

# THE EFFECT OF INFORMATION AND COMMUNICATION TECHNOLOGY LITERACY, SELF-EFFICACY AND KNOWLEDGE ON THE READINESS OF HEALTH PROFESSIONAL FOR ADOPTING ELECTRONIC MEDICAL RECORDS AT SINJAI DISTRICT GENERAL HOSPITAL

**Idhawati Nahwing<sup>1\*</sup>, Alimin Maidin<sup>2</sup>, Lalu Muhammad Saleh<sup>3</sup>, Syahrir A. Pasinringi<sup>4</sup>, Fridawaty Rivai<sup>5</sup> and Irwandy<sup>6</sup>**

<sup>1,2,4,5,6</sup> Hospital Administration Study Program, Faculty of Public Health, Hasanuddin University.

<sup>3</sup> Occupation Health and Safety Program, Faculty of Public Health, Hasanuddin University.

Email: <sup>1</sup>dr.idhawati.nahwing@gmail.com (\*Corresponding Author), <sup>2</sup>aliminmaidin@gmail.com, <sup>3</sup>ms\_lalu79@yahoo.com, <sup>4</sup>syahrir65@yahoo.com, <sup>5</sup>fridarivai@yahoo.com, <sup>6</sup>wandy\_email@yahoo.co.id

DOI: [10.5281/zenodo.12754209](https://doi.org/10.5281/zenodo.12754209)

## Abstract

Adoption and utilization of EMR is still low, especially in developing countries. One of the factors that causes 50% of health institutions to fail to implement EMR is the lack of hospital readiness in implementing EMR, especially the lack of human resources readiness such as health professional as EMR users, both in terms of knowledge and skills in operating computers and their attitude towards EMR. This research aims to analyze the influence of information and communication technology literacy, knowledge, self-efficacy and sociodemographic characteristics on the health professional readiness to adopt electronic medical records at Sinjai District General Hospital. The type of research carried out is research quantitative using a cross sectional design study. The sample in this study was health professional at the sinjai district general hospital, totaling 201 respondents. Data were analyzed using SPSS version 22.0, using the chi-square test and logistic regression analysis. Overall readiness was 55.2% (core readiness 55.7% and engagement readiness 50.2%). Knowledge about EMR [Odds Ratio (OR): 3.259, 95% Confidence Interval (CI): 1.793–5.924] and ICT literacy (OR: 1.916, 95% CI: 1.054–3.483) are variables that influence the readiness of health professionals to EMR adoption. Studies indicate that readiness to embrace EMR is influenced by ICT literacy and EMR knowledge, with knowledge about EMR having the greatest impact on health professionals' readiness to use EMR. It is advised that hospital administration help all medical professionals who complete EMR forms in hospitals by offering training on the form. Moreover, health professionals should enhance their ICT literacy by participating in computer and information technology training sessions and conducting independent online research.

**Keywords:** Readiness for EMR Adoption, ICT Literacy, Knowledge about EMR, Self-Efficacy.

## INTRODUCTION

The rapid development of world technology currently also has an impact on the health sector, especially in terms of the application of digital information technology in hospitals. In the era of globalization of information, the flow of information is increasingly open, thus encouraging the health industry to use information technology as a support system in health services. As a result, hospital management is faced with challenges and demands to make changes and innovations in all fields in order to respond to consumer demands and needs in the future. Information and communication technology are currently an important part of information management, especially in terms of information system technology in hospitals. This

is because to provide, coordinate and integrate services in hospitals, adequate information is required (Koten et al., 2020).

The use of electronic medical records can support the demands of advances in information and communication technology because they are electronic based. EMR provides a number of benefits, namely ease of access to data, improved data collection, increased staff productivity, increased patient satisfaction with services and improved communication.

The Institute of Medicine (IOM) describes EMR as a system that can simplify the storage of patient clinical data and information, support decision making, encourage effective electronic communication regarding patient conditions, support patient safety, facilitate the administration and reporting of demographic data and medical data and can be equipped with decision support system.

Health care facilities implement EMR as an effort to improve service quality, patient satisfaction, documentation accuracy, reduce clinical errors and speed up access to patient data (Koten et al., 2020; Oo et al., 2021).

