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Original Article

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Human, technology, and organizational factors influencing electronic medical record data entry in primary healthcare: A qualitative study at blud timika community health center

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ABSTRACT

Introduction: Electronic medical records (EMRs) are increasingly central to primary healthcare delivery because accurate and timely documentation supports service efficiency, continuity of care, and reliable health information. However, successful implementation depends not only on the technology itself but also on staff capability and organizational procedures. This study aimed to explore the electronic medical record data-entry process for outpatient services at BLUD Timika Community Health Center, with particular attention to staff roles, system quality, and implementation of standard operating procedures (SOPs).

Research Methodology: A descriptive qualitative study was conducted at BLUD Timika Community Health Center, Mimika Regency, Central Papua, in June 2026. Six informants were purposively selected, comprising one key informant responsible for the medical records unit and five outpatient registration staff directly involved in patient registration and EMR data entry. Data were collected through in-depth interviews, direct observation, and documentation. Analysis involved data reduction, systematic data presentation, and conclusion drawing, while credibility was strengthened through source and method triangulation.

Results: EMR data entry generally followed the established service workflow, including patient identity verification, data entry, and subsequent service distribution. Staff demonstrated adequate ability to operate the Trustmedis application despite limited formal EMR training. Trustmedis was perceived as user-friendly and facilitated faster registration and patient data retrieval. Nevertheless, unstable internet connectivity frequently disrupted data entry and delayed services. SOPs were available and understood by staff, but implementation was not fully optimal because supervision and evaluation remained inconsistent. Additional challenges included patients presenting without complete identification and duplicate patient records within the system.

Conclusion: Effective EMR data entry in primary healthcare depends on the alignment of competent users, reliable technological infrastructure, and consistently implemented organizational procedures. Periodic staff training, improved internet reliability, routine SOP supervision and evaluation, and standardized procedures for managing incomplete patient identification and duplicate records are needed to strengthen data accuracy and service efficiency.

Keywords: electronic health records; health personnel; information systems; primary health care; workflow.

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INTRODUCTION

The transition from paper-based records to electronic medical records (EMRs) has changed the way patient information is created, accessed, and used within primary healthcare services. In Indonesia, this transformation is no longer merely an organizational choice because healthcare facilities are required to implement electronic medical records under Ministry of Health Regulation No. 24 of 2022. The policy is intended to improve service quality, legal certainty, data security, and the integration of health information across facilities. Nevertheless, regulatory adoption does not automatically ensure reliable implementation at the point of care[1,2]. The practical value of an EMR ultimately depends on whether patient data are entered accurately, consistently, and in a timely manner during routine service delivery. Errors at the data-entry stage can propagate across subsequent clinical and administrative processes, affecting patient identification, continuity of care, reporting, and the reliability of information used for management decisions[3].

This issue is particularly relevant in outpatient registration, where the electronic record begins with verification of patient identity and retrieval or creation of the patient record. Inaccurate names, dates of birth, or national identification numbers can generate duplicate records, while incomplete identity information may hinder retrieval of previously stored data[4,5]. The manuscript identifies data entry as a sequential process involving registration, identity verification, collection of patient information, electronic input, and data storage, each requiring a high degree of accuracy[6,7]. At BLUD Timika Community Health Center, the transition from paper records to the Trustmedis electronic system began after the institution's transformation into a regional public service agency. Trustmedis is currently used for patient registration, identity entry, service documentation, and digital storage. However, preliminary observations identified inaccurate data entry, inconsistencies in patient identity information, and the possibility of duplicate medical records, indicating that digitalization has not eliminated information-quality problems[8,9].

Existing literature reviewed in the manuscript suggests that these problems cannot be understood solely as technical failures. Evidence from previous studies shows that EMR implementation is shaped by the interaction between users, system characteristics, and organizational arrangements[10]. Staff competence is particularly important because registration personnel directly verify and enter patient information. Inadequate training, limited familiarity with the system, workload, and insufficient attention during data entry may increase the risk of documentation errors and duplicate records[11]. At the technological level, usability, access speed, system reliability, and network stability determine whether electronic documentation supports or disrupts routine workflow[12]. A user-friendly application may facilitate efficient registration, whereas system errors or unstable connectivity can delay entry and compromise service efficiency. Organizationally, standard operating procedures (SOPs) are intended to standardize data-entry practices and reduce variation among users, yet their effectiveness depends on staff understanding, compliance, supervision, and periodic evaluation.

