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THE EFFECT OF ELECTRONIC MEDICAL RECORDS ON SERVICE QUALITY AND PATIENT SATISFACTION: A LITERATURE REVIEW

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ABSTRACT: Background: Electronic medical records (EMR) are important to implement because they reduce doctors' workload, costs and errors. With Electronic Medical Records, Doctors and health workers also benefit from easy access to patient information which ultimately helps improve patient safety and clinical decision-making such as diagnoses, allergic reactions, and drug duplication. Electronic Medical Record (EMR) benefits patients because of efficiency in the health care process. Therefore, the purpose of this study was to review the literature on the implementation of EMR on service quality and patient satisfaction. **Methods**: A systematic review with Prisma on literature published between 2020 – 2023 with the inclusion criteria of national and international research articles in English and published in 2020-2023 relating to the title of the effect of Electronic Medical Records on Service Quality and patient satisfaction and the database source used, namely Scopus, Science Direct and PubMed. **Results**: Based on a comparison of hospitals that have implemented EMR vs. Paper Medical Records (PMR), it was found that implementing EMR would improve service quality more optimally than PMR. EMR enables healthcare providers to access and update patient information in real-time, quickly and accurately, increasing patient comfort and helping reduce waiting times by increasing healthcare efficiency. The level of patient satisfaction with EMR is statistically significantly better than PMR because EMR can improve the quality of care received by patients, the doctor's attention to patients during consultations increases, patient satisfaction with explanations increases, and communication between patients is well established. **Conclusion**: The implementation of EMR in hospitals significantly improves the quality of services provided by healthcare organizations and patient satisfaction.

Keywords: electronic medical record, service quality, patient satisfaction

INTRODUCTION

A hospital is a complex, professional and capital-intensive medical facility. This complexity arises because hospital services encompass various service, educational, and research functions, covering various behavioral and medical disciplines. Hospitals, as health centers, are required to provide comprehensive services for patients. One of the main elements in excellent health services is the availability of medical services with maintained quality by the mandate of Law Number 29 of 2004 concerning Medical Practice. One of the medical services in question is a medical record (*Electronic Medical Record)*. According to the Regulation of the Minister of Health of the Republic of Indonesia (Permenkes RI) No. 269 of 2008 concerning Medical Records, states that medical records are files that contain records and documents including patient identity, examination results, treatment that has been given, and other actions and services that have been provided to patients. Under these regulations, every doctor must make a medical record in medical practice. With *Electronic Medical Records*, doctors and health workers also benefit from easy access to patient information which ultimately helps improve patient safety and clinical decision-making, such as diagnosis, allergic reactions and drug duplication. Aspects of efficiency and electronic use of medical records reduce operating costs and increase revenue in healthcare facilities, especially for hospitals. So filling in the patient's medical record (RM), including EMR is an obligation every doctor and other health worker must do. Compliance in documenting medical records using EMR will improve service quality, patient satisfaction and patient safety due to misidentification and patient profiling (Nyoman et al., 2021).

The introduction of *Electronic Medical Record* (EMR) provides benefits, including saving time, preventing documents from being lost, and increasing patient participation in their care. EMR is considered an efficient system for improving patient engagement and physician communication. Notably, EMR improves patient compliance and satisfaction with the healthcare system (Wali et al, 2020). Service Quality is important in healthcare organizations. After all, the quality of health services will make healthcare organizations more efficient because everyone who works in healthcare organizations will always work better in a system that is constantly improved, and will foster job satisfaction, commitment, and morale improvement in the healthcare profession, which will ultimately lead to patient satisfaction (Pohan, 2013). Fachmi and Setiawan, (2020) stated that *Service Quality* is an assessment of the perfection of products or services from the value of benefits consumers feel based on a comparison between what consumers expect and what consumers receive. This means that when a health service place can provide

good service to patients, then either directly or indirectly, there will be a feeling of satisfaction in customers, where customers feel happy and satisfied that the health service place has provided a service that is following the expectations and expectations of these customers. In addition, a study conducted in Saudi Arabia found that using EMR improves various aspects of the health system, such as physician productivity, access to information, and quality of health services (Khalifa M, 2017). Kitesa et al, (2021), a study conducted on 184 hospital patients in Ethiopia, showed that implementing EMR in hospitals contributed significantly to the waiting time for patients to get health services.

