

Implementation of electronic signatures under Indonesian Minister of Health Regulation No. 24 of 2022 on electronic medical records (A socio-legal study at Baptis Baptist Hospital, Indonesia)

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Abstract

The digital transformation of healthcare services has accelerated the transition from conventional paper-based medical records to Electronic Medical Records (EMRs) across Indonesia. This transition is legally mandated under Indonesian Minister of Health Regulation No. 24 of 2022 concerning Medical Records, which requires healthcare facilities to implement Electronic Medical Records progressively. One of the essential components of EMR implementation is the use of electronic signatures, serving as a mechanism to authenticate healthcare professionals, verify electronic documents, and maintain data integrity. Nevertheless, the practical implementation of electronic signatures in Indonesian hospitals remains inconsistent due to organizational, technological, and regulatory challenges.

This study aims to analyze the implementation of electronic signatures in Electronic Medical Records at Baptist Hospital Batu based on Indonesian Minister of Health Regulation No. 24 of 2022. An empirical legal research method employing a socio-legal approach was adopted. Primary data were collected through field observations, interviews, and questionnaires distributed to healthcare professionals, while secondary data were obtained from statutory regulations, legal literature, and scholarly publications. Qualitative analysis was conducted using George C. Edwards III's Policy Implementation Theory, which emphasizes four interrelated implementation variables: communication, resources, disposition, and bureaucratic structure.

The findings demonstrate that electronic signatures have been implemented at Baptist Hospital Batu, however, their application remains partial and inconsistent across hospital units. The disposition variable represents the strongest facilitating factor because hospital management and healthcare professionals generally support digital transformation initiatives. Conversely, communication, resources, and bureaucratic structure continue to present substantial barriers due to uneven dissemination of regulations, insufficient understanding of standard operating procedures, limited information technology infrastructure, the simultaneous use of multiple signature methods, fragmented interdepartmental coordination, and the absence of certified electronic signatures issued by an officially recognized Electronic Certification Authority.

The study concludes that successful implementation of electronic signatures requires integrated improvements across all four implementation variables through continuous policy dissemination, comprehensive staff training, standardized operating procedures, infrastructure enhancement, integration with certified electronic signature providers, and strengthened institutional coordination. These improvements are essential to ensuring legal certainty, information security, authenticity, and accountability within Indonesia's Electronic Medical Record system.

Keywords: Electronic Signature, Electronic Medical Record, Health Law, Policy Implementation, George C. Edwards III, Indonesia

Introduction

The rapid advancement of information and communication technology has fundamentally transformed healthcare systems worldwide. Healthcare organizations are increasingly replacing conventional paper-based medical records with Electronic Medical Records (EMRs) to improve healthcare quality, operational efficiency, patient safety, and information accessibility. Beyond technological innovation, this transformation also introduces significant legal implications because medical records constitute confidential legal documents containing patients' personal health information and may serve as legal evidence in medical disputes^[12].

In Indonesia, the legal framework governing Electronic Medical Records has evolved substantially following the enactment of Indonesian Minister of Health Regulation No. 24 of 2022 concerning Medical Records^[1]. The regulation requires healthcare facilities to gradually implement Electronic Medical Records while ensuring data confidentiality, integrity, availability, accountability, and legal certainty. This regulatory framework complements

several national laws, including the Health Law, the Personal Data Protection Law^[2], the Electronic Information and Transactions Law^[3], and Government Regulation No. 71 of 2019 concerning Electronic Systems and Transactions^[14]. Collectively, these regulations establish the legal foundation for digital healthcare administration and electronic documentation.

Among the critical elements of Electronic Medical Records is the electronic signature. Unlike handwritten signatures, electronic signatures perform broader legal and technological functions by authenticating the identity of healthcare professionals, verifying document integrity, preventing unauthorized modification, and supporting non-repudiation. Consequently, electronic signatures contribute not only to administrative efficiency but also to legal accountability and information security^[14].

Despite the comprehensive regulatory framework, previous studies indicate that Electronic Medical Record implementation across Indonesian hospitals remains uneven^[5]. Variations in technological readiness, human resources, organizational commitment, and legal understanding

continue to hinder full implementation. These challenges become increasingly significant regarding electronic signatures, where differences exist in understanding legal requirements, determining authorized signatories, verifying identities, and distinguishing between scanned signatures and legally recognized electronic signatures.

Baptist Hospital Batu, a Type C private hospital located in Batu City, East Java Province, has progressively implemented Electronic Medical Records as part of its digital transformation strategy. Nevertheless, the implementation of electronic signatures remains limited to selected clinical documents and continues to utilize several different signature methods. Such conditions raise important legal and organizational questions concerning regulatory compliance, information security, and implementation effectiveness.

