

# Supporting and Inhibiting Factors in Implementing Electronic Medical Records (EMR) Policy in Indonesia

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**Abstract.** Health service facilities are obliged to provide quality services to patients. The increasingly rapid pace of information technology has influenced digital health services, one of which is through Electronic Medical Record (EMR) services. EMR, can improve the quality of health services for patients. The government issued a policy regarding medical records through the Indonesian Ministry of Health's Regulation Number 24 of 2022 on Medical Records mandating that all health facilities implement EMR by December 2023. However, health facilities have not fully complied this policy. Based on the monitoring of the SATU SEHAT implementation, only 61.42% of health service facilities in Indonesia have adopted EMR due to several obstacles related to human resources, infrastructure, and management elements. This research aims to analyze the supporting and inhibiting factors in the implementation of the EMR policy in health service facilities in Indonesia. The research used a narrative review method by searching for articles using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guideline, resulting in 16 journals that were the required criteria. The analysis of these 16 articles show that, in general, health service facilities in Indonesia are ready to implement EMR. However, the implementation of the EMR policy faces inhibiting factors, such as unprepared IT infrastructure, lack of EMR implementation guidelines, and insufficient human resource training. Supporting factors include policies regulated by the Ministry of Health and government facilitation in implementing EMR. To achieve success in implementing the EMR policy, efforts are needed to improve IT infrastructure, improve the quality of EMR, develop strategies for EMR implementation, and provide continuous government assistance from the to health service facilities.

## 1 Introduction

The rapid development and advancement of information and communication technology have significantly impacted the demand for quick and accurate information among decision-makers. Information has become a fundamental requirement for organizational management in the decision-making process. Hospitals are organizations that store a lot of data and require proper and accurate data processing to be presented as health information. Hospital data is derived from patient records, which contain the diagnosis and medical action received by the patient during their hospitalization. Patient data is recorded by the hospital in the form of a medical record. Maintenance of medical records

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is a series of activities that starts from the patient's admission, through medical treatment, nursing care, patient discharge, and the involvement of other professional caregivers while the patient is in the hospital [1].

With the rapid development of technology, the management of medical records has shifted from paper-based systems to electronic format. Electronic Medical Records (EMR) are being developed in Indonesia to improve healthcare services for patients. The use of EMR is expected to be able to support service activities and service management, as well as to generate information and reports tailored to specific needs. EMR can benefit patient services, covering both clinical and administrative functions. The information generated from EMR is also useful for education, regulatory preparation, research, health management, and health promotion [2].

Implementing EMR in Indonesia still faces various problems, including the difficulty of health personnel accessing health data by health personnel easily, continuously, and in real-time; lack of standardization and integration of health data, making it difficult to interoperability in the implementation of the continuum of care principles; and the failure to achieve completeness, consistency, and accuracy of medical data to meet the needs for evidence-based policy development. Health data recording is inefficient and ineffective due to the overwhelming number of administrative application [3]. To address these problems, the government has issued the Indonesian health transformation policy, outlined in the Strategic Plan of the Ministry of Health 2020-2024 [4]. Health transformation consists of six pillars, one of which is health technology transformation. Policies related to the transformation of health technology include the integration and development of health data systems, the integration and development of health service application system, and the development of the health technology ecosystem [3].

In support of the health transformation policy, particularly in the field of health technologies, the government enacted a policy through the Health Minister's Regulation No. 24 Year 2022 on Medical Records, mandating that all health services must implement electronic medical records in providing healthcare to patients. All health facilities must implement EMR by December 2023 [5]. According to the eHealth Report from the Ministry of Health, by the end of 2023, around 70-80% of hospitals in Java and Bali had adopted EMR, while the adoption rate outside of Java and Bali was only about 40-50% [6]. Policy obstacles, including workload, internet connectivity, lack of information technology staff, insufficient knowledge and skills, non-standard data collection, demographic conditions, legal and data security concerns, and the continued reliance on paper-based records [7].

Considering the various advantages of EMR, its application will enhance the professionalism and performance of hospital management. The aim of EMR is to improve the speed of completing of administrative tasks, enhance data accuracy, increase time efficiency, and simplify reporting [1]. The implementation of EMR will also reduce errors and lower healthcare costs [8].

Given the positive impact and obstacles encountered in Indonesia in implementing EMR, along with the enforcement of the EMR policy across all healthcare services, this article discusses supporting and hindering factors in the implementation of the EMR policy in Indonesia.

