Procedia of Engineering and Life Science Vol. 6 2024
The 3rd International Scientific Meeting on Health Information Management (3rd ISMoHIM)
Asosiasi Perguruan Tinggi Rekam Medis dan Manajemen Informasi Kesehatan Indonesia - Universitas Muhammadiyah Sidoarjo

Literature Riview: Analysis of Readiness for Implementing Electronic Medical Record Policy in Hospital Health Service Facilities

Lienda Wati[1*], Sigit Budiharto[2], Prilian Ayu Minarni[3]
[1,3] Medical Record & Health Information, Muhammadiyah University of Pringsewu, Lampung, Indonesia
[2]Indonesia University, Jakarta, Indonesia
Correspondence author: liendawati@umpri.ac.id

Abstract. IT advancements in healthcare services, particularly the use of Electronic Medical Records (EMR) are expected to increase the efficiency and quality of health services. However, there are still many obstacles during the implementation of EMR in Indonesia in accordance with government directives based on the Minister of Health Regulation Number 24 of 2022, which requires all health facilities to implement this technology. A literature review approach on electronic medical records was used by examining various studies on the readiness for EMR implementation in hospitals. Based on research findings, the readiness for EMR implementation is influenced by various important factors such as technological infrastructure, human resource (HR) policies, management support, and organizational culture. Analysis using the diffusion of innovation theory shows that the benefits of EMR in improving service efficiency and excellence are widely recognized. Nevertheless, challenges remain regarding compatibility with the complexity of current work practice systems for certain users and the need for additional testing. This study concludes that although there is considerable readiness to adopt EMR, further efforts are needed in modifying HR training infrastructure and user engagement to improve the implementation of EMR in health facilities in Indonesia.
Keywords: Policy, Electronic Medical Record, Hospital

I.BACKGROUND

The development of information technology has brought significant changes in various sectors, including the health sector. One innovation that is expected to improve the efficiency and quality of health services is the implementation of Electronic Medical Records (RME). RME is a system that integrates patient medical information in digital form, allows faster and more accurate access to medical data, and improves coordination between health service providers.

Until now, many health care facilities such as health centers, polyclinics or hospitals have begun to implement RME as a substitute or complement to medical records that have been carried out manually. This is in line with the policy issued by the Ministry of Health regarding the implementation of Electronic Medical Records by all health care facilities.

The Indonesian government itself through the Ministry of Health has issued its mandate in the Minister of Health Regulation abbreviated as PMK Number 24 of 2022 concerning Medical Records where article 3 paragraph (1) states that every health service is required to organize electronic medical records.

PMK Number 24 of 2022 concerning Medical Records is a regulation that supports the implementation of health technology transformation, in accordance with the sixth pillar of the Health Transformation program. Health Transformation is an effort to change the health system that aims to improve the quality, efficiency, and accessibility of health services through the use of technology and innovation. The sixth pillar of Health Transformation covers aspects of the use of information technology in the provision of health services, including the implementation of electronic medical records to improve effectiveness and efficiency in managing patient health data. The regulation provides a legal foundation to guide and direct the implementation of electronic medical records as part of health technology transformation in Indonesia.

This policy is expected to overcome various problems that are often faced in conventional medical record systems, such as data inaccuracies, delays in accessing information, and difficulties in monitoring patient health history, so that with good RME management it can be a solution to increase cost efficiency, improve access and quality of service in health care facilities [1].

However, the implementation of RME in Indonesia faces various challenges. Several previous studies have shown that the readiness of hospitals in adopting RME still varies. For example, research by Sudirahayu et al., 2017 found that the

technological infrastructure is good enough to implement RME, but the human resources (HR) are not enough and some of them do not have sufficient knowledge about RME [2]. Another study conducted by Pribadi at al, 2018 identified lack of training and organizational culture resistance as significant barriers [3].

According to Khasanah, 2020, various obstacles and barriers to the implementation of Electronic Medical Records in hospitals include the lack of facilities and infrastructure in the implementation of Electronic Medical Records, lack of need assessment, the large costs required for software or hardware, human resources who have specific abilities in the field of technology and information are not sufficient to manage the entire process of processing medical record data and maintaining information technology infrastructure independently [4].

