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Actual Use as the Strongest Indicator of Electronic Medical Record Effectiveness Among Physicians

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ABSTRACT
Electronic Medical Records (EMR) have become an essential component of digital health transformation, offering structured documentation, improved accessibility of patient information, and enhanced efficiency in clinical workflows. Despite these advantages, variations in user acceptance remain a challenge in healthcare settings. This study aimed to describe the effectiveness of EMR utilization among physicians at Dera As-Syifa Hospital based on the Technology Acceptance Model (TAM), focusing on perceived usefulness, perceived ease of use, behavioral intention, and actual use. A quantitative descriptive study with a cross-sectional design was conducted using a Likert-scale questionnaire adapted from previous research. The instrument assessed four TAM constructs to capture physicians' perceptions and experiences in using EMR. Data were analyzed descriptively to determine the effectiveness of each construct. The findings indicate that physicians generally perceive EMR as beneficial, easy to operate, and supportive of clinical practice. Most respondents expressed positive intentions to continue using the system, and EMR has been integrated into routine service activities across multiple units. However, some physicians still experience challenges related to system features, workflow adaptation, and technical constraints, suggesting that acceptance is not yet uniform. In conclusion, EMR implementation at Dera As-Syifa Hospital is largely effective across key TAM dimensions, reflecting positive user acceptance and integration into daily clinical workflows. Continuous system evaluation, infrastructure strengthening, and sustained user training are essential to optimize EMR utilization and support high-quality, technology-driven healthcare services.
Keywords: electronic medical records; technology acceptance model; perceived usefulness; perceived ease of use; behavioral intention; actual use

INTRODUCTION
The medical record is a comprehensive document that encompasses patient identity, examination results, treatment history, medical interventions, and various healthcare services received throughout the continuum of care. This documentation is maintained continuously from the moment a patient is admitted until discharge from the healthcare facility. The management of these data is the responsibility of medical record officers or health information professionals. As healthcare practices advance, the role of medical records becomes increasingly crucial because they capture the complete history of a patient's illnesses and therapeutic interventions. Consequently, the quality of healthcare services in a facility is strongly dependent on the orderly, accurate, and accountable administration of medical records [1].

The rapid development of digital technology within society has driven a transformation in healthcare services, necessitating the transition from paper-based medical records to electronic formats while ensuring data security and confidentiality. Furthermore, the Ministry of Health Regulation Number 269/MENKES/PER/III/2008 is considered no longer aligned with current scientific developments, technological advancements, legal demands, and contemporary healthcare service needs, thereby requiring updated regulatory frameworks to replace it [2].

Electronic medical records (EMR) represent a digital system for documenting patient health information, designed to replace traditional paper-based records [2]. This system contains essential information such as patient identity, medical history, diagnoses, laboratory and imaging results, and medical procedures, enabling healthcare professionals to access data rapidly, accurately, and securely [2]. The Government of Indonesia has established a clear legal foundation for EMR implementation through the Ministry of Health Regulation Number 24 of 2022 on Medical Records, which outlines standards for administration, management, and mandatory adoption of EMR in healthcare facilities as part of the national digital health transformation agenda [3].

The effectiveness of manual and electronic medical record systems is significantly influenced by human resources and supporting infrastructure. In manual systems, performance depends heavily on the number and competence of filing personnel, whereas electronic systems rely on network quality and the availability of adequate computer equipment in each unit. Although both systems must adhere to Standard Operating Procedures (SOP), manual methods carry a higher risk of inaccuracy, particularly in the timeliness of retrieving JKN / *Jaminan Kesehatan Nasional* (in English: National Health Insurance) patient files, compared with electronic systems [4].

From an efficiency perspective, EMR supported by stable network connectivity is superior due to seamless data integration across departments, eliminating the need for physical document retrieval from filing rooms. For healthcare facilities that are not yet fully digitized, hybrid systems combining manual and electronic processes may still operate effectively, provided SOPs are strictly followed to minimize errors such as missfiling. Overall, literature indicates that electronic systems are more efficient in terms of time and storage capacity. However, transitioning to EMR requires substantial investment in hardware and intensive training for healthcare personnel. A notable physical distinction lies in space requirements: manual systems demand extensive archival storage areas, whereas electronic systems require only adequate workspace for data processing with computer equipment [4].

