

Factors Influencing the Success of E-prescribing in Hospitals: A Literature Review

Nadia Miftahul Aini¹, Rasmi Zakiah Oktarlina², Selvi Marcellia¹, Syazili Mustofa¹

¹Program Studi Pendidikan Dokter, Fakultas Kedokteran Universitas Lampung; ²Program Studi Farmasi, Fakultas Kedokteran Universitas Lampung
E-Mail: rasmi.zakiah@fk.unila.ac.id

Electronic prescribing (e-prescribing) is an information technology-based innovation in healthcare systems aimed at improving patient safety and quality of care, particularly in the medication prescribing process. The implementation of e-prescribing in hospitals has been shown to reduce medication errors; However, its success is influenced by various complex and multidimensional factors. This study aims to identify and analyze the factors affecting the successful implementation of e-prescribing in hospitals using a literature review approach. The results indicate that the success of e-prescribing implementation is influenced by individual factors (knowledge, attitudes, and user skills), technological factors (system quality, user interface design, and clinical decision support systems), organizational factors (management support, infrastructure readiness, and workflow), and policy factors (regulations and interoperability standards). Additionally, several barriers were identified, including limited infrastructure, user resistance, alert fatigue, and technology-induced errors that may affect system effectiveness. Therefore, a comprehensive and integrated approach is required to optimize the implementation of e-prescribing in improving patient safety and healthcare service quality in hospitals.

Keywords: *e-prescribing*, medication errors, patient safety, hospitals, health information systems

This is an open access article under the [CC BY-NC](#) license



Corresponding Author:

Rasmi Zakiah Oktarlina
Program Studi Pendidikan Dokter, Fakultas Kedokteran Universitas Lampung
rasmi.zakiah@fk.unila.ac.id

1. Introduction

Medication safety remains a major issue in hospital care because the drug therapy process involves multiple stages (prescribing, verification, dispensing, and administration) that are prone to error (World Health Organization, 2023). Medication errors are defined as failures in the treatment process that have the potential to cause or inflict harm to patients and can occur at any stage of medication use (Franklin et al., 2017). The World Health Organization (WHO), through its Medication Without Harm initiative, targets a 50% reduction in severe avoidable medication-related harm globally as an effort to improve patient safety (World Health Organization, 2023). Most medication errors are reported to be preventable if healthcare systems are well-designed and supported by optimal use of health information technology (Franklin et al., 2017).

The prescribing stage is one of the riskiest stages for medication errors because it involves direct clinical decision-making by medical personnel (Franklin et al., 2017). Prescribing errors can include administrative and clinical errors, such as incomplete prescriptions, illegible writing, dosage errors, incorrect dosage instructions, and duplication of therapy (Kinlay et al., 2021). These factors often lead to errors in the pharmaceutical care process, ultimately impacting patient safety (Kinlay et al., 2021). Therefore, a system capable of systematically and sustainably minimizing the risk of these errors is needed (Gates et al., 2021).

The development of information technology in the healthcare sector has led to the emergence of electronic prescribing (e-prescribing) systems or computerized physician/provider order entry (CPOE) as a solution to

improve patient safety and the quality of healthcare services (Osmani et al., 2023). Electronic prescribing is a system based on An information technology that allows medical personnel to write prescriptions electronically and send them directly to an integrated pharmacy system (Osmani et al., 2023). This system is generally part of an electronic medication system (EMS) integrated with an electronic health record (EHR), enabling comprehensive access to patient data (Gates et al., 2021). The implementation of this system aims to reduce handwriting errors, improve service efficiency, and expedite the process of administering medication to patients (Franklin et al., 2017).

The implementation of e-prescribing has grown rapidly in various countries as part of the digitalization of healthcare systems (Zheng et al., 2021). These systems are often integrated with Electronic Health Records (EHR) and Computerized Physician Order Entry (CPOE), allowing healthcare professionals to access more comprehensive patient information, including drug allergy history, drug interactions, and prior therapy history (Cresswell et al., 2024). This system integration plays a crucial role in reducing the risk of medication errors and improving the quality of clinical decision-making by healthcare professionals (Gates et al., 2021).

Various studies have shown that the implementation of e-prescribing and EMS has the potential to reduce medication errors, particularly at the prescribing stage, although results are not always consistent across hospitals due to variations in study design and implementation context (Gates et al., 2021). Furthermore, the use of e-prescribing has also been shown to improve the administrative completeness of prescriptions, such as patient and physician identification, and medication instructions, which play a crucial role in reducing prescription misinterpretation (Raban et al., 2025). Other research shows that the prescribing error rate for manual prescriptions is higher than for electronic prescriptions, at 25% compared to 17% (Franklin et al., 2017). This suggests that e-prescribing has significant potential to improve medication safety in hospitals (Osmani et al., 2023).