The results of this research show that although government policy is clear, its implementation in the field still faces many obstacles that need to be overcome, so it is necessary to assess readiness before implementing RME in health care facilities. Readiness assessment is an important thing to do before implementation. According to Ghazisaedi et al, 2013, readiness assessment will help identify the process and priority scale, also help optimize the implementation of RME[5].

This study aims to understand the preparation of health facilities, especially hospitals, towards the implementation of Electronic Medical Records so as to identify potential barriers and opportunities that exist so as to plan a more effective and efficient RME implementation strategy.

II. METHOD

This study used the literature review method to assess the readiness of RME implementation in hospitals in Indonesia. This method was chosen because it allows researchers to systematically collect and analyze information from various relevant sources. Literature review also provides a comprehensive overview of the current state and challenges faced in implementing RME.

III. RESULTS AND DISCUSSION

A. Theoritical Framework

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Theoritical Framework:

1. Researcher Name (Year) : Sidarahayu, et al (2016)
   Research Theme : Analisis Kesiapan Penerapan
   Rekam Medis Elektronik Menggunakan DOQ-IT
   di RSUD Dr. H. Abdul Moeloek Lampung
   Research Methode: Qualitative through case study
   case study and Analysis readiness using EHR
   Readiness Starter Assessment of DOQ-IT
   Conclusion:
   Human Resources:
   Specific capabilities in the field of information technology at RSUD Dr. H. Abdul Moeloek are still inadequate. To overcome this, cooperation with third parties is required. Currently, the hospital has 4 Skilled Medical Recorders, which is still below the provisions of PermenPAN-RB No. 30 of 2013 concerning Functional Position of Medical Recorder and its Credit Score.
   Organizational Culture:
   Users at Dr. H. Abdul Moeloek Hospital tend to accept and support the implementation of RME. However, it takes a long time to change work patterns related to medical records. The work culture assessment scored 22 out of a maximum of 55, indicating an understanding of the changes in work culture, but further exploration is needed to anticipate differences of opinion and other impacts.

Governance and Leadership:
The hospital leadership showed a strong commitment to the implementation of RME by establishing a SIMRS installation, namely the EDP-TI installation. The leadership has also set stipulations requiring the use of RME and direct charging via computer, showing clear support for the implementation of this system.
Infrastructure:
RSUD Dr. H. Abdul Moeloek is ready for RME implementation in terms of technology infrastructure. The SIMRS application uses a server with a capacity of 8 TB, with SyBase database and Power Builder programming language. The hospital is also equipped with 176 Personal Computers.

2. Researcher Name (Year): Pribadi et al, (2018)
Research Theme : Analisis Kesiapan Penerapan
Rekam Medis Elektronik Di Kartini Hospital
Jakarta
Research Methode: Quantitative with the design research design correlational research design through the correlation test spearman correlation test and regression test multiple
Conclusion:
Human Resources:
The majority of respondents, 58.9%, stated that training has been conducted for all employees to help them adjust to the implementation of Electronic Medical Records (RME).
Organizational Culture:
About 53.7% of respondents felt that RME was too complicated to teach to new staff. This indicates that there are barriers to RME implementation related to the complexity of the system which may slow down the onboarding and adaptation process of new staff, thus requiring a more effective training approach and possibly simplification of the system.
Governance and Leadership:
A total of 74.7% of respondents stated that relevant superiors are ready to help if there are problems during RME implementation. This indicates strong managerial support, which is crucial for successful RME implementation and provides assurance for staff that they will not face these issues alone.
Infrastructure:
A total of 58.9% of respondents reported that repairing a broken or crashed RME is a difficult task

3. Researcher Name (Year): Wirajaya, at al (2020)
Research Theme: Analisis Kesiapan Rumah Sakit
Dharma Kerti Tabanan Menerapkan Rekam Medis
Elektronik
Research Methode: Cross sectional research
Approach quantitative and qualitative approach
Conclusion:
Human Resources:
Readiness to implement RME based on human resources at Dharma Kerti Tabanan Hospital received an average score of 16.6, indicating a sufficient level of readiness. Almost all respondents understand the knowledge of RME, including its importance and the benefits to be gained from its implementation.
Organizational Culture:
The readiness of RME implementation based on organizational work culture at Dharma Kerti Tabanan Hospital received an average score of 33.1 with the interpretation of moderately ready. The hospital has implemented SIMRS, but still faces obstacles because it does not yet have SOPs related to RME implementation.
Governance and Leadership:
The readiness of RME implementation based on governance and leadership at Dharma Kerti Tabanan Hospital received an average score of 25.6, which is interpreted as moderately ready. The hospital leadership has shown commitment to the implementation of RME, but has not yet formed a special team for its implementation.