Lack of readiness is a major contributor to the failure of implementing EMR in the healthcare industry. Several studies in 1999 have shown that one of the factors that caused 50% of health institutions to fail to implement EMR was due to a lack of hospital readiness in implementing EMR (Sudirahayu & Harjoko, 2016; Sulistya & Rohmadi, 2021). Therefore, it is necessary to carry out a readiness assessment before implementing EMR (Sudirahayu & Harjoko, 2016; Sulistya & Rohmadi, 2021).

A better understanding of the use of EMR is an important factor for preparing to implement EMR. Readiness assessment is the most important step before implementation and a critical requirement for successful EMR adoption. This can help health facilities to identify barriers and to gauge organizational readiness with available resources (Oo et al., 2021).

The readiness assessment aims to evaluate the readiness of each organizational component for implementing the new system. One of the main barriers to successful implementation of EMR, as reported by many studies, is the acceptance of the new system by physicians and the potential disruption and changes that follow. It cannot be denied that health workers believe that EMR disrupts clinical workflow, reduces productivity and believes that changes can disrupt conditions in the workplace. Therefore, it is important to assess the readiness of health workers working on the front line (Biruk et al., 2014).

One important factor in implementing EMR is the need for readiness of human resources, especially health workers as EMR users, both in terms of knowledge and skills in operating computers and their attitude towards EMR (Kuek & Hakkennes, 2020). This is proven by research conducted by Delelegn et al in 2021. This research aims to identify barriers to EMR adoption in Ethiopia through a systematic review of the literature.

The conclusion of this research is that the most common barriers to EMR adoption are the absence of EMR related training, limited access to computers, poor computer literacy, poor knowledge of EMR, lack of technical support and the absence of manual instruction for EMR. Therefore, awareness of care professionals in hospitals is needed before implementing EMR so that they have good attitudes or behavior and develop their readiness for better system adoption (Yehualashet et al., 2021).

One strategy that can be used to improve medical record management at Sinjai District General Hospital is to implement EMR. Through the implementation of EMR, it is hoped that all patient data including identity, anamnesis, physical examination, laboratory, radiology, diagnosis and medical procedures given to patients can be carried out quickly, accurately, efficiently and facilitate reporting so that it can solve various problems in the medical records unit and the impact can be improve service quality. The results of interviews with the management of Sinjai District General Hospital, electronic-based medical records will be implemented at Sinjai District General Hospital at the end of 2023, therefore a readiness assessment is needed before this electronic medical record is implemented.

## **MATERIALS AND METHODS**

### **Location and research design**

This type of research is quantitative research that uses an analytical observational design with a cross sectional study design. This research will be carried out at the Sinjai District General Hospital in July – September 2023.

### **Population and sample**

The population of this study is all Health Professional at Sinjai District General Hospital, including doctors, nurses, midwives, pharmacists, nutritionists, and physiotherapists namely 369 people. The sample size in this study was determined using proportional random sampling and was obtained as many as 201 people.

### **Data analysis**

The research instrument used in collecting primary data was a questionnaire. A questionnaire is a data collection technique that is carried out by giving a set of questions or written statements to respondents to answer based on their conditions. Questionnaires were distributed according to the predetermined sample size. The initial part of the questionnaire consists of 5 items for demographic information, namely gender, age, education level, profession and period of work plus information on the unit/installation where the respondent is assigned.

The next section consists of 39 question items for ICT literacy, 25 question items for knowledge of electronic medical records, 13 question items for core readiness, 12 question items for engagement readiness, and 10 question items for Self Efficacy.

Data analysis in this study uses univariate analysis to analyze one variable separately, bivariate analysis uses the Chi-square test, and multivariate analysis uses multiple logistic regression tests to find the best model for a problem and analyze the influence between variables.

## **RESULTS**

Univariate analysis of the respondent characteristic variables stated that the majority of respondents were aged  $\geq 30$  years, totaling 178 respondents (88.6%). Judging from gender, the majority of respondents were female, totaling 171 respondents (85.1%). Based on education level, the majority of respondents had a diploma (D3/D4), totaling 95 respondents (47.3%).

