating medical recommendations that directly impact patient safety. From a health law perspective, physicians remain the primary legal subjects responsible for the medical treatments provided to patients. Article 60 of Law Number 17 of 2023 concerning Health requires medical personnel to comply with professional standards and service standards. Therefore, the use of algorithms in telemedicine does not eliminate the obligation of physicians to make independent clinical judgments (Hartono et al., 2022). Assigning full responsibility to physicians becomes problematic if errors stem from flaws in the algorithm's design or biases in the training data that are not reasonably known to the physician. In this context, doctors should not be positioned as the party bearing all technological risks, especially if they have acted according to professional standards.

Telemedicine platform providers are digital healthcare service providers. Under Law Number 8 of 1999 concerning Consumer Protection, specifically Articles 4 and 19, these providers are responsible for consumer losses resulting from unsafe services or failure to provide accurate and clear information. This study demonstrates that telemedicine platforms can be held liable for negligence in ensuring the suitability, security, and transparency of the algorithms they use, including failing to explain to patients that the algorithm is a tool and has limitations. Furthermore, as Electronic System Providers, platforms are also bound by data protection and system security obligations as stipulated in Law Number 27 of 2022 concerning Personal Data Protection. Medical algorithm developers are currently not specifically regulated under Indonesian law. There are no provisions requiring medical diagnostic algorithms to undergo certification or validation processes like medical devices. Yet, functionally, these algorithms have equivalent effects to medical devices (Ariyanto et al., 2025). Under these circumstances, algorithm developers could potentially be held liable under Article 1365 of the Civil Code if proven to have design flaws, data bias, or negligence in testing that result in harm to patients. This research confirms that a strict liability approach is worth considering for medical algorithm developers, given the high risks and information gap between developers and service users.

The analysis reveals at least three major regulatory gaps. First, the absence of national standards for the validation and certification of medical algorithms in telemedicine. Second, the absence of legal obligations regarding transparency and explainability of algorithms (explainable AI). Third, the lack of clear regulations regarding the division of legal responsibility between doctors, platforms, and algorithm developers. Furthermore, proving a causal relationship between algorithm errors and patient harm presents a serious challenge in practice. The closed nature of algorithms (black boxes) makes it difficult for patients to prove negligence, potentially weakening legal protections for patients as the most vulnerable parties. For example, a patient named Ani used a telemedicine application equipped with an AI-powered self-diagnosis feature. Ani uploaded a photo of a mole on her arm through the application. An AI algorithm developed by a technology company analyzed the image. This algorithm was trained using millions of dermatological images, but the training data mostly came from white populations. The technology company's algorithm, due to bias in its training data, failed to recognize the malignant pattern in Ani's mole, which had a slightly different color and texture than the typical pattern in white populations (Bonsapia & Jumiran, 2025).

The algorithm returned a "benign" result and advised Ani to "monitor its progress." Several months later, Ani felt a lump and significant changes in the mole. She consulted a dermatologist at a conventional healthcare facility. After a biopsy, Ani was diagnosed with advanced melanoma, which had spread extensively due to the delayed diagnosis. As a result, her prognosis worsened and her treatment costs became significantly higher. Ani's case of experiencing a delayed skin cancer diagnosis due to algorithmic bias demonstrates the concrete risks of using medical artificial intelligence without adequate regulation. In the context of Indonesian law, Ani has legal grounds to sue for damages under several legal regimes simultaneously. First, Law Number 17 of 2023 concerning Health guarantees everyone's right to safe and quality healthcare services, so algorithmic failures that contribute to incorrect diagnoses can be viewed as a violation of healthcare standards. Second, based on Law Number 8 of 1999 concerning Consumer Protection, Ani is a consumer of telemedicine services who has the right to accurate information and secure services, so algorithmic bias and the lack of explanation regarding its limitations have the potential to give rise to business liability. Third, Article 1365 of the Indonesian Civil Code Civil law can be used as the basis for a lawsuit if it can be proven that there was an unlawful act in the form of systemic negligence, whether in the design, testing, or use of an inappropriate algorithm. Fourth, Law Number 27 of 2022 concerning Personal Data Protection is also relevant if it is proven that the processing of Ani's health data did not comply with the principles of fairness, accuracy, and prudence, ultimately resulting in algorithm output that was detrimental to the patient (Ameliawati et al., 2024).