Infrastructure:

The readiness of RME implementation based on infrastructure at Dharma Kerti Tabanan Hospital was rated as moderately ready with an average score of 11.7. IT facilities are adequate and connected in one system. The hospital also has reliable IT personnel and works with vendors. However, there are obstacles because the hospital has not budgeted special funds to accelerate RME [6].

4. Researcher Name (Year): Yoga, at al (2021)
   Research Theme : AnalisisKesiapan Penerapan Rekam Medis Elektronik (RME) di RSUP Dr. M. Djamil Padang
   Research Methode: Qualitative through a case study
   Conclusion:
   Human Resources:
   The interview results show that medical staff are very enthusiastic in the preparation of RME at Dr. M. Djamil Hospital Padang. However, there are challenges with medical staff who are not yet skilled in using computers. Knowledge about the implementation of RME has been socialized to all medical and medical support staff who will use this system in the RME trial phase.
   Organizational Culture:
   Dr. M. Djamil Hospital Padang has implemented SIMRS. Continuous socialization and training has been conducted since the installation of SIMRS. Obstacles that still exist include DPJP signatures that are still manual because they are waiting for permission from the State Password Agency.
   Governance and Leadership:
   Based on the interview results, the management strongly supports the implementation of RME by providing training facilities, solutions to problems that occur, and accelerating the procurement of necessary tools. Policies and SPO for RME implementation have been made.
   Infrastructure:
   Hardware infrastructure readiness is available and adequate with a total of 140 computers. The readiness of the software used is very applicable and easy to understand. The main obstacle is the length of time to provide hardware and software. The system is still not integrated with hospitalization, medical support, and pharmacy [7].
5. Researcher Name (Year): Faida at al. (2021)
   Research Theme: Analisis Kesiapan Implementasi Rekam Medis Elektronik dengan Pendekatan DOQ-IT (Doctor's Office Qualityinformation)
   Technology)
   Research Methode: DOQ-IT (Doctor's Office Quality
   information)
   Conclusion:
   Human Resources
   The majority of officers showed readiness in implementing RME. However, there are still some officers who are not ready, mainly due to their unwillingness to run this new system.
   Work Culture
   Most officers are ready to implement RME. However, there was unpreparedness that arose due to the lack of instructions to run the RME (14%) and officers' non-involvement in the RME planning stage (10%).
   Governance and Leadership
   Most officers were ready to implement RME. Unpreparedness was due to the absence of official regulations or appeals to implement RME (16%).
   Infrastructure
   The availability of servers and computers is currently inadequate to fully support RME operations. In addition, the available application menu is not able to meet the needs of officers in running the system [8].

B. Diffusion of Innovations

Innovation diffusion theory is a theory that explains how a new idea, notion, practice, or object is communicated and spread in a social system or culture. This theory was first proposed by Gabriel Tarde in 1903, who introduced the S-shaped

diffusion curve, which illustrates that an innovation made by a person is considered through the time dimension. The theory was later developed by Everett M. Rogers in 1962, who defined innovation diffusion as a social process that communicates information about a new idea that is viewed subjectively.

Rogers also identified four main elements in the innovation diffusion process, namely:

1. Innovation something that is seen as new by the individual or the unit of adoption, whether in the form of ideas, ideas, practices, or objects
2. Communication the process of exchanging information and experiences between individuals or units of adoption through certain channels
3. Time the duration required by individuals or adoption units to know, evaluate, and adopt innovations.
4. Social system a set of individuals or adoption units that interact with each other and share common values within a certain structure.

