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Meta-Analysis
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Meta Analysis: Effects of Computer Skill and Management Support on Readiness to Use Electronic Medical Record in Health Workers

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ABSTRACT

Background: Electronic Medical Record (EMR) is an information technology that has proven its benefits in improving service quality. This study aims to analyze the effect of computer skills and management support on health workers' willingness to use EMR.
Subjects and Method: This research is a systematic review and meta-analysis study using the PRISMA diagram and PICO model. Population: health workers, Intervention: computer skills and management support, Comparison: low computer skills and no management support, Outcome: willingness to use EMR. The articles used came from Google Scholar, Pubmed, and Elsevier which were published from 2013 - 2023. The keywords used in the search were (computer skills OR Management support) AND ("willingness to use" OR "willingness to utilize" OR "readiness to implement") AND (EMR OR electronic medical record) AND "odds ratio" AND "cross-sectional study" AND ("health personnel" OR "health workers" OR "health professionals"). The inclusion criteria for this study were full paper articles with cross-sectional studies. The analysis used was multivariate with adjusted Odds Ratio. Eligible articles were analyzed using the Revman 5.3 application.
Results: Meta-analysis was conducted on 11 articles with a cross-sectional research design. Health workers who have high computer skills were 2.62 times more likely to use EMR than health workers who have low computer skills (aOR= 2.62; 95% CI= 1.92 to 3.57; p= 0.050). Health workers who received Management support were 1.87 times more likely to use EMR than health workers who did not have Management support (aOR= 1.87; 95% CI= 1.40 to 2.51; p= 0.030).
Conclusion: Computer skills and management support influence the willingness to use EMR among health workers.

Keywords: computer skills, electronic medical records, health workers, management support

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BACKGROUND

Health care systems around the world are implementing health information technology to improve access to health care and the effectiveness and efficiency of health systems. The form of health information produced by

health facilities is in the form of medical records. Medical records are information that contains administrative data and clinical data on the patient's history (Yilma, 2023). Information and communication technology is currently used by many countries to improve access, effectiveness and efficiency of health services. The implementation of electronic medical records (EMR) is a priority agenda not only in developed countries but also in many developing countries. Hospitals/ health institutions must implement an EMR system so that the data contained in conventional medical records can be integrated (Jeremia et al., 2023).

EMR systems are increasingly being implemented into healthcare systems in developing countries to improve the effectiveness and efficiency of healthcare institutions. Inaccuracy, untimeliness, incompleteness and inconsistency of paper-based data are the main trigger points for the implementation of EMR in developing countries (Koten et al., 2020). The Indonesian Ministry of Health has updated regulations regarding medical records by establishing Minister of Health Regulation NO. 24 of 2022 concerning medical records, one of which is to realize the implementation and management of digital-based and integrated medical records. Through this regulation, all health service facilities, whether in the form of legal entities or individually owned, are required to maintain electronic medical records (EMR) by the end of 2023 (Jeremia et al, 2023).

In the use of EMR systems, there are various challenges that influence the willingness to use EMR systems by health workers in developing countries. One factor that contributes to the low adoption rate of EMR systems is that implementers in low and middle income countries fail to assess organizational and staff readiness in implementing and using EMR systems (Berihun et al, 2020). When an organization is not prepared, it is unable to handle the process of implementing electronic medical records (Pradnyantara et al, 2022). There are several ways to overcome EMR-related problems, namely by understanding the factors that influence the desire to use an EMR system by health workers. As health workers are the main actors in system adaptation and sustainability, interventions are needed to build readiness in the EMR system (Biruk et al, 2014).

Studies have shown that lack of knowledge, skills, availability of skilled human resources, resource availability, computer literacy, English language proficiency, educational status, managerial support, and training are factors that potentially influence the willingness to use EMR systems by healthcare workers (Senishaw et al. 2023).

