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Research and Evidence on Knowledge in Administration and Management — Medical Electronic Data and Information Systems

Implementation of Physical Medical Record Storage System as the Basis for Integration with the Electronic Medical Record System (RME)

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ABSTRACT

In the digitalization era, transforming Hospital Information Systems presents challenges in managing physical medical records, including limited digital infrastructure, unprepared human resources, and difficulties integrating manual systems with digital technologies. These challenges pose risks to data accuracy, accessibility, and patient safety during the shift toward more efficient and secure digital systems. Purpose: This study aims to evaluate the storage and management system of physical medical records amid the digitalization process and identify barriers and potential integration with digital systems. Method: A qualitative approach was used through a case study in a regional public hospital. Data were collected via in-depth interviews, observations, and document analysis. Results: Findings indicate that hospitals still rely on physical medical records due to limited infrastructure, cybersecurity concerns, and insufficient staff training. About 65% of respondents identified patient data protection as a major issue, while limited training reduced the effectiveness of electronic system implementation. Implications: The findings emphasize the need to strengthen IT capacity and provide ongoing staff training, supported by budgets for infrastructure and skill development. Conclusion: Although digitalization is inevitable, physical medical records remain essential during the transition. Integration can be achieved through hybrid systems using technologies such as barcode scanning to enhance data accuracy, efficiency, and security.

Keywords : *Physical Medical Records, Digitization, Filling*

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INTRODUCTION

Medical record management is a crucial element in the health care system because it serves as a source of administrative, medical, legal, and financial information related to patients (Selvia & Sulistiadi, 2019). The medical record maintains a comprehensive and continuous medical history of the patient, which is the basis for medical decision-making, evaluation of actions, as well as the preparation of reports and research (Ikawati, 2024). Therefore, the quality of Health Services is highly dependent on the accuracy, completeness, and availability of medical records that are managed efficiently, by following the principles of order, security, and confidentiality in accordance with applicable laws and regulations (the Digitization of Medical Records, 2016).

In the midst of the digitization era, transformation in medical record management is a great challenge and opportunity for hospitals. Along with efforts to improve efficiency, data accuracy, and patient treatment outcomes, digital technologies are increasingly replacing the once-vital physical medical records in medical documentation and clinical decisions (Scott et al., 2016). While the benefits of digitization are significant, including reducing medical errors and speeding up hospital operations, the transition to digital systems presents a number of challenges, such as legal compliance, data security, and infrastructure and technology readiness (Andayani, 2024; Honavar, 2020). The integration of electronic medical record (RME) systems with traditional record filling systems requires careful evaluation to ensure patient safety, data confidentiality, and hospital accreditation compliance (Global Health Science Group, 2024).

To support this transformation, the government of Indonesia through Permenkes No. 24 of 2022 requires the implementation of electronic medical records (RME) in all health facilities by the end of December 2023 (Suci Ariani et al., 2023). The purpose of this digitization is to improve the efficiency of services, ensure the security of patient data, and accelerate the exchange of medical information between health facilities. However, Ministry of Health data shows that until mid-2023, only about 50% of hospitals already have an adequate RME system, and only a small percentage have managed to implement it effectively and sustainably (Tanjungpinang Polytechnic, 2023).

Although digitization has become a national policy direction, many hospitals in Indonesia still rely on physical medical record management systems due to various constraints, such as limited technological infrastructure, limited budgets, and lack of human resource training (Lestari & Nugroho, 2023). This resulted in the storage of medical records in paper form still dominates, which hinders the efficiency and speed of medical services. In addition, manual systems are prone to human error and non-standardized procedures, and cannot support data integration between health facility units (Scott et al., 2016). Other problems include limited storage space, disorganized file storage, and the risk of document loss or damage due to age or disasters, all of which worsen hospital operational efficiency (Selvia & Sulistiadi, 2019). Furthermore, poor archive management can degrade the quality of Health Information and lead to clinical errors if information is not available when needed (Ikawati, 2024).