Patient satisfaction results from an evaluation carried out by the patient between what is desired and the reality the patient feels (Xesfingi &; Vozikis, 2016). In healthcare, satisfaction is an attitude shaped by emotions, which must be measured by a multidimensional total subjective assessment of attributes associated with the healthcare experience (Spiridon et al., 2018). According to Wali et al (2020), EMR is considered an efficient system for improving patient engagement and clinician communication. In particular, EMR improves patient compliance and satisfaction with the healthcare system. Service time also affects the increase in patient satisfaction. Ibrahim et al (2022), a study conducted on 321 patients in 14 public hospitals in Malaysia, showed that hospitals with the application of EMR significantly affected patient satisfaction. Jin et al (2022) research on RSU patients in China, the results showed that the application of EMR in hospitals had an impact on patient satisfaction ($b = .162$, $p = .000<0.01$) and improved service quality ($b = .316$, $p = .000<0.01$).

Electronic medical records (EMRs) are important to implement because of their ability to reduce physician workload, costs and errors. Paper-based reporting has many drawbacks, including manual data entry and requiring manual processing. Therefore, a systematic review of electronic medical record (EMR) systems for patient satisfaction and quality of care is important to know the extent of its application.

Materials and Method

The research method used is *literature review,* which is to conduct a more careful and thorough study, which can be divided into two: meta-analysis and meta-synthesis. In the meta-analysis, research results from many articles with the same subject are discussed and analyzed based on planned statistical procedures. In meta-analysis, patterns and relationships between research results from various articles are sought, analyzed and conclusions are made. Meta-analysis is included in the deductive approach, in other words, before conducting a meta-analysis, the author has determined the major premises to be used (*top-down approach*). Meta-analysis is usually done using PRISMA (*Preferred Reporting Items*

for Systematic Reviews and Meta Analysis) approach.

Document identification

The initial stage in the PRISMA method, identifying research questions as keywords to then determine the research database as an article search area, data base commonly used by PubMed, Scopus, Google Scholar, Science Direct and other official sources, and adjusted to the research title, abstract and keywords used to find articles. In this study, database sources used Scopus, Google Scholar and PubMed. The keywords used are "*Electronic Medical Record*" *AND* "service quality" *AND* "patient satisfaction".

Inclusion criteria

With inclusion criteria for national and international research articles in English and published in 2020-2023 related to the title of the effect of *Electronic Medical Record* on Service Quality and *patient satisfaction*. Research articles that can be accessed in full (full text) are not abstracts only and are not paid. Articles from the database sources used are Scopus, Google Scholar and PubMed.

Exclusion criteria

And the exclusion criteria in this study are sourced from other databases, national and international research articles unrelated to the research problems studied, the use of languages except English, articles published less than 2020 and articles cannot be downloaded in full.

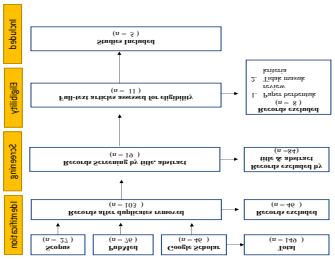

Figure 1. Flowchart PRISMA Guidelines

Researchers searched *Scopus, PubMed and* Google Scholar*, and found 149 journals and articles related to the keywords* "Electronic Medical Record" AND "*service quality*" *AND* "*patient satisfaction*". Then sorting out duplicate journals so that there are 103 journals, then judging from the title and abstract, there are 84 journals that are not under the research. Researchers then pursued again by looking at the completeness of journals and found only 11 complete journals. From 11 journals, only 5 journals were obtained that met the research criteria to be taken.