SUBJECTS AND METHOD

1. Study Design

This research is quantitative research with a meta-analysis study design. The review was systematically analyzed using the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) guidelines. The article search process was carried out systematically and comprehensively using electronic databases including Google Scholar, Pubmed, and Elseveir which were published from 2013 to 2023. The keywords used in the search were (computer skills OR Management support) AND ("willingness to use" OR "willingness to utilize" OR "readiness to implement") AND (EMR OR electronic medical record) AND "odds ratio" AND "cross-sectional study" AND ("health personnel" OR "health workers" OR "health professionals"). Data analysis was carried out using review manager software (RevMan) 5.3. There were 11 primary studies that met the inclusion criteria for this study.

2. Steps of Meta-Analysis

Meta-analysis was carried out through the following 5 steps:

1) Formulate research questions using the PICO model.
2) Search for primary study articles from electronic databases.
3) Conduct screening and carry out critical appraisal of primary studies.
4) Extract data and enter effect estimates from each primary study into the RevMan 5.3 application. The results of the article analysis are presented in the form of an overall aOR, describing the 95% confident interval (CI) using model effects and data heterogeneity (I^2).
5) Interpret the results and draw conclusions.

3. Inclusion Criteria

Full-text paper research articles used cross-sectional study designs. The analysis used in the article was multivariate by ensuring the adjusted odds ratio (aOR). The research subjects were health workers. Intervention in the form of computer skills and management support. Outcome was willingness to use EMR.

4. Exclusion Criteria

Exclusion criteria for articles used in this study were articles published in languages other than English, articles published before 2013, duplicate articles.

5. Operational Definition

Electronic medical records (EMR): a documents that contain patient identity data, examinations, treatment, procedures and other services that have been provided to patients.

Computer skill: The computer skills healthcare workers have to run the EMR

Management support: provided to health workers is in the form of moral and material support.

6. Study Instrument

The systematic learning guide used is the PRISMA flowchart guide and assessing the quality of research articles using the Critical Appraisal Skills Program Crosssectional Checklist (CASP for Crosssectional).

7. Data Analysis

This research was conducted using secondary data which are findings from previous studies. Data processing was carried out using RevMan 5.3 software by calculating effect size and heterogeneity (I2) to determine the combined research model and form the final results of the meta-analysis. The results of data analysis are presented in the form of forest plots and funnel plots.

RESULTS

The meta-analysis process began with determining the research question. The question in this study is whether computer skills and management support influence the willingness to use EMR. Formulating PICO aims to be used as a reference for searching for relevant articles. Article searches were carried out comprehensively through several online databases such as Google Scholar, Pubmed, and Elseveir.

The article selection process is shown by the prism flow chart which can be seen in Figure 1. It shows that the results of searching for articles from several databases obtained 7,393 related articles. After that, duplicate data was removed for 3,022 articles so that 4,371 articles were filtered. Based on the filtered articles, 4,344 articles were excluded because the title was irrelevant and the article was not a primary study, so there were 27 articles that were considered eligible, then 11 articles were included in the meta-analysis synthesis.