Based on length of service, the majority of respondents had worked for >10 years, totaling 94 respondents (46.8%). Judging from occupation, the majority of respondents are nurses, totaling 113 respondents (56.2%) as follows:

**Table 1: Frequency Distribution of Respondents Based on Age, Gender, Education Level, Duration of Services and Occupation at Sinjai District General Hospital in 2023**

No	Variable	Category	N	%
1.	Age	< 30 years	23	11.4
		≥ 30 years	178	88.6
2.	Gender	Man	30	14.9
		Woman	171	85.1
3.	Level of education	Diploma	95	47.3
		Bachelor	89	44.3
		Postgraduate	17	8.5
4.	Duration of service	< 5 years	27	13.4
		5 – 10 years	80	39.8
		>10 years	94	46.8
5.	Occupation	Doctor	25	12.4
		Nurse	113	56.2
		Midwife	41	20.4
		Physiotherapist	7	3.5
		Pharmacist	7	3.5
		Nutritionist	8	4.0

Source: Primary Data, 2023

Univariate analysis of the variables of respondent readiness, ICT literacy, knowledge and self-efficacy stated that the majority of respondents were ready to implement EMR, totaling 111 respondents (55.2%). Judging from ICT literacy, the majority of respondents had high ICT literacy, totaling 106 respondents (52.07%). Based on knowledge about EMR, the majority of respondents had high knowledge, totaling 104 respondents (51.7%). Based on self-efficacy, the majority of respondents had high self-efficacy, totaling 111 respondents (55.2%) as follows:

**Table 2: Frequency Distribution of Respondents Based on EMR Adoption Readiness, ICT Literacy, Knowledge on EMR and Self-Efficacy at Sinjai District General Hospital in 2023**

No	Variable	Category	N	%
1.	Overall Readiness	Ready	111	55.2
		Not ready	90	44.8
2.	ICT literacy	High	106	52.07
		Low	95	47.03
3.	Knowledge on EMR	High	104	51.7
		Low	97	48.3
4.	Self-Efficacy	High	111	55.2
		Low	90	44.8

Source: Primary Data, 2023

Bivariate analysis using the Chi Square test obtained a p-value for the variables ICT Literacy, Knowledge about EMR, Self-Efficacy, and Work Experience < 0.05 so it can be concluded that there is a significant relationship between ICT Literacy, Knowledge

about EMR, Self-Efficacy, Gender, Level of education and Occupation regarding health professional readiness to adopt EMR as follows:

**Table 3: Bivariate Analysis of ICT Literacy, Knowledge on EMR, Self-Efficacy, and Respondent Characteristics of Health Professional Readiness for EMR Adoption at Sinjai District General Hospital in 2023**

Variable	Category	Readiness						p-value
		Ready		Not ready		Total		
		N	%	N	%	N	%	
ICT literacy	Tall	69	65.1	37	34.9	106	100	0.002
	Low	42	44.2	53	55.8	95	100	
Knowledge on EMR	Tall	73	70.2	31	29.8	104	100	0.000
	Low	38	39.2	59	60.8	97	100	
Self-Efficacy	Tall	65	58.6	46	41.4	111	100	0.181
	Low	46	51.1	44	48.9	60	100	
Age	<30 years	13	56.5	10	43.5	23	100	1.000
	≥30 years	98	55.1	80	44.9	178	100	
Gender	Man	20	66.7	10	33.3	30	100	0.243
	Woman	91	53.2	80	46.8	171	100	
Level of education	Diploma	50	52.6	45	47.4	95	100	0.181
	Bachelor	48	53.9	41	46.1	89	100	
	Postgraduate	13	76.5	4	23.5	17	100	
Duration of service	<5 years	16	59.3	11	40.7	27	100	0.324
	5-10 years	39	48.8	41	51.3	80	100	
	>10 years	56	59.6	38	40.4	94	100	
Occupation	Doctor	19	76	6	24	25	100	0.065
	Nurse	54	47.8	59	52.2	113	100	
	Midwife	23	56.1	18	43.9	41	100	
	Physiotherapist	6	85.7	1	14.3	7	100	
	Pharmacist	5	71.4	2	28.6	7	100	
	Nutritionist	4	50	4	50	8	100	

Source: Primary Data, 2023

Multivariate analysis using multiple logistic regression tests produced 5 analysis models. Based on the final model of multivariate analysis, it was found that knowledge about EMR significantly influenced health professional readiness to adopt EMR, with a p value = 0.000 (< 0.05). Apart from that, it was also found that ICT literacy significantly influenced health professional readiness to adopt EMR, with a value of p = 0.033 (< 0.05).

