Journal of Indonesian Legal Studies
Vol. 10 Issue 2 (2025) 773-808
DOI: https://doi.org/10.15294/jils.v10i2.10025
Online since: November 30, 2025

Journal of
INDONESIAN
LEGAL STUDIES
https://journal.unnes.ac.id/journals/jils/index

Legal Aspects of Patient Data Governance in Digital Health: A Comparative Analytical Study of UAE and Indonesian Legislation

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Abstract

This study provides a comparative legal analysis of the United Arab Emirates (UAE) and Indonesia regarding the regulation of digital health technologies, particularly electronic medical records (EMR) and artificial intelligence (AI). It examines core legal dimensions including data security, patient consent, monitoring mechanisms, and data ownership. Although both countries have adopted ambitious digital health strategies, the UAE has developed a more comprehensive and integrated regulatory framework through Federal Law No. 2 of 2019 on the Use of Information and Communication Technology in Health Fields and the Personal Data Protection Law No. 45 of 2021. These instruments ensure stricter data protection, structured access control,

encryption standards, and regular audit mechanisms. In contrast, Indonesia, despite the enactment of Minister of Health Regulation No. 24 of 2022 and Law No. 27 of 2022 on Personal Data Protection, still faces challenges in enforcement, interoperability, and accountability. The findings highlight the need for Indonesia to strengthen its legal and institutional infrastructure to ensure compliance, enhance data privacy, and promote patient trust in digital health systems. Drawing lessons from the UAE experience, the study proposes policy reforms aimed at aligning Indonesia's legal framework with international standards and fostering a secure, ethical, and innovation-oriented digital health environment.

KEYWORDS *Digital Health, Electronic Medical Records, Artificial Intelligence, Patient Data Protection, Comparative Law, UAE, Indonesia*

Introduction

The global digital health market is projected to expand significantly, increasing from USD 427.24 billion in 2025 to approximately USD 1,500.69 billion by 2032, reflecting a compound annual growth rate (CAGR) of 19.7%. For 2024, the market value is estimated at USD 376.68 billion[1]. According to recent industry analyses, the accelerated adoption of digital healthcare solutions is anticipated to generate a new global market valued at USD 230 billion, including USD 10 billion within the Middle East region over the next five years[2].

Consequently, digital technologies such as telehealth platforms, digitally assisted surgical instruments, electronic health records (EHRs), mobile health (mHealth) applications, and artificial intelligence (AI)-driven clinical decision-support tools, are increasingly embedded in healthcare service delivery frameworks. The overarching objectives of these technologies are to enhance the efficiency, accuracy, and modernization of medical service provision in accordance with contemporary standards of care. [3]

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1 Jignesh Rawal, "Healthcare/Digital Health Market", *Report ID: FBI100227*, September 29, 2025, https://www.fortunebusinessinsights.com/ar/industry-reports/digital-health-market-100227.

2 World-government-summit-proceeding-report_2022, May 31, 2022, https://www.worldgovernmentssummit.org/ar/observer/publications/detail/world-government-summit-proceeding-report_2022.

3 Simon P. Rowland et al., "Digital health technology-specific risks for medical malpractice liability", *NPJ Digital Medicine* 5, no. 157 (2022): 1-6.

The healthcare system is currently confronting significant challenges arising from increasing patient demand, the growing prevalence of chronic diseases, and the persistent scarcity of medical resources. Simultaneously, the volume of data generated across healthcare environments has expanded considerably, accompanied by a rapid rise in the utilization of digital health technologies. The effective deployment of these tools enables healthcare providers to identify the underlying causes of illness more accurately and to assess the efficacy of preventive and therapeutic interventions. Policymakers, regulators, and other decision-makers must remain cognizant of these developments and their implications for public health governance. Furthermore, there is broad consensus among clinical innovators, data scientists, and software developers that machine learning and other forms of artificial intelligence constitute essential instruments for advancing healthcare reform and ensuring the sustainability of modern health systems. [4]

The integration of emerging technologies into healthcare systems raises significant concerns regarding potential data breaches and the dissemination of inaccurate or unreliable information. Errors occurring within the healthcare sector, especially those resulting from technological or algorithmic failures, may have severe and irreversible consequences for patients. This is particularly critical given that individuals often engage with healthcare providers during their most vulnerable circumstances. [5]

Consequently, the application of artificial intelligence (AI) in healthcare must be approached with due regard to the legal and ethical challenges it presents. While AI possesses the capacity to enhance diagnostic accuracy, operational efficiency, and the quality of care, it also gives rise to complex issues of accountability, liability, and data protection. The principal legal considerations associated with AI in healthcare are summarized in Tabel 1.

TABLE 1. Health Technology Legal Challenges

Legal Aspect	Problem	Explanation
Data Confidentiality and Privacy	Risk of patient data leakage	In order to implement AI, massive volumes of sensitive data must be accessible. While developing and using AI systems, we must respect data protection and privacy regulations such as the General Data Protection Regulation (GDPR) in Europe

[4] Jessica Morley & Luciano Floridi, "An Ethically Mindful Approach to AI for Health Care", *The Lancet* 395, Issue 10220 (2020): 254-255.

[5] Marie-France Mamzer, "Ethics and artificial intelligence in health: The emergency of an integrated approach", *Annales de Pathologie* 39, no 2 (2019): 85-86.

Legal Aspect	Problem	Explanation
		and the Information Technology Equity Law (ITE) in Indonesia.
Data Ownership and Use	Who owns the data and how it can be used	There are concerns around who owns the patient data used to train the AI and the outcomes of that AI analysis, as third parties often create AI. Legislation must clearly define data usage restrictions and ownership rights.
Accuracy and Error	Responsibility for misdiagnosis or treatment	In healthcare contexts, AI mistakes might have devastating effects. In the event of a mistake, the law must decide who is liable, whether it is the healthcare practitioner, the algorithm developer, or someone else entirely.
Consent (Approval)	Info RME consent in the use of AI	The use of patient data in AI systems requires their express agreement. We must meet legal requirements to ensure patients receive adequate information about the intended use of their data and any potential hazards.
Regulatory Oversight Standards	Ensure AI meets clinical standards	For artificial intelligence (AI) to be safe and successful in healthcare settings, it must adhere to stringent regulatory requirements. The testing, deployment, and supervision of AI systems necessitate the establishment of a transparent framework by regulators.

The digitalization of healthcare in Indonesia and the United Arab Emirates (UAE) has accelerated rapidly, presenting both significant opportunities and complex legal challenges. In Indonesia, the implementation of Electronic Medical Records (EMR) represents a transformative step toward modernizing healthcare administration. The issuance of Minister of Health Regulation No. 24 of 2022 marks a milestone in the digital transformation of Indonesia's health sector, providing a regulatory framework for recording and storing electronic medical data. However, the legal landscape remains fraught with issues concerning data ownership, privacy protection, and accountability. The involvement of third parties in EMR system development raises further concerns regarding the lawful use of patient data for research or clinical

purposes[6]. Despite partial adoption, only half of Indonesian hospitals had implemented EMR by 2022, with effective compliance in just 16%, many institutions continue to face challenges transitioning from manual to electronic systems. [7]

Similarly, the UAE has witnessed an unprecedented expansion of digital health technologies, driven in part by the COVID-19 pandemic. Innovations such as electronic prescriptions, health information management systems (HIMSS) [8], and AI-assisted diagnostic tools have become integral to healthcare delivery. Legislative developments, including the 2019 Health Data Law and subsequent regulatory measures introduced by the Ministry of Health and Prevention (MOHAP), aim to govern the use of AI and machine learning in medical devices. Nonetheless, the UAE continues to confront legal issues related to data protection, product liability, antitrust practices, and cybersecurity[9]. Obligations concerning the timely disclosure of data breaches and the maintenance of patient confidentiality are central to the evolving regulatory framework.

Both jurisdictions face similar concerns regarding the ethical and legal implications of AI in healthcare, including accountability for algorithmic errors, potential misdiagnoses, and questions of transparency and fairness. Data security and privacy remain the most pressing issues, necessitating clear allocation of responsibility for data processing and error management. As AI increasingly informs clinical decisions, the need for robust legislative frameworks that safeguard patient rights while fostering technological innovation has become evident.[10]

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[6] Neng Sari Rubiyanti, "Implementation of Electronic Medical Records in Hospitals in Indonesia: Juridical Study", *AL-ADALAH: Journal of Politics, Social, Law and Humanities*, 1, no. 1 (2023): 179-187.