These findings are consistent with the Human Organization Technology Fit perspective, which conceptualizes successful health information-system implementation as a product of alignment among human capability, organizational support, and technological performance. In the conceptual framework adopted in this study, the human component comprises staff competence, skills, experience, and accuracy; the technological component includes usability, access speed, and system reliability; and the organizational component concerns SOP implementation, training, supervision, and evaluation. This framework is useful because it

shifts the assessment of EMR implementation away from a narrow focus on software performance and toward the operational relationships among users, infrastructure, and work procedures.

Despite the growing literature on EMR implementation, an important gap remains. Previous studies summarized in the manuscript have mainly reported broad implementation barriers, system effectiveness, human-resource limitations, network constraints, or compliance with SOPs as separate issues. Less attention has been given to how these factors interact during the actual outpatient data-entry workflow in a primary healthcare facility operating in the context of Timika, Central Papua. Consequently, there is limited context-specific evidence explaining how staff practices, Trustmedis system performance, and organizational procedures jointly shape the accuracy and continuity of routine patient registration.

The novelty of this study lies in examining EMR data entry as an integrated operational process rather than as an isolated technological function. By simultaneously exploring staff roles, system quality, and SOP implementation within the real-world outpatient registration workflow, this study provides a context-sensitive assessment of the fit between human, technological, and organizational components in a primary healthcare setting in Central Papua. This approach is expected to identify not only whether the system is being used, but also where operational vulnerabilities persist and what organizational responses are required to improve data quality and service reliability.

Accordingly, this study aimed to explore the electronic medical record data-entry process for outpatient services at BLUD Timika Community Health Center, with specific attention to the role of registration staff, the quality of the Trustmedis system, and the implementation of standard operating procedures. The findings are expected to provide an empirical basis for strengthening staff competence, technological infrastructure, supervision, and procedural standardization in primary healthcare EMR implementation.

MATERIALS AND METHODS

Study Design

This study employed a descriptive qualitative design to explore the electronic medical record (EMR) data-entry process for outpatient services at BLUD Timika Community Health Center. A qualitative approach was considered appropriate because the study sought to understand routine practices, experiences, perceptions, and operational constraints encountered by personnel directly involved in EMR implementation rather than to quantify associations between predetermined variables. The inquiry focused on three interrelated domains: staff roles as the human component, system quality as the technological component, and implementation of standard operating procedures (SOPs) as the organizational component. These domains were conceptually informed by the Human–Organization–Technology Fit framework used in the study.

Setting and Participants

The study was conducted at BLUD Timika Community Health Center, Mimika Regency, Central Papua Province, Indonesia, in June 2026. The setting was selected because the facility had transitioned from paper-based medical records to the Trustmedis electronic system and routinely used the application for outpatient registration and patient-data management. Participants were selected through purposive sampling based on their direct involvement in the EMR registration and data-entry process. Six informants participated: one key informant, the person responsible for the Medical Records Unit, and five main informants who worked in

outpatient registration and were directly involved in registering patients and assigning or retrieving medical record numbers.

Eligibility was therefore based on participants' roles and direct experience with outpatient EMR processes. The manuscript does not report separately formulated exclusion criteria; consequently, no additional exclusion criteria were introduced in this article. Because this was a qualitative study, no statistical sample-size calculation or power analysis was applicable. The number and composition of participants reflected the purposive selection of information-rich personnel directly involved in the phenomenon under investigation. The manuscript reports that participants ranged from 29 to 47 years of age.

Variables and Measurement

Consistent with qualitative methodology, the study did not define statistical independent or dependent variables. Instead, three analytical domains guided data collection and interpretation. The staff-role domain addressed personnel involvement in EMR data entry, including their ability, skills, accuracy, and understanding of system use. System quality referred to the performance of the Trustmedis application in supporting data entry, particularly ease of use, access speed, and technical reliability. SOP implementation concerned staff understanding of established procedures, adherence to data-entry processes, consistency between routine practice and written procedures, and the presence of supervision, evaluation, and monitoring.