## 2 Writing Methods

This article uses the narrative review method, where literature sourced from Google Scholar for articles related to the implementation of Electronic Medical Records (EMR) in Indonesia. The initial phase involved filtering of articles with a time limit of the last five years (2019-2024), free full-text availability, and quantitative and qualitative research types. The article search was conducted using the PICO framework, with the keywords “Implementation AND Electronic Medical Record AND Supporters AND Inhibitors,” resulting in 1,600 articles. Of these, 1,210 were duplicates, leaving 390 articles.

A total of 390 articles were screened and 373 were excluded. Exclusion occurred because the articles were not available in full-text format or did not match the criteria, especially for articles using qualitative and quantitative research methods related to the implementation of EMR in Indonesia. The remaining 17 articles met the inclusion criteria, were available in full text, and used quantitative and qualitative research methods. These remaining articles were further selected based on their clear and specific discussion of factors supporting and hindering the implementation of electronic medical records in Indonesia. Based on these criteria, 16 articles and literature reviews were included..

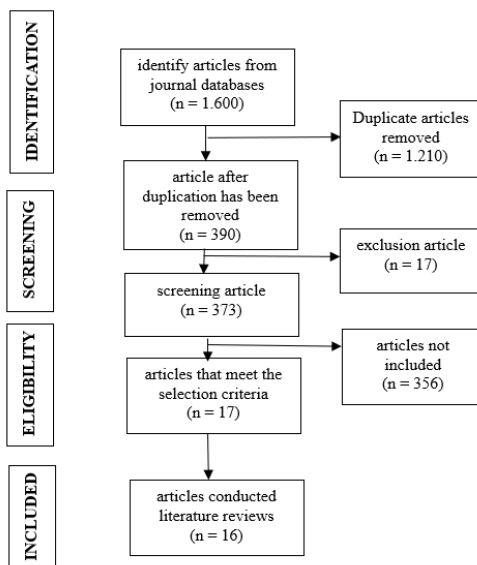


Image 1. Flow Chart Prism

Table 1. Literature Review

No	Author/ Year/ Title	Method	Result
1	Pohan, Sulisna, Meliala, 2022 [9]  <i>Factors Hindering the Implementation of Electronic Medical</i>	Qualitative	Obstacles in the application of electronic medical include a lack of educational background in medical records, insufficient training for staff, a shortage of computers, and an unstable internet network.

No	Author/ Year/ Title	Method	Result
	<i>Records at Aksara Clinic in 2022</i>		
2	Widayanti, et all, 2023 [10]  <i>Puskesmas Preparedness Samigaluh I in the Transition of Conventional Medical Records to Electronic Medical Records</i>	Qualitative Descriptive	Support: There has already been socialization of electronic medical records, preparation of SOPs maintenance of EMR, and adequate infrastructure is available (server, genset, internet, electricity). Obstacles: There are no information technology experts, no technical guidance from the health service, insufficient program security, and no budget.
3	Silva, Dewi, 2023 [11]  <i>Barriers to Implementation of Electronic Medical Records from a Medical Recorder's Perspective with the PIECES Method</i>	Qualitative	The obstacles to implementing electronic medical records include system speed, information accuracy, system modules and features, data integration, output quality, data security, costs, technical barriers, non-technical barriers and efficiency, and service quality.
4	Dhamar, Rahayu, 2020 [12]  <i>Experience of Nurses in the Use of Electronic Medical Records at Panti Rini Yogyakarta Hospital</i>	Qualitative	Support: Availability of medical facilities, motivated human resources, supportive hospital management policies, and the presence of information technology staff. Barriers: Slow internet, computer shortages, and differences in understanding between healthcare and information technology staff.
5	Juliantari, et all, 2023 [13]  <i>Overview Process Implementation of Electronic Medical Records in Road Care Unit with HOT-FIT Method at General Hospital Ari Canti</i>	Quantitative Descriptive	Human Aspects 71.7% Good, Organization 90% Good, Technology 55% Good, and Net Benefit 80% Good. The area for improvement in the human is training.

