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THE EFFECT OF INFORMATION COMMUNICATION TECHNOLOGY LITERACY AND KNOWLEDGE ON THE READINESS OF HEALTH WORKERS TO ADOPT THE ELECTRONIC MEDICAL RECORD SYSTEM AT SAYANG RAKYAT HOSPITAL

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Abstract

Background, The implementation of electronic medical records is used as a strategy to improve the quality of current health services. Based on several studies, RME knowledge and ICT literacy are factors that affect the readiness of RME adoption. The readiness of health service providers is a determining factor in the success of Electronic Medical Records (RME). Objective, This study aims to assess ICT literacy, knowledge, and readiness for RME adoption. Methods, This study is a quantitative study using a cross sectional study conducted on 164 health workers working at Sayang Rakyat Hospital, South Sulawesi province, Indonesia using Stratified Random Sampling.Data was collected using a questionnaire, analyzed using SPSS version 22 and a chi-square test and logistic regression analysis were carried out to assess the influence of ICT literacy and knowledge on the readiness of health workers to adopt RME. The results showed that the level of readiness in this study was 59.8%, the ICT literacy level was 50.6%, and the RME knowledge level was 50.6%. Based on the results of the analysis of the influence of ICT literacy and RME knowledge with the readiness to adopt RME, the results of knowledge about RME (P=0.000), ICT literacy (P=0.000) were obtained. The results of the multivariate analysis showed that knowledge significantly affected readiness. An OR value of 9,415 with a 95%CI of 14,539 to 19,533 was obtained, indicating that individuals with low knowledge were 9 times more likely to be unprepared than individuals with high knowledge. In conclusion, high ICT knowledge and literacy have a positive effect on the readiness of health workers in the adoption of RME. The most dominant factor affecting readiness is RME knowledge. More than half of healthcare workers have a good level of readiness to implement RME.

Keywords: Electronic Medical Records, Readiness, Knowledge, ICT Literacy.

INTRODUCTION

RME is a health information subsystem that is increasingly adopted in Indonesia and has become a global trend in document management using computer/electronic-based systems in the health sector. The implementation of electronic medical records is used as a strategy to improve the quality of health services such as improving workflows, overcoming the constraints of clinical documentation based on manual medical records which experience many problems in the demands of information exchange between health service providers (Yulida et al., 2021)Patients' medical records began to shift to electronic-based with the issuance of Regulation of the Minister of Health of the Republic of Indonesia Number 24 of 2022 concerning medical

records. Through this policy, health service facilities are required to run an electronic system for recording patients' health history (Siswati et al., 2023).

In addition to the Regulation of the Minister of Health of the Republic of Indonesia Number 24 of 2022 concerning Medical Records, medical records are also regulated in regulations related to minimum service standards in the form of the Decree of the Minister of Health Number 129 of 2008 concerning Minimum Service Standards for Hospitals (Siyoto & Personal, 2016). In the regulation, it is explained that the time for providing medical record documents for outpatient services and inpatient services is standardized with a time of ≤10 minutes and ≤15 minutes, respectively. The use of electronic medical records can reduce distribution wait times (Kanhaiyakarnit, 2019).

Healthcare technology adoption is worst in developing countries. Many e-health technology initiatives in developing countries fail or do not make it past the project phase (Salifu et al., 2017). Based on the results of a survey that has been conducted by PERSI in 2022 regarding RME. In the specified time frame, there were 25% of all Indonesian hospitals who filled out the survey. As a result, 18% of hospitals already have RME and optimal, 38% of hospitals already have RME but not optimal while 44% of hospitals do not have the same RME (Wilda Faida & Angesti, 2023)

If a hospital wants to adopt RME then there are several steps that must be considered, before, during and after the system is implemented, first the hospital management needs to conduct an assessment to determine the level of staff knowledge and computer literacy in the context of RME implementation, Then, the training package (WHO, 2017). Healthcare workers who have a high knowledge of RME tend to be better prepared to adopt RME compared to those who have low knowledge of RME. It can be expected that healthcare professionals who have a high level of knowledge about RME will have more computer utilization. It is essential for individuals in the healthcare field to have basic knowledge to work with digital tools (Ghorbanian Zolbin et al., 2022) . Knowledge of RME is a significant predictor of healthcare professionals' readiness to adopt RME (Oo et al., 2021a).