**Table 4: Multivariate Model the Influence of ICT Literacy, Knowledge on EMR, Self-Efficacy and Duration of Service on Health Professional Readiness for EMR Adoption at Sinjai District General Hospital in 2023**

Model	Variable	p-value	OR	95%CI
Model 1	Gender	0.119	2.066	0.829-5.152
	Level of education	0.749	0.918	0.543-1.552
	Occupation	0.137	0.799	0.594-1.075
	ICT literacy	0.034	1.934	1.051-3.561
	Knowledge on EMR	0.000	3.461	1.842-6.504
	Self-Efficacy	0.479	1.247	0.677-2.296
Model 2	Occupation	0.109	2.101	0.847-5.207
	Gender	0.145	0.810	0.610-1.075
	ICT literacy	0.031	1.952	1.067-3.585
	Knowledge on EMR	0.000	3.532	1.902-6.562
	Self-Efficacy	0.500	1.232	0.672-2.258

Model 3	Occupation	0.098	2.148	0.869-5.311
	Gender	0.158	0.815	0.614-1.082
	ICT literacy	0.026	1.986	1.084-3.639
	Knowledge on EMR	0.000	3.529	1.901-6.553
Model 4	Gender	0.181	1.812	0.758-4.332
	ICT literacy	0.028	1.959	1.074-3.576
	Knowledge on EMR	0.000	3.234	1.774-5.894
Model 5	ICT literacy	0.033	1.916	1.054-3.483
	Knowledge on EMR	0.000	3.259	1.793-5.924

Source: Primary Data, 2023

## DISCUSSION

The results of this research showed that 55.2% of respondents were ready to adopt EMR at Sinjai District General Hospital. This result is lower when compared with the results of research in Ethiopia by Awol et al. (2020) obtained a result of 62.3% and research by Biruk et al. (2014) obtained a result of 54.1%. Similar research was also conducted in Myanmar by Oo et al. (2021) showed a result of 52.2% and research at East Yangon General Hospital conducted by Htoo (2017) showed a result of only 36%. This difference in results can be explained by the fact that the readiness of health professional is probably related to technological developments in recent years, so that health professional increasingly accept technology and realize the importance of technology in the world of hospitals. Apart from that, this difference may also be caused by differences in samples and measuring tools/instruments used (Oo et al., 2021).

The results of statistical tests show that there are two variables that significantly influence the readiness of health professional at Sinjai District Hospital in adopting EMR, namely knowledge about EMR and ICT literacy. This result was obtained after removing one other variable from the analysis model, namely gender. The results of the multivariate analysis show that knowledge about EMR is the most dominant variable influencing health professional readiness for EMR adoption. This is proven by the results of statistical tests, where the OR (Odds Ratio) = 3.259. The OR value for knowledge about EMR is the highest compared to other variables which show an OR value = 1.916 for ICT literacy. This means that health professional who have high knowledge about EMR are 3.2 times more likely to be ready to adopt EMR. As previously explained in the section on the influence of knowledge about EMR on health professional readiness for EMR adoption.

The results of this study show that there is a significant influence of ICT literacy on the health professionals readiness to adopt EMR at Sinjai Regional Hospital with a value of  $p = 0.033$  ( $p < 0.05$ ). In this study, it was found that health professional who had high ICT literacy were 1.9 times more ready to adopt EMR compared to health professional who had low ICT literacy. This means that the higher the level of ICT literacy possessed by health professional, the more prepared they are to adopt EMR. These results are in line with several previous studies which show that the level of computer literacy possessed by health workers influences their readiness to adopt EMR (Abdullai & Adam, 2020; Awol et al., 2020; Biruk et al., 2014; Ngusie et al., 2022). The results of research conducted by Abdullai & Adam (2020) show that health workers with computer skills or those who are comfortable using computers are more likely to express their readiness. Research conducted by Awol et al. (2020) found that health workers who had high computer literacy were 3.3 times more ready to adopt

EMR than health workers who had low computer literacy. The results of research conducted by Biruk et al. (2014) shows that health workers who have high computer literacy are 1.64 times more ready to adopt EMR. Meanwhile, the results of research conducted by Ngusie et al. (2022) show that computer literacy plays an important role in determining the readiness of health service providers because these skills can help carry out tasks related to any computerized technology.