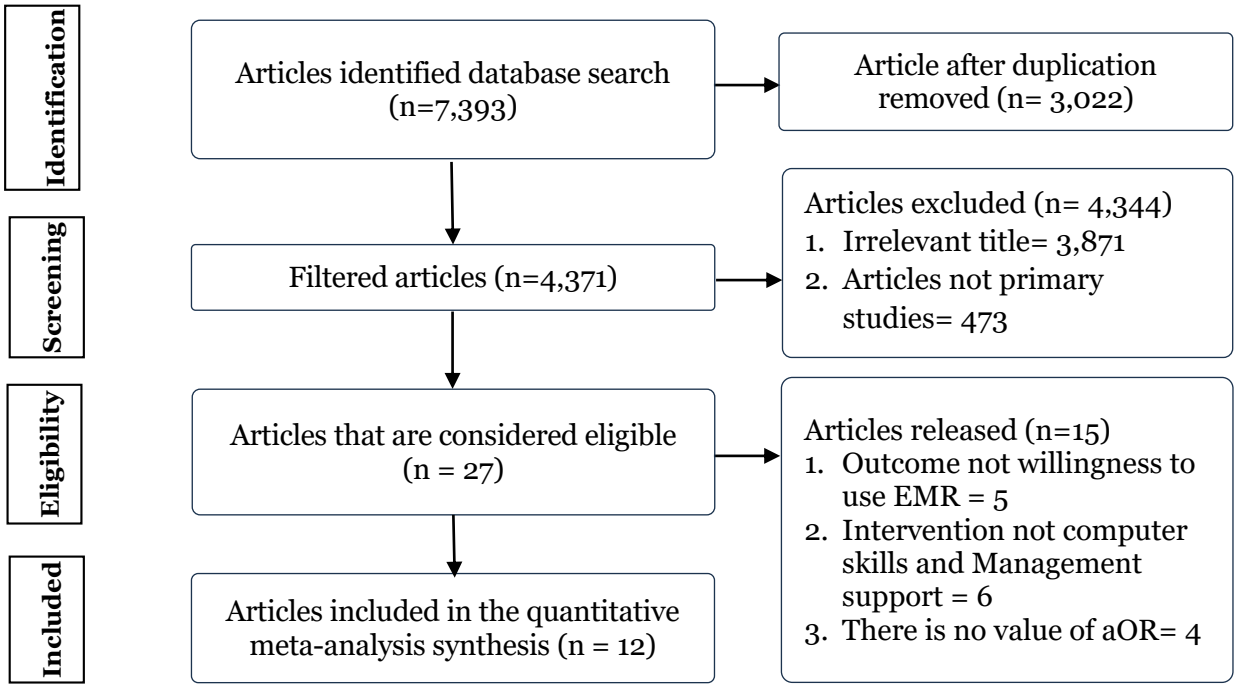

Figure 1. PRISMA Flow diagram

Figure 2. Study area map of the influence of computer skills and management support on the willingness to use EMR

Table 1. Critical appraisal of cross-sectional studies of the influence of computer skills and management support on the willingness to use EMR

Primary Study	Criteria													Total
	1a	1b	1c	1d	2a	2b	3a	3b	4	5	6a	6b	7	
Berihun et al., 2020	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Biruk et al., 2014	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Ngusie et al., 2022	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Tolera et al., 2022	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Gashu et al., 2022	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Hailegebral et al., 2023	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Seboka et al., 2021	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Mekonin et al., 2023	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Mengistu et al., 2021	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Senishaw et al.,2023	2	2	2	2	2	2	2	2	2	2	2	2	2	26
Samuel et al., 2016	2	2	2	2	2	2	2	2	2	2	2	2	2	26

Description: 2= Yes; 1= Uncertain; 0= No

Question criteria descriptions:

1. Fromulation of research questions in the acronym PICO

a. 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 the 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 study the same as the definition intended in the meta-analysis?

2. Methods for selecting research subjects

a. In analytical cross-sectional studies, does the researcher select samples from the population randomly (random sampling)?

b. As an alternative, if in a cross-sectional analytical study the sample is not selected randomly, does the researcher select the sample based on outcome status or based on intervention status?

3. Methods for measuring exposure (intervention) and outcome

a. Are the exposure and outcome variables measured with the same instruments (measuring tools) 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

If the sample was not chosen randomly, has the researcher made efforts to prevent bias in selecting research subjects? For example, in selecting subjects based on outcome status it is not affected by exposure status (intervention), or in selecting subjects based on exposure status (intervention) it is not affected by outcome status?

5. Methods for controlling confusion

Have primary study investigators made efforts to control the influence of confounding (for example, conducting multivariate analysis to control for the influence of a number of confounding factors)?

6. Statistical analysis methods

a. Did the researcher analyze the data in this primary study using a multivariate analysis model (for example, multiple linear regression analysis, multiple logistic regression analysis)?

b. Does the primary study report effect sizes or relationships resulting from multivariate analysis (eg, adjusted OR, adjusted regression coefficient)?