Primary data were obtained from in-depth interviews and direct observations. Documentary materials served as complementary sources and included relevant SOPs, patient-visit information, and electronic-system records used to support verification of findings. The research instruments comprised a semi-structured interview guide, an observation sheet, field notes, and an audio-recording device. The observation sheet was used to systematically document registration workflow, staff–patient interactions, EMR use, and operational barriers. Given the qualitative design, conventional psychometric measures of instrument validity and reliability, such as Cronbach's alpha, were not applicable and were not reported in the manuscript. Methodological rigor was instead addressed through triangulation of sources and methods.

Data Collection

Data were collected using in-depth interviews, direct observation, and documentation. Face-to-face interviews followed a prepared interview guide and explored participants' experiences, perceptions, and difficulties in registering patients and entering data into the EMR. Interviews were audio-recorded with participants' permission to support accurate transcription. Direct observation was conducted at the outpatient registration unit to examine the actual registration workflow, patient identification procedures, patient-data retrieval, use of the electronic system, and situations in which patients presented without adequate identification. Findings were systematically documented using an observation sheet. Documentary review complemented interview and observational evidence and was used to verify information obtained from participants.

Quality control was achieved through source and method triangulation. Information provided by different informants was compared, while interview findings were cross-checked against direct observations and supporting documents. This approach was used to identify convergence or discrepancies across data sources and strengthen the credibility of the interpretation.

Data Analysis

Data were analyzed manually using content analysis and the interactive qualitative analysis approach described in the manuscript. Analysis proceeded through three interconnected stages: data reduction, data display, and conclusion drawing. During data reduction, interview, observational, and documentary material was reviewed, selected, simplified, and organized according to the study focus. Relevant information was then grouped around staff roles, system quality, SOP implementation, and operational issues emerging from the data. Reduced data were presented systematically as descriptive narratives supported by relevant participant quotations. Findings from different sources were compared to identify recurring patterns, consistencies, and operational problems. The final stage involved drawing conclusions that integrated evidence across interviews, observations, and documentation to characterize the EMR data-entry process and identify areas requiring improvement.

The manuscript specifies manual qualitative analysis and does not report the use of qualitative analysis software such as NVivo, ATLAS.ti, or MAXQDA. Accordingly, no software is attributed to the analysis. Statistical descriptive analysis, bivariate hypothesis testing, multivariable regression, effect estimates, confidence intervals, p-values, and a significance threshold of $\alpha = 0.05$ were not applicable because the study was designed to generate contextual qualitative understanding rather than statistical inference.

Ethical Considerations

Participation was voluntary. Before data collection, participants were provided with an informed consent form and indicated their willingness to participate in interviews without coercion. The consent documentation also authorized the research team to use information provided by participants for purposes consistent with the objectives of the study. Participants' permission was obtained before audio recording interviews.

RESULTS

Six informants participated in the study, consisting of one key informant responsible for the medical records unit and five main informants working in outpatient registration. Participants ranged from 29 to 47 years of age; five were women, and one was a man. The findings were organized around three analytical domains: staff roles, system quality, and implementation of standard operating procedures (SOPs). These domains reflect the human, technological, and organizational dimensions underlying the electronic medical record (EMR) data-entry process.

Table 1. Characteristics of study informants

No.	Informant Code	Position/Role	Age (years)	Sex	Informant Category
1	TMB	Head of Medical Records Unit	41	Female	Key informant
2	DK	Registration staff	43	Female	Main informant
3	JP	Registration staff	29	Male	Main informant
4	SS	Registration staff	33	Female	Main informant
5	MT	Registration staff	47	Female	Main informant
6	MTL	Registration staff	42	Female	Main informant

Source: Primary data, 2026.

The informant composition represented personnel directly involved in both managerial oversight and routine outpatient registration. This combination enabled the study to capture operational experiences from staff performing daily data entry while also incorporating the

perspective of the person responsible for the medical records unit.