Readiness to receive information systems in healthcare is influenced by the individual's level of computer skills. This supports the statement that computer skills have a direct influence on respondents' perception of computer-based systems. Further research by (Kgasi & Kalema, 2014)conducted in developing countries shows that poor computer skills are strongly correlated with the unpreparedness of healthcare workers to adopt electronic health records.

Based on preliminary study data, it is stated that Sayang Rakyat Hospital in providing services related to medical records still does not meet the specified achievement standards, this is an indicator of poor service, through RME it is hoped that it can minimize delays in sending patient data. Based on the problems found, this study was conducted to determine the readiness of health workers at Sayang Rakyat Hospital in the adoption of electronic medical records and how the literacy of information communication technology and knowledge related to electronic medical records is affected. Health workers are the target of research on the readiness of electronic medical record adoption because the key factor in the adoption and successful implementation of electronic medical records depends on the readiness of health workers (Abdulai & Adam, 2020).

MATERIALS AND METHODS

Location and Design of the study

This research was carried out at Sayang Rakyat Hospital, South Sulawesi Province. By using a quantitative method with a cross sectional approach through the distribution of survey questionnaires.

Population and sample

There are a total of 279 Caregiver Professionals (PPAs) in question in the study population. This group was specifically selected with the aim of assessing the readiness of healthcare professionals in the transition from paper-based medical records to electronic medical records. The sampling technique uses Stratified Random Sampling, resulting in a sample size of 164.

Data collection methods and instruments

The variables studied in this study include readiness, RME knowledge and ICT literacy,), which were measured using a questionnaire. The questionnaire used in this study is based on the questionnaire used in the research Oo et al (2021). with a high Cronbach's alpha value ranging from 0.79 to 0.84. Written in Indonesian and filled out by the respondents themselves, the first part of the questionnaire focused on five sociodemographic factors.

Gender, age, level of education, profession and length of service. The next part consists of 12 items that assess ICT literacy, 14 items that evaluate electronic medical record knowledge and 25 items that measure readiness. For readiness, a score below 71 indicates not ready, while a score equal to or above 71 indicates readiness. High RME knowledge is defined as a score of 15 or above, while low knowledge means a score below 15. ICT literacy is categorized as high if the score is 35 or more, and low if the score is below the score of 35.

Data analysis

The data were analyzed and interpreted to test the hypothesis.analyzed using SPSS version 22. Univariate analysis was carried out to get an overview of the research problem by describing each variable used in the study and the characteristics of the respondents. Bivariate analysis is used to determine the relationship between independent and dependent variables. Because the dependent and independent variables in this study are categorical, the chi-square test is used. If the p-value is <0.05, it indicates a significant relationship according to the results of statistical calculations.

Multivariate analysis was carried out to identify the independent variable that had the greatest influence on the dependent variable considered in the determinant analysis. Logistic regression tests are used to find out which independent variables tend to have a stronger influence on dependent variables.

Furthermore, the independent variable that has the most significant influence is included in the model to assess the mutual influence between the independent and dependent variables.

RESULT

Table 1: Distribution of Respondents by Sociodemographics

Variables		n(%)
Responsive Features		
Age		
	< 35 years	64 (39.0)
	≥35 years	100 (61.0)
Gender		
	Man	20 (12.2)
	Woman	144 (87.8)
Profession		
	Doctor	22 (13.4)
	Nurse	108 (65.9)
	Midwife	12 (7.3)
	Pharmacist	12 (7.3)
	Nutritionist	8 (4.9)
	Physiotherapy	2 (1.2)
Education		
	Diploma	57 (34.8)
	Postgraduate	2 (1.2)
	Bachelor	90 (54.9)
	Profession	15 (9.1)
Working period		
	< 5	46 (28.0)
	5 - < 10	84(51.2)
	≥ 10	34 (20.7)

Based on the table, it was found that health workers at Sayang Rakyat Hospital with the age of less than 35 years were 64 (39.0%) respondents, and those who were 35 years old or more than 35 years old as many as 100 (61.0%) respondents. The greatest frequency is found in health workers who are equal to or more than 35 years old.