From a comparative perspective, Malaysia has a relatively more adaptive telemedicine legal framework, although it does not yet specifically regulate the use of artificial intelligence algorithms in medical services. The Telemedicine Act 1997 (Act 564) recognizes telemedicine as a legitimate form of healthcare and maintains the primary responsibility for medical procedures under the principle of a professional duty of care for physicians. However, within Malaysia's common law-influenced legal system, there is a growing understanding that the use of algorithm-based systems does not necessarily impose absolute liability on physicians, particularly when errors result from system defects, algorithmic bias, or

technological failures beyond the medical professional's reasonable control. This approach creates room for sharing responsibility with platform providers and technology developers based on the principles of negligence and product liability analogy. Furthermore, Malaysia is strengthening accountability for algorithm-based telemedicine through consumer protection and personal data protection regimes, particularly the Consumer Protection Act 1999 and the Personal Data Protection Act 2010 (PDPA). The PDPA emphasizes the principles of accuracy, fairness, and security of health data processing, so algorithm failures due to unrepresentative or inaccurate data can be attributed to a breach of the data controller's obligations (Simatupang et al., 2023). Compared to Indonesia, Malaysia's approach shows a trend toward a more proportional model of shared liability between doctors, platform providers, and algorithm developers, although both countries still face the challenge of a lack of specific standards related to the validation, certification, and transparency of medical algorithms in telemedicine.

Based on normative and doctrinal analysis, responsibility for errors in telemedicine consultations cannot be solely placed on the doctor or the algorithm provider, but must be assessed proportionally according to the source of the error and the role of each party. In the Indonesian health legal system, doctors remain the primary legal subjects due to their therapeutic relationship with patients and their obligation to comply with professional standards and service standards. If errors arise due to a doctor's negligence, such as failing to conduct clinical verification or relying too heavily on algorithm recommendations without adequate professional consideration, the doctor can still be held civilly and ethically liable. However, placing full responsibility on the doctor becomes unfair if the error stems from a flawed algorithm design, bias in training data, or a system failure beyond the doctor's reasonable control. In this context, telemedicine platform providers and algorithm developers have a significant causal role and can be held liable under consumer protection law and the principle of tort (Jannati & Sylva, 2022). Therefore, the shared liability model is the most rational approach, by dividing responsibilities proportionally: doctors are responsible for clinical aspects, platforms for system security and transparency, and algorithm developers for the quality and reliability of the technology used, in order to provide fair legal protection for patients.

The concept of shared liability in telemedicine consultation errors is based on the fact that technology-based healthcare services are the result of interactions between doctors, technological systems, and the business entities that manage them. Therefore, legal liability is no longer sufficient if it is solely placed on the doctor; it must be shared proportionally according to the roles and causal contributions of each party. From a health law perspective, the doctor still bears primary responsibility because the therapeutic relationship exists only between the doctor and the patient, as stipulated in Article 60 of Law Number 17 of 2023 concerning Health. However, this responsibility is limited to aspects within the doctor's professional competence, namely clinical judgment and medical decision-making. If the doctor has acted according to professional standards and used the algorithm only as a tool, then errors originating from the system should not be entirely placed on him or her (Dewayanti & Suryono, 2023).