Various challenges related to the transition to digital systems are found in a study by Lestari and Nugroho (2023), which shows budget constraints, lack of experts in the field of Information Technology, and low digital literacy among medical personnel. The work culture accustomed to manual systems has also slowed down the adoption of digital systems, so even though digitization is promoted nationally, physical medical records remain an important part of hospital services, especially in regional health care facilities (Honavar, 2020).Research at the Medan Madani Regional General Hospital (2022) found that physical medical record storage rooms do not meet ergonomic standards, with high temperatures, poor lighting, and narrow storage shelves, which slow down the work process and increase the risk of accidents (Suci Ariani et al., 2023). Something similar was found in Lebak Mission Hospital, Banten, where the storage room structure is not in accordance with the rules of good medical record management.

In developed countries, such as South Korea, Japan, and Singapore, the implementation of electronic medical record (EMR) systems is proven to increase efficiency, reduce patient waiting time, and minimize medical errors, which shows the importance of digital transition for hospitals in Indonesia (Scott et al., 2016). The success of this digital transition relies fundamentally on robust infrastructure, effective management, and comprehensive Human Resources (HR) training.

Along with this development, it is very important to conduct an in-depth study of the condition of the management of physical medical records in Indonesian hospitals during the transition to digitization. This study aims to provide an overview of technical and non-technical challenges and strategic recommendations related to the integration of physical and digital systems to ensure the continuity of effective and efficient services during the digital transition process (Lestari & Nugroho, 2023).

METHODS

This study uses a descriptive qualitative approach with a case study method to gain an in-depth understanding of the practice of storing and managing physical medical records in the era of digitization. The location of the study was conducted at the Rasidin Padang Regional General Hospital in June-July 2015 site selection was done deliberately, considering that the hospital is in the process of transitioning to the implementation of electronic medical records. The focus of the research is directed to the physical condition of storage space, filing system, standard operating procedures (SOP), as well as the obstacles faced by medical records officers in their daily activities.

Data collection techniques were conducted through in-depth interviews with key informants as many as 5 people consisting of the head of the medical record installation, 3 filing officers, and hospital management staff. In addition, direct observation of the activities in the medical record storage room to observe the layout, workflow, and condition of the facilities and infrastructure used. Documentation is also carried out on sops, physical archives, and related internal regulations. The data obtained were analyzed using data reduction, data presentation, and inference techniques, according to Miles and Huberman models. The validity of the data is maintained through the

triangulation technique of sources and methods, in order to ensure the reliability and credibility of the research results.

RESULTS

Table 1. Main Findings of Research on Physical Medical Record Storage Unit

Aspects studied	Findings
Storage room conditions	Narrow room, poor air circulation, insufficient lighting
Storage system (filing)	Uses a direct numerical system; misfiles often occur
Facilities and infrastructure	Shelves are too high (≥2.5 meters), the distance between the shelves is narrow (±60 cm)
Medical record management SOP	There are, but not yet fully run by all officers
Officer competence	Most have not received training on RME and filing management
Main obstacles	Limited human resources, document overload, no integration with digital systems
Digitization efforts	Only limited to electronic filing for new patients; not yet comprehensive

Based on the results of research conducted in the medical records unit of a regional public hospital, it was found that the condition of the physical medical record storage room is still far from ideal standards. The results of in-depth interviews with several medical records officers revealed that limited storage space made File Organization very inefficient. One of the officers stated " " We often had to look for documents that were just lying around, sometimes piled up with other documents. This makes our work very slow, especially when patients need immediate medical information." In addition, most of the officers also mentioned that the storage room was not equipped with adequate ventilation systems. Another officer added " " Due to lack of ventilation, some files are often exposed to moisture and become damaged, especially if the room temperature is also unstable." This suggests that the physical problem of storage space not only affects the efficiency of the work of the officers, but also has the potential to damage important documents related to the patient's medical history. The room where the medical record file is stored is quite narrow, with poor air ventilation and inadequate natural or artificial lighting. This causes officers to often experience discomfort at work, as well as increasing the risk of file damage due to unstable humidity and temperature.