However, the success of e-prescribing implementation is determined not only by the system's existence but also by how it is implemented, used, and optimized in the clinical context (Gates et al., 2021). E-prescribing implementation can also have unintended consequences if sociotechnical factors are not managed properly. Studies show that several medication error incidents after e-prescribing implementation are related to sociotechnical issues, namely the interaction between humans and technological systems (Redwood et al., 2021). Furthermore, the use of CPOE can also introduce new risks such as errors due to suboptimal interface design, information fragmentation, and system disruptions such as downtime that can hinder the service process (Koppel et al., 2015).

At the individual/user level, various factors influence the extent to which physicians and healthcare professionals consistently and correctly use e-prescribing (Mogharbel et al., 2021). A systematic review of physicians' use of CPOE identified dozens of determinants that can be grouped into individual, technological, and organizational factors (Mogharbel et al., 2021). Within these organizational/individual factors, training issues, availability of technical support, and time constraints were among the most frequently reported factors influencing CPOE use in prescribing practice (Mogharbel et al., 2021).

At the technology and system design level, interface quality, performance, and clinical decision support (CDS) design are critical determinants of successful e-prescribing implementation (Alaboud et al., 2023). While CDS can improve medication safety, excessive alert exposure can trigger alert fatigue, which actually reduces system effectiveness (Agency for Healthcare Research and Quality, 2019). Furthermore, risks from human-machine interface weaknesses, information fragmentation, and system constraints demonstrate that system design and integration are crucial for patient safety (Koppel et al., 2015).

At the organizational level, successful implementation is heavily influenced by hospital readiness, implementation strategy, infrastructure availability, and cross-professional support (Vaghasiya et al., 2021).

Frequent barriers include inadequate training, limited equipment, and changes in workflow and communication between healthcare professionals (Hogan-Murphy et al., 2015). Furthermore, policy and regulatory factors also play a significant role in driving the adoption of e-prescribing systems within the healthcare system (Baysari et al., 2016).

In Indonesia, the implementation of e-prescribing is growing in line with digital transformation through the implementation of Electronic Medical Records (EMR) and integration of the national health system (Minister of Health of the Republic of Indonesia, 2022). The policy, through Ministerial Regulation No. 24 of 2022, and integration with the HL7 FHIR-based SATUSEHAT platform, requires system readiness, data interoperability, and quality clinical documentation (Ministry of Health of the Republic of Indonesia, 2023). Therefore, research on the factors influencing the successful implementation of e-prescribing is crucial to ensure that this system can improve patient safety while minimizing new risks resulting from the digitalization of healthcare services (Zheng et al., 2021).

2. Literature Review And Problem Statement

The Concept of E-Prescribing in Hospitals

Electronic prescribing (e-prescribing) is an electronic drug prescribing system that allows medical personnel, particularly doctors, to create, send, and store prescriptions digitally through the hospital information system. The implementation of e-prescribing aims to improve service efficiency, reduce prescription writing errors, facilitate coordination between doctors, pharmacists, and other healthcare professionals, and improve patient safety. Compared with conventional prescription systems that still use paper, e-prescribing can minimize the risk of errors due to illegible handwriting, duplication of medication administration, and drug interactions that have the potential to harm patients. Along with the development of digital transformation in the healthcare sector, the implementation of e-prescribing has become a crucial component in the development of information technology-based hospitals that support faster, more accurate, and more integrated healthcare services.

Factors Influencing the Success of E-Prescribing Implementation

The success of e-prescribing implementation in hospitals is influenced by various interrelated factors. Technological factors include system quality, ease of use, access speed, software reliability, and integration with other hospital information systems. Furthermore, organizational factors such as management support, institutional policies, infrastructure availability, and funding also determine the sustainability of system implementation. Human resources also play a crucial role, encompassing user competence, adequate training, acceptance of new technology, and the readiness of healthcare workers to adapt to changing work processes. Equally important, external environmental factors such as government regulations, healthcare standards, and developments in information technology also influence the success of e-prescribing implementation in various healthcare facilities.

Previous Research Results Regarding the Implementation of E-Prescribing

Various previous studies have shown that the implementation of e-prescribing has a positive impact on improving the quality of healthcare services in hospitals. Some studies report a decrease in medication errors, increased efficiency in the prescribing process, accelerated pharmaceutical services, and increased satisfaction of healthcare workers and patients after the system is implemented. However, several studies also reveal that various obstacles remain in its implementation, such as system disruptions, limited information technology infrastructure, lack of user training, healthcare worker resistance to change, and suboptimal integration with electronic medical record systems. These differing research findings indicate

that the success of e-prescribing is not solely determined by the availability of technology, but also influenced by organizational readiness, quality of implementation, and support from all stakeholders within the hospital environment.