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 2. Description of primary studies on the effect of computer skills on willingness to use EMR (n=3,318)

Author	Country	Sample	P	I	C	O
Berihun *et al.*, 2020	Ethiopia	634	Professional health workers	Computer skill	Low Computer skill	Willingness to use EMR
Biruk *et al.*, 2014	Ethiopia	606	Health workers	Computer skill	Low Computer skill	Readiness of health workers in using EMR
Tolera *et al.*, 2022	Ethiopia	402	Professional health workers	Computer skill	Low Computer skill	Willingness to use EMR
Gashu *et al.*, 2023	Ethiopia	414	Professional health workers	Computer skill	Low Computer skill	Willingness to use EMR
Ngusie *et al.*, 2022	Ethiopia	423	Health workers	Computer skill	Low Computer skill	Willingness to use EMR
Senishaw *et al.*, 2020	Ethiopia	423	Health workers	Computer skill	Low Computer skill	Willingness to use EMR
Hailegebral *et al.,* 2023	Ethiopia	416	Health workers	Computer skill	Low Computer skill	Willingness to use EMR

Table 3. Adjusted Odd Ratio (aOR) of the effect of computer skills on the willingness to use EMR

Author (Year)	aOR	CI 95%	
		Lower Limit	Upper Limit
Berihun *et al.*, 2020	2.46	1.31	4.61
Biruk *et al.*, 2014	2.55	1.62	3.76
Tolera *et al.,* 2022	1.32	0.68	2.56
Gashu *et al.,* 2023	3.30	2.05	5.31
Ngusie *et al.,* 2022	1.297	3.885	4.330
Senishaw *et al.*, 2020	1.77	1.002	3.148
Hailegebral *et al.*, 2023	3.06	1.49	6.29

The effect of management support on the willingness to use EMR among health workers

Table 2 presents descriptions of 7 primary articles with cross-sectional studies included in the meta-analysis of the influence of computer skills on willingness to use EMR among health workers with a total sample of 3,318.

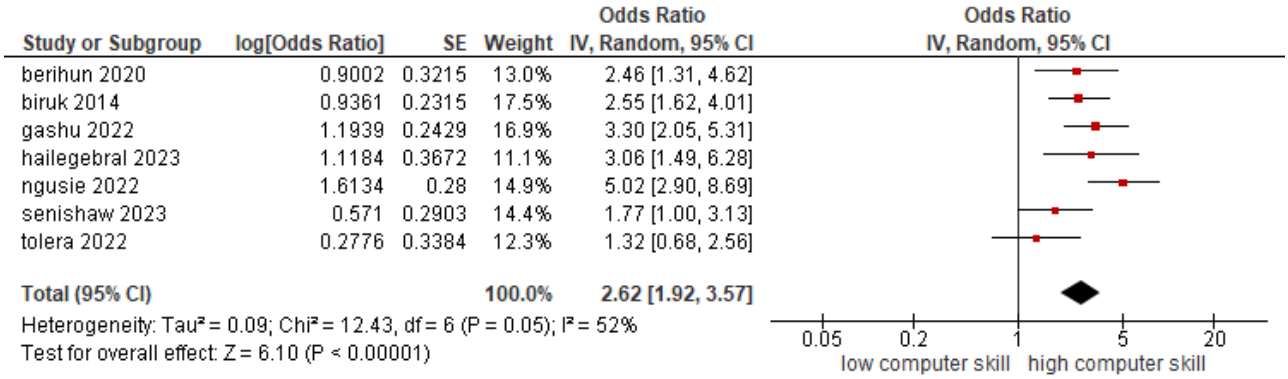

Figure 3. Forest plot of the effect of computer skills on the willingness to use EMR among health workers

