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Effectiveness of EMR Training To Readiness Of Professional Health Workers To Use EMR In Health Services : Meta Analysis

Hendra Dwi Kurniawan[1*], Rizki Aqsyari. D[2], Aem Ismail[3], Julhan Irfandi[4]

[1,2] Sekolah Tinggi Ilmu Kesehatan Panti Kosala, Sukoharjo, Indonesia
[3]Politeknik Insan Husada Surakarta, Indonesia
[4] Masters Program in Public Health, Universitas Sebelas Maret, Surakarta, Indonesia

[*]*Corresponding Author: hendradeeka@gmail.com*

Abstract. *Health services are undergoing changes in terms of digitalization. Electronic Medical Record (EMR) is one form of change in the impact of digitalization in the health service sector. It is hoped that the existence of EMR in the health services sector can improve the performance of health workers in providing services to patients so that it can improve the level of public health. However, with EMR there are still problems in its use. Many health service institutions apply several methods to adapt to changes or novelties in the field of EMR, one of which is by providing training on the use of EMR to health workers. This research aims to determine the effectiveness of EMR training on the readiness of health workers in using EMR in health services. This research uses meta analysis and systematic review methods with the PICO model (P = EMR users, I = EMR training, C = Non EMR training, O = readiness to use EMR). Articles were obtained through searching articles in the PubMed database. The articles used are full-text articles from 2019 to 2024. Articles were selected using the PRISMA flow diagram. Articles were analyzed using the RevMan 5.3 application. A total of 5 articles analyzed came from Ethiopia. The study results show that EMR training can increase the readiness of health workers to use EMR to support health services (aOR = 1.87; CI 95% = 0.92 – 3.79; p = 0.08)**. *Health workers who receive EMR training will be 1.87 times better prepared to use EMR in health services than health workers who do not receive previous EMR training.*

Keywords: *EMR, readiness to use EMR, training.*

1. INTRODUCTION

The development of the digitalization era continues to experience developments and innovations that have an impact on many service sectors. One of the service sectors that has been affected by the development of the digitalization era is the health sector. Health services are experiencing a transition period in the health information systems they use. This transition period is a move from minimizing the use of documents in hard file form, therefore there is one system that can replace it, namely electronic health. One of the programs contained in electronic health is the Electronic Medical Record (RME) program or often also called Electronic Medical Record (EMR).

Electronic Medical Record (EMR) is a patient's medical record or record created using a computerized system which contains the patient's identity, data on examination results, actions, treatment and other services from the patient which are intended for the maintenance of medical records in every health service, including hospitals. [1]. Electronic Medical Records (RME) are part of the Hospital Information System (SIM-RS). Contemporary hospitals have integrated RME with the SIM-RS application which is the

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main application, along with various other supporting applications [2]. It is hoped that the EMR program will have a positive impact on progress in health services [3]. However, implementing and implementing the use of EMR is certainly not easy, there are many obstacles faced by users, namely health workers.

Electronic medical records are designed to increase the efficiency of medical record management and enable faster and easier data access, improving data integration between hospital management systems and other systems. This reduces human error, reduces storage space requirements, and has many other benefits. Currently, however, many hospitals and other healthcare facilities continue to use manual medical records. The use of manual medical records tends to be slow, prone to errors, and ineffective.

Not all health services are able to implement EMR in their service systems. Because the readiness of each health service unit is different. Hospitals and health facilities have several reasons why not all of them have implemented electronic medical records in their service systems. Several factors that influence this include, but are not limited to, inadequate system implementation, data security issues, insufficient internet network availability, and training and adaptation that require a lot of time for medical recorders [4].

2. MATERIAL AND METHODS

Design

The study design used in this research is a meta analysis and systematic review study with the PICO model (Population = EMR users, Intervention = EMR training, Comparison = Non EMR training, Outcome = readiness to use EMR). Articles were obtained through searching articles in the PubMed database. The articles used are full-text articles from 2020 to 2024. Articles were selected using the PRISMA flow diagram. Articles were analyzed using the RevMan 5.3.

Steps of Meta-Analysis

Meta-analysis analysis was carried out through 5 steps as follows:

1. Formulate research questions using the PICO model (Population = EMR users, Intervention = EMR training, Comparison = Non EMR training, Outcome = readiness to use EMR).
2. Search for research articles from online databases, namely PubMed.
3. Conduct screening and assess the quality of the research articles obtained.
4. Extract and analyze data into RevMan 5.3 software.
5. Interpret the results and draw conclusions.