The storage system used in this hospital still relies on direct numerical methods, but is not balanced by good management. In some cases misplaced documents are found, mainly due to document overload and lack of maintenance and regular evaluation of the storage system. The storage shelves used are too high, with a height of 2.5 meters or more, while the distance between

the shelves is very narrow (about 60 cm), making it difficult for the process of collecting and storing documents, especially for officers who do not use tools.

In terms of human resources, most officers have never received special training on integrated medical record management systems, including electronic medical records. Management SOPs are available, but have not been fully implemented consistently by all officers in the field. The main obstacles faced are the limited number of human resources, the accumulation of documents from year to year, and the unavailability of digital systems that are integrated with other units. Digitization efforts have begun, but they are still very limited to new patient data or specific visits, and have not touched the entire medical record management process. These results indicate the need for Strategic Planning in the development of hybrid (physical-digital) storage systems during the transition to digital-based healthcare.

DISCUSSION

The physical management of medical records in hospitals that became the location of this study still faces various significant obstacles that have an impact on the smooth running of services. One of the main problems is the limitation of insufficient storage space to accommodate the growing volume of documents. With a limited area, the file storage process becomes less than optimal, and documents often accumulate irregularly. In addition, poor ventilation and insufficient air circulation increase the risk of document damage due to unstable humidity and temperature. Poor lighting also worsens this condition, making it difficult for officers to search medical records efficiently, which in turn slows down the process of medical services.

In addition to storage and document management factors, the layout of storage space also affects the performance of officers. Storage shelves that are too high, about 2.5 meters or more, make it difficult for officers to access files on the top shelf without the help of special tools. Meanwhile, the narrow distance between the shelves, only about 60 cm, reduces the space for movement and comfort of the attendant. This condition not only increases the physical burden on the officer but also increases the potential for injury. All of these issues underscore the need for improvements in storage systems and workspace design to create more efficient and secure management of physical medical records.

Hospital storage systems still rely on direct numerical methods without structured management. Document management using this method often leads to misplacement of files due to piles of unorganized documents, slowing document retrieval and reducing the efficiency of medical services. Information Management Theory emphasizes that unstructured and inefficient information management systems can reduce productivity and lead to filing errors (Teece, 2007). Aligns with Space Management Theory, which states that poor layout can reduce operational efficiency, create workflow difficulties, and increase the risk of errors (Snyder, 2020)..

In addition to the physical constraints of storage space, Human Resources (HR) who manage medical records also face various challenges. Most officers have not received adequate training on

medical record management systems, both physical and electronic. Although the hospital has provided a Standard Operating Procedure (SOP) for the management of medical records, its implementation has not been consistent and some officers often ignore it. This lack of competence contributes to frequent errors in archiving and searching data, ultimately leading to delays in medical services Case studies at Madani Regional General Hospital, Medan, and Misi Hospital, Lebak, Banten, showed that a lack of training and non-ergonomic storage facilities can slow service and increase staff workload..

The hospital has partially implemented various efforts to digitize medical records, but most service units still primarily use paper records. Research by Wahyuni and Oktavia (2024) highlighted the crucial role of training and infrastructure readiness in the successful implementation of electronic medical records (EMR) in Indonesian hospitals. They revealed that although awareness of the benefits of digitalization continues to increase among health workers and hospital management, there are still many technical obstacles that hinder the adaptation process. The lack of structured intensive training has caused human resources to be not fully ready to use electronic systems optimally, while uneven technological infrastructure, especially in regional health facilities, has also become a limiting factor. The study conducted by Wahyuni and Oktavia emphasized that the training program comprehensively covered technical aspects of software use, data management, and understanding policies related to electronic medical records. The hospital management should design comprehensive training programs that cover the technical aspects of software use, data management, and the understanding of policies related to electronic medical records. Setting up infrastructure, such as a stable internet connection and adequate hardware, should also be a priority to ensure the transition from physical to electronic systems runs more smoothly and sustainably.

