

Factors inhibiting readiness to implement Electronic Medical Records (RME) in management information systems in hospitals: Literature review

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Abstract

Advances in communication and information technology have occurred in the health sector, especially in health services such as hospitals, one of which is Electronic Medical Records (RME). RME is the application of information technology used in collecting, storing data, processing data and accessing data as patient track records. The Ministry of Health is also targeting all health facilities to have implemented RME no later than December 2023. The challenges for implementing RME are so complex, it is necessary to identify factors inhibiting RME implementation and evaluate them.

Research Objective: to identify factors inhibiting the implementation of Electronic Medical Records in hospitals.

Method: Data collection was carried out through 4 data sources, namely, Google Scholar, ScienceDirect, PubMed, and Digital Referral Garba (Garuda) using the keywords " *Barriers of Electronic Medical Record*" OR " *Readiness of Electronic Medical Record*" AND " *Electronic Medical Record Implementation*" OR " *Hospital Management Information System*".

Results: Based on *the screening*, 4 *Google Scholar* articles were obtained, 2 *ScienceDirect* articles, 2 *PubMed* articles, 2 *Digital Reference Garba (Garuda)* articles. The results of *a review of 10 journals* on factors inhibiting the implementation of RME in hospitals are caused by individual readiness factors and organizational readiness factors. From all journals, the most frequently found results were individual unpreparedness to face changes and technological advances, lack of training.

Conclusion: Barriers to implementing electronic medical records are influenced by two factors, namely individual readiness factors and organizational readiness factors which are divided into psychological factors and also structural factors.

Keywords: Barriers to Implementing RME; Individual; Organization; Hospital

1. Introduction

One of the developments that has an impact on life and changes that can be felt is the progress of information and communication technology. Advances in communication and information technology also occur in the health sector, especially in health services such as hospitals. One of the technological developments implemented by hospitals is *the Electronic Health Record/Electronic Medical Record* or what is known as the Electronic Medical Record (RME). The use of RME is the application of health-related information technology which is used in collecting, storing data, processing

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data and accessing data stored in patient medical records in a health service in a database management system that accommodates various sources of medical data [22].

In previous research such as that conducted by Rubiyanti 2023, *Bureau Head* of Public Service Communications from the Ministry of Health, dr. Siti Nadia Tarmizi, M.Epid stated that almost all hospitals currently use electronic medical records. Meanwhile, Anis Faud as Head of the Persi Data and Information Center Compartment actually said that not all hospitals are capable and ready to apply medical records electronically. Seeing that RME has the potential to provide benefits for Indonesia's future compared to a manual medical record system, on September 12 2022, the Indonesian Ministry of Health issued RME regulations contained in Minister of Health Regulation No. 24 of 2022 concerning medical records. The Ministry of Health is also targeting all hospitals and other health facilities to have implemented RME no later than December 2023.

Some of the benefits of RME are used, namely, as a basis or guide for diagnosing a disease, planning treatment given to patients more easily and reducing the risk of errors. According to research conducted by [1], the success factor for archiving data on RME is related to individual readiness factors such as attitudes, knowledge, computer-related skills and also the readiness of an organization's components before implementation. Of course, the positive impacts felt also involve challenges that must be overcome. Several challenges faced by hospitals in implementing RME include a lack of understanding of the concept of technology development, concerns about privacy violations, lack of integration and communication by various levels of management. Lack of organizational readiness is a major contributor to the failure of RME in the world of health. Several studies show that one of the factors that causes 50% of health institutions to fail to implement RME is because hospitals are not prepared enough [22].

The challenges that are inhibiting factors are divided into two supporting factors for readiness which are aspects that determine the success of implementing the RME system. The first factor supporting readiness is individual readiness, such as individual structural and psychological factors which consist of elements of individual belief regarding technological progress, level of agreement with change, and individual ability to adapt to new technology. The second factor is related to organizational readiness, which involves organizational psychological and structural factors as well. The psychological aspect is the belief of organizational members regarding their commitment and expertise, while the structural aspect is related to human resources, materials, governing policies and communication networks [1].

Considering its importance in achieving the goals and implementation of RME in the Hospital Management Information System (SIMRS) and its influence on the process of improving the quality of health services, a study that discusses this aspect will help provide a deeper understanding. It is important to pay attention to the need to prepare a review of readiness to adopt RME. By identifying challenges that are inhibiting factors, hospitals will be evaluated to be more alert and prepare themselves from various aspects before implementing RME.