On the other hand, telemedicine platform providers and algorithm developers have legal responsibility for the technological aspects they design and operate. Platform providers, as digital health service providers, are responsible under Law Number 8 of 1999 concerning Consumer Protection and Law Number 27 of 2022 concerning Personal Data Protection, specifically regarding security, system reliability, and transparency of information regarding algorithm limitations. Meanwhile, algorithm developers can be held civilly liable under Article 1365 of the Civil Code if there is evidence of design flaws, training data bias, or negligence in algorithm testing (Azhar & Handayani, 2023). Shared liability is the fairest and most functional accountability model because it divides responsibility proportionally between doctors, platforms, and algorithm developers, while strengthening legal protection for patients as the most vulnerable parties in the AI-based telemedicine ecosystem. Ultimately, determining legal responsibility for errors in telemedicine consultations is done through a judge's assessment of the source of the error and the causal relationship between the telemedicine service and the patient's harm, using a shared liability approach (Andrianto & Athira, 2022). Under this framework, the patient is not burdened with technically identifying the most at-fault party; instead, it is sufficient to prove actual harm and a failure or defect in the telemedicine service that reasonably contributed to that harm. Once the initial causal relationship is proven, the judge then assesses liability proportionally based on the role and level of control of each party: the doctor, the platform provider, and the algorithm developer.

Proof of medical misconduct is carried out by examining compliance with professional standards and service standards as stipulated in Law Number 17 of 2023 concerning Health. The judge will assess whether the doctor has conducted an independent clinical assessment, provided adequate information to the patient, and not relied excessively on algorithm recommendations. If overreliance or neglect of clinical signs that should have been recognized professionally is proven, then responsibility can be placed on the doctor. Conversely, if the doctor has acted according to standards and the error stems from system limitations that could not have been reasonably known, then the doctor's responsibility can be limited or transferred. Meanwhile, the fault of platform organizers and algorithm developers is proven through the legal regimes of consumer protection, electronic systems law, and torts. Platform organizers can be held liable if they fail to guarantee the security, reliability, and transparency of the system as stipulated in Law Number 8 of 1999 and Law Number 27 of 2022, while algorithm developers can be held liable under Article 1365 of the Civil Code if there is evidence of design flaws, data bias, or negligence in testing (Sabrina & Defi, 2021). Thus, the shared liability approach allows for a fair and rational division of responsibility according to each party's contribution to the fault, while also providing more effective legal protection for patients in AI-based telemedicine practices.

Conceptual Reconstruction of Algorithmic Errors in Telemedicine

The findings regarding the four main forms of algorithmic errors: design flaws, training data bias, misuse/overreliance, and systemic platform errors, demonstrate that failures in AI-based telemedicine cannot be reduced to a single error. They are multidimensional phenomena involving technical, professional, and structural aspects. This classification is conceptually important because it determines the direction of legal liability analysis. Design flaws reflect defects at the algorithm conceptualization stage. At this stage, developers determine variables, weights, and analysis parameters. If the modeling is not based on adequate clinical validation from the outset, the risk of error is inherent and systemic. Legally, this type of error is closer to product liability than to professional negligence on the part of the physician. This means the locus of fault lies with the system designer, not the user. Training data bias demonstrates that the neutrality of technology is a false assumption. Algorithms are only as accurate as the data used to train them. In Indonesia's pluralistic and heterogeneous context, the risk of bias is even greater if the dataset does not represent the population's ethnic, biological, and socioeconomic variations. Ani's hypothetical case illustrates how systemic bias can impact patient safety. Normatively, this opens up space for the application of the precautionary principle and the obligation to conduct due diligence before technology is widely implemented.