Problem Statement

Although e-prescribing has been recognized as a key innovation in improving patient safety and healthcare efficiency, its implementation in various hospitals still faces various challenges. Differences in success rates between hospitals indicate that not all institutions are able to maximize the system's benefits. Various factors such as technological readiness, user competence, organizational support, management policies, and regulatory aspects remain issues frequently identified in various studies. Furthermore, previous research indicates a variety of dominant factors influencing the success of e-prescribing implementation, thus preventing a comprehensive conclusion regarding the most influential factors. Therefore, a literature review that compiles, analyzes, and synthesizes various previous research findings is needed to identify the key factors determining the success of e-prescribing implementation in hospitals and provide a more comprehensive picture as a basis for future research and policy development.

3. Method

This study used a literature review method by collecting and analyzing various relevant literature sources regarding the implementation of electronic prescribing (e-prescribing) in hospitals. The literature search was conducted systematically through several electronic databases, namely Google Scholar, PubMed, and ScienceDirect, using keywords such as electronic prescribing, e-prescribing, medication error, Computerized Physician Order Entry (CPOE), electronic medication system, and hospital. The selected articles were published between 2015 and 2025 to ensure that the data used reflects the latest developments related to the implementation of e-prescribing in healthcare facilities. The entire search process was carried out based on predetermined inclusion and exclusion criteria to ensure that the literature obtained was in accordance with the research objectives.

The literature analysis process adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, encompassing identification, screening, selection, and inclusion, until 20 articles met the criteria for analysis. Data from each article was systematically extracted based on author identity, year of publication, research design, research objectives, and key findings. The extracted data were then synthesized using a narrative synthesis method with a thematic approach, grouping research findings into several key themes, such as individual factors, technological factors, organizational factors, and policy factors. This approach enabled researchers to compare, integrate, and interpret findings from previous studies to obtain a comprehensive picture of the factors influencing the successful implementation of e-prescribing in hospitals.

4. Results and Discussion

Concept and Definition of E-prescribing

Electronic prescribing (e-prescribing) is an information technology-based system that allows healthcare professionals to create, modify, and send prescriptions electronically to the pharmacy unit within an integrated system (Osmani et al., 2023). In practice, e-prescribing does not operate alone but is part of a broader system, namely an electronic medication system (EMS) or computerized physician order entry (CPOE), which is integrated with an electronic health record (EHR) to support data-driven clinical decision-making (Gates et al., 2021). This integration allows healthcare professionals to access comprehensive, real-

time patient information, including treatment history, drug allergies, and potential drug interactions relevant to the prescribing process (Cresswell et al., 2024).

Conceptually, e-prescribing serves not only as a digitalization tool for conventional prescriptions, but also as a complex sociotechnical system involving interactions between humans, technology, and organizations within a healthcare environment (Carayon et al., 2015). This sociotechnical approach emphasizes that the success of a system is determined not only by technological sophistication but also by how the system is integrated into clinical workflows and how users interact with it (Zheng et al., 2021). Therefore, e-prescribing must be understood as part of the digital transformation of healthcare services, which requires multidimensional adaptation (Kinlay et al., 2021).

Functionally, e-prescribing has several key components, including prescription input by physicians, electronic transmission to the pharmacy, and integration with a clinical decision support system (CDSS) (Alaboud et al., 2023). A CDSS is a critical component of e-prescribing because it can provide warnings regarding drug dosage, drug interactions, allergies, and contraindications based on patient clinical data (Alaboud et al., 2023). The presence of a CDSS has been shown to improve the quality of clinical decisions, although its effectiveness is heavily influenced by system design and user acceptance (Gates et al., 2021).

Furthermore, e-prescribing also improves the quality of clinical documentation through more systematic, structured, and easily traceable recording compared to manual prescriptions (Raban et al., 2025). This electronic documentation enables longitudinal data analysis and supports clinical audits and continuous improvement of healthcare services (Zheng et al., 2021). Thus, e-prescribing impacts not only operational aspects of care but also quality management and patient safety (Osmani et al., 2023).

However, the implementation of e-prescribing is also associated with the emergence of new types of errors not found in manual systems, known as technology-induced errors (Redwood et al., 2021). These errors can arise from less intuitive interface design, data input errors, and limitations in the representation of clinical information within the system (Koppel et al., 2015). Studies show that CPOE systems can indirectly facilitate errors if not designed with human factors engineering in mind (Koppel et al., 2015). Therefore, the development of e-prescribing must consider ergonomics, usability, and system security comprehensively (Carayon et al., 2015).