In general, if the implementation of RME in hospitals throughout Indonesia has not been implemented well, it could certainly have a negative impact on several parties, including patients, health workers and hospitals. Impacts on patients include difficulty in obtaining their own health information, delays in diagnosis and treatment, medical errors or errors in administering procedures. Implementation of RME that has not been carried out optimally also has an impact on additional workload for health workers to enter data into the system, the use of an RME system that is complicated and not *user-* friendly can also result in frustration for health workers. Apart from that, it not only impacts individuals such as health workers and patients, but also has a detrimental impact on hospitals. These impacts include the difficulty of exchanging patient health information between hospitals and also the risk of sanctions if errors occur that cause a decrease in service quality. Therefore, this qualitative study was conducted to identify factors that could hinder the implementation of Electronic Medical Records in hospitals

2. Material and methods

The method used in writing this article is *a literature review*. *Literature Review* is a series of methods carried out by collecting library data from several other relevant article references, reading and taking notes, and processing writing material (Ridwan, 2021). *The literature review* in this research was carried out on several articles. The articles used consist of National and International journals. The article is related to the topic of Hospital Management Information Systems (SIMRS) with the main discussion being the factors that hinder the implementation of Electronic Medical Records. Data collection in this writing was carried out through 4 data sources, namely, Google Scholar, ScienceDirect, PubMed, and Digital Reference Garba (Garuda). Articles can be written in Indonesian and also English. The keywords used in the article search process are, "*Barriers of Electronic Medical Record*" OR "*Readiness of Electronic Medical Record*" AND "*Electronic Medical Record Implementation*" OR "*Hospital Management Information System*".

The articles used in this writing are limited to the last 5 years (2019 to 2023). The articles used are also in the form of *original articles, open access, full text*. The study used is an article according to the topic that discusses factors inhibiting readiness to implement Electronic Medical Records in Hospital Management Information Systems. The selection of articles used was based on the purpose of writing, namely to determine the factors causing delays in the implementation of RME in the Hospital Management Information System. This study is not limited by region or country but the research design is only qualitative and quantitative.

3. Results and discussion

Based on the search results, there are a total of 10 articles that are not limited by region or country. The articles consist of 5 national articles and 5 international articles published between 2019 – 2023. There is one article published in 2023, one article published in 2022, three articles published in 2021, four articles published in 2020, and one article was published in 2019. Of the 10 selected articles, 6 articles used qualitative methods with case study design (n=4) and descriptive analysis (n=2). Meanwhile, 3 articles used quantitative methods with a *cross-sectional design* (n=3), and 1 article used a mixture of quantitative and qualitative methods. Based on *the screening*, 4 *Google Scholar* articles were obtained, 2 *ScienceDirect* articles, 2 PubMed articles, 2 Digital Reference Garba (Garuda) articles.

Through the review carried out, the results show that each hospital has a Hospital Management Information System (SIMRS) which of course is in the process of implementation and development differently. Each hospital also has several factors that can hinder the implementation of electronic medical records which can be observed through two readiness factors, namely the individual readiness factor and also the organizational readiness factor.

Based on table 1, it can be seen that the obstacles most often encountered in the problem of implementing electronic medical records which are an aspect of hospital management information systems are individual factors, namely those related to the readiness of health workers related to change as well as wishes and desires or grouped into work motivation in implementing electronic medical record.

These obstacles are also followed by obstacles originating from the organization's readiness in implementing RME. The most common organizational readiness is related to the availability of special training for officers in operating electronic medical records. Of course, this training must also be supported and motivated by management and leadership support in the organization. Apart from that, the cost factor is also a factor in organizational readiness which plays quite an important role. A summary of the research results can be seen in Table 1.

3.1. Individual Factors

Individual factors are factors that arise from within a person that can influence a particular condition. In this case, individual readiness such as individual structural and psychological factors which consist of elements of individual beliefs regarding technological progress, level of agreement with change, individual ability to adapt to new technology [1]. The individuals in question are health workers. The readiness factor in health workers greatly influences the implementation of electronic medical records. Eka Wilda Faida and Amir Ali (2021) explained that individual readiness has a very important influence on the implementation of RME. Based on this research, some health workers still say they are not ready and some say they do not want to carry out RME. This feeling of not wanting or not being ready will certainly affect the knowledge and skills of health workers in operating RME.

This is because individual desires are the main foundation for something to happen. If the individual rejects technological developments, namely changing the system from manual to digital, this will of course have a big impact on the course of RME implementation. Apart from that, the individual's attitude will influence his knowledge and skills. Knowledge and skills can increase if a feeling of will arises in the individual. Thus, an individual's unpreparedness and unwillingness to implement RME will also be related to the knowledge and skills they possess.