[7] Nurul Aini Habibah, "Implementation of Electronic Medical Records in Health Facilities in Indonesia", (2023). https://bbkpm-bandung.org/blog/2023/07/penerapan-rekam-medis-elektronik-di-fasilitas-kesehatan-di-indonesia.

[8] Marmore Mena Intelligence, "UAE Healthcare Report - Growth fuelled by private healthcare", *Marmore Research Report*, (2021). https://www.marmoremena.com/wp-content/uploads/pdf/1633351667_UAE%20Healthcare%20-Executive%20Summary%20-%20Marmore%20Research%20Report.pdf.

[9] Khalid A. Alnaqbi et al., "Consensus-Based Recommendations for the Implementation of Health Technology Assessment in the United Arab Emirates", *Value in Health Regional Issues* 43, no. 101012 (2024): 1-10.

[10] Maiss Ahmad, Kasem S. Akhras & Shadi Saleh, "Genuine Policy Learning Is Fundamental: The Journey of the United Arab Emirates toward the Establishment of Health Technology Assessment", *International Journal of Technology Assessment in Health Care* 39, Issue 1 (2023).

This study employs a normative legal method combined with a comparative approach to analyze and contrast the regulatory systems of Indonesia and the UAE concerning healthcare digitalization. It examines the relevant laws, policies, and institutional mechanisms governing technologies such as EMR and AI, identifying both commonalities and divergences in their legal treatment. The analysis evaluates the effectiveness of current enforcement mechanisms in protecting patient confidentiality and mitigating data security risks.

Ultimately, this research seeks to propose regulatory reforms that align national legislation with international standards, including the General Data Protection Regulation (GDPR), while accommodating local needs. The overarching objective is to promote a balanced legal framework that both encourages innovation and ensures the ethical and secure use of digital health technologies. The findings aim to contribute to policy formulation and guide legislators, healthcare professionals, and legal practitioners in developing a more secure and accountable digital health environment in both countries.

To assess the effectiveness of in the Indonesia's Personal data protection law (No. 27 of 2022) in the context of patient data protection, compared with the United Arab Emirates Personal data protection law (No. 45 of 2021), this study explores several key research issues. First, it reviews the regulatory frameworks for healthcare digitalization in Indonesia and the UAE, emphasizing EMR and health information systems. Second, it analyzes and compares patient data protection and privacy laws under both laws, focusing on consent, data ownership, accountability, secure storage, and the use of AI in healthcare. Third, it offers recommendations to enhance regulation, compliance, system integration, and alignment with international standards, drawing lessons from the UAE to improve Indonesia's digital health governance.

Through a comparative analysis for both laws, this study seeks to explore how Indonesia can benefit from the United Arab Emirates' Personal Data Protection Law, particularly regarding the protection of patient data against the risks associated with the digitalization of healthcare services, to contribute to ongoing discussions on how to enhance Indonesia's data protection regime in accordance with comparative international standards.

Previous researches have explored personal data protection under UAE and Indonesia's law, separately, but many gaps remain addressing a comparative analysis between them or study them in interaction. Ni Nyoman Putri Purnama Santhi, explores the legal weaknesses in Indonesia's framework for safeguarding patient data amid rapid healthcare digitalization. Using a normative juridical

approach, she examines gaps in existing laws such as the Health Law No. 36/2009 and the lack of cybersecurity and consent mechanisms.[11]

The study identifies Indonesia's vulnerability to data breaches and limited enforcement capacity compared with international standards like the GDPR. Their study focuses solely on Indonesia's patient data protection framework, identifying legal weaknesses, outdated provisions, and poor enforcement but offering only general reform suggestions.

In contrast, the present study adopts a comparative legal-technical approach between Indonesia and the UAE, analyzing both substantive and procedural aspects of digital health regulation, including AI governance and patient rights. Through a concrete, comparative, and policy-oriented recommendations. Kevin Raihan and Sinta Dewi Rosadi, focused primarily on analyzing how AI-enhanced telemedicine applications in Indonesia comply with the Personal Data Protection Law No. 27 of 2022, focusing on the seven core principles of data protection.

It identifies telemedicine providers such as Halodoc, Alodokter, and KlikDokter as data controllers responsible for safeguarding patient data, identifying some gaps and inconsistencies in how these platforms apply principles like consent, purpose limitation, accuracy, and data security. It emphasizes the need for stronger privacy policies and technical safeguards to ensure lawful and transparent data processing.[12] However, their study does not address the impact of the United Arab Emirates' Personal Data Protection Law on strengthening patient data safeguards in the healthcare sector, nor does it offer a comparative analysis of other countries.

The study of Firsta Rahadatul 'Aisy, Muhammad Azil Maskur, and A.M Adzkiya' Amiruddin, examines Indonesia's Personal Data Protection Law (Law No. 27 of 2022), focusing on the absence of an independent supervisory authority to enforce administrative sanctions. It investigates institutional and legal barriers delaying the establishment of the Personal Data Protection Agency. Using comparative analysis, it studies data protection enforcement frameworks in Ireland, Australia, and Singapore to identify effective models.[13]

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[11] Ni Nyoman Putri Purnama Santhi, "Patient Data Privacy Challenges in Electronic Health Systems: A Juridical Analysis of Medical Information Protection in Indonesia", *West Science Law and Human Rights* 3, no. 1 (2025): 1-8.

[12] Kevin Raihan and Sinta Dewi Rosadi, "Have AI-Enhanced Telemedicines in Indonesia Adopted the Principles of Personal Data Protection?", *Yustisia Jurnal Hukum* 13, no. 2 (2024): 151-167.

[13] Firsta Rahadatul 'Aisy, Muhammad Azil Maskur, A.M Adzkiya' Amiruddin, "Establishing Indonesia's Personal Data Protection Agency: Comparative Administration Sanctions

Unlike this study, their research does not undertake a comprehensive comparative analysis of the substantive and procedural provisions for protecting data subjects, but instead centers on institutional independence and regulatory capacity.

Sevy Septiana Afina and Rina Arum Prastyanti, study the comparative frameworks of personal data protection in Indonesia and the United States, examining how differences in legal systems and governmental structures shape privacy enforcement. Their research analyzes Indonesia's centralized Personal Data Protection Law No. 27 of 2022 alongside the United States' sectoral and fragmented model, highlighting that Indonesia offers comprehensive regulation but suffers from weak implementation, while the U.S. achieves stronger enforcement yet faces inconsistency due to federalism.[14]

Similarly, Rifai Sulistyo, Laksanto Utomo, Erwin Owan Hermansyah, and Rahmat Saputra, compares Indonesia's Personal Data Protection Law No. 27 of 2022 with Thailand's PDPA, to evaluate their respective approaches to privacy regulation and enforcement. They highlight Indonesia's slower implementation and lack of an independent supervisory body compared to Thailand's earlier enforcement through the Personal Data Protection Committee. They call for the immediate creation of a supervisory agency and clearer technical regulations to ensure effective protection of personal data.[15]

The main gaps of both studies are their lack of sector-specific analysis and its omission of how data protection principles function within sensitive domains like health data governance. adopting a general legal–comparative approach focusing on administrative enforcement. In contrast, our study examines personal data protection within the specific context of healthcare digitalization, comparing Indonesia and the UAE through the lens of electronic medical records and AI governance, within sensitive domains like health data governance, which are addressed through a comparative legal-technical framework.

Employing both legal and conceptual approaches, this study conducts a comprehensive review of laws and regulations related to personal data

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Enforcement from Ireland, Australia, and Singapore". *Journal of Indonesian Legal Studies* 10, no. 1 (2025): 431-482.

[14] Sevy Septiana Afina & Rina Arum Prastyanti, "Personal Data Protection Analysis: Comparison of Indonesia, the United States as Federal Countries". *International Journal of Law, Crime and Justice* 2, no. 2 (2025): 246-259.