The table also shows that male health workers at Sayang Rakyat Hospital as many as 20 (12.2%) respondents and female health workers as many as 144 (87.8%) respondents. The greatest frequency is found in female health workers.

The distribution based on profession found that health workers at Sayang Rakyat Hospital who worked as doctors were 22 (13.4%) respondents, as nurses as many as 108 (65.9%) respondents, as midwives as many as 12 (7.3%) respondents, as nutritionists as many as 8 (4.9%) respondents, as pharmacists as many as 12 (7.3%) respondents, and as physiotherapists as many as 2 (1.2%) respondents. The greatest frequency is found in the nursing profession.

The distribution of work periods was found that health workers at Sayang Rakyat Hospital who have worked for less than 5 years were 46 (28.0%) respondents, 84 (51.2%) respondents who had worked for 5 years to less than 10 years, and 34 (20.7%) respondents who had worked for the same period for 10 years or more. The greatest frequency is found in health workers who have worked for the same 5 years to less than 10 years.

Furthermore, the distribution based on education level was found that health workers at Sayang Rakyat Hospital who had diploma-level education were 57 (34.8%) respondents, undergraduate level education as many as 90 (54.9%) respondents, and postgraduate level education as many as 2 (1.2%) respondents, and professions as many as 15 (9.1%) respondents. The greatest frequency is found in health workers with bachelor's level education

Table 2: Distribution of Respondents based on ICT Literacy

	Category	n(%)	Median (IQR)
ICT literacy			35 (15,25.00 – 40.00)
	Low	81 (49.4)	
	Tall	83 (50.6)	

Based on the literacy variable about RME, those who have a score at or above the median of 35 are considered to have high knowledge, while those below the median of 35 are considered to have low knowledge. Based on the ICT literacy distribution table, it was found that more health workers at Sayang Rakyat Hospital had high ICT literacy, namely 83 (50.6%) health workers, compared to those who had low ICT literacy, namely 81 (49.4) health workers.

Table 3: Distribution of Respondents by Knowledge

	Category	n (%)	Median (IQR)
RME Knowledge			15 (9,10.00-19.00)
	Low	77 (47.0)	
	Tall	87 (53.0)	

Based on the variable of knowledge about RME that has a score at or above the median of 15 is considered to have high knowledge while those below the median are considered to have low knowledge, based on table 4.2 it was obtained that the health workers of Sayang Rakyat Hospital who have a high level of RME knowledge are 87 (53.0%) health workers, this value is higher than those who have low knowledge about RME, which is as many as 77 (47.0) health workers.

Table 4: Distribution of respondents based on readiness

Variables		n(%)	Median (IQR)
Readiness			71 (14, 60.00 – 74.00)
	Not ready	66 (40.2)	
	Ready	98 (59.8)	
CR			39 (6,36.00 - 42.00)
	Not ready	71 (43.3)	
	Ready	93 (56.7)	
HE			30.5 (9, 26.00 – 35.00)
	Not ready	82 (50.0)	
	Ready	82 (50.0)	

In this study, the researcher calculated the readiness score of health workers at Sayang Rakyat Hospital. Respondents who had a score at or above the median were considered ready and below the median were considered unprepared. Based on table 1. The respondents who were ready for total readiness were 98 (59.8%) with a median value of 71 (43.3), core readiness 93 (56.7%) with a median value of 39, and engagement readiness was 82 (50.0%) with a median value of 30.5. Respondents who were not prepared for overall readiness 66 (40.2%), core readiness 48 (43.3%), and engagement readiness 65 (50.0%)

Table 5: Bivariate Analysis of RME Knowledge and ICT Literacy on RME Adoption Readiness