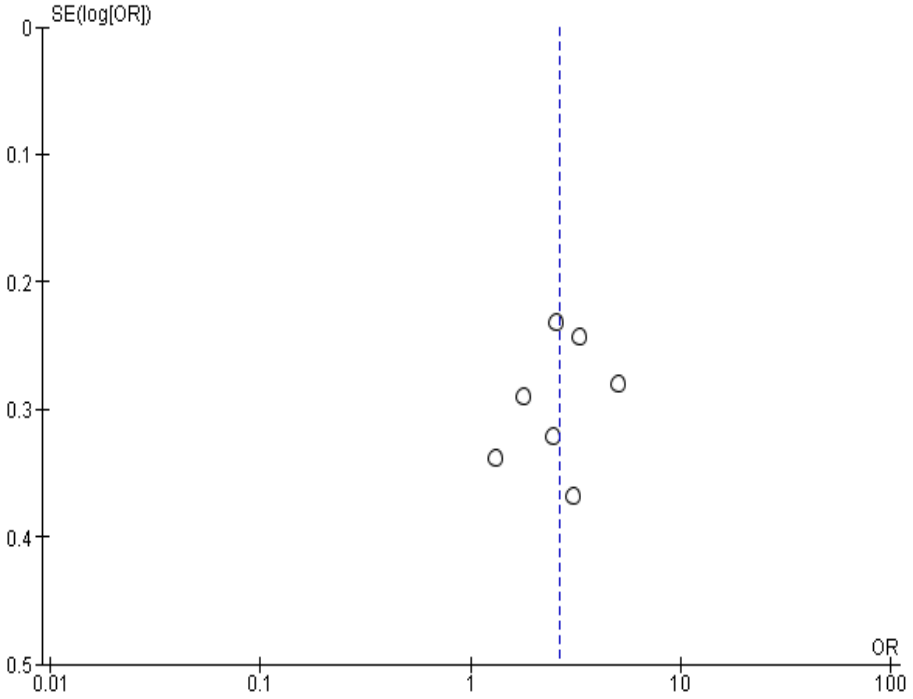

Figure 4. Funnel plot of the influence of computer skills on the willingness to use EMR among health workers

The forest plot in Figure 3 shows that there was a high influence of computer skills on the willingness to use EMR among health workers, and this influence was statistically significant. Health workers who have high computer skills were 2.62 times more likely to use EMR than health workers who have low computer skills (aOR= 2.62; 95% CI= 1.92 to 3.57; p= 0.050). The forest plot also showed high heterogeneity of effect estimates between primary studies (I^2= 52%; p < 0.001). Thus, the calculation of effect estimates used a random effect model approach.

The funnel plot in Figure 4 shows that the distribution of effect estimates was more or less balanced to the right and left of the vertical line of mean estimates. Thus, the funnel plot did not indicate publication bias.

The Effect of Management Support on The Willingness to Use EMR among Health Workers

Table 4 presents descriptions of 8 primary articles with cross-sectional studies included in the meta-analysis of the influence of feedback on SIKR utilization, with a total sample of 3,845 samples.

Table 4. PICO table summary of primary study cross sectional articles with sample size (n= 3,845)

Author	Country	Sample	P	I	C	O
Berihun et al., 2020	Ethiopia	634	Professional health workers	Management support	No management support	Willingness to use EMR
mekonin et al, 2023	Ethiopia	498	Health workers	Management support from the facility	No management support	Readiness of health workers in using EMR
Seboka et al., 2021	Ethiopia	423	Professional health workers	Computer skill	No management support	Readiness of health workers in using EMR
Mengistu et al., 2021	Ethiopia	408	Professional health workers	Computer skill	No management support	Willingness to use EMR
Samuel et al., 2016	Ethiopia	620	Professional health workers	Computer skill	No management support	Willingness to use EMR
Ngusie et al., 2022	Ethiopia	423	Health workers	Computer skill	No management support	Willingness to use EMR
Senishaw et al., 2020	Ethiopia	423	Health workers	Computer skill	No management support	Willingness to use EMR
Hailegebral et al., 2023	Ethiopia	416	Health workers	Computer skill	No management support	Willingness to use EMR