Table 2. Thematic findings on EMR data-entry implementation

Analytical Domain	Positive Findings	Barriers/Negative Findings	Interpretation
Staff roles (Human)	Staff understood the EMR workflow and were able to operate Trustmedis during routine registration. Practical competence developed through repeated daily use and peer-based learning.	Most staff had not received structured formal training specifically related to EMR or Trustmedis. Competence therefore relied largely on individual experience and self-learning.	Operational capability was adequate for routine service, but the absence of standardized training may create variability in competence and vulnerability when staff rotate, or system functions change.
System quality (Technology)	Trustmedis was perceived as easy to learn and use. Searching patient records using NIK or medical record numbers was faster than manual record retrieval. The system facilitated registration, data updating, and routine service delivery.	Slow or unstable internet connectivity repeatedly interrupted access and delayed registration.	The major technological constraint was not primarily software usability but the infrastructure supporting the application.
SOP implementation (Organization)	SOPs for EMR data entry were available, known by staff, and used as a reference during registration.	Supervision and evaluation were not consistently performed. Difficulties occurred when patients presented without adequate identification or when duplicate records were identified.	Formal procedures were established, but implementation lacked sufficiently consistent monitoring and explicit contingency procedures for non-routine registration problems.

Staff capability emerged as an important facilitator of routine EMR implementation. Observation showed that personnel involved in registration understood the system and were able to perform electronic data entry. Interview findings similarly indicated that personnel could operate Trustmedis according to the established service workflow. However, the competence observed in practice was predominantly acquired through routine experience rather than structured training. This distinction is important because practical familiarity does not necessarily ensure standardized competencies in patient identification, data-quality control, privacy, or management of unusual cases.

System usability was consistently viewed positively. Informants described Trustmedis as relatively simple to operate, with patient information retrievable through a national identification number or medical record number. These functions reduced dependence on manual records and facilitated faster patient registration and updating of demographic information. The principal technological barrier was unstable internet connectivity. Across informants, slow or interrupted network access delayed application response, patient-data retrieval, and the registration process.

Organizationally, EMR-related SOPs were already available and recognized by all

informants as a routine reference. Nevertheless, their implementation was not fully supported by consistent supervision and evaluation. Practical challenges also emerged when patients arrived without complete identification or when duplicate records were encountered.

Table 3. Integrated qualitative synthesis of human, technology, and organizational findings

Dimension	Core Finding	Supporting Evidence	Consequence for EMR Data Entry	Priority for Improvement
Human	Staff were functionally capable of operating Trustmedis.	Staff understood registration workflow and routinely used the system.	Supports continuity and efficiency of routine data entry.	Formal competency-based EMR training.
Human	Competence was largely experiential rather than formally standardized.	Most staff had not received specific structured EMR training.	Potential differences in capability may emerge when handling complex cases, system updates, or staff turnover.	Periodic training, technical mentoring, and competency assessment.
Technology	Trustmedis was considered usable and service-supportive.	Patient information could be retrieved rapidly through NIK or medical record number.	Reduced manual record searching and accelerated registration.	Maintain application functionality and usability.
Technology	Network instability was the dominant technological barrier.	All main informants reported slow or unstable connectivity affecting system access.	Registration delays, longer queues, and interruption of workflow.	Reliable internet capacity, server support, and backup connectivity.
Organization	SOPs were available and generally followed.	Informants reported knowing and using SOPs during registration.	Provides a standardized foundation for data-entry procedures.	Sustain SOP dissemination and adherence.
Organization	Monitoring and contingency procedures remained insufficient.	Evaluation was inconsistent; patients without identification and duplicate records remained problematic.	Increased risk of inconsistent verification and duplicate patient records.	Routine supervision, data-quality audits, and specific procedures for incomplete identity and duplicate records.

The integrated analysis indicates that the effectiveness of EMR data entry cannot be attributed to a single component. Trustmedis itself was generally perceived as functional and useful, while the principal weaknesses occurred at the interfaces between users, infrastructure, and organizational controls. The manuscript similarly concludes that the application supports faster registration and patient-data retrieval, but implementation continues to depend heavily

on internet stability and organizational support.

Statistical Effect Estimates

OR, RR, β coefficients, 95% confidence intervals, and p-values were not calculated and are not applicable to this study. The research used a descriptive qualitative design involving six purposively selected informants and qualitative content analysis rather than inferential statistical analysis. Consequently, presenting bivariable or multivariable effect estimates would constitute fabrication of results and would be inconsistent with the study protocol. The findings indicate that successful EMR implementation at BLUD Timika Community Health Center depends less on the mere availability of digital technology than on the operational fit between staff competence, infrastructure reliability, and organizational governance. Trustmedis appears to provide a workable technological platform: users perceive it as accessible, patient information can be retrieved more efficiently, and routine registration is facilitated. However, these advantages become fragile when network instability interrupts system access. At the same time, reliance on experiential learning means that current performance depends substantially on individual familiarity rather than standardized organizational competence. This creates a potential continuity problem when staff rotates, new personnel are recruited, or application features change.