No	Author/ Year/ Title	Method	Result
6	Amin, Setyonugroho, Hidayah, 2021 [14]  <i>Implementation of Electronic Medical Records: A Qualitative Study</i>	Qualitative, Case Study	Support: Human Resource Support, Hardware, Finance, Leadership, Support and Technical Support. Obstacles: System error, system design not perfect, not compatible with other systems, computer skills lacking, power out.
7	Andriani, Wulandari, Margianti, 2022 [15]  <i>Electronic Medical Recorder as Patient Service Management Assistant at Gadjah Mada University Hospital</i>	Qualitative, Case Studies	Need to develop patient reminder features as well as regular training for information technology staff.
8	Rusmana, Sari, 2023 [16]  <i>Regional Health Information System Implementation Analysis (SIKDA) Generic Uses Enhancing the Effectiveness of Electronic Medical Records in UPTD Puskesmas</i>	Qualitative	Support: The governance system is good. Obstacles: Other services are not integrated with other services, only registration; understanding of human resources is still lacking; there is no official regulation; officers lack training and guidance; there are limited human resources and facilities, as well as Internet disruption.
9	Marzuki, Kiswanto, Putri, 2024 [17]  <i>Integrating Electronic Medical Record Practices to Protect Misfile Challenges in Hospital X Pharmacy Facilities</i>	Qualitative Explorative	Support: Active management support, adequate financial resources, staff participation in integration process Obstacles: Resistance to change, insufficient availability of technological infrastructure, regulatory complexity
10	Belrado, Harmendo, Wahab, 2024 [18]	Qualitative Descriptive	Obstacles: Features not matching user needs, server downtime, slow internet network

No	Author/ Year/ Title	Method	Result
	<i>Analysis of use of electronic medical records in hospitals</i>		
11	Wati, Igianny, Pertiwi, 2024 [19]  <i>Preparedness Analysis Implementation of Electronic Medical Records in Puskesmas Baki</i>	Qualitative Descriptive	Support: Medical records officers have already obtained a seminar on electronic medical records; material aspects are strong enough and stable. Obstacles: Lack of regulation, insufficient finance, servers, unupdated computer gensets, lack of staff training
12	Azka, Wahab, 2024 [20]  <i>Review of Implementation of Electronic Medical Records Used to Support the Effectiveness of Registration of Hospitals in RSUD City of Bandung</i>	Qualitative Descriptive	Support: Adequate funding, adequate regulation Obstacles: Lack of human resources, unstable electricity, the system still needs a lot of improvement, less registration lock, limited number of support facilities
13	Dhamar, Rahayu, 2020 [21]  <i>Experience of Nurses in the Use of Electronic Medical Records at Panti Rini Yogyakarta Hospital</i>	Qualitative	Support: Availability of medical facilities, motivated human resources, hospital management policies, and adequate information technology staff. Obstacles: Slow internet, few computers, and unupdated systems
14	Insani, Andriani, 2024 [22]  <i>Preparedness of Management Elements in Dealing with Application of Electronic Medical Records at Clinic A in Yogyakarta</i>	Qualitative Descriptive	Support: Sufficient human resources, good knowledge of electronic medical records, and adequate facilities Obstacles: No policy and SOPs on electronic medical records

No	Author/ Year/ Title	Method	Result
15	Franki, Sari, 2022 [23]  <i>Evaluation of Electronic Medical Records with HOT-FIT Method at Neural Clinic Hospital Mitra Plumbon</i>	Qualitative Descriptive	There are no scheduled programs, no maintenance schedules, no socialization and training schedule, no screening and screening; there are some unavailable reports, patients who register online often late, unaccessible old data before electronic medical records, difficulty finding prescriptions, frequent interference, & slow internet network.
16	Wartini, Sartika, Pertiwi, Triana, 2023 [24]  <i>Analysis of Preparedness for Implementation of Electronic Medical Records Reviewed from Human Resources and Sarana da Prasarana at RSUD Dr. Darsono district of Pacitan Province East Java</i>	Qualitative	Sufficient human resources yet lack of training. Satisfying facilities with additional servers, UPS, and network smoothness

### 3 Results and Discussion

Sixteen articles have met the inclusion criteria using both qualitative and quantitative research methods. The entire articles analyzed were published from 2019 to 2024. Electronic Medical Records (EMR) is an information system that integrates patient health information digitally. The implementation of EMR in Indonesia is part of an effort to improve the efficiency, quality, and accuracy of health services.

The government issued a policy that by December 2023, and all healthcare facilities were obliged to maintain electronic medical records. The government has facilitated the maintenance of medical records by issuing a standard metadata policy, launching a Healthy One program, conducting periodic follow-ups, and providing an electronic medical record application. Healthcare facilities have electronic medical records, where the EMR can cooperate with an electronic system organizer verified by Kominfo. As the policy goes on, there are some supportive factors and obstacles to the EMR policy.