This study therefore aims to analyze the implementation of electronic signatures in Electronic Medical Records at Baptist Hospital Batu based on Indonesian Minister of Health Regulation No. 24 of 2022^[1]. The analysis employs George C. Edwards III's Policy Implementation Theory to evaluate implementation effectiveness through four interrelated dimensions: communication, resources, disposition, and bureaucratic structure^[8]. The findings are expected to contribute to strengthening digital health governance and improving the legal implementation of Electronic Medical Records in Indonesian healthcare institutions.

Materials and Methods

Research Design

This study employed empirical legal research using a socio-legal approach to examine the implementation of electronic signatures in Electronic Medical Records (EMRs) at Baptist Hospital Batu. Unlike normative legal research, empirical legal research emphasizes the observation of how legal norms are implemented in practice^[6]. Accordingly, this study not only analyzed the legal provisions governing electronic signatures but also evaluated their practical application within hospital operations.

Research Site

The research was conducted at Baptist Hospital Batu, a Type C private hospital located in Batu City, East Java, Indonesia. The hospital has gradually implemented Electronic Medical Records following the enactment of Indonesian Minister of Health Regulation No. 24 of 2022^[1].

Data Collection

Primary data were obtained through field observations, structured interviews, and questionnaires administered to healthcare professionals (Profesional Pemberi Asuhan/PPA), including hospital directors, physicians, nurses, midwives, medical record officers, and Hospital Management Information System personnel.

Secondary data consisted of legislation, government regulations, academic books, scientific journal articles, and other legal documents relevant to Electronic Medical Records and electronic signatures^[7].

Data Analysis

The collected data were analyzed qualitatively using George C. Edwards III's Policy Implementation Theory, which identifies four determinants influencing policy implementation:

- Communication
- Resources
- Disposition
- Bureaucratic Structure^[8]

These four dimensions served as the analytical framework for assessing the effectiveness of electronic signature implementation at Baptist Hospital Batu.

Results and Discussion

Legal Framework of Electronic Signatures in Indonesia

Electronic signatures within Indonesian Electronic Medical Records are primarily regulated under Indonesian Minister of Health Regulation No. 24 of 2022 concerning Medical Records, which permits healthcare facilities to utilize electronic signatures for authentication and verification purposes^[1]. This regulation should be interpreted together with Law No. 11 of 2008 on Electronic Information and Transactions^[3], Government Regulation No. 71 of 2019, and other legislation governing electronic systems and data protection^[13].

Government Regulation No. 71 of 2019 distinguishes between certified electronic signatures and uncertified electronic signatures, both of which possess different legal implications regarding authentication and evidentiary value^[13].

Consequently, electronic signatures within Electronic Medical Records represent more than merely replacing handwritten signatures. They function as legal mechanisms for identity authentication, document integrity verification, information security, accountability, and legal certainty^[9].

Failure to comply with Electronic Medical Record regulations may result in administrative sanctions against healthcare facilities, including written warnings and recommendations affecting accreditation status.

Digital Readiness at Baptist Hospital Batu

Baptist Hospital Batu officially initiated its Electronic Medical Record program following the enactment of Minister of Health Regulation No. 24 of 2022^[1]. In January 2023, the hospital established an Electronic Medical Record implementation team responsible for coordinating digital transformation activities.

Since 2025, the implementation team has been divided into two specialized units: the EMR Development Team, responsible for software development and collaboration with system vendors; and the EMR Socialization Team, responsible for training and disseminating information to hospital departments.

Electronic Medical Records have been fully implemented in outpatient clinics, emergency services, laboratory services, radiology, nutrition services, and pharmacy departments. However, inpatient wards and operating theatres continue to operate under a hybrid documentation model combining paper-based and electronic medical records.

Current Electronic Signature Practices

The study found that electronic signatures are currently implemented only for selected documents, particularly those supporting National Health Insurance (BPJS) reimbursement and private insurance claims.

Four different signature methods coexist within the hospital:

- Electronic signatures using drawing pads and tablets for informed consent documents.

- Scanned handwritten signatures embedded in medical discharge summaries.
- QR Code-based electronic signatures used in outpatient medical summaries and participant eligibility documents.
- Conventional handwritten signatures on many remaining medical forms.

The simultaneous use of multiple signature methods demonstrates that implementation remains inconsistent across hospital units.

Furthermore, Baptist Hospital Batu has not yet adopted certified electronic signatures issued by an officially recognized Electronic Certification Authority (Penyelenggara Sertifikasi Elektronik/PSrE), thereby limiting the legal robustness and security assurance of its electronic documentation^[10].

Analysis Based on George C. Edwards III's Policy Implementation Theory

Communication

Communication represents the first determinant influencing policy implementation. Edwards III emphasizes that policy implementation depends upon clear, accurate, and consistent communication among implementing actors.

