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Identification of the Quality of *Electronic Medical Records* in Improving Health Services and Access to Technology to Increase Patient Satisfaction in Hospitals

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ABSTRACT

Electronic Medical Record (EMR) system brings major changes in the healthcare system. EMR transforms conventional medical records into digital medical records (EMR), thus addressing many issues, such as data loss (data security), difficulty reading handwriting, and the need for large storage space. By improving the quality of EMR, all its advantages will be reversed and will lead to patient satisfaction. The purpose of this study was to identify, understand, and analyze the quality of EMR in improving health services and technology access in improving patient satisfaction at Gunung Maria Hospital, Tomohon. This type of quantitative research with a cross-sectional study design , with a sample of 216 inpatients (purposive sampling), using a simple random sampling method with a probability sampling (PS) technique. Data were collected using a questionnaire. The results of the study obtained an R2 value of 0.993 (p = 0.000) on the predictor of service speed having a very strong and significant influence on patient satisfaction. On the predictor of data accuracy, the R2 value of 0.981 (p = 0.000), indicating that data accuracy is an important factor that has a very strong and significant influence on patient satisfaction. Information transparency predictor, R2 value = 0.983 (p = 0.000) which indicates that information transparency significantly influences patient satisfaction. In general, EMR quality (service speed, data accuracy and information transparency) influences patient satisfaction (p = 0.019). The results of the simultaneous test obtained that the predictor of service speed most influences patient satisfaction, with a value of p = 0.000. There is a need for a policy on service procedures in hospitals that includes service speed.

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INTRODUCTION

An effective healthcare system has prioritized patient satisfaction. Electronic medical records (EMR) systems have brought significant changes to the healthcare system. EMRs transform conventional paper-based medical records into digital ones (Alenazi et al., 2022) . By

shifting from paper-based medical records to electronic medical records (EMR), healthcare facilities can overcome many of the problems associated with traditional methods, such as data loss (security), difficulty reading handwriting, and the need for large storage space (Sofia et al., 2022) . EMRs also enable more complete and standardized documentation, easier access to data, and better communication between healthcare workers and patients (Anwar, 2024) . Better quality electronic medical records are associated with ease of access, clear design, and lower *website error rates* . Therefore, further research is needed on the factors that influence the performance of electronic medical record documentation (Agus et al., 2024) . Ease of access means the data acquisition system can be accessed anytime, anywhere, and only by authorized parties. Furthermore, EMR makes it easier to use patient information. (Faida & Jannah, 2019) . By using EMR, patients are more satisfied, especially during clinical consultations with doctors about health problems, listening to patient statements, talking about test results and treatment, and having more time to talk about patient statements (Wali et al., 2020) .

In the USA, physicians using EMR systems increased dramatically from 18% in 2001 to 2011 to 57% in 2011. In 2013, 72% of physicians used tablets to access electronic *telemedicine platforms* (Aviat, 2022) . The Indonesian Ministry of Health ratified the EMR regulations as stipulated in Ministerial Regulation No. 24 of 2022 concerning Medical Records. This regulation stipulates that hospitals and other healthcare facilities must implement an EMR system to store patient medical records. Furthermore, it is targeted that all hospitals and other healthcare facilities must do so no later than December 2023 (Wahyudi & Wahab, 2024) . Data on patients treated since February 2025 shows a total of 216 patients treated in 7 inpatient rooms at Gunung Maria Tomohon General Hospital (Diklit RSU Gunung Maria Tomohon, 2025) .

The problem identified in the field is that the quality of the EMR implemented determines the effectiveness of the health information system. However, not all hospitals have successfully implemented EMR optimally. Field findings indicate that technical obstacles persist, such as incomplete data, poor system interoperability, and inadequate training for healthcare workers. On the other hand, non-technical aspects such as user resistance, infrastructure availability, and managerial policies also impact EMR quality. These issues impact patient care, including speed of service, diagnostic accuracy, and coordination between units.

Previous research indicates that hospital health information systems significantly influence patient satisfaction (Jad & Zainol, 2022) . High-quality electronic health records significantly help physicians facilitate services and manage their workload (Holmgren et al., 2024) . Clinics must prepare and provide clinical information systems to support their patient care delivery, helping clinical staff provide better and faster service, thereby reducing patient queues (Hartono et al., 2024) . EHR systems (direct functions, supportive functions, and information infrastructure) are significantly positively associated with patient satisfaction (Gumus et al., 2023) . Complete electronic health records improve the quality of healthcare (Adomah-Afari et al., 2023) .