#### 3.1 Supporting Factors

Several factors support the implementation of the electronic medical record policy in Indonesia as follows.

### 3.1.1 *Government Support*

The implementation of EMR is certainly inseparable from the role and support of the government. The Ministry of Health and Health Services in Ghana has supported the implementation of EMR systems in various healthcare facilities. However, challenges such as inadequate training for users and poor network infrastructure have hindered its success. The government acknowledges the importance of technical support and user involvement for its successful implementation; however, a more comprehensive assessment of the infrastructure is needed before launching the system [25].

The National Guard Health Affairs (NGHA) of Saudi Arabia has implemented EMR on a large scale across all its hospitals. Leadership plays a crucial role in ensuring the success of projects, especially after the Middle East Respiratory Syndrome (MERS) outbreak. NGHA employed change management techniques, including mobilizing resources and encouraging team collaboration, to achieve the goals of EMR implementation. The techniques highlight the importance of leadership and preparedness in a complex healthcare system [26].

The federal government of the United States provides financial incentives under the Health Information Technology for Economic and Clinical Health (HITECH) Act to encourage healthcare [27].

The Indonesian Ministry of Health has demonstrated a strong commitment to addressing the implementation of EMR through several regulations including the Health Act, the Health Minister's Regulations on Medical Records, and health transformation policies, particularly health technology transformation. In addition, it also issued a meta-data standard for maintaining EMRs and facilitating the EMR system for healthcare facilities. Good government support may lead to good healthcare facility management [16, 20].

### 3.1.2 *Technological Advances*

The development of Information and Communication Technology (ICT) in the health sector in Indonesia has been rapid in recent years. The Indonesian Ministry of Health continues to promote the implementation of EMR in various healthcare facilities. It reported in 2021 that about 30% of hospitals in Indonesia had already used EMR, with a target of 100% usage by 2024 [26]. The use of EMR aims to enhance the efficiency of healthcare services, facilitate access to patient data, and support data-driven clinical decision-making. The main challenge is the readiness of infrastructure in hospitals, especially in remote areas, and the training of human resources to use the system. The United States had employed more established EMR since the HITECH Act provided incentives for healthcare providers to use EMR [26]. Although Indonesia continues to strive to expand the use of EMR, it has to provide supporting infrastructure and training for equitable implementation.

Countries like China and India also experienced a surge in telemedicine usage during a pandemic, supported by stronger infrastructure. The use of applications like Ping An Good Doctor in China has long been established and has received full support from the government [26]. Telecommunications and internet networks in remote areas of Indonesia are facilities used for wider information dissemination

Developed countries like the UK have applied the National Health Service (NHS) Digital, which provides integrated health data for all citizens. Using a digital system like *Aplikasi Sistem Informasi Kesehatan Nasional* (ASIK) or Information System for National Health is important, but it needs continuous support of infrastructure and digital literacy in the health sector.

Countries like Singapore has implemented digital hospital services more quickly and evenly [26]. Compared to Indonesia, Singapore has more advanced infrastructure and greater resources to support this digitalization program.

The development of information and communications technology in Indonesia in addition to the growing and rapid Internet network supports and accelerates the adoption of EMR. With the advancement of technology, the sustainability of EMR is guaranteed [19].

### 3.1.3 Education and Training

**Training and education offer** increased awareness and capacity of health workers using information technology. The failure using EMR in some health services, however, is caused by a lack of training for officials [9, 22].

The Indonesian government provides significant support in education and training to enhance knowledge and skills of handling EMR. The Indonesian Ministry of Health has launched a training program on how to use EMR for healthcare workers, including doctors and nurses. This program includes technical training on EMR software and the importance of managing patient data digitally, aimed to improve medical personnel's knowledge and skills of using EMR [26].

The Ministry of Health has collaborated with various universities and educational institutions to incorporate material on health technology and EMR into their curricula. The collaboration equips new graduates to have a better understanding of the EMR system and preparedness in entering the workforce [25]. The Indonesian government strives to ensure that healthcare workers in remote areas also have access to health technology training programs in both rural and urban health facilities[25].