The findings indicate that policy dissemination regarding electronic signatures has occurred but remains uneven across healthcare professionals.

Approximately 64.3% of respondents reported receiving formal training or socialization regarding electronic signatures, whereas 35.7% had never participated in such activities.

Although all respondents recognized that healthcare professionals are required to use electronic signatures, substantial differences remained regarding:

- Which medical documents require electronic signatures;
- Whether scanned signatures are legally acceptable; and
- Procedures for identity verification.

Inconsistencies also appeared concerning mandatory electronic signature implementation. Only half of respondents believed electronic signatures were compulsory for all Electronic Medical Records, while others either disagreed or were uncertain.

These findings suggest that communication mechanisms remain insufficient to ensure consistent policy implementation throughout the hospital.

Resources

Resource availability constitutes the second implementation variable.

Human resources were generally considered adequate, particularly among Information Technology personnel and medical record officers. Nevertheless, competency levels among physicians, nurses, and other healthcare professionals varied considerably.

Infrastructure also remains inadequate.

Survey findings indicate that:

- Tablets and drawing pads are not universally available;
- Server capacity requires upgrading;
- Awareness regarding backup servers remains limited; and
- Electronic signatures have not yet been integrated with certified Electronic Certification Authorities.

These infrastructure limitations directly affect implementation effectiveness.

Disposition

Disposition refers to the willingness, commitment, and acceptance of policy implementers in carrying out a particular policy. According to Edwards III, even a well-designed policy supported by adequate resources may fail if implementers lack commitment or willingness to execute it effectively.

The findings indicate that disposition constitutes the strongest supporting factor in implementing electronic signatures at Baptist Hospital Batu. Most respondents demonstrated positive attitudes toward digital transformation and recognized the importance of Electronic Medical Records in improving healthcare quality and administrative efficiency. Approximately 64.3% of respondents stated that physicians were willing to use Electronic Medical Records and electronic signatures in their daily clinical practice. Although some respondents remained uncertain, the overall perception reflects favorable acceptance among healthcare professionals.

Hospital management also exhibited a strong institutional commitment to digital transformation. Approximately 85.7% of respondents believed that hospital leadership actively supported Electronic Medical Record implementation and viewed electronic signatures as instruments capable of improving document security, operational efficiency, and accountability. These findings suggest that organizational culture within Baptist Hospital Batu has become increasingly receptive to digital innovation.

Moreover, respondents generally perceived electronic signatures as beneficial for accelerating administrative processes and reducing documentation errors. Such positive perceptions are particularly important because policy acceptance significantly influences compliance with newly introduced technologies.

Nevertheless, positive disposition alone cannot guarantee successful implementation. Organizational commitment must be accompanied by effective communication, sufficient technological resources, and clear institutional procedures to ensure that electronic signature implementation becomes consistent across all hospital departments.

Bureaucratic Structure

Bureaucratic structure represents the organizational arrangements that guide policy implementation, including the availability of Standard Operating Procedures (SOPs), organizational coordination, and clearly defined responsibilities.

The present study found that bureaucratic structure remains one of the principal weaknesses in implementing electronic signatures at Baptist Hospital Batu. Although the hospital has established an Electronic Medical Record implementation team, the dissemination of Standard Operating Procedures has not yet reached all healthcare professionals.

Approximately 64.3% of respondents stated that they were unaware of the existence of Standard Operating Procedures governing electronic signatures, whereas only 35.7% confirmed that such procedures were available. These

findings indicate that existing policies have not been effectively institutionalized throughout the organization. Interdepartmental coordination also requires further improvement. Although coordination meetings involving hospital management, Information Technology personnel, medical record officers, physicians, and other healthcare professionals have been conducted, participation and awareness remain inconsistent among respondents. Because Electronic Medical Record implementation requires collaboration among multiple professional groups, fragmented organizational communication may generate inconsistent practices, overlapping responsibilities, and uncertainty regarding legal accountability. Therefore, strengthening bureaucratic structure through standardized procedures, clearly defined organizational responsibilities, and continuous interdepartmental coordination should become a strategic priority for hospital management.

Discussion

The present findings are consistent with Lestari *et al.* (2024), who emphasized that effective Electronic Medical Record governance requires an integrated legal framework to ensure patient data security, confidentiality, and regulatory compliance^[11, 15].

The findings demonstrate that implementing electronic signatures in Electronic Medical Records is not merely a technological issue but also an organizational and legal challenge^[16]. Successful implementation depends upon the interaction of technological infrastructure, institutional governance, regulatory compliance, and human resource readiness.

Applying George C. Edwards III's Policy Implementation Theory reveals that the four implementation variables are highly interdependent. The relatively strong disposition observed among hospital personnel provides a favorable foundation for digital transformation. However, weaknesses in communication, resource availability, and bureaucratic structure continue to hinder effective implementation.