Inclusion Criteria

The articles included in this research are full paper articles with a cross-sectional study design. The research subjects were health service facilities that used an electronic medical record system. Selected articles discuss training provided in the use of electronic medical record systems.

Exclusion Criteria

Articles that were not used in this research were articles with a cohort study design, articles that were not full-text, and articles that were not published in English.

Operational Definition of Variables

The article search was carried out by considering the eligibility criteria determined using the PICO Model. The research population is hospitals that use EMR, the intervention is training in using EMR, the comparison is without training in using EMR, and the result is the readiness of medical personnel in using the EMR system.

Study Instrument

This research uses the PRISMA diagram and evaluates the article using Critical Appraisal.

Data Analysis

Data processing was carried out using Review Manager (RevMan 5.3) by entering the adjusted odds ratio (aOR) value to determine the combined study model and form the final meta-analysis results. Forest plots and funnel plots are used to determine the size of the relationship and heterogeneity of research data.

3. RESULT

The article search process was carried out through the online journal database, namely PubMed. The review process for related articles can be seen in the PRISMA flowchart in Figure 1. Research related to training in the use of EMR as an effort to prepare health workers to use it totals 5 articles. The initial search process yielded 436 articles, after the deletion process 388 articles were obtained, 9 of which met the requirements for further full text review, 5 articles that met the quality assessment were included in the quantitative synthesis meta-analysis. This research article comes from the country of Ethiopia.

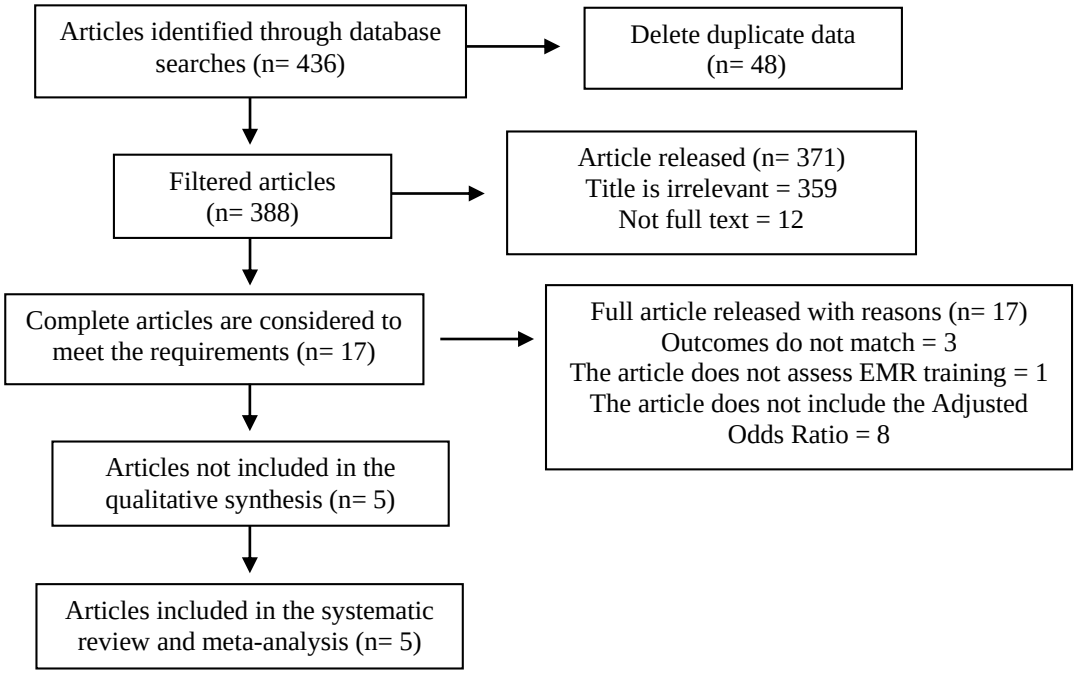

Figure 1. PRISMA Flow Diagram

The first search procedure, depicted in Figure 1, produced a total of 436 articles. Duplicate articles from multiple journals were eliminated, yielding a total of 388 articles, of which 17 were qualified for additional full text study. Five articles in all fulfilled the standards for the full text review. A map of Ethiopia, the primary study region for this meta-analysis, is presented in Figure 2. At the conclusion of the screening procedure, five papers satiated the quantitative requirements. Cross-sectional studies were used in every publication.

