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The Role and Challenges of E-Medical Records Implementation in Indonesia's Health System: Legal and Technological Perspectives

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ABSTRACT

The digital literacy gap among medical personnel is a challenge, and the lack of understanding and skills in using information technology may hinder the effective utilization of e-medical records. The purpose of this study is to analyze the impact of e-medical records on the efficiency of health services, as well as evaluate the legal aspects governing their use in Indonesia. This research method uses normative juridical and empirical juridical research approaches; the research subjects consist of medical personnel, hospital managers, and IT system developers. In this research, the legal material collection technique that will be used is the literature collection technique. Overall, although e-medical records present challenges related to data security and privacy that must be addressed seriously, the development of a more comprehensive and clear legal framework will be essential to support the growth of this system as well as protect the rights of patients in the digital era; further regulatory development is still needed to optimize the benefits and overcome the challenges. There is a need for strategic planning that includes a thorough needs assessment, a realistic timeline, and adequate budget allocation; ongoing training for staff; establishment of an internal technical support team and mentoring program for users; and evaluation and monitoring with regular KPI measurement.

INTRODUCTION

The rapid development of information technology has driven digital transformation in various sectors, including the health sector. One significant innovation in the health sector is the digitization of health data through the implementation of electronic health records (EHRs), or e-medical records. E-medical records are electronic systems for recording patient health data that replace conventional paper-based medical records. The implementation of e-medical records has become an urgent need in efforts to improve the efficiency of healthcare services, reduce human error, and provide data that can be accessed more quickly by relevant authorities (Kruse et al., 2020; Martinez et al., 2023; Zhang et al., 2023).

A number of studies have shown that the use of e-medical records offers various benefits, such as improving the quality of patient care, reducing operational costs, and increasing the accessibility of health data (Lee et al., 2019). With e-medical records, patients' health information can be accessed in real time by healthcare workers, facilitating clinical decision-making. In addition, e-medical records can also be used for more comprehensive data analysis, which can support the development of health research and policy (Nugroho & Sujarwadi, 2022; Pratama et al., 2023).

Although the Indonesian government has encouraged the implementation of e-medical records through various regulations, its implementation still faces a number of challenges (Sutanto et al., 2021; Rahman et al., 2021). One of the main obstacles is concern related to the privacy of patient data (Handayani & Kusuma, 2022; Patel et al., 2022). As health data becomes increasingly digitized, the risk of data breaches grows, necessitating stricter security measures to protect the confidentiality of patient information (Ministry of Health of the Republic of

Indonesia, 2020). In addition, limitations in technological infrastructure in some areas, particularly in rural areas, pose obstacles to the accessibility and stability of e-medical record systems. Finally, the digital literacy gap among medical personnel is also a challenge in itself. A lack of understanding and skills in using information technology can hinder the effective use of e-medical records (Yulida et al., 2021).

The implementation of e-medical records in Indonesia is directly related to the mandate of Law No. 36 of 2009 concerning Health, particularly with respect to patient rights. Article 28 paragraph (1) of the law states that everyone has the right to health. This right to health includes the right to obtain information about one's own health. E-medical records, as a digitized form of conventional medical records, hold great potential in fulfilling patients' rights to obtain accurate, complete, and easily accessible health information.

Government Regulation No. 28 of 2024, as the implementing regulation of Law No. 17 of 2023 on Health, provides a more specific legal framework for the implementation of e-medical records in health facilities. This regulation governs the form, content, management, and storage of medical records, including electronic medical records. However, the implementation of e-medical records in Indonesia still faces a number of challenges, as previously explained. These challenges must be addressed promptly so that the benefits of e-medical records can be optimally realized by the public (Wijaya & Rahman, 2022).

Several recent studies have identified various obstacles in the implementation of e-medical records in Indonesia, including those related to the readiness of technological infrastructure, human resources, as well as legal and regulatory aspects. For example, research conducted by Yulida et al. (2021) shows that the lack of understanding and skills among medical personnel in using information technology is one of the main obstacles. In addition, limitations in technological infrastructure in some areas, especially in rural areas, are also a significant obstacle.