Then Rogers (1995) in the journal Mailin et al (2022) also suggested that there are four characteristics of innovations that can affect the adoption rate of individuals or adoption units [9], namely:

1. Relative advantage

How much the innovation is better than previous innovations or other alternatives. Innovations that have more value than previous innovations are more easily adopted by the general public.

2. Compatibility

How much the innovation is in accordance with the conditions, needs, values, and norms of the social system. Innovations that are in line with the conditions of society can be easily adopted by them.

3. Complexity

How much the innovation is easy to understand and use. The level of difficulty in its use can affect whether or not an innovation is adopted quickly. Innovations that are easy to use are also easily accepted by the community.

4. Trialability

How much the innovation can be tested before it is fully adopted. Trial or trial can provide experience to the adopter and form a clear perception of the innovation to the adopter.

Rogers (1995) explains that there are four main theories related to innovation diffusion, namely innovation decision process theory, individual innovation theory, adoption rate theory, and perceived attribute theory.

C. Innovation Decision Theory

This theory is based on time and five different stages. They are:

1.Knowledge, potential adopters must first learn about the innovation.
2.Persuasion, they must be persuaded of the benefits of the innovation.
3.Decision, they must decide to adopt the innovation.
4.Implementation, once they have adopted the innovation, they must implement it.

D. Discussion

The results showed that the readiness of RME implementation in hospitals is influenced by several key factors, namely technological infrastructure, human resources (HR), policies and regulations, management support, and organizational culture. Through the theory of innovation diffusion, one can find out how innovations and new things can be accepted or rejected by certain individuals and social groups. This is something that is important to consider if we want to try something new and try to influence certain groups. By using Diffusion of Innovation, we can find out how innovations and new things, in this case Electronic Medical Records which were previously done manually, can be accepted or not by individuals and a work unit in a health care facility, one of which is in a hospital.

E. Relative advantages in Electronic Medical Records (RME)

The adoption of technology, in this case Electronic Medical Records, which was previously carried out using manual (paper) methods, can have a major beneficial impact on its application. The benefits obtained from the adoption of such technology are indicated by a noticeable increase in the efficiency and accuracy of medical records which can affect the

readiness of the implementation of electronic medical records. This is supported by several studies.

In a study conducted by Pribadi at al, 2018 showed that in terms of efficiency benefits, almost all respondents stated that RME increased work efficiency (93.7%), in terms of service quality, the application of RME is considered to improve the quality of hospital services and help Kartini Hospital face competition (97.9%) and besides that the application of RME can support service cooperation between Kartini Hospital and other hospitals, and improve communication between users in the hospital (98.9% and 97.9%).

In line with (7) Wirajaya et al, 2020 in his research at Dharma Kerti Tabanan Hospital showed that almost all respondents understood the importance of RME and its benefits, such as increasing the speed of service to patients and the ease of finding patient history. This shows that RME provides a significant improvement in service quality and efficiency. This reinforces (8) Bates et al, 2003 which stated that RME that shows direct benefits to medical staff is more easily adopted and can be better implemented in the future.

However, it is different at Dr. H. Abdul Moeloek Hospital according to Sidarahayu et al, 2016 that most (54.84%) informants do not know what and how RME is, it is necessary to socialize the ideal RME, what are the benefits and how much efficiency can be obtained when implementing RME so that it indicates that there is no strong understanding of RME and its benefits.

F. Compatibility in Electronic Medical Records (RME)

Implementing a new technology requires compatibility or harmony with existing infrastructure and practices to ensure a smooth transition. For example, in RME implementation, compatibility with existing health information systems can minimize resistance and accelerate technology acceptance. To be able to realize harmony in RME can be seen from the workflow and organizational culture in the hospital. This was revealed by (9) Boonstra et al, 2010 who identified that systems tailored to user needs are more easily accepted [10].

From the results of Sidarahayu et al, 2016, it shows that RME must be in accordance with the work culture, habits, and existing infrastructure at RSUD Dr. H. Abdul Moeloek. Although most medical staff are familiar with the computer system through SIMRS, there are still challenges in adjusting work culture and habits. The pre-existing habit of manual writing must be replaced with computerized data entry, so the transition process from manual medical records to RME requires significant changes in work culture and mindset.