In the context of global implementation, e-prescribing has become a crucial part of the digital transformation of healthcare systems in various developed countries, with adoption rates continuing to increase alongside advances in health information technology (Zheng et al., 2021). However, variations in system design, policies, and organizational readiness lead to differences in implementation success rates across healthcare institutions (Kinlay et al., 2021). This demonstrates that e-prescribing is not simply a technological innovation but a complex intervention that requires a systemic approach to implementation (Gates et al., 2021).

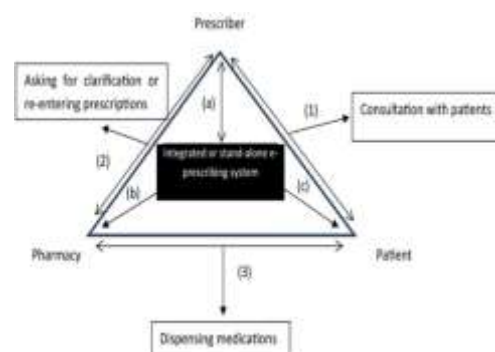


Figure 1. E-prescribing system model

Goals and Benefits of E-prescribing Implementation

The primary goal of implementing e-prescribing in the healthcare system is to improve patient safety by reducing medication errors, particularly at the prescribing stage, a critical point in the medication use process (Gates et al., 2021). This system is designed to address the limitations of manual prescription systems, which are prone to errors due to illegible handwriting, incomplete information, and lack of access to comprehensive patient clinical data (Franklin et al., 2017). Thus, e-prescribing serves as a systemic intervention aimed at improving accuracy, clarity, and safety in the medication prescribing process (Osmani et al., 2023).

In addition to improving patient safety, e-prescribing also aims to increase healthcare efficiency through the automation of the prescription process and integration with pharmacy systems (Zheng et al., 2021). Electronic prescription transmission reduces patient waiting times and speeds up the dispensing process in pharmacy settings (Franklin et al., 2017). This integration also reduces the need for manual communication between doctors and pharmacists, thereby minimizing the potential for miscommunication in prescription interpretation (Kinlay et al., 2021).

In terms of clinical benefits, various studies have shown that implementing e-prescribing can significantly reduce the number of prescribing errors compared to manual systems (Osmani et al., 2023). This reduction primarily occurs in administrative errors such as incomplete prescriptions, as well as clinical errors such as incorrect dosages and undetected drug interactions (Gates et al., 2021). Furthermore, the existence of a clinical decision support system (CDSS) in e-prescribing allows early detection of potential drug interactions, allergies, and contraindications, thereby improving the quality of clinical decision-making by medical personnel (Alaboud et al., 2023).

Another benefit of e-prescribing is improved quality of clinical documentation, which is more structured and systematic compared to manual systems (Raban et al., 2025). Electronic documentation allows for complete, consistent, and easily traceable data recording, thus supporting clinical audit processes and evaluation of healthcare quality (Zheng et al., 2021). Furthermore, data stored in the system can be used for epidemiological analysis, drug use monitoring, and data-driven decision-making within the healthcare system (Zheng et al., 2021).

E-prescribing also offers benefits in improving coordination and communication between healthcare professionals, particularly physicians and pharmacists (Hogan-Murphy et al., 2015). The integrated system enables real-time information exchange, simplifying prescription clarification and enhancing interprofessional collaboration in patient care (Kinlay et al., 2021). This is particularly important in the context of modern healthcare, which emphasizes a team approach in patient therapy management (Vaghasiya et al., 2021).

From an organizational perspective, implementing e-prescribing can improve hospital operational efficiency by reducing paper use, increasing healthcare worker productivity, and optimizing service workflows (Zheng et al., 2021). Furthermore, this system can also reduce costs associated with medication errors, including additional treatment costs due to preventable adverse drug events (Gates et al., 2021). Thus, e-prescribing provides not only clinical benefits but also economic benefits for healthcare institutions (Osmani et al., 2023).

However, the benefits of e-prescribing implementation are not always optimal and are highly dependent on system quality and user adoption (Vaghasiya et al., 2021). Studies show that poorly designed systems that do not meet user needs can reduce effectiveness and even potentially create new risks in healthcare (Koppel et al., 2015). Furthermore, the phenomenon of alert fatigue resulting from excessive alerts from

CDSS systems can cause healthcare workers to ignore important warnings, thus reducing the system's benefits in improving patient safety (Agency for Healthcare Research and Quality, 2019).

History and Development of E-prescribing in Indonesia

The development of e-prescribing in Indonesia is inseparable from the digital transformation of the healthcare system, which has been gradually implemented through the development of health information systems and electronic medical records (EMR) (Minister of Health of the Republic of Indonesia, 2022). Initially, the use of information technology in healthcare facilities focused on hospital administration and management systems, such as the Hospital Management Information System (SIMRS), before evolving into the digitalization of clinical services, including drug prescribing (Zheng et al., 2021). This transformation demonstrates a paradigm shift from manual systems to integrated digital systems in healthcare (Kinlay et al., 2021).