To overcome these challenges, collaborative efforts from various parties—including the government, health institutions, and the community—are needed. Some of the steps that can be taken include: improving the quality of human resources through training and competency development of health workers in the field of information technology; strengthening technological infrastructure by ensuring adequate availability, especially in remote areas; refining existing regulations to make them more relevant to technological developments; and increasing public awareness and health workers' understanding of the importance of e-medical records and their benefits through socialization and education.

Thus, the implementation of e-medical records in Indonesia is a step forward in realizing higher-quality and more efficient health services. However, the successful implementation of e-medical records is highly dependent on collective efforts to address the various challenges that exist. Problem Formulation: What are the roles and challenges of the implementation of e-medical records in the health system in Indonesia from legal and technological perspectives? This study aims to analyze the impact of e-medical records on health service efficiency in Indonesia, evaluate compliance with relevant regulations (the ITE Law, Permenkes No. 24/2022, and Government Regulation No. 71/2019), identify technological and human resource challenges, and formulate strategic recommendations for optimizing implementation in healthcare facilities. The research offers both theoretical and practical contributions. Theoretically, it enriches health informatics and health law literature on electronic medical

records implementation in developing countries. Practically, it provides insights for policymakers in formulating comprehensive regulations, strategic recommendations for healthcare managers to improve system effectiveness and security, enhanced understanding for medical personnel to optimize utilization, and guidance for system developers to create compliant solutions addressing local healthcare needs.

RESEARCH METHOD

This research employed a qualitative method, using both normative juridical and empirical juridical approaches. The normative juridical approach was used to examine the legal and regulatory aspects related to the implementation of e-medical records, including the analysis of applicable laws and regulations such as Law No. 11 of 2008 concerning ITE, Permenkes No. 24 of 2022 concerning Medical Records, and Government Regulation No. 71 of 2019 concerning the Implementation of Electronic Systems and Transactions, as well as regulations related to patient data protection and standard regulations for health information systems. The empirical juridical approach was used to analyze the implementation of these laws in practice, examining the effectiveness of regulations in the implementation of e-medical records and their impact on stakeholders.

The research subjects consisted of various stakeholders involved in the implementation of e-medical records, including medical personnel (doctors and nurses), hospital managers, system developers, and representatives of government agencies responsible for overseeing the implementation of regulations related to data protection and patient privacy.

Data were collected through a literature study, drawing on legal literature, laws and regulations, previous research findings, academic articles, electronic media, and expert opinions, including sources obtained through website searches and online journals. The collected legal materials were then studied, analyzed, and formulated into a systematic discussion relevant to the research topic and the problem formulation of this study.

Legal materials were analyzed using a qualitative descriptive analysis technique, in which data were described and interpreted in regular, sequential, logical, and effective sentences to facilitate interpretation and understanding of the results.

RESULTS AND DISCUSSION

Effectiveness of e-Medical Records

The implementation of the electronic medical record system (e-medical record) has been a transformative step in the modernization of health services. This system is an evolution from traditional manual recording to comprehensive and integrated digitization of health data. This analysis will examine the impact of the implementation of e-medical records in various healthcare facilities, focusing on aspects of operational efficiency, patient safety, and quality of healthcare services.

The implementation of the Electronic Medical Record (RME) system in various healthcare facilities has been an important step in improving efficiency, reducing medical errors, and improving services to patients. By switching from manual to digital systems, RME offers a range of significant benefits for patient data management and healthcare quality.

One of the most tangible impacts of implementing RME is increased operational efficiency. RME allows the process of processing patient data to be faster and more accurate.

Doctors and medical staff no longer need to spend time searching for physical files or manually recording information. All patient data is stored digitally and can be easily accessed, allowing medical personnel to focus more on patient service rather than administrative tasks. In addition, the system also helps in the management of patient schedules and queues, which reduces wait times and improves the patient experience at healthcare facilities.