Variable	Categories	Readiness						p-value
		Not Ready		Ready		total		
		n	%	n	%	n	%	
ICT literacy	Low	46	56.8	35	43.2	81	100	0.000
	Tall	20	24.1	63	75.9	83	100	
Knowledge	Low	51	66.2	26	33.8	77	100	0.000
	Tall	15	17.2	72	82.8	87	100	
Age	< 35 years	24	37.5	40	62.5	64	100	0.566
	≥ 35 years	42	42.0	58	58.0	100	100	
Gender	Man	5	25.0	15	75.0	20	100	0.138
	Woman	61	42.4	83	57.6	144	100	
Profession	Doctor	8	36.4	14	63.6	22	100	0.149
	Nurse	40	37.0	68	63.0	108	100	
	Midwife	5	41.7	7	58.3	12	100	
	Nutritionist	7	87.5	1	12.5	8	100	
	Pharmacist	5	41.7	7	58.3	12	100	
	Physiotherapy	1	50.0	1	50.0	2	100	
Education	Diploma	18	31.6	39	68.4	57	100	0.183
	Postgraduate	0	0	2	100	2	100	
	Sarjana	40	44.4	50	55.6	90	100	
	Profession	8	53.3	7	46.7	15	100	
Working period	< 5	11	23.9	35	76.1	46	100	0.019
	5 - < 10	37	44.0	47	56.0	84	100	
	≥ 10	18	52.9	16	47.1	34	100	

Based on the table, respondents with high ICT literacy who have more readiness, namely 63 (75.9%) health workers, compared to respondents who have readiness but low ICT literacy, namely 35 (43.2%) respondents.Obtaining a p-value of ICT literacy of 0.000 <0.05, it can be concluded that ICT literacy has a significant effect on readiness.

Based on the table, respondents with high RME knowledge were obtained who had readiness as many as 72 (82.8%) respondents. Meanwhile, respondents with readiness but low RME knowledge were 26 (33.8%).A knowledge p-value of 0.000 <0.05 can be obtained, so it can be concluded that knowledge has a significant effect on readiness.

The results of the analysis of the relationship between the ages of less than 35 years who had readiness were as many as 40 (62.5%) respondents. Meanwhile, respondents with the age of 35 years or older who had readiness were 58 (58.0%). The age p-value was obtained at 0.566 >0.05 so that it was concluded that age did not have a significant effect on readiness.

Based on the table, it was obtained that 15 (75.0%) male respondents had readiness. Compared to female respondents, 83 (57.6%) respondents. The p-value of gender was obtained >0.05 so that it was concluded that gender did not have a significant effect on readiness.

The results of the analysis of professional relationships on readiness found that those who had readiness in the adoption of RME were doctors as many as 14 (63.6%) respondents, nurses as many as 68 (63%) respondents, midwives as many as 7 (58.3%) respondents, nutritionists as many as 1 (12.5%) respondents, pharmacists as

many as 7 (58.3%) respondents, and physiotherapists as many as 1 (50.0%). The p-value of the profession was obtained of 0.149 > 0.05 so that it was concluded that the profession did not have a significant effect on readiness.

The results of the analysis of the relationship between education level and readiness found that health workers with diploma-level education who had readiness to adopt RME were 39 (68.4%) respondents compared to health workers with postgraduate level education as many as 2 (100%) respondents, undergraduate level education as many as 50 (55.6%) respondents, and professions as many as 7 (46.7%) respondents.The p-value of education was obtained > 0.05 so that it was concluded that education did not have a significant effect on readiness.

Based on the table, it was found that those who have readiness in the adoption of RME are health workers who have worked for less than 5 years as many as 35 (76.1%) respondents, health workers who have worked for 5 years to less than 10 years as many as 47 (56.0%) respondents, and health workers who have worked for 10 years or more as many as 16 (47.1%). The p-value of the working period was 0.019 < 0.05, so it was concluded that the working period had a significant effect on readiness.

Table 6: Multivariate Model Candidate Selection Table

Variable	p-value	Information
ICT literacy	0.000	Candidate
Knowledge	0.000	Candidate

Candidate selection is used for the selection of what variables will be tested in a multivariate analysis with a p-value criterion < 0.25. From the results of the candidate selection above, it was obtained that the two independent variables, namely ICT Literacy and Knowledge, had a p-value of < 0.25, so it can be concluded that the two variables continued the test to multivariate analysis.

Table 7: Multivariate Model of the Influence of RME Knowledge and ICT Literacy on Health Workers' Readiness for RME Adoption

Model	Variable	p-value	OR	95%CI
Model 1	ICT literacy	0.130	1.842	0.836 – 4.057
	Knowledge	0.000	7.227	3.268– 15.983
Model 2	Knowledge	0.000	9.415	4.539-19.533

ICT literacy: the p-value of kindergarten literacy was obtained at 0.130 < 0.25, so it was concluded that ICT literacy had a significant effect on readiness. An OR value of 1,842 was obtained with a 95%CI of 0.836 – 4,057 which means that individuals who have low ICT literacy are at risk of being unprepared by 1 times than individuals who have high ICT literacy with a range of risk opportunities ranging from 0 times to 4 times.