Several studies have evaluated the effectiveness of EMR use in healthcare settings. Research conducted at Tk. II dr. Soepraoen Hospital employed the Technology Acceptance Model (TAM) to assess EMR effectiveness based on perceived usefulness, ease of use, attitudes, intentions, and actual usage among healthcare workers. Findings indicate that EMR is considered effective when TAM components are fulfilled, ultimately enhancing the quality of healthcare service processes [5].

Dera As-Syifa hospital is one of the healthcare facilities that has implemented EMR in daily medical service activities. However, to date, no study has clearly described the level of EMR effectiveness among physicians in this hospital. Such information is essential as a basis for evaluating system performance, improving service quality, and supporting managerial decision-making. Based on this context, the present study is important to provide a scientific overview of EMR effectiveness among physicians at Dera As-Syifa Hospital, serving as an evaluative reference for system improvement and contributing to the advancement of technology-based healthcare services.

METHODS

This study employed a quantitative descriptive method with a cross-sectional design and was conducted at Dera As-Syifa Hospital from March to May 2026. The study adhered to established ethical principles, including informed consent, anonymity, and strict confidentiality of respondent data throughout all stages of the research process.

The study population comprised all physicians at Dera As-Syifa Hospital who routinely utilized the EMR system in daily clinical practice. A total of 32 respondents were included using a total sampling technique. Inclusion criteria consisted of physicians who actively used the EMR system and had been employed for at least six months. Exclusion criteria included physicians who were on leave or temporarily inactive, as well as visiting consultants or external specialists who were not required to complete EMR documentation on a regular basis.

Primary data were collected using a Likert-scale questionnaire adapted from Azzahra et al., distributed electronically through Google Forms. The main research variable was the effectiveness of EMR utilization, measured using the TAM framework. The TAM dimensions assessed included Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Behavioral Intention (BI), and Actual Use (AU). Each dimension was operationalized through multiple indicators rated on a five-point Likert scale, with higher scores reflecting more favorable perceptions or behaviors. Effectiveness was determined through univariate analysis, in which each TAM dimension was categorized as effective if the respondent's score was equal to or above the median of the total sample, and not effective if the score fell below the median.

Data processing involved several sequential steps, including editing, coding, data entry, and cleaning to ensure accuracy and completeness. Descriptive statistical analysis was then performed to generate frequency distributions, percentages, and median scores for each TAM dimension, thereby providing an empirical overview of EMR effectiveness among physicians at the study site.

RESULTS

Based on the Table 1, most physicians were male (53.1%). In terms of age distribution, the largest proportion of physicians fell within the 35–39-year age group (37.5%). Overall, the majority of physicians were within the productive age range of 35–44 years (68.8%), indicating that most physicians possessed adequate professional experience to support the effective use of the EMR system in clinical services.

Prior to categorizing effectiveness based on median values, descriptive statistical analysis was conducted for each TAM construct. This analysis aimed to obtain the mean, median, standard deviation, minimum, and maximum scores for each variable. The descriptive statistics are presented in Table 2. The median score for all TAM constructs; Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Behavioral Intention (BI), and Actual Use (AU) was 16.00. This median value was used as the cut-off point to categorize physicians into effective and ineffective groups. Physicians with scores ≥ median were classified as effective, whereas those with scores < median were classified as not effective.

Based on Table 3, the findings show that: 1) PU: Twenty respondents (62.5%) were categorized as effective, indicating that most physicians perceived the EMR system as beneficial in supporting healthcare service delivery; 2) PEOU: Eighteen physicians (56.3%) were categorized as effective, suggesting that the majority found the EMR system relatively easy to use, although certain aspects of usability still require improvement; 3) BI: Nineteen physicians (59.4%) were categorized as effective, demonstrating that most physicians intended to continue using the EMR system as part of their clinical workflow; 4) AU) Twenty-two physicians (68.8%) were categorized as effective, indicating that the majority had integrated EMR use into their daily clinical activities. Overall, these results show that EMR utilization among physicians at Dera As-Syifa Hospital was predominantly effective across all TAM dimensions; usefulness, ease of use, intention to use, and actual use reflecting positive acceptance and integration of the EMR system in routine healthcare services.