[15] Afnan Rifai Sulistyo, Laksanto Utomo, Erwin Owan Hermansyah, Rahmat Saputra, "Comparison of Personal Data Protection in Indonesia and Thailand: Case Studies and Comparisons", *Greenation International Journal of Law and Social Sciences* 3, no. 3 (2025): 773-782.

protection while simultaneously analyzing the foundational legal concepts that shape the broader framework for safeguarding personal rights. This dual approach ensures a robust understanding of both theoretical foundations and practical implications in safeguarding individuals' rights in the digital age, providing valuable insights for the improvement of Indonesia's Personal Data Protection regulations.

The primary aim of this study is to assess the current state of the law and to justify the need for legislative reforms that better protect patients while optimizing the benefits of healthcare digitalization, in order to propose legislative improvements to ensure stronger patient safeguards alongside the ethical advancement of healthcare digitalization.

Regulation in the United Arab Emirates and Indonesia Governing the Implementation of Health Digitalization

A. United Arab Emirates

The United Arab Emirates provides high-quality healthcare services to both residents and foreign workers through an extensive network of public and private institutions. Several emirates, including Abu Dhabi and Dubai, have made health insurance mandatory, reducing out-of-pocket expenses through comprehensive coverage. Healthcare expenditure accounted for over 4% of GDP in 2017, with the government covering nearly 55% of total costs. For the 2025 fiscal year, AED 5.745 billion, about 8% of the federal budget, was allocated to health services and community prevention. According to the Ministry of Economy, healthcare spending is projected to reach $26 billion by 2028, supporting around 700 ongoing projects worth $60.9 billion[16]. The sector is expected to represent 4.6% of GDP by 2026, with the medical device market growing by $1.5 billion by 2025 and Dubai's healthcare industry valued at over $4.6 billion annually.[17]

The United Arab Emirates maintains a robust healthcare system supported by both the expanding private sector and the Ministry of Health and Prevention (MOHAP). MOHAP serves as the central authority overseeing healthcare facilities nationwide, while each emirate manages its own hospitals and allocates resources locally. In addition to MOHAP, key public healthcare entities include

[16] Amna I. Alshamsi, "A Review of the United Arab Emirates Healthcare Systems on Medical Tourism and Accreditation", *Front. Health Serv.*, 21 February, Vol. 4 (2024).

[17] Emirates Today report, "$26 billion in healthcare spending by 2028", May 01, 2024. https://www.emaratalyoum.com/business/local/2024-05-01-1.1848492.

the Abu Dhabi Health Authority (HAAD), the Dubai Health Authority (DHA), and the Emirates Health Services (EHS), all working together to ensure efficient administration and delivery of medical services across the country.[18]

Unlike Abu Dhabi and Dubai, which operate their own regulatory authorities, the other five emirates rely on the Emirates Health Services (EHS) for healthcare licensing and regulation. Healthcare providers across the UAE face the dual challenge of meeting the growing demand for high-quality medical services while maintaining adequate workforce capacity[19]. Approximately 30% of total healthcare spending is devoted to pharmaceuticals. In 2022, healthcare expenditure accounted for 5.2% of the UAE's GDP, reflecting the nation's commitment to improving accessibility and quality of care[20]. With the highest per capita healthcare spending in the Middle East, the UAE is recognized as a high-income country with advanced healthcare standards. The structure of the UAE health system as shown on Figure 1.

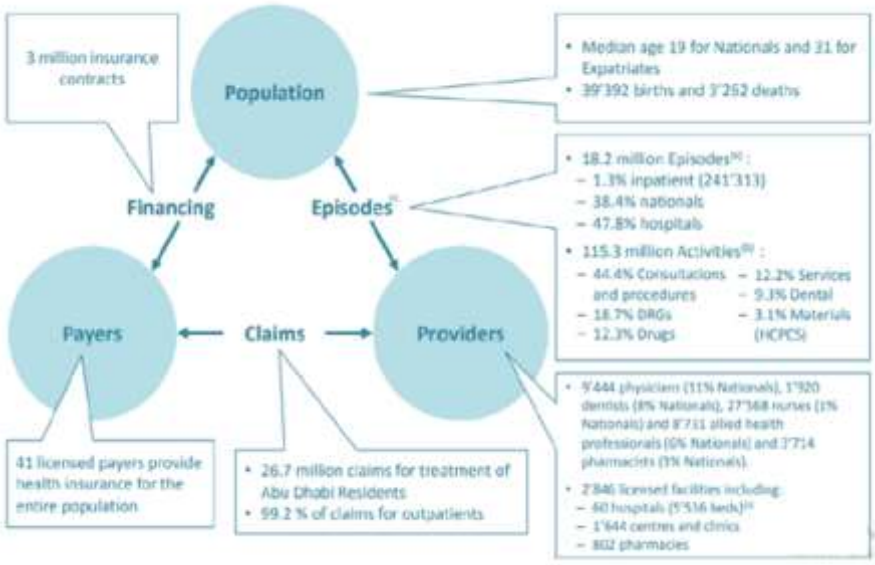

FIGURE 1. Health System in UAE[21]

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[18] Erik J. Koornneef, Paul Robben & Iain Blair, "Progress and Outcomes of Health Systems Reform in the United Arab Emirates: A Systematic Review", 17 *BMC Health Serv. Res.* 672 (2017): 1-13.

[19] Halah Ibrahim et al., "Should I Stay or Should I Go Now? The Impact of "Pull" Factors on Physician Decisions to Remain in a Destination Country", *The International Journal of Health Planning and Management* 34, Issue 4 (2019): 1909-1920.

[20] Amna I. Alshamsi, Angeli Santos & Louise Thomson, "Psychosocial Safety Climate Moderates the Effect of Demands of Hospital Accreditation on Healthcare Professionals: A Longitudinal Study", *Front. Health Serv.*, 22 April, Vol. 2 (2022).

[21] Sheima Ali, Bryan McIntosh & Anjali Raj, "Determinants of Success and Challenges in Healthcare System: The Case of Abu-Dhabi", *Journal of Medical and Health Sciences (RRJMHS)* 9, Issue 4 (2020): 65-75.

These data are particularly valuable when examining healthcare digitalization from an operational perspective. Digital solutions and health information technologies (such as electronic medical record (EMR) systems and health data exchange platforms) enhance efficiency and accuracy across the healthcare continuum, from patient treatment to claims processing. The integration of digital systems benefits consumers, providers, and payers alike by streamlining data management, improving diagnostic precision, optimizing treatment outcomes, and accelerating both reimbursement and funding procedures.

One of the UAE government's key strategies for building a world-class healthcare system is the integration of advanced medical technologies into patient care. However, no country, regardless of its wealth, can realistically provide unrestricted access to all emerging technologies. Before 2016, the UAE lacked a centralized Health Technology Assessment (HTA) body; reimbursement and pricing decisions were managed separately by the Ministry of Health and Prevention, individual emirate health authorities, and private insurers. The establishment of an HTA division within the Abu Dhabi Department of Health (DOH) therefore reflects a strategic shift toward evidence-based decision-making in healthcare policy and resource allocation.[22]

Since its establishment, the HTA unit has been responsible for assessing medical devices, surgical procedures, and other emerging health technologies. Through the Open Health Technology Platform, companies can submit their innovative products for evaluation, with the Department of Health (DOH) subsequently publishing the assessment results on its official website. Although the UAE has made significant progress in institutionalizing HTA practices, further efforts are needed to expand its application, particularly to include pharmaceuticals and a wider range of health technologies.

The healthcare sector across the emirates is experiencing growing demand and an increasing number of patients. In November 2022, the UAE launched its federal strategy, We Are the UAE 2031, which aims to position the nation's healthcare system among the world's top ten. Abu Dhabi and Dubai serve as the primary healthcare hubs, supported by multiple government bodies, including the Ministry of Health and Prevention (MOHAP), the Dubai Health

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[22] Shaikha FS Alhashmi, Said A. Salloum & Chaker Mhamdi, "Implementing Artificial Intelligence in the United Arab Emirates Healthcare Sector: An Extended Technology Acceptance Model", *International Journal of Information Technology and Language Studies (IJITLS)* 3, Issue 3 (2019): 27-42.

Authority (DHA), and the Department of Health (DOH)[23]. The private sector also plays a vital role, featuring state-of-the-art medical facilities and partnerships with world-renowned institutions such as the Mayo Clinic and the Cleveland Clinic.[24]

One of the key strategic objectives of the UAE's healthcare regulators is to establish the country as a leader in digital health ecosystems, research excellence, and high-quality medical services, all aimed at enhancing societal well-being. The government has strengthened the authority of the Ministry of Health and Prevention, enabling broader regulation and oversight of the private healthcare sector. Today, the United Arab Emirates hosts approximately two-thirds of the region's healthcare facilities, positioning it as a major destination for medical tourism and advanced treatment services[25].