Figure 2. Study distribution map

Table 1. Summary of primary study article with a cross-sectional design

Author	Negara	Desain Studi	Sampel	P Population	I Intervention	C Comparison	O Outcome
Awol et al., (2020)	Ethiopia	cross-sectional	414	Professional health workers	Positivity toward EMR, proficiency with computers, and attendance at EMR training	lack of computer literacy and abilities, unfavorable attitude regarding EMR, and never having attended EMR training	EMR adoption readiness
Berihun et al., (2020)	Ethiopia	cross-sectional	636	Professional health workers	Obtain EMR training and assistance, and possess the necessary computer capabilities	Lack of assistance and training for EMR, insufficient computer skills	EMR readiness
Ngusie et al., (2022)	Ethiopia	cross-sectional	423	Professional health workers	Computer access, computer literacy, strong self-efficacy, perceived benefits, EMR training, and technical support	Lack of computer literacy, availability of computers, benefits perceived, high self-efficacy, and receipt of EMR training and technical assistance	EMR adoption readiness
Tolera et al., (2022)	Ethiopia	cross-sectional	629	Professional health workers	Sufficient computing abilities, a positive outlook on EMR, and a strong sense of benefit	Low perceived benefit, unfavorable attitude toward EMR, and inadequate computer abilities	Use of EMR

Yilma et al., (2022)	Ethiopia	cross-sectional	1520	Professional health workers	Possess a favorable outlook regarding EHR, computer proficiency, and access to computers	Lack access to computers, have no computer training, and view electronic medical records negatively	EMR readiness

Table 2. Article Assessment Criteria

	Question criteria														Total
	1				2		3		4		5	6		7	
	a	b	c	d	a	b	a	b	a	b		a	b		
Awol et al., (2020)	2	2	2	2	2	2	2	2	2	2	2	2	2	1	27
Berihun et al., (2020)	2	2	2	2	2	2	2	2	2	2	2	2	2	1	27
Ngusie et al., (2022)	2	2	2	2	2	2	2	2	2	2	2	2	2	1	27
Tolera et al., (2022)	2	2	2	2	2	2	2	2	2	2	2	2	2	1	27
Yilma et al., (2022)	2	2	2	2	2	2	2	2	2	2	2	2	2	1	27

Description of the answer score:

0= No

1= Doubtful

2= Yes

Question criteria descriptions:

1. Formulation of research questions in the acronym PICO
    a. Is Is the population in the primary study the same as the population in the PICO meta-analysis?
    b. Is the operational definition of intervention, namely exposed status in the primary study, the same as the definition intended in the meta-analysis?
    c. Is the comparison, namely the unexposed status used by the primary study, the same as the definition intended in the meta-analysis
    d. Are the outcome variables examined in the primary studies the same as the definition intended in the meta analysis?

2. Methods for selecting research subjects
    a. Does the target population and accessible population not experience the outcomes studied at the start of the study?
    b. Is there a distinction between the exposed group and the unexposed group and the unexposed group at the start of the study?
3. Methods for measuring exposure (intervention) and outcome variables
    a. Are exposure and outcome variables measured with the same instruments in all primary studies?
    b. If the variable is measured on a categorical scale, are the cutoffs or categories used the same across primary studies?
4. Design-related bias
    a. Is there no possibility of "Loss-to Follow-up Bias" in primary studies?
    b. Have primary study researchers made efforts to prevent or overcome such bias (for example, selecting highly motivated subjects, subjects who are easy to follow, or providing incentives to subjects so they do not drop out)
5. Methods for controlling confounding

    Have primary study researchers made efforts to control the influence of confounding? (for example, carrying out multivariate analysis to control the influence of a number of confounding factors, or do the matching)
6. Statistical analysis methods

    Does the researcher analyze the data in this primary study using a multivariate analysis model? (e.g., multiple linear regression analysis, multiple logistic regression analysis, Cox regression analysis)
7. Conflict of interest

    Is there no possibility of a conflict of interest with the research sponsor, which could cause bias in concluding the research results?