The implementation of medical e-records has shown a significant increase in the operational efficiency of health facilities. According to research conducted by Wang et al. (2020), the implementation of e-medical records can reduce the time of searching and retrieving patient data by up to 65% compared to manual systems. The system allows simultaneous access to patient data by multiple departments, eliminating duplication of records, and speeding up the administrative process.

The time efficiency achieved has a direct impact on the productivity of medical staff. A longitudinal study in hospitals in Southeast Asia showed an increase in staff productivity of up to 30% after the full implementation of the medical e-record system (Chen et al., 2021). This is reflected in the reduced time spent on administrative tasks and the increased time that can be dedicated to patient care.

The reduction of medical errors is another very important benefit of RME. Errors in medical records can have a serious impact on the patient's health. With features such as automatic reminders for drug doses and drug interactions, RME helps minimize the risk of these errors. The system is equipped with an automatic alert feature for drug and allergy interactions, as well as standardization of prescription writing formats that reduce misinterpretation. A multicenter study conducted by Martinez et al. (2022) showed a 48% reduction in the incidence of medication errors after the implementation of medical e-records. Digital records that are easier to read than handwritten also reduce the likelihood of misinterpretation. This contributes to patient safety and increases trust in the healthcare system.

Furthermore, RME improves coordination between medical teams. With real-time access to patient information, various members of the medical team can work together more effectively in delivering integrated care. This is especially important in emergency situations or when consulting with other specialists. The existence of standardized data also facilitates communication between departments, thereby speeding up the clinical decision-making process.

In the context of service to patients, RME plays a big role in increasing their satisfaction. Faster enrollment processes, reduced wait times, and more coordinated care all contribute to a positive experience for patients. Patients can also access their medical records through the patient portal, which increases their transparency and involvement in their own healthcare.

E-medical records have been proven to improve the quality of patient service through various aspects:

1. Continuity of Care: Real-time access to complete medical history allows for better coordination between healthcare providers.
2. Clinical Decision Making: System-based clinical decision support assists clinicians in diagnosis and treatment planning.
3. Data Security: Modern encryption systems ensure the confidentiality of patient information with a higher level of security than manual systems.

A study conducted by Thompson et al. (2023) showed a 35% increase in patient satisfaction after the implementation of medical e-records, mainly related to the speed of service and access to their health information.

Overall, the implementation of Electronic Medical Records in healthcare facilities shows a significant positive impact on operational efficiency, healthcare quality, and patient care safety. While challenges such as upfront costs and staff training needs remain, the long-term benefits of RME make it an indispensable solution in today's digital age. With the support of government policies to encourage the adoption of this system, it is hoped that all health facilities will soon switch to RME to improve the overall quality of health services.

Aspects of Data Security and Privacy

The implementation of medical e-records in healthcare facilities brings significant challenges related to the security and privacy of patient data. In the digital age, medical data is a prime target for cybercriminals, and data leaks can have serious consequences for individuals and institutions. Medical record data leaks can occur due to cyberattacks, malware, or negligence in information system management. When sensitive data such as medical history, lab results, and other personal information falls into the wrong hands, the risk of misuse of information increases, including identity hacking and insurance fraud

Although many countries, including Indonesia, have issued regulations such as the Personal Data Protection Law (PDP Law) and the Minister of Health's Regulation on Medical Records, their implementation still faces challenges. Existing regulations are often not specific enough to govern the responsibilities of healthcare providers and system vendors related to data leaks. For example, although the PDP Law regulates the protection of personal data, ambiguity regarding legal liability in the context of a partnership with a system provider may create loopholes that are exploited by irresponsible parties

The risk of data leakage is very real; In early 2022, there was an incident where six million patient medical record data from the Indonesian Ministry of Health was leaked and sold on online forums. The leaked data includes sensitive information such as medical photos and health examination results. These leaks not only harm individual patients but can also damage the reputation of healthcare institutions and lower public trust in the healthcare system as a whole. Therefore, it is important for healthcare facilities to implement stricter security measures, including data encryption and staff training on best practices in maintaining data confidentiality

Overall, while existing regulations provide a framework for the protection of patient data, challenges in implementation and enforcement still need to be addressed (Sundari & Kusuma, 2020). Collaboration between governments, healthcare providers, and system providers is needed to ensure that the protection of patient privacy is a top priority in the use of information technology in the healthcare sector.