The coexistence of multiple signature methods—including handwritten signatures, scanned signatures, QR Code-based signatures, and tablet-generated signatures—illustrates the absence of standardized institutional policies. From a legal perspective, such inconsistency may reduce legal certainty concerning document authenticity and evidentiary reliability, particularly when Electronic Medical Records are used in judicial proceedings or administrative investigations. Furthermore, the hospital has not yet adopted certified electronic signatures issued by an officially recognized Electronic Certification Authority. Although existing electronic signatures may facilitate daily administrative activities, certified electronic signatures provide stronger legal assurance because they verify signer identity through trusted certification mechanisms and support document integrity through cryptographic technologies.

These findings are consistent with previous studies reporting that successful Electronic Medical Record implementation depends upon technological readiness, institutional commitment, adequate training, and comprehensive regulatory compliance. The present study extends existing literature by demonstrating that legal implementation should be evaluated not only from technological and managerial perspectives but also through a policy implementation

framework that considers organizational behavior and institutional governance.

Consequently, hospitals seeking to strengthen Electronic Medical Record implementation should prioritize four strategic initiatives:

- Continuous education regarding legal requirements governing electronic signatures;
- Improvement of information technology infrastructure and cybersecurity capacity;
- Adoption of certified electronic signatures issued by recognized Electronic Certification Authorities; and
- Development of comprehensive Standard Operating Procedures supported by continuous monitoring and evaluation.

Such integrated measures would improve legal certainty, organizational accountability, and information security while promoting sustainable digital transformation in Indonesian healthcare institutions.

Policy Implications

The findings of this study have several implications for healthcare policymakers and hospital administrators.

First, the Ministry of Health should provide more detailed technical guidelines concerning the implementation of electronic signatures within Electronic Medical Records. Although Minister of Health Regulation No. 24 of 2022 establishes the legal basis, practical guidance regarding authentication procedures, identity verification, document standards, and institutional responsibilities remains limited^[1].

Second, hospitals should accelerate the adoption of certified electronic signatures integrated with nationally recognized Electronic Certification Authorities. Such integration would strengthen legal certainty, improve cybersecurity, and enhance the evidentiary value of Electronic Medical Records.

Third, continuous professional education should become an institutional priority. Training programs should focus not only on technical operation of Electronic Medical Record systems but also on legal responsibilities, personal data protection, information security, and electronic evidence management.

Finally, future digital transformation initiatives should emphasize organizational governance alongside technological innovation. Sustainable implementation requires coordinated leadership, effective communication, adequate resources, and institutional commitment across all levels of healthcare organizations.

Conclusion

This study examined the implementation of electronic signatures in Electronic Medical Records (EMRs) at Baptist Hospital Batu within the framework of Indonesian Minister of Health Regulation No. 24 of 2022 concerning Medical Records^[1]. Using George C. Edwards III's Policy Implementation Theory, the study evaluated implementation through four interrelated dimensions: communication, resources, disposition, and bureaucratic structure^[8].

The findings indicate that electronic signatures have been implemented as part of the hospital's digital transformation; however, implementation remains partial and inconsistent across healthcare services. Among the four implementation variables, disposition emerged as the strongest facilitating

factor. Hospital management and healthcare professionals generally demonstrated positive attitudes toward digital transformation and recognized the benefits of electronic signatures in improving administrative efficiency, document security, and accountability.

Nevertheless, the study also identified several barriers that limit effective implementation. Communication has not been fully effective because dissemination of regulations and organizational policies has not reached all healthcare professionals consistently. Resource-related constraints include limited information technology infrastructure, uneven staff readiness, and the absence of certified electronic signatures issued by a recognized Electronic Certification Authority. Furthermore, bureaucratic structure requires strengthening through comprehensive Standard Operating Procedures and more systematic coordination among organizational units.

The coexistence of multiple signature methods—including handwritten signatures, scanned signatures, QR Code-based signatures, and tablet-generated signatures—demonstrates that implementation has not yet achieved institutional standardization. This situation may reduce legal certainty, particularly regarding document authenticity, accountability, and evidentiary reliability in Electronic Medical Records.

Overall, successful implementation of electronic signatures requires integrated improvements across all four policy implementation variables. Hospitals should strengthen regulatory dissemination, provide continuous professional training, improve digital infrastructure, establish comprehensive Standard Operating Procedures, and adopt certified electronic signatures to ensure legal certainty, information security, and organizational accountability.

Future research should involve a broader range of hospitals with different ownership types and accreditation levels to generate comparative evidence regarding electronic signature implementation in Indonesian healthcare institutions. Quantitative approaches involving larger samples may also complement empirical legal studies by identifying organizational factors influencing successful Electronic Medical Record implementation.

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