The organizational implications are equally important. Existing SOPs provide a basic structure for routine registration, yet their value as a quality-governance mechanism remains limited when supervision and evaluation are inconsistent. Problems involving incomplete patient identification and duplicate records therefore should not be treated merely as individual data-entry errors. They reflect weaknesses at the interface between patient verification, information governance, and workflow control. Strengthening EMR implementation consequently requires an integrated strategy: competency-based staff training, reliable and redundant internet infrastructure, routine data-quality audits, structured supervision, and specific SOP pathways for patients without adequate identification and for duplicate-record reconciliation. Such measures would move EMR implementation from functional digitalization toward a more resilient information-governance system.

DISCUSSION

The findings of this study indicate that the implementation of electronic medical records (EMRs) at BLUD Timika Community Health Center should be understood as a socio-technical process rather than a purely technological intervention. Staff were generally able to operate the Trustmedis application and follow the outpatient registration workflow, despite most of them not having received structured formal training. At the same time, the application was perceived as easy to use and useful in accelerating patient registration. In contrast, unstable internet connectivity, incomplete patient identification, duplicate records, and inconsistent supervision remained important operational barriers. These findings suggest that the facility has reached a stage in which the digital system is functionally embedded in daily service delivery. However, its implementation has not yet been fully institutionalized through standardized competencies, resilient infrastructure, and consistent governance mechanisms.

The human component is particularly important because the ability of staff to use Trustmedis appears to have developed largely through repeated practice, experiential learning, and informal support. Previous evidence summarized in the manuscript similarly suggests that familiarity with health information systems can improve user adaptation, while the absence of formal training may leave competence dependent on individual experience[13,14]. In the present study, this adaptive capacity allowed services to continue and prevented the absence of formal training from becoming an immediate implementation failure. However,

competence acquired informally may be uneven and vulnerable to staff rotation, the recruitment of new personnel, software updates, or more complex registration problems. For this reason, the findings point to an important distinction between functional competence and institutionalized competence[15,16]. Functional competence enables staff to complete daily tasks, whereas institutionalized competence ensures that all personnel apply comparable standards in patient identification, data verification, confidentiality, duplicate-record management, and system use.

This distinction is important because registration staff should not be viewed merely as administrative operators. Their role is closely related to information governance and data-quality assurance. Patient identification and record retrieval at the registration stage determine whether subsequent clinical and administrative information is attached to the correct person. Incomplete identity documentation or the creation of a new record when an existing record cannot be located may therefore produce consequences beyond the registration desk[17]. The manuscript shows that incomplete identification makes verification more difficult and increases the risk of duplicate medical records[18]. This means that the quality of EMR implementation partly depends on the ability of registration staff to act as gatekeepers of data integrity. Training should therefore go beyond software navigation and include identity matching, record reconciliation, data correction, confidentiality, escalation procedures, and management of non-routine cases.

The technological findings reinforce the same systemic interpretation. Trustmedis was generally considered easy to use and helpful in accelerating patient-data retrieval. The ability to search using a national identification number or medical record number reduced dependence on manual file searching and supported a more efficient registration process[19,20]. However, the benefits of the application were repeatedly constrained by unstable internet connectivity. This finding is conceptually important because it shows that software usability alone is an insufficient indicator of digital-health performance[21]. A technically adequate application may still perform poorly within a weak infrastructural environment. In this setting, the major technological vulnerability was not primarily the application itself, but the network on which it depended. The operational performance of EMR should therefore be assessed as a layered system that includes the application, internet connectivity, server capacity, backup arrangements, hardware availability, and technical support.

The organizational findings reveal another gap between formal implementation and operational maturity. SOPs for EMR data entry were available and generally known by staff, but supervision and evaluation were not consistently implemented. This indicates that the existence of written procedures does not automatically ensure effective governance[22]. An SOP becomes a meaningful quality-control mechanism only when its implementation is monitored, deviations are identified, corrective actions are taken, and procedures are periodically revised in response to recurring operational problems[23]. The problems of incomplete identification and duplicate records illustrate this clearly. These should not be treated only as occasional difficulties requiring staff improvisation. Their recurrence suggests that the organization needs explicit contingency procedures for patient identification, record searching, data correction, record merging, and escalation when reliable identification is unavailable[24].