Investment priorities in the UAE healthcare sector through 2025 focus on key areas such as mental health, rehabilitation, emergency and long-term care, public health management, and the development of MedTech startups. The UAE's healthcare system operates as a hybrid model, integrating public and private sector efforts to deliver high-quality medical services. The fundamental regulatory framework governing healthcare in the United Arab Emirates is established by the Constitution and further defined through specific national health laws and regulations.[26] The UAE's healthcare system is governed by several key constitutional and legislative provisions that establish the legal foundation for public health and medical practice:[27]

1) The UAE Constitution, Article 19: "*The community shall provide all citizens with medical care and means of prevention and treatment from diseases and epidemics and shall promote the establishment of public and private hospitals, clinics, and treatment houses*".

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[23] Ahmad Z. Al Meslamani, "Technical and Regulatory Challenges of Digital Health Implementation in Developing Countries", *Journal of Medical Economics* 26, Issue 1 (2023).

[24] Náder Alyani, "Formulating Digital Right-Skilling in the Gulf's Healthcare 4.0 Ecosystem to Enhance Professional Capabilities", *Chapter in Book (Nationalization of Gulf Labor Markets: Higher Education and Skills Development in Industry)*, (2023): 149-177.

[25] Hajar Al Hubaishi & Abdelrahim Ali, "The Effect of Public Healthcare Service Quality on Residents' Satisfaction in the United Arab Emirates (UAE), the Case of Ajman Emirate", *Health* 14 (2022): 306-321.

[26] Sharon M. Brownie et al., "Establishing Policy Foundations and Regulatory Systems to Enhance Nursing Practice in the United Arab Emirates" *Policy Politics & Nursing Practice* 16, Issue 1-2 (2015): 1-13.

[27] Erik J. Koornneef et al., "Health System Reform in the Emirate of Abu Dhabi, United Arab Emirates", *Health Policy* 108, Issues 2–3, December (2012): 115-121.

2) Federal Law No. 13 of 2020 on Public Health, Article 2: "*This Law is intended to: (1) Establish an end-to-end system of scientific and applied rules and systems for the purpose of enhancing and protecting public health, in accordance with the precautionary principle and proven scientific evidence, and pursuant to the International Health Regulations and any other regulations approved by the State*".
3) Federal Law No. 5 of 2019 Regulating the Practice of the Medical Profession, Article 3: "*The present Law aims to: (1) Regulate the practice of the medical profession; (2) Lay the legal foundations for professional conduct to ensure the advancement of the medical field and the provision of high-quality health services; and (3) Establish professional standards and criteria to prevent medical misconduct, unlawful acts, and unethical practices*".

The basic regulations in the Constitution and relevant UAE health laws as explained on Table 1.[28]

The United Arab Emirates has made significant progress in healthcare digitization through the enactment of Federal Law No. 2 of 2019 on the Use of Information and Communication Technology (ICT) in Health Fields and its implementing Cabinet Decision No. 32 of 2020 (ICT Health Regulations), alongside the Federal Decree-Law No. 45 of 2021 Concerning the Protection of Personal Data. These legislative measures establish a comprehensive framework that promotes digital transformation while ensuring the confidentiality, security, and integrity of health data. In the modern healthcare landscape, data protection and patient privacy have become essential components of technological advancement, addressing ethical challenges and legal concerns related to the misuse or breach of sensitive medical information[29]. The legislation regulates multiple aspects of digital health, including data governance and telemedicine, which enable remote consultations and treatment within a secure and ethically governed system.

TABLE 2. Regulatory Framework and Guidelines for Health Digitalization in the United Arab Emirates

Regulations/Guidelines	Information/Short Description
Federal Law No. (2) of 2019 on the use of the information and communication technology in the areas of health.	Article 4, Commitment to maintaining the confidentiality of health data and information, ensuring the accuracy and reliability of health data and information, as well as

[28] Erik J. Koornneef et al., "Health System Reform in the Emirate of Abu Dhabi, United Arab Emirates", *Health Policy* 108, Issues 2–3, December (2012): 115-121.

[29] Mourad Benseghir, Maamar Bentria, "Artificial Intelligence in Medicine: Is the Legal Framework Prepared to Address Its Risks? A Comparative Analysis", *Journal of Law* 49, No. 3 (2025): 183-238.

	ensuring the availability of health data and information to those authorized, and facilitating access to them.
	Article 5 makes it clear that the Ministry of Health, in coordination with the health authority and relevant authorities, shall establish a central system for storing, exchanging and collecting health data and information.
Federal Decree by Law No. (45) of 2021 Concerning the Protection of Personal Data.	Article 6 stipulates that health authorities, in coordination with the Central system of the Ministry of Health, are responsible for collecting, storing, and distributing health data and Information. Article 5/6: Personal Data shall be kept securely, including protecting it from any violation, penetration, or illegal or unauthorized processing through the development and use of appropriate technical and organizational measures and procedures in accordance with the laws and legislation in force in this regard.
DOH Policy on Digital Health, September 2020.	Care delivery and health outcomes may be enhanced by the integration of digital technology into health systems, as directed by this policy.
National Nutrition Guidelines (MoHaP)	With the goal of promoting better nutritional status and good eating habits, it serves as an integrated national resource for nutrition education and food.
Hayat Organ Donation Program Initiative	'Hayat' is a national system to enhance efforts to get more people to donate human organs and tissue in accordance with international standards and practices in this regard.
Ministerial Resolution No. (14) of 2021 on the Patient Rights and Duties Charter	Empower patients to take an active role in their own healthcare, particularly in the digital health arena.

Through the above initiatives, The UAE has demonstrated a strong commitment to healthcare innovation and efficiency through its pioneering integration of digital technologies into the national healthcare system. These initiatives aim to enhance both the quality of healthcare services and the safety and effectiveness of treatments supported by technological advancements. Regulations such as Federal Law No. 2 of 2019 firmly establish the principles of data protection and patient privacy, while also enabling the use of real-time data to support more accurate, evidence-based medical decision-making. Through this balanced approach, the UAE continues to strengthen its position as a regional leader in digital health governance and patient-centered innovation.

B. Indonesia

According to Presidential Decree No. 72 of 2012 concerning the National Health System (SKN), the SKN serves as an integrated and coordinated framework for managing the health of the Indonesian population, with the ultimate goal of achieving the highest possible standard of public health. However, several challenges hinder the establishment of a strong and reliable

health system, including inadequate funding, limited institutional coordination, and shortages of healthcare personnel. In times of extraordinary circumstances, such as natural disasters or public health emergencies, these weaknesses in the SKN pose significant risks[30]. Although the SKN policy has led to some improvements in the subsystems of health services and financing, the persistence of major health challenges highlights the need to further strengthen the SKN as a sustainable foundation for national health development.

In an effort to improve public health, Presidential Decree No. 72 of 2012 defines the National Health System (SKN) as an integrated framework designed to coordinate and strengthen healthcare across Indonesia. However, the development of an effective health system faces several persistent challenges, including shortages of healthcare personnel, suboptimal inter-institutional coordination, and insufficient funding. These limitations become even more critical in situations requiring rapid and efficient responses, such as natural disasters or public health emergencies.

To address these persistent challenges, the Ministry of Health of the Republic of Indonesia launched The Blueprint for the Digital Health Transformation Strategy 2024. This initiative serves as a roadmap for stakeholders across the health sector to integrate digital technologies into healthcare delivery and management[31]. The strategy highlights the critical issue of data fragmentation resulting from the uncoordinated use of various health applications, which undermines the effectiveness of health policies due to the absence of accurate and comprehensive foundational data. Furthermore, the digital divide in Indonesia's healthcare system remains vast, an estimated 270 million patient records are still maintained in paper form, and nearly 80 percent of health institutions have yet to adopt digital technologies. This strategy therefore emphasizes the urgent need for nationwide digital integration to enhance data reliability, policy responsiveness, and healthcare efficiency.[32]

Indonesia's digital health strategy focuses on implementing single-identity medical records, developing AI-driven big data, expanding telemedicine, and

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[30] Yusriando Yusriando, "Konstruksi Sistem Jaminan Sosial Nasional Bidang Kesehatan", *Bestuur* 7, Issue 2 (2019): 122-130.

