

RESEARCH ARTICLE

Analysis of the Implementation of the Hospital Management Information System (SIMRS) on Waiting Time and Patient Satisfaction

Analisis Implementasi Sistem Informasi Manajemen Rumah Sakit (SIMRS) terhadap Waktu Tunggu dan Kepuasan Pasien

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Abstract

Hospital Information Management System (SIMRS) is crucial for speeding up healthcare services and integrating medical data. This study aimed to determine the relationship between SIMRS quality (system quality, information quality, and service quality) and waiting time and patient satisfaction in the outpatient department of RSUD Lembang. This quantitative study employed an analytic cross-sectional design involving 96 outpatients. Data were collected using questionnaires and direct observations of waiting times and were analyzed using Chi-square and Poisson regression analyses. The results showed that most patients experienced waiting times of less than 60 minutes (59.4%) and were satisfied with the hospital services (51.0%), although the information quality and service quality of SIMRS were still rated as poor by most participants. The statistical analyses showed that all dimensions of SIMRS quality were significantly associated with waiting time and patient satisfaction ($p < 0.001$). Staff service quality in operating the system was the main factor associated with shorter patient waiting times ($PR = 2.67$). Meanwhile, the technical stability of the computer system was the strongest factor associated with patient satisfaction ($PR = 4.90$). The study concludes that stable information technology system performance and responsive staff contribute to reducing waiting times and improving patient satisfaction. Hospitals are recommended to integrate computer systems across all service units and provide digital training for staff.

Keywords: patient satisfaction, SIMRS, waiting time

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Abstrak

Sistem Informasi Manajemen Rumah Sakit (SIMRS) berperan penting dalam mempercepat pelayanan kesehatan dan mengintegrasikan data medis. Penelitian ini bertujuan untuk mengetahui hubungan antara kualitas SIMRS (kualitas sistem, kualitas informasi, dan kualitas pelayanan) dengan waktu tunggu dan kepuasan pasien di instalasi rawat jalan RSUD Lembang. Penelitian kuantitatif ini menggunakan desain analitik cross-sectional yang melibatkan 96 pasien rawat jalan. Data dikumpulkan melalui kuesioner dan observasi langsung terhadap waktu tunggu, kemudian dianalisis menggunakan uji Chi-square dan regresi Poisson. Hasil penelitian menunjukkan bahwa sebagian besar pasien mengalami waktu tunggu kurang dari 60 menit (59,4%) dan merasa puas terhadap pelayanan rumah sakit (51,0%), meskipun kualitas informasi dan kualitas pelayanan SIMRS masih dinilai kurang baik oleh sebagian besar responden. Analisis statistik menunjukkan bahwa seluruh dimensi kualitas SIMRS berhubungan secara signifikan dengan waktu tunggu dan kepuasan pasien ($p < 0,001$). Kualitas pelayanan staf dalam mengoperasikan sistem merupakan faktor utama yang berhubungan dengan waktu tunggu pasien yang lebih singkat ($PR = 2,67$). Sementara itu, stabilitas teknis sistem komputer merupakan faktor yang paling kuat berhubungan dengan kepuasan pasien ($PR = 4,90$). Penelitian ini menyimpulkan bahwa kinerja sistem teknologi informasi yang stabil dan staf yang responsif berkontribusi terhadap pengurangan waktu tunggu dan peningkatan kepuasan pasien. Rumah sakit direkomendasikan untuk mengintegrasikan sistem komputer di seluruh unit pelayanan serta memberikan pelatihan digital kepada staf.

Kata Kunci: kepuasan pasien, SIMRS, waktu tunggu

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Highlight:

- The reliability and stability of the computer system (system quality) are dominant factors that shape positive perceptions and significantly enhance outpatient satisfaction.
- Staff responsiveness and service quality in operating the Hospital Management Information System (SIMRS) are key factors in streamlining workflows and reducing patient waiting times.
- The majority of patients experienced short waiting times (less than 60 minutes) and were satisfied with the hospital's services, even though most still rated the quality of information and technical support provided by the SIMRS as suboptimal.