The urgency of this research is that, given the importance of the EMR's role in supporting healthcare services, research is needed to identify the quality of the EMR system used in hospitals and its relationship to healthcare services and patient satisfaction. This study also aims to evaluate the extent to which access to health information technology can be a supporting factor in improving service quality and positive patient perceptions of the system used. Linked to RIRN, including the direction of research development; development in the fields of science and technology; and the availability and mobility of human resources and infrastructure. This is related to the ASTA CITA Government Program Towards a Golden Indonesia 2045, specifically

mission number 4 on Human Resource Development and Gender Equality, which emphasizes human resource development through improving the quality of education, health, and access to technology (Prabowo & Gibran, 2024) . Therefore, the purpose of this study is to identify, understand, and analyze patient satisfaction in relation to EMR quality and technology access.

METHODS

The type of research is quantitative with a *cross-sectional study design* (Abdullah et al., 2022) with a sample of 216 patients who were treated and sampled using a *simple random sampling technique* (Masturoh & Anggita, 2019) . This study was conducted at Gunung Maria Tomohon General Hospital, in June 2025. The population in this study were all inpatients at Gunung Maria Tomohon General Hospital and a sample of 216 patients spread across 7 inpatient rooms. Each room was taken according to the number available [St. Paula Room as many as 38 patients, St. Fransiskus Room 38 people, Maria Josep Room 30 people, Agustinus Angela Room 30 people, St. Yohana Room 28 respondents, St. Theresia Room (children's room) 28 patients' families, Neonati Room (baby room) 24 people (patient families)] Data were collected using a questionnaire instrument. EMR quality questionnaire (consisting of 3 predictors, namely speed of service, data accuracy and transparency of information, each consisting of 4 statement items with answer choices using a Likert scale. The patient satisfaction instrument consists of 4 statements which are the result of simplification of satisfaction based on the five dimensions of SERVQUAL with answer choices using a Likert scale. The questionnaire used has passed the validity and reliability test. Data analysis consists of univariate analysis, which includes the frequency distribution of characteristic data including age, gender, education and occupation of respondents. The frequency distribution of each variable, namely the variable speed of service, data accuracy and transparency of information integrated in the EMR quality variable. Likewise, the frequency distribution of patient satisfaction variables. Each variable is presented in tabular form and explained according to its frequency and percentage. Bivariate analysis by linking EMR quality with patient satisfaction. Analyzed using the SPSS test with the R *square test* . Multivariate analysis to analyze predictors on the independent variables that most influence patient satisfaction uses the *adjusted R test* because it consists of several predictors.

RESULTS AND DISCUSSION

Characteristics and research variables

Table 1. Respondent Characteristics Data and Research Variables

Characteristics and Variables	n	%
Respondent Age Group		
15-25 years	19	8.8
26-35 years old	46	21.3
36-45 years	58	26.9
46-55 years	40	18.5
56-65 years	27	12.5
66-75 years	18	8.3
76-85 years	8	3.7
Respondent Gender		
Man	117	54.2
Woman	99	45.8
Respondent Education		

Elementary School	26	12.0
JUNIOR HIGH SCHOOL	37	17.1
SENIOR HIGH SCHOOL	88	40.7
Vocational School	23	10.6
D3	18	8.3
S1	24	11.1
Respondent's Occupation		
Driver	10	4.6
Craftsman	11	5.1
Housewife	35	16.2
Laborer	5	2.3
Private	54	25.0
Farmer	30	13.9
Student	11	5.1
Businessman	14	6.5
civil servant	17	7.9
Students	3	1.4
Fisherman	2	0.9
Retired	6	2.8
Indonesian National Police	4	1.9
Indonesian National Armed Forces	1	0.5
Doesn't work	13	6.0
Research Variables:		
EMR Quality		
Good	118	54.6
Not good	98	45.4
Speed of Service		
Fast	98	45.4
Slow	118	54.6
Data Accuracy		
Accurate	98	45.4
Less Accurate	118	54.6
Information Transparency		
Transparent	93	43.1
Lack of Transparency	123	56.9
Patient Satisfaction		
Satisfied	98	45.4
Less satisfied	118	54.6
Total	216	100.0

Source: Primary Data (2025)