[31] UNDP, "Indonesia Launches a Blueprint on Digital Health to Expand Inclusive Health Care Coverage", *UNDP* (2021), https://www.undp.org/indonesia/press-releases/indonesia-launches-blueprint-digital-health-expand-inclusive-health-care-coverage.

[32] Muhamad Beni Kurniawan, "Government Legal Politics in Handling the Covid-19 Pandemic Reviewed from the Right to Health's Perspective", *Journal Ham*, Vol. 12, No 1 (2021): 37-55.

integrating health data systems to improve efficiency and accessibility[33]. It also highlights the need for strong leadership through a dedicated digital transformation management team. Overall, the strategy aims to enhance healthcare responsiveness, close service gaps, and improve national health outcomes through technology-driven solutions.[34]

Indonesia has established comprehensive policies to regulate the development and implementation of telemedicine as part of its efforts to strengthen healthcare delivery through digital technology. This framework is outlined in the Minister of Health Regulation No. 20 of 2019 on the Implementation of Telemedicine Services Between Health Service Facilities and further reinforced by Law No. 17 of 2023 on Health. Telemedicine, defined as the provision of clinical services through telecommunications technology for the exchange of medical information, aims to improve the quality, accessibility, and efficiency of healthcare for the wider population.[35]

In addition, new regulations have been introduced to support the expansion of telemedicine, including Minister of Health Regulation No. 24 of 2022 concerning Medical Records. This regulation mandates the implementation of electronic medical record (EMR) systems in all healthcare institutions that provide telemedicine services. The use of this technology not only enhances the protection and confidentiality of patient health data but also facilitates improved coordination and collaboration among healthcare providers.[36] The key regulations governing health digitalization in Indonesia are as explained on Table 3.

TABLE 3. Regulations Supporting Health Digitalization in Indonesia

Regulations/Guidelines	Information/Short Description
Health Act No. 17 of 2023	Outlines the concept of telemedicine and establishes guidelines for its use in Indonesia, including a system for

[33] Gunawan Wahyudiono, Joko Ismono & Nuryanto A. Daim, "Legal Protection of Health Personnel (Anesthesians) After the Issue of the Health Law Number 17 of 2023", *Law Humanity* 2, Issue 1 (2024): 1-17.

[34] Wahyu Andrianto & Amira Budi Athira, "Telemedicine (online medical services) in the New Normal Era Reviewed Based on Health Law (Study: Indonesian Telemedicine Program/Temenin at Dr. Cipto Mangunkusumo Hospital)", *Jurnal Hukum & Pembangunan* 52, no. 1 (2022): 220 - 250.

[35] Gunawan Wahyudiono, Joko Ismono & Nuryanto A. Daim, "Legal Protection of health personnel (anesthesians) after the issue of the health law number 17 of 2023", *Law Humanity*2, Issue 1 (2024): 1-17.

[36] Andika Putra, Redyanto Sidi & Syaiful Asmi Hasibuan, "Legal Responsibility of Third Parties and Hospitals for the Implementation of Electronic Medical Records", *JIIP (Jurnal Ilmiah Ilmu Pendidikan)* 6, no. 8 (2023): 6280-6289.

Regulations/Guidelines	Information/Short Description
	providing healthcare services via electronic means of communication.
Minister of Health Regulation No. 20 of 2019, on the Implementation of Telemedicine Services Between Health Service Facilities	Establish the protocols for running the telemedicine service and the amount of time, money, and manpower needed to run it.
Minister of Health Regulation No. 24 of 2022, on Medical Records	Insist that all medical centers adopt EMR systems and support the expansion of telemedicine.
Regulation of the Minister of Communication and Information on Personal Data Security No. 20 of 2016	M Keep users' private information safe in digital systems, especially those that deal with health care.
Minister of Health Regulation No. 18 of 2022, on Standardization and Certification of Health Information Systems	To facilitate interoperability and safe data interchange, all healthcare institutions should standardize their health information systems.

Although Indonesia has enacted several laws promoting health digitalization, multiple challenges continue to hinder the realization of its digital health objectives. One of the most pressing issues is health data fragmentation. The proliferation of independent health platforms and applications operating without proper integration makes it difficult to collect, manage, and utilize data effectively. As a result, public health needs often go unmet, and policymakers may be forced to make decisions without access to comprehensive and reliable information, thereby limiting the effectiveness of national health strategies.[37]

Data breaches and cyberattacks are becoming increasingly common, making data security a critical concern in Indonesia's digital health landscape. Ensuring the secure storage and protection of patients' personal information is essential to building public trust in digital health systems.[38] Although regulations exist to maintain a certain level of data protection, compliance remains inconsistent, as many hospitals and healthcare institutions fail to fully meet the prescribed security standards and enforcement mechanisms are still limited.

A major obstacle to the advancement of digital health in Indonesia is the unequal distribution of technological infrastructure, particularly in remote areas and smaller islands. This disparity allows people in urban centers to benefit from

[37] Masyri Madjido et al., "Health Information System Research Situation in Indonesia: A Bibliometric Analysis", The Fifth Information Systems International Conference, 23-24 July 2019, *Surabaya, Indonesia, Procedia Computer Science*, 161 (2019): 781-787.

[38] Md. Mahmudul Alam et al., "Impacts of COVID-19 Pandemic on National Security Issues: Indonesia as a Case Study", *Security Journal* 35 (2022): 1067-1086.

advanced health technologies, while those in underprivileged or rural regions remain underserved.[39] As a result, a significant gap in access to digital healthcare services persists, hindering the goal of achieving equitable health digitalization nationwide.

Furthermore, there is a shortage of qualified professionals with expertise in health information technology[40]. Many healthcare providers lack adequate training to manage and effectively utilize digital systems, preventing them from fully realizing the benefits of digital health solutions. Although regulatory frameworks have been introduced to guide the transition toward digital healthcare, successful implementation still requires greater attention to the practical challenges of execution, capacity building, and operational readiness across all levels of the health sector.

C. Comparative Analysis of Health Digitalization in the United Arab Emirates and Indonesia

Both the UAE and Indonesia have adopted strategic approaches to enhance healthcare quality and accessibility through digital transformation. In the UAE, mandatory health insurance in emirates such as Abu Dhabi and Dubai ensures universal access to comprehensive care supported by collaboration between public and private sectors. The country has introduced advanced health technologies, including electronic medical records and data-sharing platforms.

In contrast, Indonesia continues to face challenges such as shortages of healthcare personnel, weak inter-institutional coordination, and limited funding, which hinder the establishment of an effective health system. To address these issues, the Indonesian government introduced the Blueprint for Digital Health Transformation Strategy 2024, aimed at integrating digital technologies into national healthcare delivery. The plan includes expanding telemedicine services, implementing electronic medical records, and developing a unified health data system to improve efficiency, accessibility, and coordination across the health sector.

By establishing clear guidelines for delivering clinical services through telecommunications technology, regulations such as Law No. 17 of 2023 on

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[39] Bevaola Kusumasari, Widodo Agus Setianto & Li Li Pang, "A Study on Digital Democracy Practice: Opportunities and Challenges of e-Health Implementation in Indonesia", *Jurnal Ilmu Sosial dan Ilmu Politik* 22, Issue 1 (July 2018): 1-16.

[40] Anastasia A. Dinakrisma et al., "The Role of Digital Mobile Technology in Elderly Health Management among Health Care Workers in Indonesia: Analysis of Knowledge, Attitudes, and Practice", *Digital Health*8 (2022): 1-13.

Health and Minister of Health Regulation No. 20 of 2019 on the Implementation of Telemedicine Services Between Health Service Facilities reinforce the legal foundation for telemedicine and promote its nationwide adoption. Despite ongoing challenges (such as data fragmentation, cybersecurity risks, and uneven technological infrastructure) Indonesia remains committed to advancing health digitalization to enhance the efficiency, accessibility, and equity of healthcare services.

