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Evaluation of Medical Record Digitalization in Outpatient Registration: A Case Study of Diponegoro National Hospital, Indonesia

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Abstract

Digitization refers to the process of converting paper-based medical records into electronic format. At Diponegoro National Hospital (RSND), implementation continues to face challenges, as some documents remain in manual format. This study employed descriptive qualitative research. This research was conducted through interviews and observations of outpatient registration staff and digitalization staff who digitized electronic outpatient documents. Observations regarding the age characteristics of staff within the productive age group revealed that 4 respondents (3 men and 1 woman) had worked for 1 year and 5 years, respectively, and had never received training on the digitization of electronic medical records. The staff learned about this by being taught by a third party until they understood how to use the system. The system used is the RSND Electronic Medical Record, but some users have not yet understood the application's contents. In-depth statistical analysis of the relationship between outpatient staff knowledge and the implementation of electronic document digitization was not conducted in this study. Strengthening staff competency through structured training and the development of standard operating procedures is crucial to optimizing EMR digitization at RSND.

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Introduction

General hospitals, as defined by the Decree of the Minister of Health of the Republic of Indonesia No. 983/Menkes/SK/XI/1992, are healthcare facilities that provide basic, specialist, and subspecialist services. As a complex healthcare institution with various services, educational, and research fuctions, hospitals employ numerous experts and require substantial investment. To carry out their roles professionally, hospitals must establish a continuous quality improvement system(Asgiani et al., 2024) and implement Electronic Medical Records (EMR) in accordance with government regulations(Kementerian Kesehatan RI, 2022).

Medical records are essential documents containing information about patient identity, anamnesis, physical examinations, laboratory results, diagnoses, and medical procedures performed (Izza & Lailiyah, 2024).These records can be maintained manually or electronically, with EMR systems specifically designed to support the management of medical record data. EMRs not only serve as documentation but also encompass service processes and the storage of documents necessary for patient care and other purposes. Regulation No. 24 of 2022, issued by the Minister of Health, stipulates provisions on ownership, content, security, and protection of electronic medical records, underscoring the critical role of EMRs in healthcare systems.

The implementation of EMRs in several hospitals indicates that although such systems have been introduced to improve information recording, only a small proportion have successfully optimized their use (Khasanah, 2020).This process faces numerous challenges, including infrastructure limitations, human resource shortages, inadequate regulations, and high costs and time requirements.

At Diponegoro National Hospital, Semarang, electronic medical record digitization has been underway since 2023, particularly in the outpatient registration clinic. However, despite adequate infrastructure, some documents still need to be printed, and limited human resources in the registration unit hinder optimal medical record management. A gap emerged: limited literature on the implementation of EMR digitization in the outpatient registration unit, especially in national hospitals. Therefore, this study aims to examine the implementation of medical record digitization to support EMR applications in the outpatient clinic at Diponegoro National Hospital, Semarang, in 2025.

Methods

This study was conducted from November to May 2025. It employed a descriptive quantitative research design with the aim of providing a comprehensive overview of the conditions encountered in the field related to the implementation of electronic document digitization in the outpatient registration unit of Diponegoro National Hospital, Semarang, in 2025.

The data were collected through interviews involving one head of medical records as triangulation/verification, one digitization officer as the primary informant, and two outpatient registration officers as key informants. The research instruments included direct observation and interviews. Qualitative data obtained from the interviews were analyzed using content analysis.

This research has received approval from the ethics committee, involving several officers in the medical records unit as research respondents.

Results

This study aims to review the implementation of digitization of electronic medical records in the outpatient registration unit of the Diponegoro National Hospital (RSND) Semarang in 2025. The results of data analysis were obtained from interviews and observations of four informants consisting of the head of the medical record unit and three registration officers. The analysis is presented based on the main themes, namely:

Characteristics of Human Resources

The characteristics of the registration officers show that all informants are in the productive age range, which is 24 to 33 years old. There are three men and one woman with a background in DIII education to the medical profession. Their tenure varies from less than 1 year to 9 years. The observation results showed that the officers had never participated in in-depth technical training on the digitalization system, so their understanding of the RSND EMR system was more obtained through informal socialization from third parties or vendors.