Table 3. Data on adjusted odds ratio (aOR) and 95% confidence interval (CI 95%)

Author (years)	aOR	CI 95%	
		Lower limit	Upper limit
Awol et al., (2020)	3.63	1.69	7.80
Berihun et al., (2020)	3.75	1.73	8.13
Ngusie et al., (2022)	1.92	0.61	6.04
Tolera et al., (2022)	0.45	0.20	1.01
Yilma et al., (2022)	1.88	1.19	2.97

Forest Plot

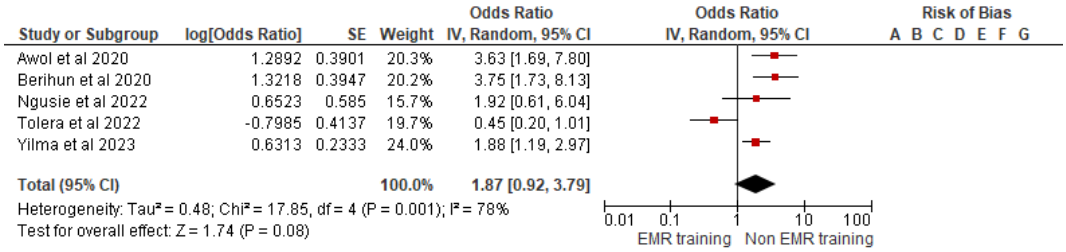

Figure 3. Forest plot of Effectiveness of EMR Training To Readiness Of Professional Health Workers To Use EMR In Health Services

According to the forest plot, health professionals who have undergone EMR training are 1.87 times more prepared to use EMR in healthcare settings than those who have not, and this difference is statistically significant (aOR 187; 95% CI = 0.92 to 3.79; p = 0.01).

Funnel Plot

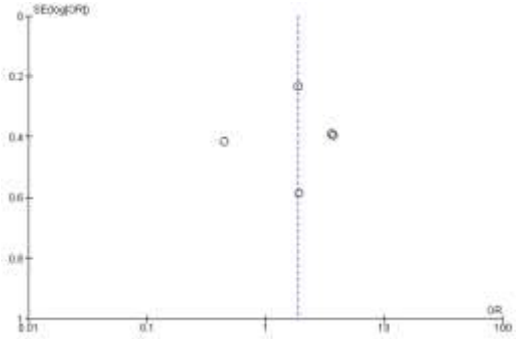

Figure 4. Funnel plot Effectiveness of EMR Training To Readiness Of Professional Health Workers To Use EMR In Health Services

The funnel plot shows that there is potential for publication bias, characterized by an overestimate effect, which is characterized by an asymmetrical distribution between plots (1 plot on the left, 2 plots on the right, and 2 plots touching the vertical line).

4. DISSCUSION

Health workers are experiencing a transition period in health administration that they are required to carry out. One of them is the use of EMR in health services. In general, health workers are still ill-equipped to use EMRs. Efforts to increase the readiness of health workers in a comprehensive manner are very important to improve knowledge, attitudes and computer skills among health workers [5]. There are still many health workers who do not understand the use of EMR and also lack the use of digital documentation. This is seen as one of the aspects that can hinder the implementation of EMR in health service facilities. Therefore, it is necessary to provide EMR education or training for all health workers, whether they already understand it or those who do not understand it [6].

Research conducted by Ngusie et al., (2022) stated that there was a significant difference in the readiness to use EMR by health workers who were classified as young and health workers who were classified as older. This states that older health workers need training in the use of EMR, so that they better understand how to use and utilize the program properly and appropriately [7]. This is in line with research conducted by Tolera et al., (2022) which stated that it was found that workforce readiness was low in using the EMR program in health services, therefore socialization and training were greatly needed to increase this readiness [8][9].

If all health workers are ready and able to use and utilize EMR in health services, it is hoped that the existing health service system can be more optimal and the quality of services provided can increase. So if the quality of health services increases, it can also increase patient satisfaction [10]. Where patient satisfaction status is an indicator that needs to be considered in providing health services [11]. Therefore, from the results of the meta-analysis in this study, it was found that training in the use of EMR can increase the readiness of health workers to use it and make optimal use of it.

The implementation of EMR in health services is a new change and can be an effort to improve the quality of current health services. Both health workers and health service agencies need to prepare how all human resources in health services can be ready to implement EMR in accordance with the initial objectives of the program.

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