TABLE 4. Comparison of Health Digitalization Regulations and Concepts in the United Arab Emirates and Indonesia

Aspect	United Arab Emirates (UAE)	Indonesia
Main Regulations	Federal Law No. (2) of 2019, with respect to the Use of the Information and Communication Technology in the Areas of Health.	Law Number 17 of 2023 concerning Health
	Article 4: Confidentiality and validity of health data	Rule 20 of 2019 by the Minister of Health on the Establishment of Inter-Facility Telemedicine Services Medical Record
	Article 5: Preventing Unauthorized Modifications to Health Records	Regulation No. 24 of 2022 promulgated by the Minister of Health
	The Ministry of Health's Gathering and Analyzing of Health Records (Article 6)	Personal Data Security Regulation No. 20 of 2016 by the Minister of Communication and IT Health Information System Certification and Standardization Regulation No. 18 of 2022 from the Minister of Health
Health Digitalization Concept	Implementation of electronic medical records Health data exchange platform	Digital health record and telemedicine implementation Developing and integrating health data systems
	Health technology assessment by the HTA group Integrated electronic health information system by MOHAP	Building up telemedicine and large data infrastructure powered by AI Integrating healthcare applications
Goals and Objectives	Increasing the availability and quality of medical care	Make health services more accessible and efficient
	Prove yourself to be an expert in digital ecosystems and cutting-edge research.	Fixing the disjointed nature of health records and making the health care system more agile
	Increased health spending to 5.2% of GDP by 2022	The blueprint for a digital health transformation strategy by 2024
Main Challenges	The need for adequate health care professionals	Problems with healthcare personnel shortages, inter-institutional communication breakdowns, and inadequate funding
	Data protection and patient privacy	Health data fragmentation, data security concerns, and an unequal technological landscape

Aspect	United Arab Emirates (UAE)	Indonesia
Special Initiatives and Programs	Hayat Organ Donation Program Enhanced mental wellness, recovery, and chronic care	National Nutrition Guidelines Health care provided remotely via telemedicine
International Cooperation	Working together with international health agencies like WHO	Health policy development via international cooperation based on data

To achieve effective health digitalization, Indonesia must address several complex challenges requiring coordinated action from all stakeholders. A key obstacle is the fragmentation of health data caused by the use of numerous unintegrated platforms and applications, which limits efficient data access and utilization. This lack of comprehensive and reliable information weakens health policy development, leading to unmet public health needs and suboptimal decision-making. Moreover, the growing frequency of cyberattacks and data breaches has intensified concerns over data security. Although regulations defining security standards exist, inconsistent enforcement and partial compliance among healthcare institutions continue to undermine public trust in digital health systems.

Another significant challenge is the unequal distribution of technological infrastructure across Indonesia. Limited access to digital health technologies in rural areas and small islands widens the gap between urban and rural populations in terms of healthcare accessibility and quality. In addition, managing and utilizing digital systems remains difficult due to a shortage of healthcare professionals skilled in health information technology. Addressing these barriers-ranging from data fragmentation to disparities in infrastructure and human resources-requires strong coordination and collaboration among all stakeholders to ensure the successful implementation of Indonesia's national digital health agenda.

Improving Patient Health Data Privacy and Security in EMR and AI Applications

Significant transformations have taken place in healthcare delivery as a result of rapid technological advancements, particularly with the rise of electronic medical records (EMR) and artificial intelligence (AI). The adoption of these technologies offers numerous benefits, including greater efficiency, reduced medical errors, and faster, more accurate service delivery[41]. EMR systems enable patients to access their own medical information while allowing

[41] N. Lance Downing, David W. Bates & Christopher A. Longhurst, "Physician Burnout in the Electronic Health Record Era", *Annals of Internal Medicine* 170, no. 3 (2019): 216-217.

physicians and healthcare providers to manage patient data more effectively. At the same time, AI demonstrates great potential in analyzing complex health data, enhancing disease detection, and supporting the development of more effective treatment strategies.[42]

However, despite these advantages, there are legitimate concerns regarding the security and confidentiality of patients' medical records. Given the sensitive nature of health data, there is a substantial risk of data breaches, misuse of information, and inaccurate diagnoses resulting from flawed AI algorithms[43]. These challenges must be carefully addressed to ensure patient safety and trust. For example, data protection and privacy regulations-such as the General Data Protection Regulation (GDPR) in Europe and Indonesia's Information Technology and Electronic Transactions (ITE) Law-must be strictly adhered to when developing and implementing AI systems that process sensitive personal health information.

Nevertheless, legitimate concerns persist regarding the safety and confidentiality of patients' medical records. Despite the aforementioned advantages, the inherent sensitivity of health data exposes it to substantial risks of leakage, misuse, or unauthorized access and circulation without the patient's informed consent or proper authorization. In addition, incorrect diagnoses resulting from errors in artificial intelligence algorithms may give rise to complex questions of legal liability, particularly concerning civil liability and compensation for damages arising from violations of health data protection.[44]

This reality necessitates continuous legislative vigilance, requiring all entities that process or handle patients' health data to comply with applicable data protection and privacy regulations[45], such as the European General Data Protection Regulation (GDPR), the UAE Personal Data Protection Law, the 2023 Health Law, and Indonesia's amended Information and Electronic Transactions Law (ITE) of 2008, when developing and implementing AI systems that access sensitive personal information.

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[42] Ahmad Alimadadi et al., "Artificial Intelligence and Machine Learning to Fight COVID-19", *Physiological Genomics* 52, Issue 4 (2020).

[43] Aude Marie Marcoux, "The Ethics of AI as a Healthcare Practice", *Public Ethics Review* 25, no. 1 (2023).

[44] Javad Pool et al., "A systematic analysis of failures in protecting personal health data: A scoping review", *International Journal of Information Management* 74, (2024): 1-29.

[45] Charisma Septi Jayanti Suraji, "The issues of data protection against leaking of personal data in social security health services (A comparison between Indonesia and other countries regulations)", *International Journal of Business, Economics and Law* 26, Issue 1 (2022): 103-107.

These regulations[46] collectively emphasize that the processing of health data must adhere to strict foundational principles, the breach of which may give rise to liability for the concerned parties. These principles include:[47]

1) Lawfulness: All data processing activities must be based on a clear legal ground.
2) Purpose limitation: Processing must pursue a specific and legitimate purpose.
3) Data minimization: Only data strictly necessary for the declared purpose may be collected.
4) Accuracy: Data must be accurate, relevant, and kept up to date.
5) Storage limitation: Data may not be retained longer than necessary for the purpose of processing.

To ensure effective observance of these principles, the European GDPR introduced a stringent and data subject-oriented liability framework. Article 82 explicitly grants any individual who has suffered material or moral harm due to a data breach the right to compensation, imposing liability on both the data controller and the data processor. Similarly, the Court of Justice of the European Union (CJEU) has progressively shaped the contours of civil liability for breaches of personal data protection under the General Data Protection Regulation (GDPR) and earlier EU law.[48]

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[46] Article 82 of Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016. (General Data Protection Regulation). https://eur-lex.europa.eu/eli/reg/2016/679/oj/eng. *See also* Articles 20 & 21 of the Federal Decree by Law No. (45) of 2021 Concerning the Protection of Personal Data. (UAE). https://uaelegislation.gov.ae/en/legislations/1972; Article 301 of Law of the Republic of Indonesia No. 17 year 2023 on Health. https://peraturan.bpk.go.id/details/258028/uu-no-17-tahun-2023; Articles 15 & 43 of the amended Law of the Republic of Indonesia No. 11 of 2008 concerning Electronic information and transactions. https://www.icnl.org/wp-content/uploads/Indonesia_elec.pdf.

[47] Dian Ayu Lukitasari et al., "Hospital Legal Responsibilities Against Misuse of Patient Personal Data in Electronic Medical Records", *Journal of Indonesia Law & Policy Review (JILPR)* 5, no. 1 (2023): 60-74; Margareth Cynthia Hutapea et al., "Hospital Responsibility for Medical Records Leaked by Medical Personnel Without the Patient's Consent", *Journal of Law, Politics and Humanities (JLPH)*, Vol. 5, No. 1 (2024): 430-435.

[48] Julie Charpenet, "The progressive development of civil liability in the field of personal data", *Dalloz IP/IT*, N° 6, June (2024): 372-375.
Jonas Knesch, "Litigation concerning compensation for damages caused by violations of the GDPR: the tensions within the CJEU", *Contract Law Review*, Jun (2024), N° RDC202a3; Thibault Douville, "Civil liability of a data controller: the need to prove the existence of damage", *Gazette du Palais*, No. 32 (10 oct. 2023): 1-2. n° GPL454l2.