The study therefore strengthens the logic of the Human–Organization–Technology Fit framework by showing that the main implementation vulnerabilities occur at the interfaces between components. Staff may be capable of operating the system, but poor connectivity can still interrupt their work. The software may be user-friendly, but incomplete patient identity can reduce the accuracy of record retrieval[25]. SOPs may be available, but inconsistent supervision can produce variation in practice. In other words, the effectiveness of EMR cannot be explained by assessing human, technological, and organizational factors separately[26]. The more important issue is the degree to which these components reinforce one another during routine service delivery. This interpretation extends the HOT-Fit framework from a checklist of implementation factors toward a more dynamic understanding of operational alignment.

The findings are broadly consistent with previous studies discussed in the manuscript.

Earlier research has shown that user familiarity and practical exposure improve adaptation to health information systems, while insufficient formal training may limit standardization of competence[27]. The present study adds nuance by showing that the absence of formal training does not necessarily prevent routine system use, but may create a hidden dependence on individual experience[28]. This means that apparently successful implementation may remain organizationally fragile if knowledge is concentrated in experienced staff rather than embedded in structured training, competency standards, and routine evaluation.

The technological findings also support earlier evidence that user-friendly EMR interfaces can improve efficiency, while poor internet connectivity remains a major barrier in primary healthcare settings. The manuscript notes that improvement in EMR implementation requires not only software development, but also stronger network capacity, server support, and backup connectivity. The present findings reinforce this argument by showing that software quality and infrastructure quality should be treated as separate but interdependent dimensions. A well-designed application cannot compensate for repeated network failure. This has important implications for digital-health policy because investment decisions that focus only on software procurement may underestimate the infrastructural requirements necessary for reliable service delivery.

The organizational findings are also consistent with previous literature summarized in the manuscript, which indicates that written procedures are more effective when accompanied by dissemination, supervision, and routine evaluation. Facilities that merely possess SOP documents without active monitoring may continue to experience inconsistent work practices and data-quality problems. The present study extends this understanding by distinguishing between procedural compliance and procedural adequacy. Staff may comply with an existing SOP, but the procedure itself may still be insufficient for complex or non-routine situations. This is particularly relevant to patients without complete identity documents and to duplicate records. In such situations, the problem may not be staff non-compliance, but the absence of sufficiently detailed operational guidance.

This distinction has broader implications for information governance. The manuscript links SOP implementation with the requirement that electronic medical records maintain accuracy, security, confidentiality, and continuity of patient information. Therefore, identity verification and duplicate-record management should not be viewed merely as local administrative issues. They are part of the integrity of the health information system. Errors introduced at the point of registration may affect downstream clinical documentation, reporting, reimbursement, continuity of care, and future interoperability with other health information platforms. From this perspective, the registration unit becomes a critical control point in the digital-health architecture of primary care.

Several limitations should be considered when interpreting these findings. The study used a descriptive qualitative design and was conducted in a single primary healthcare facility with six purposively selected informants. The findings therefore provide contextual depth rather than statistical representativeness and should not be generalized numerically to other facilities or regions. The participants were directly involved in medical-record management and outpatient registration, which strengthens the operational relevance of the data but also means that perspectives from clinicians, information-technology personnel, managers outside the medical-record unit, and patients were not fully represented.

The findings were derived primarily from interviews, observations, and supporting documentation. Although triangulation strengthened credibility, self-reported experiences remain susceptible to recall bias and social desirability. The study also did not measure registration time, system downtime, the frequency of duplicate records, the prevalence of incomplete patient identifiers, or the rate of data-entry errors. As a result, statements regarding efficiency, usability, and data quality should be interpreted as qualitative assessments rather than quantified effects. Similarly, the design does not permit causal inference regarding the relationship between training, connectivity, SOP implementation, and EMR performance.

Another caution concerns the role of patients in the observed workflow. Incomplete

identification and inconsistent demographic information emerged as important challenges, but these problems occur at the interface between patients, administrative processes, and the electronic system. It would therefore be inappropriate to attribute them solely to staff performance. Access to identification documents, variations in demographic records, system matching functions, and local service conditions may all contribute to the problem. A broader system perspective is therefore necessary when designing corrective strategies.