Table 1. Physician characteristics by sex and age at Dera As-Syifa Hospital in 2026

Physician characteristics	Category	Frequency	Percentage
Sex	Male	17	53.1
	Female	15	46.9
Age (years)	25–29	2	6.3
	30–34	5	15.6
	35–39	12	37.5
	40–44	10	31.3
	≥45	3	9.4

Table 2. Descriptive statistics of electronic medical record scores based on TAM constructs among physicians at Dera As-Syifa Hospital in 2026

Variable	Mean	Median	SD	Minimum	Maximum
Perceived Usefulness (PU)	14.78	16.00	3.118	8	20
Perceived Ease of Use (PEOU)	14.91	16.00	1.940	7	17
Behavioral Intention (BI)	14.28	16.00	3.324	4	20
Actual Use (AU)	15.06	16.00	2.687	4	19

Table 3. Distribution of PU, PEOU, BI, and AU among physicians at Dera As-Syifa Hospital in 2026

Variable	Category	Frequency	Percentage
Perceived Usefulness (PU)	Effective	20	62.5
	Not Effective	12	37.5
Perceived Ease of Use (PEOU)	Effective	18	56.3
	Not Effective	14	43.8
Behavioral Intention (BI)	Effective	19	59.4
	Not Effective	13	40.6
Actual Use (AU)	Effective	22	68.8
	Not Effective	10	31.3
Total		32	100.0

DISCUSSION

Perceived usefulness

The findings of this study indicate that 62.5% physicians were categorized as effective, whereas 12 respondents (37.5%) were categorized as not effective. These results demonstrate that most physicians perceived the use of the EMR system as effective based on the Perceived Usefulness dimension. This suggests that the majority of respondents experienced the benefits of EMR in supporting healthcare service delivery, although a portion of respondents had not yet fully perceived these benefits optimally. According to the Technology Acceptance Model developed by Davis, Perceived Usefulness refers to an individual's belief that using a particular system will enhance job performance. The greater the

perceived benefits, the higher the level of acceptance toward the technology [6]. In the healthcare context, perceived usefulness is one of the primary factors influencing healthcare workers to adopt and continuously use health information systems [7,8].

The results of this study align with the findings of Hayati et al., who evaluated the effectiveness of EMR implementation at Tk. II dr. Soepraoen Hospital. Their study showed that healthcare workers perceived EMR as beneficial in improving service efficiency, accelerating medical data documentation, and facilitating access to patient information [5]. Similarly, Alipour et al. reported that perceived usefulness is a major determinant influencing the acceptance of hospital information systems among healthcare workers [7]. A systematic review by Shoon et al. also found that Perceived Usefulness is the most consistently associated TAM construct with the acceptance of various health information systems, including EMR [9].

Nevertheless, the findings of this study differ from several studies reporting that EMR benefits are not fully perceived by all users, particularly during early implementation stages. Some studies found that users considered data input processes more time-consuming than manual documentation, especially when training was insufficient or system integration was suboptimal [10]. These differences indicate that perceived usefulness is influenced not only by the existence of the system but also by implementation quality, organizational readiness, user training, and technological infrastructure stability.

The researcher argues that the high percentage of Perceived Usefulness in this study may be attributed to the fact that Dera As-Syifa Hospital has implemented EMR since 2023. This implementation period allowed physicians to gain sufficient experience in using the system, making EMR benefits more apparent in daily service activities. The ease of accessing patient medical histories, more structured documentation processes, and the availability of medical information in real time likely strengthened physicians' positive perceptions of EMR use. However, 37.5% of respondents still perceived EMR use as ineffective, indicating that some users may still face challenges related to system features, workflow, or adaptation to digital technology in clinical practice.

Based on these findings, the hospital needs to maintain the benefits perceived by most users through regular system evaluations. Optimizing features that support clinical needs, improving inter-unit data integration, and providing continuous user training are recommended to enhance perceived usefulness, particularly among physicians who still consider EMR use ineffective. Thus, EMR implementation is expected not only to be accepted as an administrative requirement but also to be recognized as a system that adds value to healthcare service quality.