With the growing need for patient safety and service efficiency, e-prescribing has begun to be adopted as part of a more comprehensive electronic medical record system (Osmani et al., 2023). Initial implementation of e-prescribing in Indonesia was generally partial and limited to certain hospitals with better technological infrastructure (Baysari et al., 2016). During this phase, key challenges included limited resources, a lack of system standards, and poor interoperability between health information systems (Zheng et al., 2021).

Significant progress in the implementation of e-prescribing in Indonesia has begun to emerge with the issuance of a national policy promoting the digitalization of healthcare services, specifically through Regulation of the Minister of Health of the Republic of Indonesia Number 24 of 2022 concerning Medical Records (Minister of Health of the Republic of Indonesia, 2022). This regulation requires all healthcare facilities to maintain integrated electronic medical records, including electronic drug prescribing as part of clinical services (Minister of Health of the Republic of Indonesia, 2022). This policy provides a strong legal basis for accelerating the adoption of e-prescribing across healthcare facilities in Indonesia (Ministry of Health of the Republic of Indonesia, 2023).

Furthermore, the Indonesian government is also developing the national SATUSEHAT platform as an effort to improve health data interoperability between healthcare facilities (Ministry of Health of the Republic of Indonesia, 2023). This platform adopts the international HL7 FHIR standard, enabling structured and integrated health data exchange, including drug prescription data (Ministry of Health of the Republic of Indonesia, 2023). With SATUSEHAT, e-prescribing implementation functions not only at the hospital level but also becomes part of an integrated national health data ecosystem (Zheng et al., 2021).

Despite the development of policies and infrastructure, the implementation of e-prescribing in Indonesia still faces various multidimensional challenges (Baysari et al., 2016). These challenges include limited technological infrastructure in some healthcare facilities, varying levels of human resource readiness, and differences in information systems used across institutions (Vaghasiya et al., 2021). Furthermore, suboptimal system integration and a lack of standardization in implementation also hinder effective interoperability (Zheng et al., 2021).

On the other hand, the development of e-prescribing in Indonesia is also influenced by the increasing demands for improved healthcare quality and patient safety (Osmani et al., 2023). Hospitals, as referral healthcare facilities, are required to implement systems that minimize medication errors and increase service efficiency (Gates et al., 2021). Therefore, e-prescribing is a crucial indicator in hospitals' digital transformation toward technology-based healthcare (Kinlay et al., 2021).

Overall, the development of e-prescribing in Indonesia shows significant progress, but still requires optimization efforts in various aspects to achieve effective and sustainable implementation (Zheng et al.,

2021). Integration between policy, technology, and human resources is key to supporting the successful implementation of this system in improving the quality of healthcare services (Vaghasiya et al., 2021).

Factors that Influence

Success of E-prescribing Implementation

The successful implementation of e-prescribing is a complex process and is influenced by various Multidimensional factors interact with each other in the healthcare system (Zheng et al., 2021). A widely used approach to analyzing the implementation of health information systems is the sociotechnical approach, which emphasizes the interaction between humans, technology, and organizations as a unified system (Carayon et al., 2015). In the context of e-prescribing, these factors can generally be classified into individual, technological, organizational, and policy factors, which collectively determine the effectiveness and success of system implementation (Kinlay et al., 2021).

a. Individual Factors (Human Factors)

Individual factors are a key determinant of the success of e-prescribing implementation because this system relies heavily on direct interaction with users, particularly medical personnel such as doctors and pharmacists (Mogharbel et al., 2021). Users' knowledge, skills, and experience in using health information systems significantly influence the level of adoption and optimal use of the system (Mogharbel et al., 2021). Users with good digital literacy tend to adapt more easily to e-prescribing systems than users less familiar with technology (Zheng et al., 2021).

In addition, user attitudes and perceptions of the system are also important factors influencing implementation success (Hogan-Murphy et al., 2015). The perception that e-prescribing can improve patient safety and work efficiency will encourage system acceptance, while negative perceptions such as the belief that the system slows down work can be a barrier to adoption (Hogan-Murphy et al., 2015). Resistance to change is a phenomenon common issues that often occur in the implementation of new technologies in clinical settings (Vaghasiya et al., 2021).