Misuse or overreliance by medical personnel demonstrates an ethical-professional dimension. Although the algorithm is intended as a clinical decision support system (CDSS), practice demonstrates a tendency to substitute clinical judgment for system recommendations. This automation bias phenomenon can be understood as an inherent risk of the digitalization of healthcare services, which is based on efficiency and speed. Legally, this error remains within the domain of physicians' professional responsibility, as it directly relates to professional standards and service standards. Meanwhile, systemic platform errors demonstrate that the telemedicine technology ecosystem comprises not only algorithms but also digital infrastructure, system integration, cybersecurity, and interface design. Failures at this level are organizational and corporate in nature. Therefore, responsibility cannot be separated from the business entity that operates the platform. This classification reinforces the argument that a single liability approach is no longer adequate. The complexity of error sources necessitates a more adaptive and proportional approach to responsibility distribution.

Normative Vacuum and Regulatory Fragmentation

An analysis of Law Number 17 of 2023 concerning Health and Ministerial Regulation Number 20 of 2019 shows that Indonesian regulations still position doctors as the central actors in medical accountability. This approach aligns with the classic construction of a therapeutic relationship, where professional obligations (duty of care) are inherent in medical personnel. Although national health regulations have recognized the provision of information technology-based healthcare services, this recognition has not been accompanied by regulations that explicitly position algorithms or artificial intelligence (AI) as new normative actors in the medical process. This absence of specific regulations creates a legal vacuum (*rechtvacuum*), especially when algorithms no longer function merely as administrative aids but also play a role in the

process of analyzing clinical data, determining initial diagnoses, and providing therapeutic recommendations. In this context, there are no clear legal standards regarding the validation and certification of medical algorithms before their widespread use in healthcare practice. Yet, as systems that can impact patient safety, algorithms should be subject to due diligence mechanisms, independent audits, and periodic evaluations to ensure their accuracy and reliability (Rayga & Siregar, 2025).

Furthermore, the legal vacuum is also evident in the absence of explicit obligations regarding the transparency and explainability of medical algorithms. In telemedicine practices, patients and even doctors often lack adequate information regarding how the system operates, the sources of training data, or the limitations of the technology used. This lack of transparency has the potential to violate the principle of informed consent and obscure the basis for accountability in the event of service errors (Pradana, 2021). Existing regulations do not systematically address the division of responsibility in multi-actor situations involving doctors, platform providers, and algorithm developers. Without a clear normative framework, the risk of algorithmic error tends to be disproportionately borne by doctors as the parties who interact directly with patients. Therefore, the establishment of a legal framework that regulates validation standards, transparency principles, and a shared accountability model is urgently needed to ensure legal certainty and patient protection in the digital healthcare ecosystem.

Regulatory fragmentation is also evident in the separation between health law, consumer protection law, and personal data protection law. Each regime has its own distinct logic and evidentiary mechanisms. In practical disputes, patients can face difficulties navigating multiple legal frameworks simultaneously. The lack of national standards for algorithm validation is the most crucial gap. Functionally, diagnostic algorithms have an impact equivalent to medical devices. However, unlike conventional medical devices, which are subject to registration and clinical trials, AI algorithms lack a dedicated certification mechanism. This creates regulatory asymmetry: high risk without adequate normative controls. Furthermore, the black-box nature of AI algorithms raises evidentiary challenges. In Indonesian civil law, the burden of proof generally rests with the plaintiff. However, in the context of complex technology, it is nearly impossible for patients to technically prove design flaws or data bias. This situation has the potential to undermine the principle of access to justice (Neves & Céu, 2018). Thus, this discussion emphasizes the need for a more integrative and responsive reformulation of norms to address the development of AI in healthcare.

Shared Liability Model as a Reconstruction of Responsibility

Based on normative and doctrinal analysis, the shared liability model emerges as the most rational and proportionate solution. This model does not eliminate physicians' responsibility, but rather limits it to aspects within their professional competence. Within the framework of shared responsibility, the division of roles between actors is key to ensuring justice and legal certainty. First, physicians retain responsibility for the clinical aspects inherent in their profession. This means they are required to conduct independent medical assessments, verify the output or recommendations generated by algorithms, and ensure that every therapeutic decision adheres to applicable professional and service standards. Algorithms serve only as tools, so professional responsibility cannot be fully transferred to technological systems. Furthermore, telemedicine platform providers bear responsibility for the system and governance of digital services. They are obligated to guarantee the security of the technological infrastructure, ensure reliable integration between software and service mechanisms, and provide transparent information regarding the operation and limitations of the systems used. Furthermore, platforms are responsible for protecting patients' personal data, including preventing data leaks, misuse of health information, and system failures that could harm service users (Rieke et al., 2020).