RESULT AND DISCUSSION

Table 1. Selection Results of Scientific Articles

No	Title and Author	Variabel	Method	Results
1	Effect of Electronic Health Records on Patient	Patient Satisfaction, electronic medical record	Samples of 184 patients at hospitals in Etopia,	The average waiting time at Yekatit 12 Hospital is 60.2

	Satisfaction and Waiting Time at Selected Hospitals, in Addis Ababa. Garoma Kitesa et al (2021)	(EMR), waiting time	namely Yekatit 12 Hospital and Menelik II Ethopia referral hospital. Analysis method using cross-sectional study with SPSS software.	± 48.2 minutes and 82 ± 56.8 minutes at Menelik Hospital. As many as 83.1% of patients at Yekatit 12 Hospital were satisfied with the services received, while at Menelik II Hospital only 31.8% were satisfied with the service. This shows that implementing EMR in hospitals contributes significantly to the waiting time for patients to get health services more effectively. In addition, the application of EMR affects patient satisfaction. Based on the results of this study, it is recommended for hospital management to implement EMR for better service quality.
2	The role of electronic medical records in improving health care quality. Ariff Azfarahim Ibrahim et al (2022)		This experimental study used a control group and was conducted on patients in 14 health facilities in Seremban district, Malaysia.	The results showed that health facilities with EMR had a higher average patient satisfaction value of 4.08 while without EMR 3.81 (P-value 0.03<0.05). In terms of

			The total sample was 321 patients, of which 48.9% of samples from health facilities had applied EMR. Patient satisfaction was measured with the PSQ-18 Likert scale (1-7). Data processing using SPSS.	communication, it also showed the same results, namely health facilities with EMR had a higher score value of 4.08 while without EMR 3.96. This shows that with the use of EMR, patient satisfaction and communication in health services improve.
3	Association between Electronic Medical Records and Healthcare Quality Hong-Ling Lin et al (2020)	Electronic medical records, healthcare quality	This study involved 262,569 patients (patient data 2013-2018), aiming to see the effect of EMR application on the quality of hospital services. The statistical method used Cox proportional hazards regression. Indikator yang digunakan: *inpatient mortality, readmission within 14 days, and 48-hour postoperative mortality*.	The results showed that full implementation of EMR resulted in lower *inpatient mortality* rates [adjusted hazard ratio (HR) 0.947, 95% confidence interval (CI): 0.897–0.999, P=0.049 <0.05], and a lower risk of *readmission within 14 days* compared to hospitals without EMR (adjusted HR 0.627, 95% CI: 0.577–0.681, P<.001). Full EMR implementation has a lower risk of *48-hour postoperative mortality* (adjusted HR 0.372, 95% CI: 0.208–0.665, P=.001) than without EMR.

4	Patient satisfaction with implementing electronic medical Records in the Western Region, Saudi Arabia. R. M. Wali et al (2020)	Patients' satisfaction, Electronic medical record, Physician-patient communication	Research method with a *cross-sectional approach*. Samples of 377 patients in 5 health facilities in 2018. in the Western Region during 2018.	The results showed that overall patient satisfaction scores with EMR were statistically significant compared to Paper Medical Records (PMR) (3.7241 vs. 3.6919, p-value <0.001). The doctor's attention to the patient during the consultation increased from 77% (n = 291) to 82.3% (n = 314) with the application of EMR with a P-value of <0.001 and patient satisfaction with the explanation increased from 80.7% (n = 302) to 85.8% (n = 325). The time patients spent during consultations also increased from 73.8% (n = 279) to 80.4% (n = 303) and active listening increased from 73.5% (n = 278) to 77.3% (n = 289). After applying EMR, patients' perception that there is time to ask about their health improved from 79.4% (n = 300) to 84% (n = 316). Finally, patients'

				feelings that doctors were more interested in medical records improved from 44.1% (n = 166) to 57.5% (n = 218). All indicators differ significantly with a P-value of <0.05. This shows that the implementation of EMR is considered an efficient system to increase patient satisfaction
5	Implementing electronic health records on a medical service trip improves the patient care process Maarsight et al (2022)	Electronic medical records (EMR) systems, patient care process	Method: Comparison of service quality when using EMR with paper or manual recording	The results showed that *electronic medical records* (EMR) had a fairly good impact on the quality of service. In terms of time, doctor services are more effective than manual or paper recording. So that EMR is quite effective in improving service quality.