Government support in education and training on EMR allows healthcare workers in Indonesia to effectively utilize digital technology. Despite significant progress in the programs, challenges remain, especially regarding access gaps in remote areas. Compared to others, the United States has carried out similar initiatives through the HITECH Act, providing incentives for training healthcare professionals [26]. Meanwhile, countries like Singapore and South Korea have been more advanced in integrating health technology into their education system, particularly on developing digital skills among healthcare professionals.

To further enhance the success of EMR implementation, training on health technology should be more available in remote areas through collaboration between educational institutions and healthcare facilities.

The digitization of healthcare services evolves since healthcare systems carry large data from time to time. Thus, healthcare workers will continuously face changes in how they perform their jobs and organize their work (as well as how they collaborate) [28]. Therefore, digitalization skills in healthcare services like the use of EMR is eminent.

### 3.1.4 *Management Commitment*

Electronic medical records offer many benefits including improved accuracy of patient data, reduced data duplication, and improved coordination between healthcare providers. The use of EMR requires prepared standards of operational procedures among the officers. In addition, it demands on support facilities to streamline the system[10].

Good EMR management and human resources with a high motivation to learn leads to the effective and efficient use of EMR [12, 14, 17].

Leadership and management skills may improve the readiness of healthcare facilities in utilizing EMRs. Moreover, the staff build fervor once she/he sees a good leadership and managerial skills [29]. Leadership has the authority through regulations, supervision, and legislation to ensure the development of comprehensive national EMR standards [30].

Organization, people, and technology serve as the basis for policymakers and other key stakeholders to make evidence-based decisions during the integrated EMR implementation across healthcare facilities. Additionally, end-user factors, existing technology standard usage and policies, as well as advancements in technology and research will affect how these factors dynamically interact during EMR implementation [31].

To optimize EMR implementation, healthcare facilities need to consider and develop change management approaches and encourage effective group norms and prioritize adequate training. Monitoring risk levels in the EMR implementation enable them to make timely adjustments and mitigation strategies to optimize the chances of success [32].

## 3.2 Inhibitor Factors

**There are some obstacles hindering the use of EMR in Indonesia as follows.**

### 3.2.1 *Implementation Cost*

**Indonesia experiences** quite complex financing, both in terms of funding sources for EMR and implementation strategies. Despite government support, many financing challenges need to be addressed. Funding for implementing EMR in Indonesia mostly comes from the central and regional government budget, such as the Ministry of Health with digital infrastructure and training for healthcare personnel [33] [34]. In addition, private healthcare facilities are also expected to invest their own funds in the EMR system, but such policy could be a significant financial burden.

Besides, other investments such as adequate information and communication technology, including hardware, software, and human resource training often become challenges. The majority of the healthcare facilities in Indonesia do not have systems that are compatible or advanced enough to support EMR [35, 33]. The disparity in access and budget between urban and rural areas is also another issue.

Malaysia and Thailand have allocated a larger budget for digital transformation in the healthcare sector. Malaysia, for example, has made significant investments in digital health infrastructure and has more integrated policies to support the use of EMR [33]. Meanwhile, Thailand has a stronger funding system for healthcare facilities, allowing them to adopt digital technology more quickly and efficiently.

Solutions to overcome high financing costs are public-private partnerships for developing EMR infrastructure, training and education, as well as project-based funding. This may include cost-sharing between the government and healthcare providers. Besides, well-trained health personnel is helpful to reduce significant additional costs for intensive training [34]. Adopting a project-based financing model, where investments are made in stages and based on outcomes, can reduce the initial financial burden. Overall, despite a little progress in the implementation of EMR, Indonesia experiences many financing challenges such as a digital and integrated health system.

Initial investment funds should be allocated for procuring hardware, software, and staff training. However, some healthcare facilities, especially located in rural areas, have limited budget capabilities. Low-allocated cost correlates with poor human resources and information technology staff [10][19][36].

### 3.2.2 *Infrastructure Readiness*

**Infrastructure readiness is another obstacle in the implementation of EMR.** The majority of healthcare facilities, especially in remote areas, face difficulties in accessing stable and fast internet, while it is necessary for the operation of EMR which should be accessed online and in real time [35, 37]. The availability of hardware and software is often found to be a constraint in supporting EMR. Secure data storage devices and procedures are the technological aspects to maintain data integrity [37, 38]. The existing EMR systems cannot function well because of the poor facilities, restricting the efficient flow of data and the integration of health information across healthcare facilities [38]. The Philippines and Vietnam experience similar obstacles, but they have applied different approaches in addressing infrastructure issues. The Philippines government has launched major projects to improve IT infrastructure in remote areas, and Vietnam has invested in training programs to enhance the digital operation skills of healthcare workers [37].