Involving human resources in the design and implementation of RME also needs to be considered so that the RME to be implemented can be in accordance with the needs. As revealed by Sidarahayu et al, 2016 that involving doctors and clinical staff can create a desire and minimize reluctance to use new applications so as to increase compatibility and reduce resistance.

Compatibility in RME can also be improved by providing training and socialization related to the application of RME. This is indicated by the existence of an organizational culture that is quite ready at dr. M. Djamil Padang Hospital in the transition to RME. Yoga et al, 2018 in their research showed that knowledge related to the application of RME has been socialized to all medical and medical support staff involved in the RME trial stage. In addition, socialization and continuous training have been carried out from the SIMRS Installation. However, the readiness of medical support staff that has not been prioritized indicates that there are several aspects that still need to be improved to ensure overall suitability.

In line with Wirajaya el al, 2020, the readiness of organizational culture at Dharma Kerti Tabanan Hospital is quite ready to switch to RME, where this hospital already has an information system that has been running well and the scope is not too complex. However, there are some shortcomings such as the absence of RME-related SOPs and an overview of the system that will run. This shows that despite the readiness, there needs to be further adjustments to fully comply with the implementation of RME.

Adjustments to the RME system cannot be separated from management support, be it in providing training, socialization related to RME knowledge, the existence of SOPs that can support the daily application of RME. This is as desired by most medical personnel and others in Pribadi et al, 2018 which states that 88.4% or more than three-quarters of respondents stated that support from top management is very important and management has committed to implementing RME.

G. Complexity or Complexity in Electronic Medical Records (RME)

Electronic Medical Records are new to some medical personnel who were previously accustomed to using manual

methods (paper) then with the existence of PMK no 24 of 2022 concerning RME are required to switch to RME which must switch to using technology. The transition cannot be easily done by all medical personnel and others where the more complex or complicated technology will be more difficult to adopt or apply. Such complex technology can lead to frustration and decreased efficiency in hospital services. For example, if medical staff find RME too complicated, it will lead to the possibility of refusing to use the RME. This is in line with Holden et al, 2010 that the level of complexity of the RME system is one of the main barriers[11]. Users often find it difficult to understand and use new technologies, which can hinder adoption.

Unwillingness or unwillingness to implement RME occurs in some human resources at RS Haji Surabaya. According to Faida et al, 2021 most of the officers have shown their readiness in implementing RME. However, there are still some officers who state that they are not ready, one of which is dominated by the statement of unwillingness to carry out RME [8]. This can occur due to the lack of staff ability to operate computers when operating electronic medical records. So this is a big task for the hospital to be able to provide guidance and motivation in an effort to increase the willingness of officers to run RME.

Unwillingness or reluctance in implementing RME can also occur because there are several concerns regarding the implementation of RME. Among them as expressed by in Sidarahayu et al, 2016 that the concern will be less efficient in serving patients because medical personnel will be busy struggling with data entry; Unsupported infrastructure such as power outages; Data lost due to viruses in the program; Data security; Reluctance of medical personnel to enter. These concerns can disappear when medical personnel will begin to be comfortable with the use of new technology even though it gradually takes time to adjust.

Complexity can also occur when medical personnel or RME officers have just started working at the hospital. Their ability and experience in implementing both manual and electronic medical records are considered new to them. This was revealed by Pribadi et al, 2018 that more than half of the respondents stated that RME was too complicated to teach to new staff (62.1%). All respondents stated that RME can be reused according to software development. More than half of the respondents stated that RME errors were difficult to fix (69.4%).

H. Trialability in Electronic Medical Records (RME)

In implementing RME, healthcare facilities need to know the extent to which the new technology can be piloted before full adoption. This is done by trying RME in several departments first to be able to help identify initial problems and allow for necessary adjustments before full-scale implementation.

The results of Sidarahayu et al, 2016 showed that Dr. H. Abdul Moeloek Hospital can start the implementation of RME in stages, for example by implementing certain modules first before completely replacing the manual system. This trial allows for the identification and resolution of problems that may arise in the future, as well as providing an opportunity for staff to adapt to the new system before it is widely implemented.