The relationship between EMR and Service Quality

EMR can significantly impact the quality of services provided by healthcare organizations. Kitesa et al, (2021), the study was conducted on 184 patients in two hospitals in Etopia, namely Yekatit 12 Hospital (EMR implementation) and Menelik II Hospital (not yet EMR implementation), the results showed that hospitals with EMR

implementation in hospitals contributed significantly to patient waiting times to get health services.

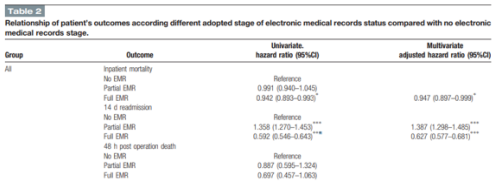

Table 2
Relationship of patient's outcomes according different adopted stage of electronic medical records status compared with no electronic medical records stage.

Group	Outcome	Univariate. hazard ratio (95%CI)	Multivariate adjusted hazard ratio (95%CI)
All	Inpatient mortality		
	No EMR	Reference	
	Partial EMR	0.991 (0.940–1.045)	
	Full EMR	0.942 (0.893–0.993)*	0.947 (0.897–0.999)*
	14 d readmission		
	No EMR	Reference	
	Partial EMR	1.358 (1.270–1.453)***	1.387 (1.298–1.485)***
	Full EMR	0.592 (0.546–0.643)***a	0.627 (0.577–0.681)***
	48 h post operation death		
	No EMR	Reference	
	Partial EMR	0.887 (0.595–1.324)	
	Full EMR	0.697 (0.457–1.063)	

Source: Lin et al. Medicine, (2020)

This study involved 262,569 patients (patient data 2013-2018), aiming to see the effect of EMR application on the quality of hospital services. The table shows that full implementation of EMR results in lower *inpatient mortality* [adjusted hazard ratio (HR) 0.947, 95% confidence interval (CI): 0.897–0.999, P=0.049 <0.05], and lower risk of *readmission within 14 days* compared to hospitals without EMR (adjusted HR 0.627, 95% CI: 0.577–0.681, P<.001). Full EMR implementation has a lower risk of *48-hour postoperative mortality* (adjusted HR 0.372, 95% CI: 0.208–

0.665, P=.001) compared without EMR. This means that full implementation of EMR will improve optimal service quality (Lin et al. 2020).

Based on several research results, the application of EMR contributes significantly to service quality, namely:

1. ***Improved accuracy and completeness of patient information*:** EMR allows healthcare providers to access and update patient information in real-time. Healthcare providers can quickly and accurately access a patient's medical history, medication list, and other important information. This can help reduce errors and improve the quality of care provided (Maarsight et al, 2022)

- ***Waiting time* :** EMR can help reduce waiting times by improving healthcare efficiency. For example, if a patient's medical history is easily accessible in the EMR, healthcare providers may be able to diagnose and treat the patient more quickly, thereby reducing wait times (Kitesa et al, 2021; Ibrahim et al, 2022).

The Link between EMR and Patient Satisfaction

In healthcare, satisfaction is an attitude shaped by emotions, which must be measured by a multidimensional total subjective assessment of attributes associated with the healthcare experience (Spiridon et al., 2018). EMR can be significant in improving patient satisfaction with healthcare. In a study conducted by Wali et al (2020), on 377 patients in Saudi Arabia, overall patient satisfaction scores with EMR were statistically significant compared to Paper Medical Records (PMR) namely (3.7241 vs. 3.6919, p-value <0.001). The following are the results of a comparison before and after EMR implementation on several aspects:

Table 2 Patient Satisfaction with the Medical Consultation before and after the Implementation of EMR

	Agree n (%) Before EMR	Agree n (%) After EMR	*p*-value
Physicians attention	291(77%)	314(82.3%)	< 0.001
Physicians explanation	305(80.7%)	325(85.8%)	< 0.001
Clinical encounter time	279(73.8%)	303(80.4%)	< 0.001
Physicians listening	278(73.5%)	289(77.3%)	< 0.001
Patients ask conveniently	300(79.4%)	316(84%)	< 0.001
Physicians more interested in file than the patients	218(57.5%)	166(44.1%)	< 0.001

Source: Wali et al (2020)