Table 1 shows that the distribution of the largest age group is 36–45 years old with 58 respondents (26.9%) and the least age group is 76–85 years old with 8 respondents (3.7%) out of 216 respondents. The distribution of gender from a total of 216 respondents who are inpatients, male gender is 117 respondents or 54.2%, while female gender is 99 respondents or 45.8%. Respondents with the highest education of Senior High School (SMA) are the largest group, namely 88 people (40.7%) and Diploma 3 (D3) graduates are the least, as many as 18 people (8.3%). Respondents who have a work background as private workers are the most dominant,

namely 54 people (25.0%) and as TNI are the least, namely only 1 person (0.5%). The EMR quality variable explains that most have good quality, namely 118 respondents (54.6%) and those who consider it to have poor quality are 98 respondents (45.4%), only a small difference. Meanwhile, for the predictor of EMR quality from a total of 216 respondents, as many as 118 patients (54.6%) considered the service predictor to be fast and 98 patients (45.4%) considered the service slow. Meanwhile, the data accuracy predictor mostly assessed the data provided by health workers as accurate, namely 118 respondents (54.6%) and as many as 98 respondents (45.4%) assessed the data obtained as less accurate. Meanwhile, for the predictor of information transparency, as many as 123 (56.9%) respondents assessed the information provided as transparent, while as many as 93 (43.1%) respondents assessed the information provided by health workers as less transparent. For the satisfaction variable which is the dependent variable, it is seen that most respondents felt satisfied with health services, namely 118 respondents (54.6%). While respondents who felt less satisfied were 98 respondents (45.4%).

Bivariate Analysis

Table 2. Cross Tabulation of Service Speed Variables on Patient Satisfaction at Gunung Maria General Hospital, Tomohon

Variable (Predictor X1)	B	t	Sig.	Beta Coefficient
(Constant)	2,659	27,189	0.000	-
Speed of Service	0.929	125,187	0.000	0.993
a. Dependent Variable: Patient Satisfaction				

Source: Primary Data (2025)

Based on Table 2, the statistical test results obtained a B value of 0.929, which means that every 1 unit increase in service speed will increase satisfaction by 0.929 per respondent. A Beta (*Standardized Coefficient*) value of 0.993 was also obtained, indicating that service speed has a very strong influence on patient satisfaction. This is because the value is close to 1, which means it is very strong. The t value was also obtained at 125.187 and *Sig* . value (*p value*) = 0.000, which means this influence is very statistically significant (because <0.05). Based on the explanation above, it can be concluded that there is a positive and significant influence between service speed and patient satisfaction.

Table 3. Cross Tabulation of Data Accuracy Variables on Patient Satisfaction at Gunung Maria General Hospital, Tomohon

Variable (Predictor X2)	B	t	Sig.	Beta Coefficient
(Constant)	2,717	23,725	0.000	-
Data Accuracy	0.928	106,377	0.000	0.991
a. Dependent Variable: Patient Satisfaction				

Source: Primary Data (2025)

Table 3 data shows that the coefficient B value is 0.928, which means that every 1 unit increase in data accuracy will increase satisfaction by 0.928 per respondent. Beta (Standardized Coefficient) of 0.991 indicates that data accuracy has a very strong influence on satisfaction. The t value of 106.377 with a significance value of 0.000 indicates that the effect is very significant statistically because the p value <0.05. The results of the analysis conclude that there is a positive and very significant influence between data accuracy and patient satisfaction. The almost perfect

Beta value (0.991) strengthens that data accuracy is one of the dominant factors in shaping patient/respondent satisfaction.

Table 4. Cross Tabulation of Information Transparency Variables on Patient Satisfaction at Gunung Maria General Hospital, Tomohon

Variable (Predictor X3)	*B*	*t*	*Sig.*	*Beta Coefficient*
(Constant)	2,496	15,599	0.000	-
Information Transparency	0.926	77,358	0.000	0.983
a. Dependent Variable: Patient Satisfaction				

Source: Primary Data (2025)

The data in Table 4 can be explained that the B value obtained is 0.926 indicating that every 1 unit increase in information transparency will increase satisfaction by 0.926 per respondent. The Standardized Coefficient (Beta) obtained is 0.983 indicating a very strong influence on patient satisfaction. Meanwhile, the t value is 77.358 and the significance value is 0.000, meaning that the influence is very significant statistically (because $p < 0.05$). Based on the results of the analysis above, it can be said that information transparency has a positive and significant effect on patient satisfaction. The magnitude of the influence (Beta = 0.983) indicates that information transparency is one of the predictors in determining patient/respondent satisfaction.