INTRODUCTION

Hospital Management Information Systems (SIMRS) are increasingly used to improve the quality and efficiency of healthcare services. However, their implementation does not always achieve the level of integration needed to reduce patient waiting times and improve patient satisfaction. In Indonesia, Regulation No. 82 of 2013 on Hospital Management Information Systems requires hospitals to implement SIMRS to support information integration, service efficiency, and operational effectiveness ([Kementerian Kesehatan Republik Indonesia, 2014](#)). The regulation also highlights the importance of

interoperability between SIMRS and government information systems (Shadilla *et al.*, 2025). Recent surveys and empirical studies have reported considerable differences in SIMRS adoption, functionality, and effectiveness, particularly among Class C Regional General Hospitals (Christia *et al.*, 2021). This issue is particularly relevant to Lembang Regional General Hospital. A preliminary assessment conducted in November 2024 recorded an average outpatient waiting time of 4 h 28 min, which substantially exceeded the national standard of ≤ 60 min established by Minister of Health Decree No. 129/2008. This occurred despite the implementation of SIMRS in January 2021, which initially covered only the outpatient registration process. Waiting time was assessed through direct observation by recording the time from patient registration to physician consultation. This assessment provided an objective indication of the operational challenges related to SIMRS integration and outpatient workflow.

Evaluating the effectiveness of SIMRS requires a framework that integrates information system quality with healthcare service quality. The DeLone and McLean Information Systems Success Model provides three key dimensions relevant to SIMRS assessment: system quality, encompassing reliability, responsiveness, and interoperability; information quality, including accuracy, completeness, and availability; and service quality, which covers IT support and user training (Viriendo and Sfenrianto, 2021). Collectively, these dimensions influence system use and user satisfaction. In parallel, the SERVQUAL framework, comprising tangibles, reliability, responsiveness, assurance, and empathy, helps explain how the quality of clinical and administrative services, including waiting time, influences patient satisfaction (Jonkisz *et al.*, 2022). Integrating these two approaches enables a comprehensive assessment in which SIMRS quality may affect the efficiency of clinical and administrative processes, which in turn may influence SERVQUAL-related service quality dimensions and ultimately determine patient satisfaction.

Previous studies have demonstrated an association between health information system quality and healthcare service performance (Wildan *et al.*, 2024). However, evidence examining the pathways linking SIMRS quality to patient waiting time and satisfaction in Regional General Hospitals remains limited. Many existing studies have focused on large referral hospitals or assessed patient satisfaction without incorporating waiting time as an operational indicator (Azizah, 2023). This research gap highlights the novelty of the present study, which quantitatively examines how SIMRS quality is associated with outpatient waiting time and its implications for patient satisfaction in a Class C Regional General Hospital with partial SIMRS implementation. In addition, this study provides context-specific evidence from a local setting, Lembang Regional General Hospital, which may inform healthcare policy and management in Regional General Hospitals operating under infrastructure and human resource constraints.

The barriers to SIMRS implementation need to be systematically identified to understand the mechanisms underlying unsuccessful system integration. Evidence from field observations and the literature indicates that these barriers occur across several domains. At the technological level, common challenges include inadequate network infrastructure, limited interoperability between system modules, and application bugs or errors. At the human resource level, barriers include insufficient training, resistance to change, and limited information technology competencies among clinical and administrative staff. Organizational and process-related barriers include outdated standard operating procedures (SOPs) that have not been revised to accommodate system-based workflows, weak change management, and inadequate leadership support and budgetary resources (Umar *et al.*, 2024). These integration limitations can have direct operational

consequences, including duplicate data entry, delays in administrative verification, fragmented inter-unit coordination, and disruptions in patient flow from registration to clinical examination, ultimately contributing to prolonged patient waiting times. (Narulitha et al., 2025).