Perceived ease of use

The results show that 56.3% physicians were categorized as effective. These findings indicate that most physicians perceived EMR as easy to use in supporting daily healthcare services. However, the proportion of respondents who perceived EMR as not effective remains considerable, suggesting that usability aspects still require attention in system development. Within TAM, Perceived Ease of Use is defined as the degree to which a person believes that using a system requires minimal effort [11]. The systems that are easy to understand and operate increase user acceptance [12]. Ease of use also enhances perceived usefulness, as users are more likely to perceive system benefits when the system is simple and does not increase workload.

The findings of this study are consistent with Deharja et al., who reported that healthcare workers positively evaluated EMR usability. Most respondents in their study stated that the system was easy to learn, easy to use, and helped accelerate service processes [13]. A systematic review by Asih et al. also concluded that Perceived Ease of Use is a consistent factor influencing technology acceptance among healthcare workers [14]. Furthermore, Husada et al. found that ease of use increases healthcare workers' interest in continuously using health information systems [15].

Conversely, several studies reported different findings, particularly in hospitals newly implementing EMR. Some users experienced difficulties operating the system due to non-intuitive interfaces, complex data input processes, or limited training [16]. Other studies noted that internet network issues and slow system response times negatively affected user perceptions of EMR usability [16]. These variations indicate that perceived ease of use is influenced not only by system design but also by technological infrastructure readiness, training quality, and technical support availability.

The researcher suggests that the high Perceived Ease of Use score in this study may be influenced by physicians' experience using EMR since its implementation in 2023. The relatively long usage period allowed physicians to adapt to available features. Routine EMR use in outpatient, inpatient, emergency, and diagnostic services also helped users become familiar with system workflows, contributing to the perception that EMR is easy to use in daily practice. However, 43.8% of respondents still perceived EMR usability as ineffective. This indicates that user perceptions vary depending on experience, technological proficiency, and familiarity with digital systems. Therefore, regular evaluation of user challenges is necessary to identify and address both individual and technical barriers.

Based on these findings, the hospital should maintain system usability by improving interface design, ensuring network stability, and providing technical assistance during system updates or changes. These efforts are expected to sustain positive user perceptions and enhance physician comfort in utilizing EMR as part of effective and continuous healthcare services.

Behavioral intention

The Behavioral Intention dimension showed that 59.4% physicians were categorized as effective. These findings indicate that most physicians intend to continue using EMR to support healthcare services, although some respondents still lack strong intention. Behavioral Intention is a key indicator of technology implementation sustainability. In TAM, BI reflects users' commitment to continue using a system after perceiving its usefulness, ease of use, and developing positive attitudes toward the technology [12,17]. The higher the user's intention, the greater the likelihood that the system will be consistently utilized in work activities. The findings of this study show that most physicians intend to continue using EMR in healthcare services. This suggests that EMR is not only viewed as a documentation tool but also perceived as supporting service effectiveness, encouraging users to maintain its use in the future.

These results are consistent with previous studies demonstrating that BI is a crucial factor in successful EMR implementation. Rizky et al. reported that most healthcare workers were committed to using EMR because it improved service efficiency and facilitated medical documentation [18]. Syahnel et al. also found that intention to use hospital information systems is influenced by perceived benefits and positive user experiences [19]. A systematic review by Ikawati et al. further confirmed that BI is consistently associated with sustained use of health information systems [20].

However, some studies reported different findings. In hospitals at early EMR implementation stages, BI may not be fully formed due to workflow changes, increased administrative burden, limited training, or technical issues such as slow system response or network disruptions. In such cases, healthcare workers use EMR mainly due to institutional policy rather than personal intention.

The researcher notes that the 40.6% of respondents categorized as not effective in BI may indicate that some physicians use EMR primarily due to service requirements and hospital policies rather than strong personal motivation. This is understandable, as EMR implementation is influenced not only by individual perceptions but also by regulations, standard operating procedures, and mandatory documentation requirements.

Interestingly, the BI findings contrast with the Actual Use dimension, which showed a higher effectiveness percentage. This suggests that actual system use is not always fully driven by personal intention but may also be influenced by organizational policies, work culture, and mandatory system use in healthcare services.