This evolution reflects the broader objective of the GDPR, particularly Article 82, to guarantee effective, dissuasive, and proportionate remedies for data subjects, three main striking rulings may be highlighted in this context. In its landmark judgment in *Österreichische* Post of 4 May 2023, the Court held that a mere infringement of the GDPR does not automatically confer a right to compensation; the claimant must demonstrate the existence of actual damage and a causal link between the unlawful processing and the harm suffered. Yet, the Court clarified that non-material (moral) damage (such as anxiety, distress, or loss of control over personal data) is fully compensable, even in the absence of financial loss, thus recognizing the intrinsic dignity interests protected by data-protection law. This reasoning consolidates a three-part test (violation, damage, and causal connection as the foundation of GDPR-based liability.[49]

In subsequent decisions, the CJEU refined the standard of accountability applicable to data controllers. In *Natsionalna agentsia za prihodite* ruling of 14 July 2023, the Court emphasized that a controller is not automatically liable for every data breach; liability arises only when it fails to adopt appropriate technical and organizational measures as required by Article 32 GDPR, and the burden of proof rests on the controller to demonstrate the adequacy of those measures in relation to the risks involved.[50] Later, in SCRL v. Belgian State of 21 December 2023, the Court confirmed that national courts must guarantee full and effective compensation for all damages resulting from GDPR violations, while maintaining procedural autonomy only insofar as it does not undermine the effectiveness of Union law.[51] In this context, the French Court of Cassation has further ruled[52] that a company director, as the legal representative of the entity, may incur personal liability, particularly in cases of mismanagement or failure to ensure adequate supervisory and security measures for data protection.

A notable illustration is the French data-breach case involving the software company Dedalus, where health data belonging to approximately 500,000 patients were leaked due to technical and security failures. On 21 April 2022, the French Data Protection Authority (CNIL) imposed a €1.5 million fine on

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[49] CJEU, 4 May 2023, Österreichische Post AG, C-300/21, EU:C:2023:370. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:62021CJ0300.

[50] CJEU, 14 July 2023, Natsionalna agentsia za prihodite, C-340/21, EU:C:2023:588. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:62021CJ0300.

[51] CJEU, 21 December 2023, SCRL v. Belgian State, C-667/21, EU:C:2023:1023. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:62021CJ0300.

[52] Cass. crim., 12 janvier 2016, n° 14-82.936. https://www.courdecassation.fr/recherche?search_api_fulltext=Cass.+crim.%2C+12+janvier+2016%2C+n%C2%B0+14-82.936.

Dedalus for its negligence. Although the administrative investigation concluded, the victims continue to face ongoing consequences, and related criminal and collective (class-action) proceedings remain under consideration.[53]

On another crucial ruling the French Court of Cassation also, affirmed this interpretation in a judgment issued on 23 January 2019, recognizing compensation for moral harm resulting solely from the loss of control over one's personal data. Consequently, a data controller, such as an employer, may be exempted from liability only if it proves the absence of fault, notably by demonstrating the implementation of appropriate security measures and the absence of negligence.

Under UAE law, however, neither the Personal Data Protection Law nor Federal Law No. 2 of 2019 on the Use of Information and Communication Technology in Health Fields expressly establishes a distinct regime for civil liability arising from health-data breaches. This creates a complex interpretive issue: should a breach or leakage of health data be treated as a medical error, requiring proof of fault in accordance with the Medical Liability Law, or as a matter of general civil liability, under which the mere occurrence of damage entitles the injured party to compensation pursuant to the UAE Civil Transactions Law?

By contrast, Indonesian law adopts a more explicit approach. Article 301 of Law No. 7 of 2023 on Health[54], and Article 15 of the amended Law No. 11 of 2008 on Electronic Information and Transactions establish specific rules governing civil liability for health-data breaches or leaks, thereby providing clearer grounds for redress. Overall, this comparative analysis reveals a clear global trend toward reinforcing the protection of health data through robust legal and procedural safeguards. Such developments help alleviate concerns regarding data breaches and enhance patients' ability to obtain fair and comprehensive compensation for both material and moral harm resulting from the unlawful disclosure or misuse of their health information.

To ensure the safe and lawful use of rapidly evolving health technologies, comprehensive and stringent regulations are essential. These regulations should address key issues such as patient data privacy and control, data ownership,

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[53] Alexandre Horn, "CheckNews, Will the 500,000 victims of the health data breach be compensated by Dedalus?", Published on 28/04/2022. https://www.liberation.fr/checknews/les-500-000-victimes-de-la-fuite-de-donnees-de-sante-seront-elles-indemnisees-par-dedalus-20220428_TFW732Y5URHXRKZQLAJWNWBQ4E/.

[54] Wahyudiono, Ismono & Daim, "Legal Protection of Health Personnel (Anesthesians) After the Issue of the Health Law Number 17 of 2023".

informed consent for data use, and accountability for errors[55]. In this context, it is vital for lawmakers, policymakers, and decision-makers to recognize the importance of legal considerations in the implementation of digital health technologies[56]. To maintain the effectiveness and safety of EMR and AI systems, strict compliance with regulatory standards must be guaranteed throughout their development and application.

Indonesia faces several legal and practical challenges in the implementation of electronic medical records (EMR). The issuance of Minister of Health Regulation (PMK) No. 24 of 2022 marks an important step in the country's digital health transformation, as it governs the recording and storage of electronic medical data within healthcare institutions. However, a study by the Indonesian Hospital Association (PERSI) revealed that only about 50% of hospitals have adopted EMR systems, and of those, merely 16% have achieved successful implementation[57]. This indicates that many healthcare facilities still require system upgrades or a full transition from manual to electronic systems to comply with current regulations.

Despite its progress, PMK No. 24 of 2022 still falls short of international best practices, such as those established in the United Arab Emirates. Critical gaps remain in key areas, including data ownership, patient consent, oversight mechanisms, and data security. Addressing these deficiencies is essential for Indonesia to strengthen its legal framework, ensure compliance, and align its EMR governance with global standards.

With regard to privacy and data security, Minister of Health Regulation (PMK) No. 24 of 2022 remains insufficient in addressing critical elements such as encryption standards[58], firewall implementation, and the establishment of an

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[55] Piers Gooding & Timothy Karotis, "Ethics and Law in Research on Algorithmic and Data-Driven Technology in Mental Health Care: Scoping Review", *JMIR Ment Health* 8, Issue 6: e24668 (2021): 1-22.

[56] Jawahitha Sarabdeen, Immanuel Azaad Moonesar, "Privacy protection laws and public perception of data privacy: The case of Dubai e-health care services", *Benchmarking An International Journal* 25, Issue 6 (2018): 1883-1902,

[57] Nurul Aini Habibah, "Implementation of Electronic Medical Records in Health Facilities in Indonesia", (2023). https://bbkpm-bandung.org/blog/2023/07/penerapan-rekam-medis-elektronik-di-fasilitas-kesehatan-di-indonesia.

[58] Based on the analysis of Minister of Health Regulation (PMK) Number 24 of 2022, several articles relevant to aspects of data security and protection, consent to use of data by patients, data ownership, as well as supervision and sanctions include: *First,* Article 29 regulates data and information security principles which include confidentiality, integrity and availability of electronic medical record data. This article explicitly explains that electronic medical records must protect data from unauthorized internal and external interference. *Secon,* Articles 33 and 34 relating to approval for the opening of medical

effective audit trail system. These provisions fall short of meeting the growing demands of health information technology, standing in clear contrast to the United Arab Emirates' approach under Federal Law No. 2 of 2019. The UAE framework explicitly requires robust data protection measures, including the use of comprehensive audit trails and detailed guidelines for safeguarding electronic health information.

Moreover, PMK No. 24 lacks clarity on how patient consent for the use of health data should be obtained-an essential aspect of ensuring privacy. This differs markedly from the UAE's policy, which mandates the explicit integration of patient consent into all digital health platforms. An immediate revision of the PMK is therefore necessary to define the procedures for obtaining, timing, and withdrawing patient consent. Additionally, the regulation does not provide clear oversight mechanisms or standards for managing electronic medical records, nor does it specify accountability measures or penalties in the event of a data breach. This highlights the urgent need for transparent and enforceable provisions, including regular audits, inspections, and compliance assessments to ensure adherence to security and privacy standards.