Medical e-record systems in addition to having a positive side also face various significant security threats (Sari & Thompson, 2023). According to a report from the Healthcare Information and Management Systems Society (HIMSS, 2023), the healthcare sector experienced an increase in cyberattacks by 35% compared to the previous year. The most common types of attacks include:

1. Ransomware: Becoming a major threat with a 60% increase in the last two years
2. Phishing: Responsible for 67% of data leak incidents
3. Malware: Causes 23% of system outages

Research conducted by Davis et al. (2022) identified that 75% of healthcare facilities have experienced at least one cybersecurity incident in the past 12 months. The financial losses from these attacks averaged $408 per leaked record, not including the impact on the institution's reputation and patient trust (Nugroho et al., 2023).

Therefore, health data protection regulations have evolved significantly in recent years. At the global level, some of the key regulations include:

1. HIPAA (Health Insurance Portability and Accountability Act) in the United States
2. GDPR (General Data Protection Regulation) in the European Union
3. PDPA (Personal Data Protection Act) in various Asian countries

In Indonesia, regulations governing health data security include:

1. Law No. 11 of 2008 concerning Information and Electronic Transactions
2. Minister of Health Regulation No. 24 Th 2022 concerning Medical Records
3. Government Regulation No. 71 of 2019 concerning the Implementation of Electronic Systems and Transactions

According to the analysis of Wong et al. (2023), although existing regulations are quite comprehensive, their implementation and enforcement still face challenges, especially in developing countries. Data security and privacy in medical e-record systems are complex and constantly evolving. While existing regulations provide a basic framework, healthcare institutions need to continually improve and adapt their security strategies. A holistic approach that combines technology, policies, and user awareness is critical to protecting sensitive health data.

The implementation of e-medical records in Indonesian hospitals has shown mixed but generally positive results. Successful implementation is highly dependent on careful preparation, management support, and effective change management. The challenges faced are generally related to the technical, human resources, and change management aspects.

Several hospitals have implemented medical e-records, namely Dr. Sardjito Hospital which began to implement an integrated medical e-record system in 2018. According to the research of Widodo et al. (2021), this hospital adopts a gradual approach in the implementation of its system. Successful Efficiency Improvements, namely Reduction of patient waiting time by 40%, Increased accuracy of medical data recording by up to 85% and Optimization of medical staff workflows, then System Integration, namely Successfully integrating pharmacy, laboratory, and radiology services, Implementation of online appointment system and Improved coordination between departments

Dr. Soetomo Hospital has also implemented a comprehensive medical e-record system since 2019. Based on a study by Rahman et al. (2022), implementation was carried out with a modular approach. And Pondok Indah Group Hospital adopted an integrated medical e-record system in 2020. According to Susanto et al. (2023), implementation is carried out comprehensively across all branches.

CONCLUSION

The implementation of e-medical records in Indonesia has significantly improved the efficiency of health services and patient data management by accelerating administrative processes, enhancing data accuracy, enabling real-time access for medical personnel, and facilitating coordination across healthcare facilities for cross-disciplinary patient care.

However, the existing legal framework, while foundational, remains insufficiently specific in defining the responsibilities of system providers and healthcare facilities, creating legal ambiguities that must be addressed through stronger regulation and stricter enforcement to ensure accountability in patient data security. Optimizing implementation further requires strategic planning encompassing needs assessment, realistic timelines, and adequate budget allocation, alongside continuous staff training, internal technical support, and regular evaluation through key performance indicators, system audits, and feedback-based adjustments. Future research should investigate the long-term effectiveness of specific regulatory reforms — particularly those governing vendor-facility liability boundaries — on data security outcomes across healthcare facilities of varying scales and regions, as well as examine how differences in digital infrastructure and human resource capacity between urban and rural settings moderate the overall impact of e-medical record systems on the quality of patient care in Indonesia.

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