Table 5. Adjusted Odd Ratio (aOR) value of the effect of management support on willingness to use EMR among health workers

Author (Year)	aOR	CI 95%	
		Lower Limit	Upper Limit
Berihun et al., 2020	2.59	1.40	4.77
Mekonin et al., 2023	1.82	1.10	2.99
Seboka et al., 2021	1.7	1.1	2.6
Mengistu et al., 2021	1.734	1.212	2.481
Samuel et al., 2016	3.536	2.250	5.558
Ngusie et al., 2022	1.87	0.95	3.68
Senishaw et al., 2023	0.79	0.488	1.402
Hailegebral et al., 2023	0.91	0.52	1.60

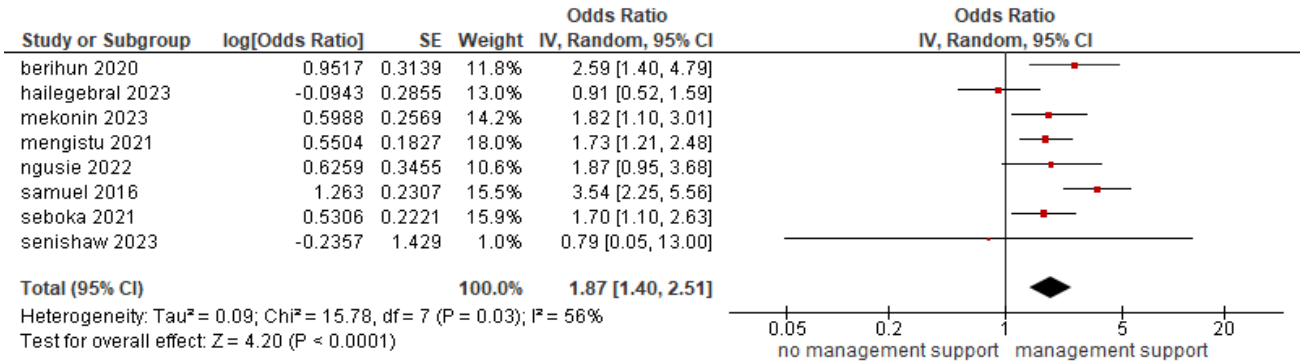

Figure 5. Forest plot of the effect of management support on the willingness to use EMR among health workers

The forest plot in Figure 5 shows that there was an effect of Management support on the willingness to use EMR among health workers, and this effect was statistically significant. Health workers who received management support were 1.87 times more willing to use EMR than health workers who did not receive management support (aOR= 1.87; 95% CI= 1.40 to 2.51; p= 0.030). The forest plot also showed high heterogeneity of effect estimates between primary studies (I2= 56%; p < 0.001). Thus the calculation of effect estimates used a random effect model approach.