Sasan Ghorbani Kalkhajeh *et al* (2023) also stated that other individual obstacles arise from lack of motivation. Lack of sufficient motivation among employees, lack of training and increased workload. Birhani Berihun *et al* (2020) in their research, also revealed that the main obstacle for individuals in implementing RME is the lack of training received. Several other studies also state that some individuals lack technological literacy. Thus, training becomes the initial foundation that can increase the fluency and readiness of individuals in operating RME.

Table 1 Summary of research results

Author (Year)	Title	Research methods	Sample/Research Population	Research sites	Results
Made Karma Maha Wirajaya, Ni Made Umi Kartika Dewi (2019)	Analysis of the Readiness of the Dharma Kerti Tabanan Hospital to Implement Electronic Medical Records	Quantitative and qualitative or mixed methods with <i>cross sectional design</i>	The sample used was 82 employees and interviews were conducted with 7 employees	Dharma Kerti Tabanan Hospital in Tabanan Regency	Factors that hinder the implementation of RME at Dharma Kerti Hospital are: Individual Factors: There has been no training given to officers, lack of knowledge Organizational Factors: They don't have SOPs yet, leaders haven't formed a special team and don't have adequate IT.
Eka Wilda Faida and Amir Ali (2021)	Analysis of Readiness to Implement Electronic Medical Records using the DOQ-IT (<i>Doctor's Office Quality-Information Technology</i>) Approach	Quantitative descriptive method with a <i>cross sectional approach</i>	Using a total sampling of 50 officers who have direct contact with medical records	Surabaya City Hajj Hospital	Factors that hinder the implementation of RME are: Individual Factors: In the HR aspect, there are still several officers who say they are not ready, one of which is dominated by statements of unwillingness to carry out RME. Organizational Factors: In terms of organizational work culture, there are no instructions for running electronic medical records and there is no involvement of officers in planning electronic medical records. Apart from that, the unavailability of regulations, the availability of <i>servers</i> & computers is inadequate, and the available electronic medical record application menu cannot meet the needs of officers.
Sasan Ghorbani Kalkhajeh, Azam Aghajari, Behnaz Dindamal, Zohreh Shahvali-Kuhsuri, and Farzad Faraji-Khiavi (2023)	<i>The Integrated Electronic Health System in Iranian Health Centers : Benefits and Challenges</i>	Qualitative research methods using conventional qualitative content analysis or descriptive analysis	The research was conducted on 6 experts and 24 users of the Integrated Electronic Health System or known as SIB	Health Center in Khuzestan Province, Iran	Factors that hinder the implementation of RME are: Individual factors are: lack of sufficient motivation among employees, lack of training and increased workload. Organizational factors are: costs for converting a paper system to an electronic system, internet usage during working hours.

Author (Year)	Title	Research methods	Sample/Research Population	Research sites	Results
Yuliana Erma Kristanti and Ratu Qurroh Ain (2021)	Hospital Management Information System	Qualitative method with case study design	The research sample consisted of 10 hospitals	Hospitals in the Jakarta area	Factors that hinder the implementation of RME are: Individual factors namely: HR capabilities, lack of knowledge Organizational factors, namely: completeness of standard operational procedures (SOP) and management, system cognition, and technology.
Tsai CH, Eghdam A, Davoody N, Wright G, Flowerday S, Koch S. (2020)	<i>Effects of Electronic Health Record Implementation and Barriers to Adoption and Use: A Scoping Review and Qualitative Analysis of the Content</i>	Qualitative method with case study design	United States hospitals and 6 studies in European countries	Hospitals in the United States, Europe	Factors that hinder the implementation of RME are: Individual factors, namely: limited human resources, poor literacy and skills in technology. Organizational factors, namely: poor or inadequate training for employees, lack of technical support from the organization, and the absence of adequate SOPs.
Wan Nuriza Afifah, Randi Afriandi, Ulil Kholili (2022)	Overview of Computer-Based Medical Record System Management at Ibnu Sina Islamic Hospital Pekanbaru	Qualitative method with case study design	11 medical records officers	Ibnu Sina Islamic Hospital Pekanbaru	Factors that hinder the implementation of RME at the Ibnu Sina Islamic Hospital Pekanbaru are: Individual factors namely: Limited human resources, inadequate ability to run applications Organizational factors, namely: The organization is not ready to change and implement applications, for example, the electricity suddenly goes out and the computer shuts down. As a result, patient services are hampered, such as what happened in the computer <i>filling room</i> , and a lack of management support in the successful implementation of RME.
Vesri Yoga, Bestari Jaka, and Mendhel Yanti (2020)	Analysis of Readiness for Implementing Electronic Medical Records (RME) at RSUP Dr. M. Djamil Padang	The method used in the research is qualitative with a case study design	Informants were selected using purposive sampling of 15 samples	RSUP dr. M. Djamil Padang	Factors that hinder the implementation of RME are: Individual factors, namely: Not yet ready human resources, inadequate ability to master technology Organizational factors, namely: organizational culture readiness factors, management governance that is not well organized, leadership factors, and also infrastructure readiness.