Knowledge: a knowledge p-value of 0.000 < 0.25 was obtained, so it was concluded that knowledge had a significant effect on readiness. An OR value of 9,415 with a 95%CI of 4,539 – 19,533 was obtained, which means that individuals with low knowledge are at risk of being unprepared by 9 times than individuals with high knowledge with a range of risk opportunities ranging from 4 times to 19 times.

DISCUSSION

In the study, 63 (75.9) health workers were found to have high ICT literacy and good readiness in the adoption of RME. This score was higher than respondents who had high ICT literacy skills but were not ready for the adoption of RME, namely 20 (24.1)

health workers. In the results of the statistical test with a value of p=0.000, the value of p<0.05 states that there is an influence between ICT literacy and the readiness of health workers in the adoption of RME. This result means that if ICT literacy skills are higher, health workers are also more prepared for the adoption of RME at Sayang Rakyat Hospital. The results of this study are in line with several other studies, including research conducted by (Ngusie et al., 2022) which shows that computer literacy of health workers is one of the significant factors in using electronic medical records.

Based on the response of health workers in the study, it shows that the average respondent who feels a lack of knowledge of information and communication technology does not trust themselves in the change of paper-based systems to RME and concerns about changes in workflows. A change in mindset is absolutely needed to start working using technology. From those who were originally used to writing, in the future by using technology, they must get used to entering using a computer. This is in line with Ajami & Bagheri's research. (2013)

In the study, 72 (82.8) health workers were found to have high knowledge and good readiness in the adoption of RME. This score was higher than respondents who had high RME knowledge but were not ready for RME adoption, namely 20 (24.1) health workers. In the results of the statistical test with a value of p=0.000, the value of p<0.05 indicates that there is an influence between knowledge about RME and the readiness of health workers in the adoption of RME. This result means that if the knowledge about RME is higher, health workers will also be more prepared for the adoption of RME at Sayang Rakyat Hospital. The results of this study are in line with several previous studies. Oo et.al (2021) research shows that health workers with high knowledge of RME will have more people to adopt the RME system than those who have knowledge of low RME, as evidenced by the results of the p-value relationship test <0.001(Oo et al., 2021a) Third, the results of research by Abdulai & Adam (2020) which states that knowledge is a significant predictor of health workers' readiness, which is further explained that health workers who have prior knowledge are more likely to adopt the new system(Biruk S, 2014).

The prevalence of high knowledge about RME among health workers at Sayang Rakyat Hospital is 87 (53.0) respondents and higher than the findings of a study conducted in Myanmar where 51.1% of health professionals have a high level of knowledge of RME. The results of this study are consistent with research conducted in Iran where 53% of health professionals have a high level of RME knowledge. The results of this study were lower than similar studies conducted in eutophia reporting that 71.3% of health workers had a high level of RME knowledge. This difference may be due to the existing knowledge of RME, and the variability of categorization in the level of RME knowledge.

Based on the response of health workers in this study, it is found that there are still few health workers who know about the implementation of RME, the knowledge of health workers about RME at Sayang Rakyat Hospital is quite high, but there are several uses and advantages of the RME system that most health workers do not know. more than half of health workers know that the RME system can help clinicians in making decisions and improving care patient. Knowing the benefits of the RME system is one of the dimensions of knowledge about RME by health workers. Therefore, according to the researcher, it is necessary to provide more complete

information about the RME system to health workers at Sayang Rakyat Hospital so that it can improve the knowledge of health workers about the RME system which will eventually affect the readiness of the adoption of the RME system at Sayang Rakyat Hospital

The results showed that 59.8% of health workers were ready for RME adoption, with core readiness of 56.7% and engagement readiness of 50.0%. This research is in line with the results of research in Myanmar (Oo et al., 2021a) which showed a total readiness of 52.2%, and also a study in Northern Ghana respondents who had readiness in the adoption of RME was 54.9%(Abdulai & Adam, 2020). The results of this study were much lower than the study in Northern Ethiopia where the readiness of health professionals was 62.3%, and in the study in California where 73.0% of respondents were ready to use RME(Ngusie et al., 2022).