Facilities

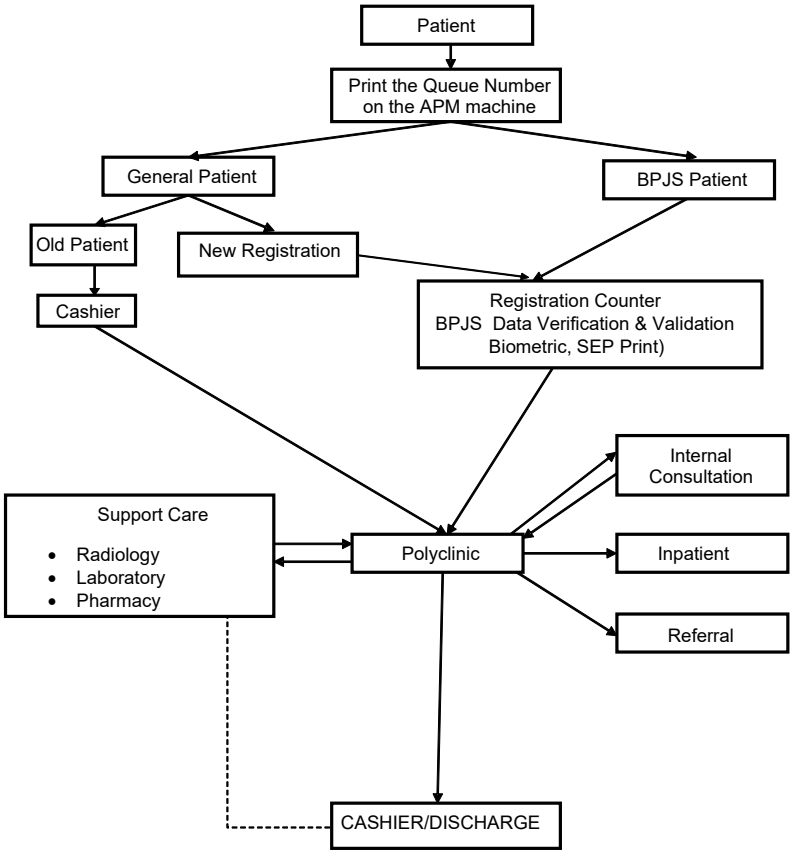
The facilities used in the digitization process are sufficient even though some equipment such as scanners and servers experience technical problems. The observation noted the use of three computer units with Windows 10 and 11 operating systems, as well as three scanner units of various brands. There are also office stationery, printed forms (such as SEP and informed consent), main server, and backup server. Although the facilities were adequate, some units experienced technical problems such as system disruptions and device malfunctions, which required intervention from the IT team.

Table 1. Means of Digitizing Medical Record Documents

Facilities	Total	Information
Computer	3	Windows 10, Windows 11
Scan	3	ScanSnap s1300i, brother ADS-1100W, Epson L3210
Stationery	± 2	Pen and St
Server	1	Data is behind outpatient enrollment
Form	3	Social data, informed consent, SEP (Participant Eligibility Letter)
Server backup	1	The data is in the IT room

Digitalization implementation flow

The flow of digitalization implementation has not been officially written. The officer runs the workflow based on the boss's verbal instructions and field experience. Based on the results of observations, there is no definite flow related to the electronic medical record form. Officers have been seeing the results through the SATUSEHAT system created by the health government and direct orders from superiors.



Source :**Diponegoro National Hospital, Semarang**

Figure 1. Hospital Outpatient Service Flow

Digitization System

The system used in digitization is the RSND EMR, which is developed by a third party. This system is equipped with document upload and CPPT features, but its use is still felt difficult by some officers. Understanding of system elements is obtained gradually, thus hindering performance optimization. Although trials and socialization have been carried out, there has been no comprehensive systematic training. However, some officers still have difficulty understanding the features of the system, so further training is needed to improve user competence.

Obstacles faced

The main obstacles in the implementation of digitalization consist of limited human resources, system disruptions (software errors, bugs), hardware limitations (damaged scanners or printers), and network instability. In addition, power outages and server downs are also quite significant obstacles. Officers relied on two network providers, but when a disruption occurred at the Undip management center, the entire system was affected.