Author (Year)	Title	Research methods	Sample/Research Population	Research sites	Results
Birhani Berihun, Desta Debalke Atnafu, and Getachew Sitotaw (2020)	<i>Willingness to Use Electronic Medical Record (EMR) System in Healthcare Facilities of Bahir Dar City, Northwest Ethiopia</i>	The method used is quantitative with an institution-based cross sectional study	Respondents were selected using a simple random sampling method of 634 health professionals	At Bahir Dar City Health Facility, North West Ethiopia	Factors that hinder the implementation of RME are: Individual factors namely: Lack of training can result in health workers lacking good computer skills, lacking good knowledge about electronic medical records, and inadequate access to guidelines Organizational factors namely: Lack of access to training is the main obstacle in the willingness to use electronic medical records. and also a lack of management support in using the electronic medical record system.
Hlaing Min Oo, Ye Minn Htun, Tun Tun Win, Zaw Myo Han, Thein Zaw, and Kyaw Myo Tun (2021)	<i>Information and Communication Technology Literature, Knowledge and Readiness for Electronic Medical Record System Adoption among Health Professionals in A Tertiary Hospital, Myanmar: A Cross-Sectional Study</i>	The method used is a quantitative approach with a cross-sectional study	The study population was 436 health workers (161 doctors including specialists and medical officers and 275 nurses including senior or head nurses, staff nurses and trained nurses). The total sample size of 118 participants was achieved using the formula for proportion of living population.	In a tertiary hospital located in the Union territory of Nay Pyi Taw, the administrative capital of the Republic of the Union of Myanmar, located 327 km from the Yangon region.	Factors that hinder the implementation of RME are: Individual factors namely: Lack of literacy by employees, the age of employees is relatively old so it is difficult to receive new information, the ability to control technology is lacking Organizational factors, namely: the lack of implementation of comprehensive job training and contextualization in electronic medical record training programs in an effort to increase the readiness of health workers to implement electronic medical records.
Shekur Mohammad Awol, Abreham Yeneneh Birhanu, Zeleke Abebaw Mekonnen, Kassahun Dessie Gashu, Atsede	<i>Health Professionals' Readiness and Its Associated Factors to Implement Electronic Medical Record System</i>	The research method used will be a quantitative approach with	The sample in the study was 451 health professionals (135 at Hidar Hospital, 59 at Sanja	In four selected primary hospitals in Ethiopia namely Hidar	Factors that hinder the implementation of RME are: Individual factors, namely: low overall readiness of health workers in implementing electronic medical records, inadequate level of knowledge, attitudes and computer skills

Author (Year)	Title	Research methods	Sample/Research Population	Research sites	Results
Mazengia Shiferaw, Berhanu Fikadie, Endehabtu, Mulugeta Haylom Kalayou, Habtamu ALganeh Guadie, and Binyam Tilahun (2020)	<i>in Four Selected Primary Hospitals in Ethiopia</i>	a cross-sectional design	Hospital, 47 at Wogera Hospital, and 210 at Assosa Hospital).	Hospital, Sanja Hospital, Wogera Hospital, and Assosa Hospital	Organizational factors, namely: Lack of management support in providing training, lack of leadership roles, inadequate governance and infrastructure

Table 2 Grouping of inhibiting factors based on readiness supporting factors which are aspects that determine the success of implementing the RME system

Individual Readiness Factors	Organizational Readiness Factors
<p>Individuals stated that they were not ready or did not want to run Electronic Medical Records, the staff's knowledge and skills were inadequate in operating the RME application menu.</p> <p>Lack of sufficient motivation among employees, lack of training and increased workload. Poor literacy in technology.</p> <p>Lack of individual readiness in facing change, which causes individuals not to want to access guidelines related to RME and learn related matters.</p> <p>Lack of officer literacy regarding information and communication between health workers is not good.</p>	<p>There has been no training carried out regarding Electronic Medical Records, there is no SOP that regulates this matter, leaders have not formed a special team regarding the implementation of RME, and the IT they have is inadequate and technical support is lacking.</p> <p>In terms of organizational culture, there are still no instructions for running electronic medical records, there are no adequate regulations, servers (software) and computers.</p> <p>The costs of changing a paper system to an electronic system and the use of the internet network during working hours, as well as limited human resources in managing hospital organizations.</p> <p>Lack of readiness in governance and leadership as well as infrastructure readiness, as well as lack of management support in using the RME system</p>