Algorithm developers have responsibilities focused on the technical quality and integrity of the AI system design itself. They are obligated to ensure that algorithms are designed based on sound scientific methodology, use representative training data free from bias that disadvantage certain groups, and undergo adequate testing and validation before implementation. System reliability, predictive accuracy, and error risk mitigation are all part of the technical responsibility that cannot be ignored. With this division, each actor bears responsibility according to their area of control and contribution to the technology-based healthcare process. This approach aligns with the principle of proportional causation. Judges no longer seek a single primary perpetrator but instead assess each party's contribution to the harm. This model also has important implications for the burden of proof. Patients simply need to prove the harm and the failure of the

telemedicine service that reasonably contributed to that harm. The distribution of responsibility is then determined based on the role and level of control of each party (Morley et al., 2020).

In the context of algorithm developer liability, the application of a strict liability approach deserves serious consideration. This idea stems from the unique characteristics of digital health technology, which has the potential to directly impact patient safety and lives. When an algorithm is used in diagnostic processes, therapy recommendations, or clinical decision-making, system errors are no longer merely administrative but can also lead to significant physical and psychological harm. Therefore, stricter liability standards are relevant to ensure patient protection. In addition to the high risk factor, there is also an information gap between developers and users. Developers have a deep understanding of system design, data training processes, technical parameters, and potential algorithmic bias. In contrast, healthcare professionals and patients generally act only as end users without full access to the system's internal mechanisms. This imbalance creates an unequal bargaining position, making the imposition of fault-based liability often difficult for injured parties (Vokinger et al., 2021).

Furthermore, the technical complexity of algorithms, especially those based on artificial intelligence, makes proving negligence complex and expensive. The digital forensic process of tracing the source of errors requires specialized expertise and significant resources. In such circumstances, a strict liability approach can be a more effective instrument because it does not require detailed proof of fault. Thus, the concept of shared liability combined with the principle of strict liability not only reflects distributive justice among actors but also strengthens the effectiveness of legal protection for patients, the most vulnerable (Yu et al., 2018).

Ethical, Constitutional Implications, and Direction of Regulatory Reform

This discussion goes beyond the technical aspects of accountability and also touches on ethical and constitutional dimensions. The right to health and the right to legal certainty are essential human rights protections. The use of AI in medical services should not diminish these standards of protection. Ani's hypothetical case illustrates how algorithmic bias can directly impact prognosis and treatment costs. From a human rights perspective, such systemic failures are not merely technical issues but also potential violations of the right to safe and quality healthcare. A comparison with Malaysia demonstrates a trend toward a more explicit model of shared liability. While there is no comprehensive regulation of medical AI, the common-law approach allows flexibility in allocating responsibility based on the principles of negligence and product liability. Indonesia can learn from these lessons to develop a more systematic AI governance framework (Gerke et al., 2020).

Regulatory reform in the field of medical algorithms needs to focus on strengthening systematic governance and patient protection. First, national standards for the validation and certification of medical algorithms are needed, encompassing digital clinical trials, diverse population-based accuracy testing, and regular independent audits. These standards are essential to ensure that systems in circulation meet safety, effectiveness, and reliability thresholds before being implemented in clinical practice (WHO, 2021). Without a structured evaluation mechanism, the risk of data bias and predictive errors will continue to plague AI-based healthcare. Second, the obligation to implement explainable AI principles needs to be emphasized, so that medical personnel and patients can understand the rationale behind the system's recommendations. This transparency is not merely a technical issue, but also part of fulfilling the right to information and informed consent in medical ethics (Floridi, 2014). With adequate explanation, doctors can still carry out their professional functions autonomously and critically.