These findings are in line with previous studies that stated that digitizing medical records requires full support from the aspects of human resources, facilities, SOPs, and network infrastructure. However, RSND is currently still in the transition stage, which causes the implementation of digitalization to not run optimally overall.

Discussion

The implementation of digitization of medical record documents in the outpatient registration unit of Diponegoro National Hospital Semarang shows complex dynamics, reflecting the challenges in the transformation of health information systems. Based on the results of the research, there are five main aspects that are the focus of the discussion, namely the characteristics of human resources, supporting facilities, implementation flows, systems used, and obstacles faced.

Human Resources Characteristics

The characteristics of the officers show that the majority are in productive age with a suitable educational background(Meianti et al., 2018).However, the lack of regular technical training causes the understanding of the RSND EMR system to be limited. This is in line with the findings, which emphasize the importance of training in increasing the readiness of health workers for digital systems.

Facilities

Digitalization supporting facilities have been adequately available, including computers, scanners, servers, and stationery. Nonetheless, some devices experience technical glitches such as system errors and scanner crashes. This complements the findings of previous research that stated that many hospitals still face limitations in digitalization tools. This condition reinforces the fact that the limitations of the tool are a common obstacle in the implementation of electronic medical records(Khasanah, 2020).

Digitalization Implementation Flow

The flow of digitalization implementation has not been supported by structured standard operating procedures. Officers run processes based on verbal instructions and personal experience, which has the potential to lead to inconsistencies in execution. The digitization process only includes patient documents since 2020, while previous documents are still stored in physical form. This shows the need for a formal policy to transfer old archival media(Nurcahyati et al., 2021).

Digitization System

The RSND EMR system used is a product of an external vendor and has gone through the socialization stage. However, some officers still have difficulty understanding the features of the system. Self-paced learning is a temporary solution, but structured training is still needed to improve the effectiveness of the system's use. This research supports the view that user acceptance of the system is strongly influenced by adequate understanding and training(Octaviasuni & Wulan, 2022).

Constraints

Obstacles in the implementation of digitalization are divided into two categories, namely technical and non-technical. Technical issues include network outages, hardware breakdowns, and system bugs. Meanwhile, non-technical obstacles include limited human resources and the absence of internal policies that support the overall digitalization process. A comprehensive mitigation strategy is needed to address these barriers and support the sustainability of the implementation of electronic medical records(Septiana & Santoso, 2021).

Overall, the implementation of digitization of medical record documents at Semarang Hospital has shown progress, but it still needs to be strengthened in terms of policies, training, workflow redesign, patient safety and technological infrastructure. This research makes an important contribution in understanding the actual conditions in the field and is the basis for the development of a more effective and sustainable health information system.

Conclusion

Based on the overall research results, the intrinsic factors met the standards, but some paper-based DMRs were still found due to documents requiring direct signatures from patient staff and some documents in the form of electronic medical records stored through the RSND electronic medical record system. Digitization officers only received guidance at the launch of the RSND EMR application, after which they

were left to their own devices to understand the hospital's needs. Officers must receive regular training on the use of the RSND EMR application and how to use electronic medical records.

The hospital recommends reorganizing the filing room, which already has several electronic medical record documents. Retention SOPs must continue to be implemented. Staff training on managing electronic documents in the RSND EMR system is essential to ensure they understand how to handle electronic documents.

Author Contributions

This research has been conducted based on collaboration among all authors. Author IIS designed the study and wrote a draft article. Authors IIS and MTA had written article protocols, managed and conducted research analyzes. Authors IIS, EJK and WRW managed literature searches. All authors read and agreed to the final draft of the article.

Institutional Review Board Statement

As per international standard or university standard guideline participant consent and ethical approval has been collected and preserved by the authors.

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Conflicts of Interest:

All authors declare that there is no conflict of interest in the product manufacturer because we do not intend to use this product as a way for any litigation, but for the advancement of knowledge. This research was not funded by a producing company but was funded by the personal effort of the author.

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