The results of the study in the table above showed that the doctor's attention to patients during consultation increased from 77% (n = 291) to 82.3% (n = 314) with the application of EMR with a P-value of <0.001 and patient satisfaction with explanation increased from 80.7% (n = 302) to 85.8% (n = 325). The time patients spent during

consultations also increased from 73.8% (n = 279) to 80.4% (n = 303) and active listening increased from 73.5% (n = 278) to 77.3% (n = 289). After applying EMR, patients' perception that there is time to ask about their health improved from 79.4% (n = 300) to 84% (n = 316). Finally, patients' feelings that doctors were more interested in medical records improved from 44.1% (n = 166) to 57.5% (n = 218). All indicators differ significantly with a P-value of <0.05. This shows that implementing EMR efficiently increases patient satisfaction (Wali et al, 2020).

Ibrahim et al (2022), conducted a study on a total sample of 321 patients in Malaysia, comparing health facilities with EMR and health facilities not using EMR or manual with paper, where 48.9% of patient samples from health facilities have applied EMR. The following table compares the scores between health facilities with EMR and without EMR:

Mean score of 7 subscale patients' satisfaction towards clinic adopted EMR compared to the paper-based record clinics of patients attending fourteen public primary healthcare clinics in Seremban District of Malaysia.

Subscale	EMR adopted clinics, mean (SD)	Paper-based record clinics, mean (SD)
General satisfaction	4.08 (0.59)	3.81 (0.63)
Technical quality	3.76 (0.57)	3.64 (0.54)
Interpersonal manner	3.70 (0.68)	3.59 (0.62)
Communication	4.08 (0.59)	3.96 (0.60)
Financial aspects	3.92 (0.68)	3.79 (0.68)
Time spent with doctor	3.55 (0.64)	3.54 (0.61)
Accessibility and convenience	3.68 (0.60)	3.66 (0.55)

EMR = electronic medical record, SD = standard deviation.

Source: Ibrahim et al, (2022)

DFrom the table above, it shows that health facilities with the application of EMR have a higher average patient satisfaction value of 4.08 while without EMR 3.81 (P-value 0.03<0.05). Regarding communication, patients with EMR health facilities have a higher and significant score of 4.08 and without EMR 3.96 (P-Value 0.04<0.05). This shows that with the use of EMR, patient satisfaction and communication in health services improve. Jin et al (2022) research on hospital patients in China, the results showed that the application of EMR in hospitals had an impact on patient satisfaction (b = .162, p = .000<0.01) and improved service quality (b = .316, p = .000<0.01).

Based on several research results, the application of EMR contributes significantly to patient satisfaction, namely:

1. ***Improved*** quality of care: EMR can improve the quality of care provided by healthcare providers by allowing them to access and update patient information in real-time. This can lead to better clinical decision-making and more efficient care delivery, resulting in higher levels of patient satisfaction (Wali et al, 2022).
2. ***Increased patient involvement***: EMR can empower patients by giving them access to their medical records and allowing them to participate more actively in their health care. Patients who feel more involved in their health care tend to have higher satisfaction levels with their care. (Ibrahim et al, 2022).

- ***Improved*** communication: EMR can improve communication between patients and healthcare providers by allowing them to share information more easily. This can help reduce misunderstandings and improve the patient-provider relationship, leading to higher levels of patient satisfaction (Ibrahim et al, 2022).

CONCLUSION

Based on the results of the literature review, it was concluded that: 1). Based on the results of a comparison of hospitals that have implemented EMR vs Paper Medical Records (PMR), it was

found that the implementation of EMR can significantly impact the quality of services provided by healthcare organizations. Because of its ability to reduce physician workload, cost and errors, EMR allows healthcare providers to access and update patient information in real-time, quickly and accurately, improving patient convenience and helping to reduce wait times by improving healthcare efficiency. 2). EMR implementation contributes significantly to increased patient satisfaction. Because EMR can improve the quality of care patients receive, allowing them to access and update patient information in real-time, physicians' attention to patients during consultations increases, patient satisfaction with explanations increases, improves communication between patients and healthcare providers by allowing them to share information more easily, thereby increasing patient satisfaction and potential for revisit. 3). Because of its significant role in improving service quality and patient satisfaction. Therefore, hospitals must implement EMR and health workers' compliance to follow EMR SOPs.

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