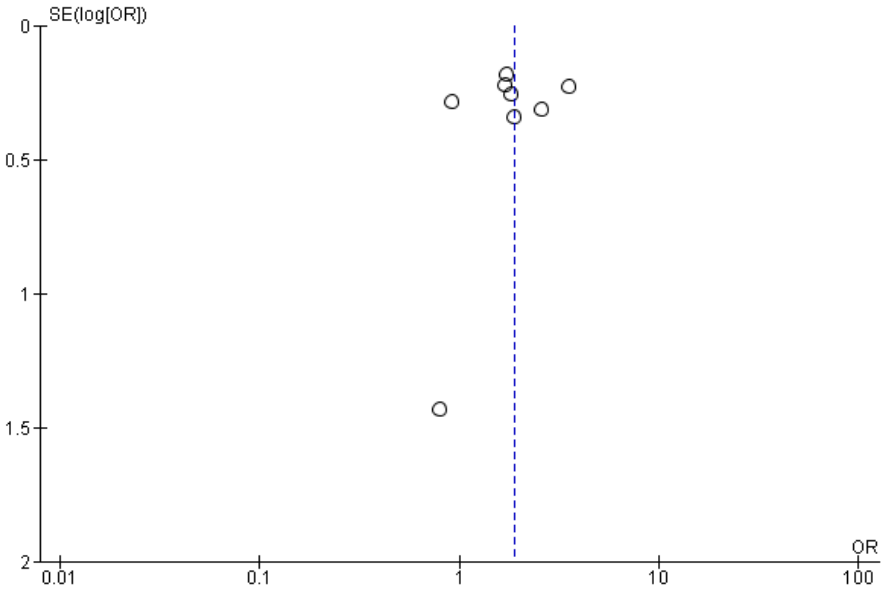

Figure 6. Funnel plot of the effect of management support on the willingness to use EMR among health workers

The funnel plot in Figure 6 shows a more or less equal distribution of effect estimates to the right and left of the vertical line of mean estimates. Thus, the funnel plot did not indicate publication bias.

DISCUSSION

1. The effect of computer skills on willingness to use EMR

This meta-analysis study included 7 primary research articles originating from Ethiopia. The sample size was 3,141. The results of this

study concluded that there was an influence of computer skills on willingness to use EMR (aOR = 2.62; CI 95%= 1.92 to 3.57 p= 0.050)

Health workers who have good computer skills are more likely to use EMR compared to health workers who do not have computer skills, this is supported by research by Berihun et al, (2020) in Ethiopia on 634 health workers which found that health workers who had good computer skills are more likely to use EMR than those with low computer skill (aOR = 2:46; CI 95% = 1,31, 4,61).

Computer skills are defined as understanding and utilizing computer knowledge or technology to access, communicate, process and understand basic health information and services to make appropriate health decisions (Ngusie et al. 2022). Oo et al. (2021) revealed that the ability to use computers well plays an important role in determining health workers' willingness to use EMR. This is in accordance with the findings of Biruk et al. (2014) in Ethiopia which stated that computer skills were one of the factors that were positively related to the willingness to use EMR among health workers.

In addition, according to Hailegebreal et al. (2023), people who have computer skills will not experience many difficulties in using the EMR system, therefore health workers who have computer skills tend to be willing to use EMR. This is supported by the research done by Hailegebreal et al. (2023) which states that health workers who have computer skills are 3.06 times more likely to use EMR than health workers who do not have computer skills (aOr = 3.06; CI 95% = 1.49, 6.29.

2. The effect of management support on the willingness to use EMR

This meta-analysis study included 8 primary research articles originating from Ethiopia. The sample size was 3,845. The results of this research concluded that there was an influence of Management support on willingness to use EMR (aOR = 1.87; CI 95%= 1.40 to 2.51 p= 0.030).

Health workers who receive management support from an EMR system are more likely to use the EMR system than health workers who do not receive management support. This is proven by research done by Samuel et al. (2016) which showed that health workers who receive Management support have a 3,536 times probability to use EMR compared to health workers who do not receive management support.

Management support can be in the form of a technical support approach and supervision which has the main focus, namely identifying skill gaps among health workers, equipping health workers with relevant skills, motivating and facilitating with the right tools and resources (Senishaw et al. 2023). Research done by Aldosari et al. (2018) reveals that management and IT support are significant factors in increasing health workers' willingness to use EMR. Considering the role of healthcare workers in providing high-quality healthcare services to patients, adequate accessibility of health information as well as easy-to-use systems and proper training are necessary to improve their views towards computerization, which in turn will influence EMR adoption.

AUTHOR CONTRIBUTION

Tria Fora Delfita as the main researcher chose the topic, carried out searches, and collected data in this research. Bhisma Murti and Noor Alis Setiyadi carried out data analysis and reviewed research documents.

CONFLICT OF INTEREST

There was no conflict of interest in the study.