Another equally important factor is the availability of training and technical support for users (Mogharbel et al., 2021). Lack of adequate training can lead to system errors and reduce user confidence in the e-prescribing system (Vaghasiya et al., 2021). Therefore, ongoing training programs tailored to user needs are key to improving system competency and acceptance (Mogharbel et al., 2021).

b. Technology Factors (System & Design Factors)

Technological factors relate to the quality of the e-prescribing system itself, including aspects of design, performance, and functionality (Alaboud et al., 2023). A system with an intuitive and easy-to-use user interface will increase user comfort and reduce the risk of operational errors. Conversely, a complex and unfriendly system can increase users' cognitive load and potentially lead to prescribing errors (Koppel et al., 2015).

System speed and stability are also critical factors in the successful implementation of e-prescribing (Zheng et al., 2021). System disruptions such as downtime, slow system response, and integration failures can hinder clinical workflow and reduce user confidence in the system (Kinlay et al., 2021). Therefore, system reliability and availability must be prioritized in the development and implementation of e-prescribing (Gates et al., 2021).

Furthermore, the existence of a clinical decision support system (CDSS) is a crucial component in improving the safety of medication use (Alaboud et al., 2023). CDSS can provide warnings regarding drug interactions, incorrect dosages, and patient allergies, thus assisting healthcare professionals in clinical decision-making

(Alaboud et al., 2023). However, if not well-designed, these systems can lead to alert fatigue, a condition where users ignore warnings due to excessive notifications (Agency for Healthcare Research and Quality, 2019). This suggests that the quality of system design significantly determines the effectiveness of e-prescribing (Gates et al., 2021).

c. Factor Organization (Organizational Factors)

Organizational factors encompass various aspects related to an institution's readiness to implement e-prescribing, including management support, organizational culture, and resource availability (Vaghasiya et al., 2021). Support from top management is crucial in providing the necessary resources and creating a supportive environment for system implementation (Baysari et al., 2016). Without strong management support, e-prescribing implementation tends to encounter obstacles in various aspects (Vaghasiya et al., 2021).

Technological infrastructure readiness, such as the availability of computers, internet connections, and integration with other systems, is also a determining factor for success (Zheng et al., 2021). Infrastructure limitations can hinder system use and reduce service efficiency (Hogan-Murphy et al., 2015). Furthermore, an appropriate implementation strategy, including go-live planning, user training, and ongoing evaluation, is essential to ensure successful implementation (Vaghasiya et al., 2021).

Workflow changes are also a challenge in implementing e-prescribing (Hogan-Murphy et al., 2015). New systems often change healthcare workers' work patterns, requiring adaptation, which is not always easy (Kinlay et al., 2021). Therefore, it is important to involve users in the system design and implementation process to ensure the system is aligned with clinical needs (Carayon et al., 2015).

d. Policy and Regulatory Factors

Policy and regulatory factors play a crucial role in encouraging the widespread and standardized implementation of e-prescribing (Baysari et al., 2016). In Indonesia, the policy, through Minister of Health Regulation No. 24 of 2022 concerning Medical Records, serves as the legal basis for implementing electronic medical record systems, including e-prescribing (Minister of Health of the Republic of Indonesia, 2022). This regulation requires healthcare facilities to implement integrated electronic systems in clinical services (Minister of Health of the Republic of Indonesia, 2022).

Furthermore, national policy, through the SATUSEHAT platform, encourages interoperability of health data between healthcare facilities using the HL7 FHIR standard (Ministry of Health of the Republic of Indonesia, 2023). This standardization is crucial to ensure secure, accurate, and efficient data exchange within the national healthcare system (Ministry of Health of the Republic of Indonesia, 2023). This policy also places regulatory pressure on hospitals to rapidly adopt digital systems, including e-prescribing (Zheng et al., 2021).

However, policy implementation also requires technical and operational readiness at the healthcare facility level (Vaghasiya et al., 2021). Mismatches between policies and field conditions can hinder system implementation (Baysari et al., 2016). Therefore, synchronization between policies, organizational readiness, and human resource capacity is necessary to optimally support e-prescribing implementation (Zheng et al., 2021).

Barriers to E-prescribing Implementation

Although e-prescribing has numerous benefits in improving patient safety and healthcare efficiency, its implementation is not without complex and multidimensional barriers (Cresswell et al., 2024). These barriers can arise at various system levels, from individuals, technology, organizations, to policies, all of

which can impact the effectiveness and success of e-prescribing implementation in hospitals (Zheng et al., 2021).

One of the main barriers to implementing e-prescribing is limited technological infrastructure, particularly in healthcare facilities with limited resources (Vaghasiya et al., 2021). These limitations include the lack of hardware availability such as computers, unstable internet connections, and systems that are not yet optimally integrated (Hogan-Murphy et al., 2015). These conditions can hinder optimal system use and reduce the efficiency of healthcare services (Zheng et al., 2021).