To strengthen BI, the hospital should enhance user engagement in system development through regular evaluation forums, feedback mechanisms, and feature development aligned with clinical needs. Additional training and recognition for EMR compliance may also increase users' sense of ownership. These efforts can help ensure that EMR use is driven not only by organizational requirements but also by users' belief in its value for improving healthcare quality.

Actual use

The study found that 68.8% physicians were categorized as effective, while 10 respondents (31.3%) were categorized as not effective. These results indicate that most physicians have used EMR in real practice according to service needs, making EMR use an integral part of daily hospital operations. Technology acceptance is ultimately reflected in actual system use in daily work activities. The high percentage of Actual Use in this study shows that EMR is not only accepted at the perceptual level but has been implemented in real healthcare processes at Dera As-Syifa Hospital. This indicates that EMR has become part of clinical workflows, from documentation to medical information management. These findings align with TAM, which explains that actual use represents the final stage of technology acceptance after users perceive usefulness, ease of use, and develop positive attitudes and commitment [21,22].

The findings reinforce previous studies showing that actual use is a key indicator of successful EMR implementation. Indira reported that healthcare workers consistently used EMR because it was integrated into hospital workflows, improving service efficiency and documentation quality [23]. Sutha et al. also found that routine EMR use accelerated patient data recording, reduced paper-based documentation, and enhanced service effectiveness [24]. Amelia et al. further noted that actual use reflects successful acceptance of health information systems [25].

Conversely, some studies reported suboptimal actual use in facilities newly implementing EMR due to limited computer availability, unstable internet networks, slow login processes, or reliance on paper-based records [26]. These differences indicate that actual use is influenced not only by user readiness but also by organizational readiness and technological infrastructure support [27].

The researcher suggests that the high Actual Use score in this study is influenced by several factors. First, EMR has been implemented at Dera As-Syifa Hospital since 2023, allowing sufficient adaptation time. Second, EMR is used across various service units, including outpatient, inpatient, emergency, and laboratory services, making system use inseparable from clinical workflows. Third, hospital policies mandating EMR use likely increased consistency among physicians. However, 31.3% of respondents still perceived actual EMR use as ineffective, indicating individual-level challenges. Differences in technological adaptation, experience with information systems, or technical issues during service delivery may influence respondents' assessments. Therefore, user experience evaluation remains essential to identify specific barriers.

Based on these findings, the hospital should maintain high Actual Use levels through regular system maintenance, improved network reliability, feature refinement aligned with clinical needs, and responsive technical support. These efforts are expected to sustain consistent EMR use, thereby improving medical documentation quality, service continuity, and overall healthcare quality.

Study limitations

This study has several limitations. The cross-sectional design only describes EMR effectiveness based on respondents' perceptions at a single point in time, preventing assessment of long-term changes. The descriptive-univariate analysis also does not identify relationships between respondent characteristics or other factors influencing EMR acceptance. The use of perception-based questionnaires may introduce response bias. Additionally, the study involved only 32 physicians at Dera As-Syifa Hospital, limiting generalizability to other healthcare facilities with different characteristics. Future studies are recommended to use analytical or longitudinal designs, involve larger and more diverse healthcare personnel, and consider additional factors influencing EMR implementation.

CONCLUSION

The study indicates that physicians at Dera As-Syifa Hospital generally perceive the Electronic Medical Record (EMR) system as useful, easy to operate, and supportive of clinical workflows. EMR has been integrated into daily practice, reflecting positive acceptance across key dimensions of the Technology Acceptance Model. Nonetheless, some users still experience challenges related to system features, workflow adaptation, and technical constraints, showing that acceptance is not yet uniform.

The findings imply that sustained improvement efforts are essential to strengthen user experience and long-term system adoption. Enhancing system functionality, ensuring stable technological infrastructure, providing continuous training, and involving users in system evaluation can help optimize EMR utilization. These measures are expected to reinforce user confidence, reduce barriers, and support the delivery of efficient, high-quality, and technology-driven healthcare services.

Ethical consideration, competing interest and source of funding

-Ethical approval for this research was obtained from the Ethics Committee of the Faculty of Medicine, Universitas Swadaya Gunung Jati, under approval number 37/EC/KEPKUGJ/IV/2026.
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