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REFERENCE

Aldosari B, Almansour S, Aldosari H & Alanazi A (2018). Assessment of factors influencing nurses acceptance of electronic medical record in a Saudi Arabia hospital. Inform Med Unlocked 82-88. https://doi.org/10.1016/j.imu.-2017.12.007

Berihun B, Atnafu DD, Sitotaw G (2020). Willingness to use electronic medical record (EMR) system in healthcare facilities of Bahir Dar city, northwest Ethiopia. BioMed Res Int. Vol 2020. https://doi.org/10.1155/2020/382738

Biruk S, Yilma T, Andualem M, Tilahun B (2014). Health Professionals' readiness to implement electronic medical record system at three hospitals in Ethiopia: a cross sectional study. BMC Med Inform Decis Mak, 14(115): 1-8. doi: 10.1186/-s12911-014-0115-5.

Hailegebral S, Dileba T & Abebe S. (2023). Health professionals' readiness to implement electronic medical record system in Gamo zone public hospitals, southern Ethiopia: an institution based cross-sectional study. BMC Health Serv Res, 23:773. https://doi.org/10.1186/-s12913-023-09745-5

Jeremia, Andrew. (2023). Transformasi Rumah Sakit Indonesia Menuju Era Masyarakat 5.0. Penerbit Stiletto Book, Yogyakarta.

Koten EHB, Ningrum BS & Hariyati RTS (2020). Implementasi electronic medical record (emr) dalam pelayanan kesehatan di rumah sakit: Studi Literatur. Carolus J Nurs, 2(2):95–110. https://-doi.org/10.37480/cjon.v2i2.45

Murti B (2018). Prinsip Dan Metode Riset Epidemiologi. 5th ed. Surakarta: Program Studi Ilmu Kesehatan Masyarakat. Program studi pascasarjana, Universitas Sebelas Maret.

Ngusie HS, Kassie SY, Chereka AA, Enyew EB (2022). Healthcare providers' readiness for electronic health record adoption : a cross-sectional study during pre pre-implementation phase. BMC Health Serv Res, 22(282):1–12. https://doi.org/10.1186/s12913-022-07688-x

Oo HM, Htun YM, Win TT, Han ZW, Zaw T, Tun KM (2021). Information and communication technology literacy, knowledge and readiness for electronic medical record system adoption among health professionals in a tertiary hospital, Myanmar: A cross-sectional study. PloS ONE 16 (7): e0253691. doi: 10.1371/journal.pone.0253691

Pradnyantara IGANP, Murti B, Tamtomo D (2022). Readiness of Application of Electronic Medical Records in Bethesda Lempuyangwangi Hospital, Yogyakarta. J Health Policy Manage. 07(02): 149-157.

Permenkes (2022). Peraturan Menteri Kesehatan Republik Indonesia Nomor 24 Tahun 2022 Tentang Rekam Medis. Jakarta: Kementrian Kesehatan Republik Indonesia.

Samuel S, bayissa G, Asaminewu S, Alaro T (2016). Electronic information sources access and use for healthcare services in governmental and non-governmental hospitals of Western Oromia, Ethiopia: A cross sectional study. Ethiop J Health Sci. 26 (4): 341-350. doi: 10.4314/ejhs-.v26i4.6.

Senishaw AF, Tilahun BC, Nigatu AM, Mengiste SA, Standal K (2023). Willingness to use electronic medical record (EMR) system and its associated

factors among health professionals working in Amhara region Private Hospitals 2021, Ethiopia. PLoS ONE. 18(1):1–13. https://doi.org/10.1371/-journal.pone.028204

Yilma TM, Tilahun B, Mamuye A, Kerie H, Nurhussien F, Zemen E, Mebratu A, et al., (2023). Organizational and health professional readiness for the implementation of electronic medical record system: an implication for the current EMR implementation in northwest Ethiopia. BMJ HCI. 30(1), 1–7. https://doi.org/10.1136/bmjhci-2022-100723.