Third, explicit regulations are needed regarding the division of responsibilities within the law, both between developers, platform providers, and medical personnel. Clarity in norms will prevent legal vacuums and minimize multiple interpretations in dispute resolution. This model can integrate a proportionally shared liability approach. Fourth, consideration should be given to reformulating the burden of proof, for example through a reversal of the burden of proof mechanism in certain cases involving high technical complexity. This scheme provides more balanced access to justice for patients as vulnerable parties. With these steps, regulations will not only function reactively when disputes arise, but also be preventive in anticipating risks from the design and implementation stages of technology (Price & Cohen, 2019).

The digital transformation in the healthcare sector has transcended conventional legal paradigms. Algorithms are no longer simply neutral tools but technological actors with significant causal impacts on patient safety. The Indonesian legal system is still in its early stages of adaptation. The absence of specific

norms regarding medical AI creates uncertainty that could potentially harm both patients and medical personnel. Therefore, a shared liability approach supported by substantive regulatory reform is the most rational and equitable option. Ultimately, the primary goal of this accountability reconstruction is not simply to distribute blame, but to ensure that technological innovation goes hand in hand with the protection of patient rights, legal certainty, and the integrity of the medical profession. In this context, the law must not lag behind technology but rather serve as a balancing instrument, ensuring that digital progress remains aligned with justice and humanity (Gerke et al., 2020).

CONCLUSION

Algorithmic errors in telemedicine are a logical consequence of the integration of advanced technology into healthcare practices. Errors can stem from various factors, such as flawed system design, bias in training data, limitations of artificial intelligence models, excessive use without clinical verification by medical personnel, and technical failures in digital platforms. This complexity demonstrates that errors in algorithm-based telemedicine cannot always be reduced to individual negligence alone but are often the result of interactions between humans, systems, and technological infrastructure. An overly simplistic legal approach has the potential to create injustice and uncertainty. In the Indonesian legal context, physicians remain the primary legal subjects due to the therapeutic relationship and professional obligations inherent in medical practice. The principle of professional responsibility requires physicians to maintain independent clinical judgment, even when assisted by algorithmic systems. However, placing full responsibility on physicians is disproportionate if the error stems from algorithmic design, data bias, or system disruptions beyond the reasonable control of medical personnel. The absence of national standards for algorithm validation, certification, auditing, and transparency further highlights the gap in norms that could potentially harm patients and create legal uncertainty for medical personnel and platform providers. In such situations, a shared liability model is the most rational and equitable approach. This model distributes responsibility proportionally: doctors are responsible for clinical aspects and professional verification; platform providers are responsible for system security, reliability, and governance; and algorithm developers can be held accountable for design flaws, technical failures, or data biases that influence decision-making outcomes. This model not only distributes risk equitably but also encourages each actor to improve the system's standards of care and quality. Comparatively, Malaysia's experience with the Telemedicine Act 1997 demonstrates a more adaptive approach in dividing responsibility between doctors, platforms, and technology developers based on the principles of negligence and product liability. This approach strengthens accountability and patient protection without stifling innovation. Drawing on this practice, Indonesia needs to develop more comprehensive and responsive regulations regarding the use of algorithms in telemedicine. This reformulation is crucial to ensure that technological advancements align with the principles of justice, legal certainty, and protection of the right to health. In conclusion, this study confirms that the struggle for equality in religious discourse requires intervention at multiple levels: language, media, ideology, and policy. Women's voices in religion should be seen not as a threat, but as a legitimate part of the diversity of interpretations that enrich the religious realm and strengthen human values. Digital space, when used critically and reflectively, can be a transformative tool for broadening the horizons of religious authority to be more just and inclusive.

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