The lack of training also causes an increase in workload, because health workers are required to be able to operate technology but are not supported by adequate training. Thus, this also affects individual readiness in facing changes which have an impact on work motivation and individuals do not want to access guidelines related to RME. According to Hlaing Min Oo *et al* (2021), obstacles related to individual readiness can also arise from poor communication between health workers. Such as communication between officers in health service units, especially hospitals, will also have a negative impact on the implementation of electronic medical records.

3.2. Organizational Factors

Organizational factors can be interpreted as factors that can influence individual and group actions within an organization. These actions can affect the system and structure of the organization [1]. Organizational readiness factors influence readiness in implementing an electronic medical record system. Organizational readiness is divided into two, namely psychological factors and structural factors. The psychological aspect is the belief of organizational members regarding their commitment and expertise, while the structural aspect is related to human resources, materials, governing policies and communication networks.

According to Made Karma Maha Wirajaya *et al* (2019), in their research, they stated that the organizational readiness factor can be seen from the lack of training for health workers regarding the implementation of electronic medical records. Apart from that, not having an SOP that regulates this matter can also hinder the implementation of RME. This is because if there are no binding and established regulations, health workers will be less committed to implementing them and as time goes by they will certainly experience a decline because they are considered something that is not yet binding or mandatory. Not only the regulatory aspect, but also leaders who have not formed a special team related to the implementation of RME is also a strengthening factor in hampering the implementation of RME. Apart from that, the technology and servers (*software*) owned by several hospitals are inadequate and technical support is still relatively lacking.

Other organizational factors that can hinder readiness in implementing electronic medical records are lack of readiness in governance and leadership as well as infrastructure readiness, as well as lack of management support in using the RME system. According to Vesri Yoga *et al* (2020) in their research, organizational governance is still in the process of adapting from manual to digital medical records. The governance process is of course also influenced by leadership factors in each organization. Good and adequate leadership will certainly have a positive impact on the governance system and organizational infrastructure. However, on the other hand, if the leadership includes inadequate management support and is unable to control conditions, it will have a negative impact on system governance and inadequate infrastructure. So it will have an impact on the implementation of RME being hampered.

The costs involved in the process of changing from a manual system to a digital system are also a factor in hampering an organization's readiness to implement electronic medical records. According to Sasan Ghorbani Kalkhajeh *et al* (2023). The costs of changing a paper system to an electronic system and the use of the internet network during working hours, as well as the limited human resources in managing hospital organizations will have an impact on hampering the implementation of RME. Inadequate operational costs also play a significant role in the implementation of RME. Thus, inadequate operational costs will have an impact on poor implementation, both in terms of systems such as technology and internet networks during working hours as well as on the provision of training for health workers.

4. Conclusion

Based on the *literature review*, the results show that obstacles in the implementation or implementation of Electronic Medical Records as part of the Hospital Information Management System can be seen through the hospital's readiness factor. These readiness factors are divided into two, namely, individual readiness factors and organizational readiness factors. Individual readiness factors are divided into psychological factors and also individual structural factors. These two factors consist of elements of individual beliefs regarding technological progress, level of agreement with change, and individual ability to adapt to new technology. The second factor is related to organizational readiness, which involves organizational psychological and structural factors as well. The psychological aspect is the belief of organizational members regarding their commitment and expertise, while the structural aspect is related to human resources, materials, governing policies and communication networks.

Overall, all journals state that these two factors are the main factors in hampering the implementation of electronic medical records, although not all of them explain it in detail from a psychological and structural perspective. However, each journal contains aspects both individual and organizational factors.

In terms of individual factors, the most inhibiting factor is the individual's unpreparedness and unwillingness to implement electronic medical records. This is supported by the lack of training received by health workers as well. Lack of training causes individuals to have to learn about medical record operations individually. This will also increase the workload which can affect work motivation.

Organizational factors that are more prominent in the process of hampering the implementation of RME are related to the lack of adequate training for health workers. Apart from that, the lack of cost factors from moving manual processes to digital processes, lack of management support, leadership, and lack of governance and infrastructure readiness are also causes of delays in the implementation of RME in several hospitals. Therefore, further evaluation of RME implementation readiness is needed.

Compliance with ethical standards

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There are no conflicts of interest.

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