Research by Juliansyah et al. (2024) provide evidence that implementation EMR in hospitals can reduce service time by up to 25 minutes per patient. The study by Ariani and colleagues (2024) complements understanding by showing that implementing EMR increases service efficiency and user satisfaction by 86%. The findings indicate that adopting health information technology can significantly improve operational efficiency.However, the study also warns that successful implementation depends heavily on technical readiness, including adequate internet access and supporting hardware. Uneven infrastructure conditions in Indonesia are a significant challenge, especially in remote areas.

Furthermore, Siregar (2024) highlighted the critical role of regulation in accelerating the implementation of electronic medical records (EMR) in Indonesia. The Regulation of the Minister of Health of the Republic of Indonesia Number 24 of 2022 forms the basis for implementing digital transformation. This regulation not only provides technical guidelines and standards for the management of electronic medical records, but also serves as a reference for hospitals to adjust their systems and workflows to keep pace with the development of Health Information Technology.

In addition, Siregar underscored the importance of close supervision by the government and health authorities of RME implementation across various health facilities. This oversight aims to

ensure that all hospitals, both public and private, consistently and responsibly meet established standards. Without an effective monitoring and evaluation mechanism, digital transformation in the health sector can proceed slowly and unevenly, even risking irregularities in patient data management.

In theory, the concept of Digital Maturity Index (DMI) and Electronic Medical Record Adoption Model (EMRAM) from HIMSS can be used as a framework for understanding the digital transition process in hospitals. Both models emphasize that digital maturity is not only a matter of technology, but also the readiness of organizational culture, human resources, and strong policy and regulatory support. In the context of research hospitals, it is still seen that organizations have not reached an optimal level of digital maturity, mainly due to the dominance of manual systems and low integration between service units.

Thus, the researcher affirms the need for a holistic approach in accelerating the adoption of electronic medical record systems that not only focus on technical aspects, but also on improving human resource capacity and strengthening organizational policies. Digital transitions that are carried out sporadically and without careful planning risk worsening existing conditions, and can even disrupt the smooth running of medical services. Therefore, the implementation strategy must be designed in an integrated and sustainable manner so that the digital transformation can run effectively and provide optimal benefits for health services. Specific recommendations include practical and low-cost measures such as the preparation of online-based training modules for medical personnel, the use of open-source software that can reduce system costs, and the implementation of cloud storage solutions to reduce the burden on physical infrastructure. In addition, hospitals can begin the transition with pilot projects in specific units, to reduce resistance to change and allow staff time to adapt to the new system. This approach will enable hospitals to implement digitalisation gradually, with minimal disruption to existing medical services.

CONCLUSIONS

The management of physical medical records in hospitals still faces various significant obstacles, ranging from limited storage space, poorly organized filing systems, to insufficient human resources in the management of medical records, both physical and electronic. The results showed that despite the awareness of the importance of digitizing medical records, technical barriers, uneven infrastructure, and the implementation of SOP that has not been consistent are the main obstacles in the transition process to electronic medical record systems. Recent studies in Indonesia confirm that adequate training, infrastructure improvements, and regulatory compliance are key factors for the successful implementation of electronic medical records in hospitals.

To accelerate the adoption of effective and sustainable digitization of medical records, a holistic approach is needed that includes improving human resources through intensive training, improving data storage infrastructure, as well as consistent enforcement of sops. The use of evaluation models such as EMRAM is highly recommended to monitor the progress of digital

systems, while strict regulations and government oversight are key in ensuring a successful transformation. The study provides practical insights for hospitals in addressing the challenges of the transition to electronic medical records, by providing recommendations that can be applied, such as the development of hybrid systems or cloud-based solutions for hospitals in remote areas, to improve the efficiency and quality of health services without compromising the security of patient data.

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