Infrastructure readiness can improve when the government moves towards digital infrastructure development, training and education, and partnership with technology providers. The Indonesian government has initiated projects such as SATRIA 1, a broadband satellite aimed at improving internet access in remote areas. This aims to support public services, including health [37]. Ongoing training programs can help healthcare workers feel more prepared and confident in using this system [38]. Collaboration with IT providers can help address hardware and software procurement

issues through system maintenance and updates [38, 35]. Despite rapid technological advances, rural and remote areas still face infrastructure gaps. Difficult internet access and stable electricity can hinder the implementation of EMR. Earlier research has shown that the application of the EMR at the Clinic of Pratama was stuck due to a lack of hardware and an unstable Internet network [9, 12, 16, 39].

### 3.2.3 *Data Security and Privacy*

Concerns about the integrity and privacy of patient data are one of the main obstacles. Healthcare facilities must have patient's data protection from cyber threats and phishing. Additionally, poor technical guidance and safety in healthcare services are other hindering factors in EMR implementation [8, 10].

System quality depends on system speed, information accuracy, system modules, features, data integration, and external quality [11, 14, 40]. Indonesia has performed personal data protection including patient data through law number 27 of 2022 on Personal Data Protection [41]. This law outlines the responsibilities of entities managing personal data, the confidentiality and security of patient data. Other regulations such as the Minister of Health Regulation number 24 of 2022 on medical records also govern health data confidentiality [5]. Patient data breaches may lead to loss of privacy, financial risk, and declining trust. Sensitive medical information can be misused, leading to psychological and social harm for patients. Cybercriminals may steal medical data, economically harming patients. Unguaranteed data protection eventually will lose public trust, thereby missing the reputation and the sustainability of services. The United States have strict regulations such as HIPAA, providing protection for digital health information and establishes stringent consequences for data breaches [42]. Meanwhile, for Indonesia, it is well-thought to maintain three strategies which are enhancing the digital security system, training healthcare personnel, and partnering with advanced security technology service providers. The results of unprotected EMR in India include phishing attacks, malware, ransomware, encryption blind spots, cloud threats, and insider threats. A comprehensive cybersecurity strategy and continuous monitoring can secure sensitive health data. The EMR should be navigated with adequate planning, financial resources, staff training, and stakeholder support to improve patient care and operational efficiency [43].

### 3.2.4 *Resistance to Change*

The shift from manual systems to electronic ones requires significant adaptation although some stakeholders choose to reject the change [17]. Previous research shows that only 20% of medical records officers were ready to implement EMR [44]. Their readiness, therefore, is reflected on their perception of the EMR [45].

### 3.2.5 *Complexity of System Integration*

**Integrating healthcare systems** requires profound adjustment. Some EMR features are not in line with user needs and still have downtime [18, 20]. EMR platforms, for example,

should be updated to align with trends in nursing care services [46] with faster and more accurate data presentation [47]. Improvements of digital systems also include EMR features, the frequency of monitoring and evaluation, as well as the formation of a dedicated team [47].

One of the program digitization in Indonesia is SATU SEHAT platform, initiated by the Indonesian Ministry of Health to support the transformation of digital health services [48]. This program aims to improve the quality of health services by utilizing integrated digital technology and accelerating data-driven decision making. The SATU SEHAT program follows Presidential Regulation No. 95 of 2018 on the Electronic Based Government System and Government Regulation No. 46 of 2014 on the Health Information System. Its platform involves health information systems across healthcare facilities such as hospitals, primary healthcare centers, clinics, laboratories, and others. It helps reduce duplication of actions and integrated referral system, thus improving the speed and accuracy of patient referral to the appropriate healthcare facilities with more reliable and integrated digital data systems [48].

## 4 Conclusion

Electronic medical record policies in Indonesia generate enormous potential to improve the quality of healthcare services. Government support, technological advancement, educational and training, as well as clinical and administrative benefits are key supporting factors in the application of EMR. However, it could be challenged by the implementation costs, infrastructure readiness, data security and privacy, resistance to change, and the complexity of system integration. Therefore, Indonesia needs to fix technology infrastructure, training and development of human resources, improvement of data regulation and standardization, data security and privacy, and allocation of incentives to healthcare facilities. Overall, these positive changes will result in efficient, safe, and sustainable EMR systems across healthcare facilities.

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