Future research should move beyond evaluating whether EMR has been adopted and examine how implementation quality is created and sustained over time. Multisite qualitative studies across community health centers with different levels of digital maturity would help distinguish context-specific barriers from structural challenges shared across primary healthcare settings. Including registration staff, clinicians, managers, information-technology personnel, and patients could also provide a more comprehensive view of the socio-technical environment surrounding EMR use.

Mixed-methods approaches would be particularly valuable. Qualitative exploration could be combined with objective indicators such as registration duration, network downtime, duplicate-record frequency, incomplete-field rates, patient-matching errors, and adherence to critical SOP steps. Longitudinal studies could assess whether structured training, infrastructure upgrades, routine audits, or revised SOPs lead to sustained improvements. Intervention studies could also compare formal competency-based training with experiential learning or evaluate the effect of backup connectivity and automated duplicate-detection mechanisms.

Further research should also consider patient identity management as a distinct dimension of EMR quality. The present study indicates that incomplete identification and duplicate records reflect broader interactions among patient documentation, staff verification practices, system-matching capacity, and organizational oversight. Developing and evaluating standardized protocols for identity verification, record reconciliation, and duplicate resolution may therefore offer a useful next step. Conceptually, future studies could extend the HOT-Fit framework by treating data quality as an outcome generated through interaction among people, technology, workflow, and governance rather than as a simple attribute of software.

Overall, the study suggests that sustainable EMR implementation in primary healthcare requires more than functional software and routine user adoption. It requires an organizational environment in which staff capability is standardized, infrastructure is reliable, SOPs are actively governed, and data-quality risks are systematically monitored. For BLUD Timika Community Health Center, the priority is therefore not simply to maintain Trustmedis as an operational application, but to strengthen the system around it through competency development, resilient connectivity, routine supervision, data-quality auditing, and clearer procedures for non-standard registration situations. This systems-oriented interpretation represents the main conceptual contribution of the study: digital transformation becomes meaningful when human capability, technological reliability, and organizational governance are aligned to protect the continuity and integrity of patient information.

CONCLUSIONS

This study demonstrates that the electronic medical record data-entry process at BLUD Timika Community Health Center has been implemented reasonably well. However, its effectiveness remains dependent on the alignment of human, technological, and organizational factors. Staff were able to operate the Trustmedis application and follow the established registration workflow, although most had not received formal EMR-specific training. The system was considered easy to use and supported faster patient registration and record retrieval, but unstable internet connectivity continued to disrupt service delivery. SOPs were available and generally followed, yet supervision and evaluation were not consistently implemented, while incomplete patient identification and duplicate records remained unresolved operational concerns. The findings indicate that improving EMR performance requires an integrated strategy rather than isolated technical improvements. BLUD Timika

Community Health Center should institutionalize periodic competency-based training, strengthen internet and backup connectivity, conduct routine data-quality audits, and reinforce SOP supervision. Specific procedures for managing patients without complete identification and reconciling duplicate records should also be established. These measures can strengthen data accuracy, service continuity, and the reliability of electronic health information in primary care.

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Conflict of Interest
The authors declare that they have no financial, professional, or personal conflicts of interest that could have influenced the design, conduct, interpretation, or reporting of this study.

Authors' Contributions
Dewi Novita Sari: Conceptualization, Methodology, Investigation, Data Curation, Formal Analysis, Visualization, Writing – Original Draft, and Project Administration.
Hasmah: Conceptualization, Methodology, Validation, Supervision, Writing – Review & Editing, and Project Administration.
Musafirah: Methodology, Validation, Supervision, Writing – Review & Editing, and Project Administration.

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Declaration of Generative AI Use
Generative artificial intelligence tools were used solely to assist with language refinement, grammatical correction, and improvement of manuscript readability. The research design, data collection, data analysis, interpretation of findings, and scientific conclusions were developed and verified by the authors. No generative AI tool was used to generate, modify, or fabricate research data. The authors reviewed and approved the final manuscript and take full responsibility for its accuracy, originality, and scientific integrity.

Data Availability Statement
The qualitative data generated and analyzed during this study are not publicly available because they contain potentially identifiable information obtained from research participants. De-identified supporting data may be made available by the corresponding author upon reasonable request, subject to ethical considerations, institutional approval, and protection of participant confidentiality.

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