Furthermore, human resource factors are also a significant barrier to e-prescribing implementation (Mogharbel et al., 2021). Lack of adequate training, low digital literacy, and resistance to work system changes are factors frequently reported in various studies (Mogharbel et al., 2021). Healthcare workers accustomed to manual systems tend to have difficulty adapting to electronic systems, which can reduce the rate of system adoption and use (Vaghasiya et al., 2021).

Another frequently encountered obstacle relates to the design and quality of the e-prescribing system itself. Systems that are not user-friendly, have complex interfaces, and are not aligned with clinical workflows can increase user cognitive load and potentially lead to prescribing errors (Koppel et al., 2015). Furthermore, technical issues such as downtime, delayed system response, and failed integration with other systems are also inhibiting implementation (Kinlay et al., 2021).

One of the key issues in the use of e-prescribing is the emergence of alert fatigue, a condition where healthcare professionals ignore system alerts due to excessive notifications (Agency for Healthcare Research and Quality, 2019). Although clinical decision support systems (CDSS) are designed to improve patient safety, excessive exposure to alerts can actually decrease system effectiveness and increase the risk of clinical errors (Alaboud et al., 2023). This suggests that the quality of system design significantly influences the success of e-prescribing implementation (Gates et al., 2021).

In addition to technical challenges, the implementation of e-prescribing can also lead to significant changes in healthcare worker workflows (Hogan-Murphy et al., 2015). These changes often impact communication patterns between healthcare professionals, particularly between doctors and pharmacists, shifting from face-to-face communication to electronic systems (Kinlay et al., 2021). In some cases, these changes can lead to reduced interpersonal communication, potentially increasing the risk of clinical miscommunication (Cresswell et al., 2024).

The implementation of e-prescribing is also associated with the emergence of technology-induced errors, errors that occur due to the interaction between humans and technological systems (Redwood et al., 2021). These errors can include data input errors, medication selection errors within the system, and errors resulting from unclear information displays (Koppel et al., 2015). This phenomenon suggests that digitalization does not completely eliminate the risk of errors, but it can change the types of errors that occur (Kinlay et al., 2021).

From an organizational perspective, lack of management support, limited resources, and a lack of thorough implementation planning are also obstacles to the success of e-prescribing (Vaghasiya et al., 2021). System implementation without adequate preparation, including user training and system evaluation, can lead to failure in system adoption (Baysari et al., 2016). Therefore, comprehensive planning and strong organizational support are essential for e-prescribing implementation (Zheng et al., 2021).

At the policy level, although regulations support the implementation of e-prescribing, challenges remain in its implementation in the field (Ministry of Health of the Republic of Indonesia, 2023). Differences in readiness levels between healthcare facilities and limitations in implementing interoperability standards

hinder national system integration (Ministry of Health of the Republic of Indonesia, 2022). This demonstrates that policy implementation requires adequate technical and operational support for its effective implementation (Zheng et al., 2021).

5. Conclusion

The implementation of electronic prescribing (e-prescribing) is a crucial innovation in the digital transformation of healthcare services, significantly contributing to improving the quality of hospital services. This system has been proven to improve patient safety by reducing the risk of medication errors, particularly at the prescribing stage, through the presentation of more accurate, well-documented, and easily accessible information for healthcare professionals. In addition to providing clinical benefits, e-prescribing also supports operational efficiency, accelerates pharmaceutical care processes, improves the quality of medical documentation, and strengthens coordination between physicians, pharmacists, and other healthcare professionals. However, the success of this system's implementation is not solely determined by technological sophistication but is also influenced by various interrelated factors, including individual, technological, organizational, and policy aspects.

Various studies have shown that the implementation of e-prescribing still faces several challenges that can hinder the achievement of optimal benefits. These obstacles include limited information technology infrastructure, user resistance to change, lack of training and human resource competency, system design that does not fully meet user needs, and suboptimal integration with other hospital information systems and inadequate regulatory support. Therefore, the successful implementation of e-prescribing requires a comprehensive and sustainable approach through increasing user capacity, improving system quality, strengthening organizational commitment and support, and harmonizing policies that support the digital transformation of healthcare services. With the synergy of these various aspects, e-prescribing implementation is expected to run optimally and sustainably, thus providing a tangible impact on improving patient safety, service efficiency, and the quality of healthcare services in hospitals.