Multivariate Analysis

Table 5. Results of Simultaneous Analysis of EMR Quality Components on Patient Satisfaction at Gunung Maria Tomohon General Hospital.

Variables/Predictors	B	Beta (Stand.)	t	*p*	R	Adjusted R Square
EMR Quality	2,694	-	26,733	0.000	0.993	0.986
Speed of Service	1,021	1,091	7,746	**0.000**		
Data Accuracy	-0.011	-0.012	-0.106	0.916		
Information Transparency	-0.082	-0.087	-1.425	0.156		
Dependent Variable: Patient Satisfaction						

Source: Primary Data (2025)

Table 5 shows a strong simultaneous correlation between the three predictor variables of EMR quality and patient satisfaction. Ninety-eight percent of the variation in satisfaction can be explained by these three predictors. The regression model, with speed of service, data accuracy, and information transparency as predictors, has very strong and accurate predictive power for patient satisfaction. This model is highly suitable for data-based prediction and decision-making. However, the information transparency and data accuracy variables were not significant ($p > 0.05$) when combined with other variables; neither made a significant contribution to explaining variations in satisfaction. The simultaneous test results showed that the speed of service variable had the greatest influence on speed, with a p value of 0.000.

Discussion

EMR Quality in the Speed of Service Contest for Patient Satisfaction

The results of this study indicate that speed of service related to EMR quality will increase the satisfaction of each respondent. Speed of service has a very strong influence on inpatient satisfaction. Based on statistical tests, it can be concluded that speed of service in the context of EMR quality significantly influences inpatient satisfaction.

Recent research results show that good service quality can include speed of service, increased patient satisfaction as reflected in reduced complaints, increased trust in medical personnel, and the tendency of patients to recommend health facilities to others (Setyawan & Isnanto, 2025) .

The results of this study align with Kosassy & Mulya (2020) , who stated that speed of service falls within the responsiveness dimension, meaning that service providers respond quickly to patient needs, increasing patient satisfaction and overall satisfaction levels. Patients who feel valued and cared for tend to be more satisfied with the services they receive.

According to Akbar & Rizky (2020) , one indicator of service quality is speed, which can be defined as the effort to meet customer needs and desires and the accuracy of delivery to meet customer expectations. Similarly, research by Arianto et al. (2022) found that one factor contributing to patient satisfaction in hospitals is service quality, which includes speed. Speed of service is reflected in the provision of information services, including medical records.

The results of this study are also supported by the theory that one of the basic requirements for health services is quality service. This quality includes service quality, including speed of service in the context of information technology systems (Arifin et al., 2016) . Medical records in hospitals are very necessary, considering that recording patient medical data, including identity and medical action plans, must all be stored and needed at any time to view the patient's medical record during treatment (Kartikasari, 2019) .

According to research by Erlindai et al. (2023) , tangible evidence and responsiveness are factors that influence healthcare services and determine patient satisfaction. The availability of information systems, including EMR, and responsiveness or a quick and accurate response are essential in healthcare services in hospitals. According to Fahmi et al. (2020) , healthcare service innovation has a positive and significant effect on patient satisfaction and loyalty. Meanwhile, patient satisfaction has a positive and significant effect on patient loyalty. Based on the results of this study, researchers assume that in any aspect of healthcare services, if carried out well and with attention to speed, it will increase patient satisfaction. Moreover, speed of service in the context of EMR quality will further increase inpatient satisfaction.

EMR Quality in the Context of Data Accuracy and Patient Satisfaction

The analysis concluded that there is a positive effect between data accuracy in the context of EMR quality and inpatient patient satisfaction. Data accuracy has a very strong influence on inpatient patient satisfaction. The results of this study also indicate that data accuracy predictors significantly influence patient satisfaction.

Research by Akthar et al. (2023) concluded that although several factors are not directly related to patient satisfaction, healthcare service factors and demographic characteristics also influence patient satisfaction. The accuracy of patient data in medical records is one of the components of healthcare. Similarly, research by Breitbart et al. (2020) stated that data accuracy influences medical accuracy. Therefore, even if the duration of a healthcare consultation is less

than optimal, if the data is accurate, the medical diagnosis will also be accurate. This is intended as a consideration for providing interventions/treatments that are appropriate to the medical diagnosis.