Other research also finds that health workers with high computer literacy will be better prepared to adopt RME. In this research, it was found that health workers with high computer literacy were 2.98 times more prepared to use the EMR system. It was further explained that someone who has computer skills will not experience difficulties when using the EMR system. This is because having this ability will make work related to digital technology easier. Thus it can be concluded that having computer skills is very necessary to manage and display data in the context of computerized technology (Walle et al., 2023).

In line with this research, research conducted by Berihun et al. (2020) also found that individuals with adequate computer literacy would be more willing to use the EMR system. Apart from that, research by Berihun et al. (2020) also shows that the probability of willingness to use EMR is 2.46 times higher for those who have computer literacy. Health workers who have a high level of computer literacy tend to feel comfortable when using EMR, which directly influences their views on using the system. It was further explained that the successful implementation and continued use of the EMR system in the health industry is very dependent on the computer literacy of all health workers involved in its use. In addition, computer literacy is considered a foundation for information communication and the use of EMR in the health care system.

In this study, it was found that there was a significant influence of knowledge about EMR on the health professionals readiness to adopt EMR at Sinjai District General Hospital, where the p value was obtained = 0.000, so the p value was < 0.05. Health professionals who have high knowledge of EMR are 3.2 times more prepared for EMR adoption compared to health professionals who have low knowledge. This means that the higher the level of knowledge about EMR possessed by health professionals, the better prepared they are for EMR adoption. These results are in line with several other studies. First, namely the results of research by Oo et al. (2021) it was found that knowledge about EMR is a related factor that significantly influences EMR adoption readiness. Further mentioned that health professional who have high knowledge of EMR tend to be more prepared for EMR adoption than those who have low knowledge, where health professionals who have good knowledge of EMR are 1.27 times more likely to be prepared. Second, the results of research conducted by Biruk et al. (2014) it was found that health professionals who had good knowledge of the EMR system were about 2.12 times more prepared than health professional who had poor knowledge. Third, namely the results of research conducted by Abore et al. (2022), where it was found that health professional who had good knowledge of the EMR system were 3.33 times more likely to be prepared than those who had poor knowledge. Fourth, the results of research conducted by Awol et al. (2020) found that health workers who have good knowledge of EMR are 2.64 times more likely to be ready to adopt EMR compared to those who have poor knowledge. Fifth, the results of research conducted by Yilma et al. (2022) shows that health workers with good

EMR knowledge are 1.88 times more likely to be ready to implement EMR than those with poor knowledge.

The results of the multivariate analysis show that knowledge about EMR is the most dominant factor in influencing health professional readiness to adopt EMR as shown by the value OR=3.259. The OR value for knowledge about EMR is the highest OR value when compared with other factors which shows OR=1.916 for the ICT literacy factor. This means that health professional who have high knowledge of EMR are 3.2 times more likely to be ready to adopt EMR. As previously explained in the section on the influence of knowledge about EMR on health professional readiness for EMR adoption.

## CONCLUSIONS AND RECOMMENDATIONS

The research results show that there is an influence of knowledge about EMR and ICT literacy on health professional readiness to adopt EMR. It was found that the majority of health professional have high knowledge about the benefits and potential of EMR in improving efficiency, patient privacy and quality of care in hospitals although there are several aspects that still need to be improved such as understanding of ICD codes and the specific benefits of EMR in clinical practice and patient monitoring . In addition, the majority of respondents feel confident in using EMR, but some still doubt their abilities. Therefore, it is important to increase health professional computer literacy to support the successful and efficient adoption of EMR technology in the hospital environment. It is recommended that hospital management provide support through training on EMR. Furthermore, it is necessary to increase ICT literacy by participating in computer and information technology training sessions and conducting independent online research.

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