The majority of 93 (56.7) respondents were considered ready to *Core Readiness*, while no more than half of 82 (50.0) health workers. This research is in line with research conducted in eutophia where Core Readiness is 67.8% higher than Engagement Readiness is 60.9% (Berihun et al., 2020). A similar study was conducted in Ghana where Core Readiness was 67.2% higher than engagement readiness of 43.1%(Abdulai & Adam, 2020). This means that healthcare providers may have expressed their dissatisfaction with the paper recording system and realized the need for RME (core readiness). There are still quite a number of health workers who are still not actively involved in the implementation of RME and are worried about the potential negative impact of computerized systems (engagement readiness). *Engagement Readiness* which is lower than *Core Readiness* (fear and concern about the negative impact of RME and willingness to adopt RME) among caregiver professionals in this study may be partly due to the lack of RME knowledge and ICT literacy skills in healthcare workers.

Based on the responses of health workers in this study, it is illustrated that most of the health workers in the study consider paper documentation inefficient, feel dissatisfaction with the completeness and accuracy of data on paper-based medical records, fear of the potential impact of computerized record-keeping, and most of the health workers in this study know the benefits of implementing the RME system. This means health workers at Sayang Rakyat Hospital have the desire to adapt to RME even though there are still less than half of the respondents who show an attitude that they are not ready to receive RME, this may be because there is still a lack of desire to adapt to using RME in relation to the habits that have been carried out by health workers for many years so that greater efforts are needed(Saleh et al., 2016)

Based on sociodemographics, gender, age, education, and profession did not have a significant influence on the readiness of health workers to adopt RME with a p-value of <0.05, respectively, while the working period had a significant influence on the readiness of health workers in the adoption of RME. . It was found that health workers who worked for less than 5 years had a higher readiness, namely 76.1%, compared to 5 to less than 10 years 56% and more or equal to 10 years 47.1%. Based on the results of the statistical test, it shows that the p-value of the working period was 0.019 <0.05, so it was concluded that the working period had a significant effect on the readiness of RME adoption. The results of this study are in line with research by Abore et al. (2022) which stated that the working period is a factor that significantly affects the readiness of health workers. However, different results were shown by research

by Oo et al. (2021) that the working period of health workers did not affect readiness in the adoption of RME. The more health workers who are more prepared for health workers who have worked for less than 5 years than those who have worked for more than 5 years may be due to the lack of desire to adapt to using RME in relation to the habits that have been carried out by health workers for many years so that greater efforts are needed(Saleh et al., 2016).

In the study, 72 (82.8) health workers were found to have high knowledge and good readiness in the adoption of RME. This score was higher than respondents who had high RME knowledge but were not ready for RME adoption, namely 20 (24.1) health workers. In the results of the statistical test with a value of p=0.000, the value of p<0.05 indicates that there is an influence between knowledge about RME and the readiness of health workers in the adoption of RME. This result means that if the knowledge about RME is higher, health workers will also be more prepared for the adoption of RME at Sayang Rakyat Hospital. The results of this study are in line with several previous studies. Oo et.al (2021) research shows that health workers with high knowledge of RME will have more readiness for the adoption of RME systems than those with low knowledge of RME as evidenced by the results of the p-value relationship test <0.001(Oo et al., 2021a) Third, the results of research by Abdulai & Adam (2020) which states that knowledge is a significant predictor of health workers' readiness, which is further explained that health workers who have prior knowledge are more likely to adopt the new system(Biruk S, 2014).

CONCLUSIONS AND SUGGESTIONS

The results of the study show that there is an influence of knowledge about RME and ICT literacy on the readiness of RME adoption of health workers, and knowledge is the most dominant factor that affects readiness. These findings provide important insights into the development of training strategies and the implementation of RME in hospitals and other healthcare institutions. The socialization and training program is intended for users who have direct contact in using and operating electronic medical record technology and technology in general, this training program can be carried out before and at the same time as the implementation of the ongoing RME.

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