In accordance with the theory that states that in improving the accuracy of patient data in healthcare through a significant reduction in data entry errors. Rare inaccuracies and discrepancies in patient records can jeopardize patient safety before their implementation. Misdiagnosis, treatment plan errors, and medication errors are risks that can harm patients (Ardem, 2023) . According to the marketing concept, to achieve the established organizational goals, companies must be better than competitors in creating, delivering, and communicating customer value to selected target markets. To be better in achieving organizational goals, optimal service is required, including measurable data accuracy (Daga, 2017) . According to Indrasari (2019) , in the book entitled "Marketing and Customer Satisfaction" states that in marketing to customers, good, accurate, and measurable service management is needed to create customer satisfaction.

In line with research by Wulandari et al. (2024) , to measure the impact of hospital healthcare quality on patient satisfaction, an evaluation of healthcare services, including the accuracy of health data, is needed to determine further action. Achieving data accuracy can improve patient satisfaction. Another study conducted at a primary healthcare facility, the Berbek Community Health Center, showed that healthcare services related to data accuracy and the availability of health facilities, both partially and simultaneously, significantly influenced patient satisfaction (Novaliana et al., 2023) .

Research by Jad & Zainol (2022) found that the quality of hospital information systems influences patient satisfaction. One indicator of a health information system is data accuracy. Recent research by Howard et al. (2025) states that data accuracy and management are crucial in healthcare. This is because the provision of healthcare services in an EMR increases effectiveness due to the reduction of time spent searching for data on specific clinical cases in other sources. EMR also helps organize documents and clinical records with more accurate data. Based on the results of this study, researchers assume that data accuracy is crucial because it affects the safety of patients receiving treatment in hospitals.

EMR Quality in the Context of Information Transparency and Patient Satisfaction

The results of this study demonstrate that information transparency has a very strong influence on patient satisfaction. The effect of information transparency is statistically significant, with a value less than the alpha value (a fixed value). Based on this analysis, it can be concluded that information transparency has a positive and significant effect on patient satisfaction in inpatient wards.

Fachri's (2024) research ADDIN CSL_CITATION {"citationItems":[{"id":"ITEM-1","itemData":{"author":[{"dropping-particle":"","family":"Fachri","given":"Muhammad","non-dropping-particle":"","parse-names":false,"suffix":""}],"container-title":"Jurnal Kedokteran dan Kesehatan","id":"ITEM-1","issue":"1","issued":{"date-parts":[["2024"]]},"page":"87-98","title":"Pelayanan dan Daya Tanggap terhadap Kepuasan Pasien Rawat Jalan di Rumah Sakit X Tahun 2023","type":"article-journal","volume":"20"},"uris":["http://www.mendeley.com/documents/?uuid=c4157f02-95c9-4559-94aa-a6d21236a65a"]}],"mendeley":{"formattedCitation":"(Fachri, 2024)","manualFormatting":"Fachri (2024)","plainTextFormattedCitation":"(Fachri, 2024)","previouslyFormattedCitation":"(Fachri,2024)"},"properties":{"noteIndex":0},"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}, which revealed that increasing information transparency is a crucial aspect in understanding the patient's actual condition, which aids in the medical care and treatment process. According to Fukami's (2024) research , information transparency encourages

a culture of openness, learning from accident risks, and addressing system issues that are purely human error. This also aligns with ethical principles, potentially mitigating legal challenges. This review synthesizes key themes, including the importance of patient-centered care, the role of psychological safety in fostering transparency, and the effectiveness of patient safety reporting systems.

The results of this study agree with Ampu & Fitriyaningsih (2020) , who explained that of the five service dimensions, *reliability* is one dimension that influences patient satisfaction. Within this dimension, information transparency, timeliness, and interpersonal relationships influence patient satisfaction levels in hospitals. Similarly, Rizki et al. (2023) stated that transparency (*disclosure and transparency*) influence patient satisfaction levels in the inpatient ward of Royal Prima Medan Hospital. Of all service dimensions, all influence patient satisfaction.

Agree with the research results Said et al., (2020) , there is an influence of the principles of information transparency, accountability, responsibility and independence on patient satisfaction in the inpatient unit of Mamuju Regional General Hospital. Respondents' assessment of the hospital's openness in providing information regarding patient health conditions, service rates and so on. Providing information is very important, because the information provided helps patients in undergoing treatment. If the information provided is unclear, it will take a long time for patients to get treatment. According to Wirawan & Yaya (2024) , transparency states that transparency increases user trust. According to Yang (2018) , transparency is also needed to increase co-creation of public services and contribute new perspectives on the effects of transparency in shaping citizen satisfaction, which can serve as a starting point for studying the role of transparency in public affairs . Based on the results of this study, researchers assume that information transparency in the context of EMR is very necessary to increase patient trust which has an impact on patient satisfaction itself.