The implementation of the trial can be beneficial for the hospital readiness process in implementing RME where with full support from management, the success rate of implementation will be higher in the future. This is expressed by Pribadi et al, 2018 that the implementation of RME at Kartini Hospital Jakarta Respondents stated the importance of superior support and active socialization for RME implementation, which shows that the trial process and receiving feedback from users have been carried out (90.5%). . The hospital's ability to conduct trials properly will provide feedback in identifying deficiencies that exist during the trial process.

IV. CONCLUSIONS AND SUGGESTIONS

Based on the research results found, overall, it can be concluded that there is a good readiness to implement RME. Although challenges in training and integrating infrastructure still exist, efforts to overcome them continue with the help of various stakeholders, especially sustainable management. The experience of the pilots highlighted proactive risk mitigation measures. By overcoming existing obstacles and continuing to improve socialization and training, it can be optimistically assessed that full implementation of RME will improve healthcare quality and operational efficiency.

V. ACKNOWLEDGMENT

Thanks to Universitas Muhammadiyah Pringsewu and the 2024 ISMOHIM committee for organizing international conference activities so that this article can be published.

REFERENCES

[1] H. D. J. Pohan, A. Sulisna, and S. A. Meliala, "Factors inhibiting the implementation of electronic medical records (EMR) at Klinik Aksara in 2022," *Indonesian Trust Health Journal*, vol. 5, pp. 45–50, 2022, doi: https://doi.org/10.37104/ithj.v5i1.98.

[2] I. Sudirahayu and A. Harjoko, "Analysis of readiness for the implementation of electronic medical records using DOQ-IT at RSUD Dr. H. Abdul Moeloek Lampung," *JISPH*, vol. 1, no. 3, Sep. 2017, doi: 10.22146/jisph.6536.

[3] Y. Pribadi, S. Dewi, and H. Kusumanto, "Analysis of readiness for the implementation of electronic medical records at Kartini Hospital Jakarta," *Journal of Health Sciences*, vol. 8, no. 2, 2018, doi: https://doi.org/10.52643/jbik.v8i2.293.

[4] M. Khasanah, "Challenges in implementing electronic medical records for healthcare institutions," *Jurnal Sainstech*, vol. 7, 2020. [Online]. Available: https://sainstech.poltekindonusa.ac.id/index.php/view/article/view/182

[5] M. Ghazisaeedi, N. Mohammadzadeh, and R. Safdari, "Electronic Health Record (EHR) as a vehicle for successful healthcare best practices," *Medical Archives*, vol. 68, no. 6, pp. 419–419, 2014, doi: 10.5455/medarh.2014.68.419-421.

[6] M. K. Maha Wirajaya and N. M. U. K. Dewi, "Analysis of the readiness of Dharma Kerti Tabanan Hospital to implement electronic medical records," *JkesVo*, vol. 5, no. 1, p. 1, Feb. 2020, doi: 10.22146/jkesvo.53017.

[7] V. Yoga, B. Jaka, and M. Yanti, "Analysis of the readiness for the implementation of electronic medical records (EMR) at RSUP Dr. M. Djamil Padang," *B-Dent*, vol. 8, pp. 71–82, 2021, doi: https://doi.org/10.33854/jbd.v8i1.598.g319.

[8] E. W. Faida and A. Ali, "Analysis of readiness for the implementation of electronic medical records with the DOQ-IT approach (Doctor's Office Quality-Information Technology)," *JurnalMIKI*, vol. 9, no. 1, p. 67, Mar. 2021, doi: 10.33560/jmiki.v9i1.315.

[9] M. Mailin, G. Rambe, A. Ar-Ridho, and C. Candra, "Media theory/innovation diffusion theory," *JGK*, vol. 6, no. 2, p. 168, Mar. 2022, doi: 10.24114/jgk.v6i2.31905.

[10] A. Boonstra and M. Broekhuis, "Barriers to the acceptance of electronic medical records by physicians: from systematic review to taxonomy and interventions," *BMC Health Serv Res*, vol. 10, no. 1, p. 231, Dec. 2010, doi: 10.1186/1472-6963-10-231.

[11] R. J. Holden and B.-T. Karsh, "The Technology Acceptance Model: Its past and its future in healthcare," *Journal of Biomedical Informatics*, vol. 43, no. 1, pp. 159–172, Feb. 2010, doi: 10.1016/j.jbi.2009.07.002.