Finally, PMK No. 24 of 2022 does not sufficiently address the issue of data ownership, a critical component of effective data governance. Clear regulations on data ownership are essential to prevent legal disputes and conflicts of interest, particularly when health data is used for research, litigation, or secondary purposes[59]. In contrast, the United Arab Emirates provides explicit legal recognition of patients' rights concerning the ownership and use of their personal data under its healthcare laws.

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records. Article 33 regulates the conditions under which medical records can be opened either with the patient's consent or without consent for certain purposes such as law enforcement and research. Meanwhile, Article 34 further stipulates mechanisms and conditions for opening medical records with the patient's consent, including arrangements for patients who are legally incompetent. *Third,* Articles 41 and 42focuses on fostering and supervising the implementation of electronic medical records, including the authority of ministers, governors and regents/mayors in carrying out these duties. Article 42 specifically states administrative sanctions that can be imposed on health service facilities that violate established provisions. And *fourth*, Article 39regulates the storage period for electronic medical records that must be carried out by health service facilities, which includes the minimum storage period and procedures for destroying medical records after the period ends.

[59] Martin Hayward, Noriswadi Ismail, "General Data Protection Rules", 7 Jul 2021. https://www.lexis.ae/wp-content/uploads/2021/09/LexisNexis__Practice-Note_UAE_General_Data_Protection_Rules_pdf.pdf?utm_source=hootsuite&utm_medium=&utm_term=&utm_content=&utm_campaign=

To ensure the security, confidentiality, and efficiency of its electronic medical record (EMR) system, Indonesia must strengthen and modernize its legal framework to align with international standards. The UAE's model, as established in Federal Law No. 2 of 2019, serves as a valuable reference in this regard. Accordingly, this research examines Indonesia's existing regulations, specifically PMK No. 24 of 2022, to identify key deficiencies and propose targeted strategies for improving regulatory clarity, compliance, and data protection in the digital health sector.

A. Data Security and Privacy Aspects

The United Arab Emirates has established comprehensive requirements for data security and privacy through strict access controls and the implementation of advanced encryption technologies. These measures ensure the confidentiality, integrity, and protection of sensitive health information in digital systems. In contrast, Indonesia's Minister of Health Regulation (PMK) No. 24 of 2022 remains relatively vague on these matters. Although Article 29 briefly mentions the principles of data availability, integrity, and confidentiality, it lacks detailed provisions regarding encryption standards, security protocols, and operational procedures. To effectively prevent data breaches and unauthorized access, Indonesia should strengthen its regulatory framework by adopting clearer and more stringent data protection measures similar to those implemented in the UAE.

B. Interoperability and System Integration

The UAE has made significant progress in ensuring interoperability and system integration across its healthcare sector through centralized digital health initiatives. Under Federal Law No. 2 of 2019, healthcare institutions are required to adopt compatible electronic systems that allow secure data exchange between public and private entities. This unified approach facilitates real-time access to patient records, enhances care coordination, and supports evidence-based policymaking.

In contrast, Indonesia continues to face major challenges in achieving system interoperability. The coexistence of multiple unintegrated platforms and health applications has led to data fragmentation, making it difficult to share and utilize information effectively. Although the Blueprint for Digital Health Transformation Strategy 2024 aims to address these issues by promoting integration through a national health data system, concrete implementation mechanisms remain limited. To align with global best practices, Indonesia

should establish standardized data exchange protocols and technical guidelines similar to the UAE's integrated digital health ecosystem.

C. Compliance and Audit

The UAE has established clear and enforceable mechanisms to ensure compliance with digital health regulations through structured audit procedures and regular oversight of healthcare institutions. These mechanisms support law enforcement efforts and help maintain adherence to data protection and electronic health system standards.

In comparison, Indonesia's Minister of Health Regulation (PMK) No. 24 of 2022 includes provisions on monitoring and supervision under Articles 41 and 42; however, these measures lack a systematic and long-term audit framework. To ensure consistent compliance with established standards, Indonesia needs to implement regular and transparent audit procedures, clearly define penalties for non-compliance, and strengthen institutional accountability. Regular audits are essential to uphold the reliability, integrity, and security of the EMR system nationwide.

D. Patient Responsibilities and Rights

In the United Arab Emirates, patients are granted explicit legal protections regarding their personal health data, including the right to access and amend their medical records, as well as defined responsibilities related to the use and confidentiality of such data. These rights are clearly articulated within the UAE's digital health legislation, ensuring patient autonomy and accountability.

By contrast, Indonesia's Minister of Health Regulation (PMK) No. 24 of 2022 (Article 34) recognizes patients' right to access their health information; however, the regulation lacks clarity on how this right is to be exercised in practice. Furthermore, the legal framework does not sufficiently address patients' ability to control or restrict third-party access to their data. Strengthening these provisions is essential to uphold patients' privacy, enhance trust in digital health systems, and align Indonesia's framework with international standards on data protection and patient rights.

The ratification of Minister of Health Regulation (PMK) No. 24 of 2022 represents a major milestone in advancing the development and implementation of electronic medical records (EMR) in Indonesia. Nevertheless, significant improvements remain necessary in areas such as patient rights, interoperability, privacy, and security, particularly when compared to the higher standards set by the United Arab Emirates under Federal Law No. 2 of 2019 (ICT Health Law) and Cabinet Decision No. 32 of 2020 (ICT Health

Regulations)[60]. Given that data protection and privacy are central to the success of EMR systems, Indonesia must prioritize the enforcement of robust data security measures and the adoption of modern encryption technologies to safeguard patients' personal information from misuse or unauthorized access.

Equally essential is ensuring effective system interoperability, which enables different healthcare platforms to communicate seamlessly and securely. This integration facilitates the efficient exchange of health information, reduces diagnostic and treatment delays, and enhances the overall quality of patient care. To achieve this, Indonesia should adopt transparent and standardized protocols similar to those established in the UAE to ensure the smooth and reliable operation of various health information systems.

Furthermore, audit and compliance mechanisms must be strengthened to ensure that all healthcare institutions comply with established regulations. Regular, structured audits, supported by clearly defined penalties for noncompliance, are crucial to maintaining the integrity of the EMR system and upholding public trust in the confidentiality of health data. Finally, the regulation should clearly define the respective roles and rights of patients and healthcare providers. Every patient must have the right to access and update their own medical records, as well as to give or withdraw consent for data usage. Strengthening patient control over personal data is an essential aspect of data protection and privacy, reinforcing both individual autonomy and confidence in the healthcare system. Indonesian lawmakers and policymakers must pursue comprehensive reforms aligned with international best practices. Doing so will enhance the efficiency, reliability, and security of healthcare services in the digital age while ensuring the protection and empowerment of patients through a trustworthy and transparent digital health framework.

Conclusion

This comparative study reveals that while both the United Arab Emirates and Indonesia have made substantial progress in embracing healthcare digitalization, significant disparities persist in the strength and effectiveness of their regulatory frameworks. The UAE demonstrates a comprehensive and integrated approach to digital health governance, ensuring robust data security,

[60] UAE legislation has been keen to implement encryption in the healthcare sector to ensure the integrity and protection of patient data. This is emphasized in Article 6/06 of the Executive Regulations, which states: "*It is prohibited to send an email or use any other electronic means of communication that contains patient information unless it is encrypted*". This undoubtedly reflects the firm direction of UAE law regarding the storage of patient data.

system interoperability, and patient rights protection through clear statutory provisions and regular compliance audits.

Conversely, Indonesia's regulatory structure, remains fragmented and insufficiently detailed regarding encryption standards, consent mechanisms, and accountability measures. Strengthening Indonesia's legislative framework to align with international best practices, including those inspired by the UAE model and the GDPR, is essential to ensure the confidentiality, integrity, and lawful use of health data. Future reforms should focus on enhancing institutional capacity, standardizing audit procedures, and reinforcing patients' control over their personal information. Ultimately, comprehensive, and enforceable legislation is indispensable to building public trust, promoting ethical innovation, and achieving a secure, transparent, and patient-centered digital health ecosystem in both jurisdictions.

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Acknowledgment
None.

Funding Information
None.

Conflicting Interest Statement
The authors state that there is no conflict of interest in the publication of this article.

Generative AI Statement
None

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