Speed of Service Has the Most Influence on Patient Satisfaction

Based on the simultaneous test results, of the three EMR quality predictors (service speed, data accuracy, and information transparency), service speed was the most dominant predictor influencing inpatient satisfaction. Although service speed was the predictor that most influenced satisfaction, data accuracy and information transparency should not be ignored because the bivariate test results of each predictor and satisfaction all contributed to inpatient satisfaction.

Research conducted by Gusrianti et al. (2024) found that hospital service procedures are all aimed at speeding up service. Without clear procedures, hospital services will be hampered and disrupted. According to Handoko & Handayani (2023) , the dimensions of service quality *, reliability, responsiveness, assurance* , and *empathy,* have a positive and significant impact on patient satisfaction. Speed of service falls within the *responsiveness dimension.*

Service quality, including speed of service, has a significant positive effect on patient satisfaction, service quality has a significant positive effect on behavioral intention, and there is no positive effect of patient satisfaction on behavioral intention. Service quality has a positive effect on behavioral intention, so increasing patient behavioral intention can be done by improving service quality (Karsana & Murhadi, 2021) . Speed of service included in the responsiveness dimension affects patient satisfaction (Lampus et al., 2023) . Speed of drug service and health facilities have a significant relationship with the level of patient satisfaction. Of the 95 respondents, those who considered the waiting time to be too fast showed a high risk of dissatisfaction (Mayasafa & Mukarom, 2024) .

According to research by Munawwaroh & Indrawati (2022) , service speed influences outpatient satisfaction. Faster waiting times increase satisfaction, and vice versa. Service speed impacts patient satisfaction in Vietnam (Nguyen et al., 2021) .

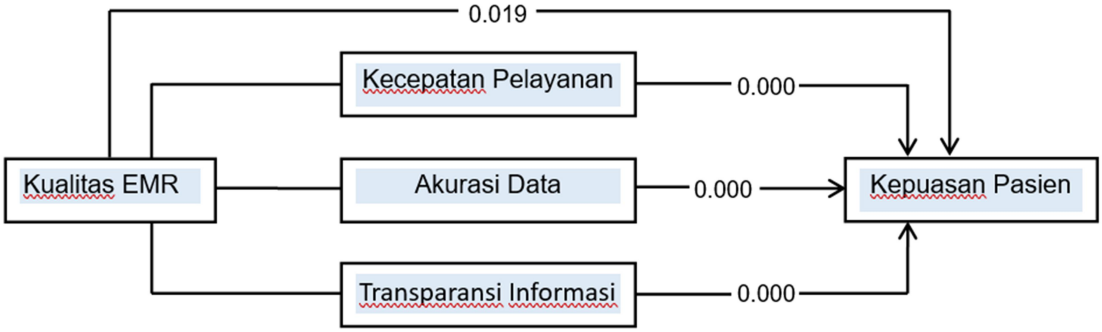

Figure 1. Satisfaction Model Reviewed from EMR Quality

CONCLUSION

The conclusion of this study is that the quality of EMR in the context of service speed is generally fast; predictors of data accuracy are generally accurate and information transparency is generally transparent in the inpatient ward of Gunung Maria General Hospital Tomohon. Inpatient satisfaction at Gunung Maria General Hospital Tomohon is generally satisfied with EMR services. The quality of EMR in the context of service speed has a significant effect on patient satisfaction at Gunung Maria General Hospital Tomohon. The quality of EMR in the context of data accuracy has a significant effect on patient satisfaction at Gunung Maria General Hospital Tomohon. The quality of EMR in the context of information transparency has a significant effect on patient satisfaction at Gunung Maria General Hospital Tomohon. The predictor of service speed in the context of EMR quality is the most dominant influence on patient satisfaction at Gunung Maria General Hospital Tomohon. Overall, EMR quality has a significant effect on patient satisfaction at Gunung Maria General Hospital Tomohon. The suggestion from this study is that the results of this study can be considered for EMR development through three predictors (service speed, data accuracy and information transparency), and are also very strong and worthy of use for analysis or policy making by hospital management, especially the predictor of service speed.

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