6. Reference

- Agency for Healthcare Research and Quality. (2019). Alert fatigue. Patient Safety Network (PSNet).
- Alaboud, N., Jani, Y., & Franklin, B. D. (2023). The impact of electronic prescribing system factors on prescribing decision making: A systematic review and narrative synthesis. *International Journal of Pharmacy Practice*, 31(Supplement_2), ii3–ii4.
- Baysari, M. T., Richardson, L., Zheng, W. Y., & Westbrook, J. I. (2016). Implementation of electronic medication management systems in hospitals: A literature scan. Australian Commission on Safety and Quality in Health Care.
- Carayon, P., Wetterneck, T. B., Hundt, A. S., Ozkaynak, M., DeSilvey, J., Ludwig, B., Ross, J., & Aarts, J. (2015). Performance obstacles and facilitators of hospital work systems: A human factors systems approach. *Joint Commission Journal on Quality and Patient Safety*, 41(4), 165–176.
- Cresswell, K., Hinder, S., Sheikh, A., Watson, N., Price, D., Heed, A., Pontefract, S. K., Coleman, J., Beggs, J., Chuter, A., Slee, A., & Williams, R. (2024). Complex hospital-based electronic prescribing intervention to support antimicrobial stewardship: A qualitative study. *JMIR Formative Research*, 8, e54458.
- Franklin, B. D., O'Grady, K., Donyai, P., Jacklin, A., & Barber, N. (2017). The impact of a closed-loop electronic prescribing and administration system on prescribing errors. *Quality and Safety in Health Care*, 16(4), 279–284.
- Gates, P. J., Hardie, R.-A., Raban, M. Z., Li, L., & Westbrook, J. I. (2021). How effective are electronic medication systems in reducing medication error rates and associated harm among hospital

- inpatients? A systematic review and meta-analysis. *Journal of the American Medical Informatics Association*, 28(1), 167–177.
- Hogan-Murphy, D., Tonna, A., Strath, A., & Cunningham, S. (2015). Healthcare professionals' perceptions of facilitators and barriers to implementing electronic prescribing systems in hospitals: A systematic review. *European Journal of Hospital Pharmacy*, 22(6), 358–365.
- Kementerian Kesehatan Republik Indonesia. (2023). Surat Edaran Nomor HK.02.02/D/7093/2023 tentang Penyelenggaraan Rekam Medis Elektronik yang Terintegrasi dengan Platform SATUSEHAT.
- Kim, E. D., Kuan, K. K. Y., Vaghasiya, M. R., Gunja, N., & Poon, S. K. (2024). A repeated cross-sectional study on the implementation of electronic medication management system. *Information Technology and Management*, 25, 33–50.
- Kinlay, M., Zheng, W. Y., Burke, R., Juraskova, I., Moles, R., & Baysari, M. T. (2021). Medication errors related to computerized provider order entry systems and how they change over time: A narrative review. *Research in Social and Administrative Pharmacy*, 17(9), 1546–1552.
- Koppel, R., Metlay, J. P., Cohen, A., Abaluck, B., Localio, A. R., Kimmel, S. E., & Strom, B. L. (2015). Role of computerized physician order entry systems in facilitating medication errors. *JAMA*, 293(10), 1197–1203.
- Menteri Kesehatan Republik Indonesia. (2022). Peraturan Menteri Kesehatan Republik Indonesia Nomor 24 Tahun 2022 tentang Rekam Medis.
- Mogharbel, A., Dowding, D., & Ainsworth, J. (2021). Physicians' use of the computerized physician order entry system for medication prescribing: Systematic review. *JMIR Medical Informatics*, 9(3), e22923.
- Osmani, F., Arab-Zozani, M., Shahali, Z., & Lotfi, F. (2023). Evaluation of the effectiveness of electronic prescription in reducing medical and medication errors: A systematic review study. *Annales Pharmaceutiques Françaises*, 81(4), 433–445.
- Raban, M. Z., Fitzpatrick, E., Merchant, A., Rahman, B., Badgery-Parker, T., Li, L., Baysari, M. T., Barclay, P., Dickinson, M., Mumford, V., & Westbrook, J. I. (2025). Longitudinal study of technology-related prescribing errors in pediatrics. *Journal of the American Medical Informatics Association*, 32(1), 105–112.
- Redwood, S., Rajakumar, A., Hodson, J., & Coleman, J. J. (2021). Does the implementation of an electronic prescribing system create unintended medication errors? A study of the sociotechnical context through the analysis of reported medication incidents. *BMC Medical Informatics and Decision Making*, 21, 29.
- Vaghasiya, M. R., Penm, J., Kuan, K. K. Y., Gunja, N., Liu, Y., Kim, E. D., Petrina, N., & Poon, S. (2021). Implementation of an electronic medication management system in a large tertiary hospital: A qualitative study. *BMC Medical Informatics and Decision Making*, 21, 226.
- World Health Organization. (2023). Medication without harm: Policy brief. World Health Organization.
- Zheng, W. Y., Richardson, L. C., Baysari, M. T., & Westbrook, J. I. (2021). Electronic medication management systems: Key lessons from implementation and ongoing use. *Australian Health Review*, 45(3), 307–315.