National and regional data indicate substantial variation in outpatient waiting times and patient satisfaction levels. Several empirical studies have reported a significant negative association between waiting time and patient satisfaction, with longer waiting times being associated with lower satisfaction scores, particularly in the SERVQUAL dimensions of responsiveness and reliability (Wulandari and Keni, 2024). Therefore, accurate measurement of waiting time, defined as the interval from patient registration to physician consultation and recorded through direct observation or system-based monitoring, is essential as a process-performance indicator that may be influenced by SIMRS quality.

Based on the aforementioned considerations, this study aimed to examine the association between SIMRS quality, outpatient waiting time, and patient satisfaction at Lembang Regional General Hospital (RSUD Lembang). Specifically, the study assessed SIMRS quality across three dimensions—system quality, information quality, and service quality; measured actual outpatient waiting times; and examined the associations of SIMRS quality with outpatient waiting time and patient satisfaction. The study hypothesized that SIMRS quality was significantly associated with outpatient waiting time and patient satisfaction among outpatients at RSUD Lembang.

This study aimed to examine the association between SIMRS quality and outpatient waiting time and its implications for patient satisfaction at Lembang Regional General Hospital (RSUD Lembang), as well as to identify the technical, human resource, and organizational barriers that hinder SIMRS integration. The study contributes to the existing literature by providing empirical evidence on the interrelationships among SIMRS quality, service processes, waiting time, and patient satisfaction within the context of Regional General Hospitals. From a practical perspective, the findings provide evidence-based recommendations for the management of RSUD Lembang and local health policymakers regarding priority areas for SIMRS improvement to reduce outpatient waiting times and enhance patient satisfaction.

METODHS

This study employed a quantitative approach with an analytical cross-sectional design to simultaneously assess SIMRS implementation quality, actual outpatient waiting times, and patient satisfaction at a single point in time. The cross-sectional design was selected because it was appropriate for examining associations and the strength of relationships among the primary study variables without researcher intervention. Specifically, the study examined the association of SIMRS quality with outpatient waiting time and the subsequent relationship between waiting time and patient satisfaction. The study was conducted in the Outpatient Department of Lembang Regional General Hospital (RSUD Lembang), West Bandung Regency, Indonesia. Data collection was conducted from May to August 2025.

The study population consisted of all patients attending the outpatient department of Lembang Regional General Hospital (RSUD Lembang). Based on hospital records, the mean monthly outpatient volume between January and May 2025 was 3,451 patients across 14 specialist clinics. The minimum sample size was calculated using the formula for an infinite population, assuming a 95% confidence level ($Z = 1.96$), a population

proportion of 0.50, and a margin of error of 10% ($d = 0.10$). The calculation yielded a minimum sample size of 96 outpatients, who were subsequently included in the study.

To ensure representative coverage of the outpatient service units, proportional stratified random sampling was employed. The sample size allocated to each specialist clinic was proportional to its average monthly outpatient volume. Participants were eligible if they met all of the following criteria: (1) they were outpatients, either National Health Insurance (BPJS) beneficiaries or self-paying patients, who were actively registered in the RSUD Lembang Hospital Management Information System (SIMRS) during the study period; (2) they were aged ≥ 17 years or were accompanied by a primary caregiver if they were unable to communicate adequately; (3) they completed the primary outpatient care pathway, from initial registration to medication dispensing at the hospital pharmacy; and (4) they provided written informed consent before participation.

Primary data were collected using a structured questionnaire and direct observation. Patient satisfaction was measured using the SERVQUAL instrument, which assesses five dimensions of service quality on a five-point Likert scale ranging from 1 (strongly dissatisfied) to 5 (strongly satisfied). SIMRS implementation quality was assessed from the patient perspective, focusing on system reliability and information accuracy based on their experience with the digital service interface during the administrative process. Actual outpatient waiting time was measured using an objective data-triangulation approach to enhance measurement validity. Electronic timestamps retrieved from the SIMRS registration database were cross-validated against time measurements obtained through direct stopwatch observation at the pharmacy counter, where the time of medication receipt was recorded. The elapsed time, calculated in minutes, was subsequently recorded as a continuous measure of actual outpatient waiting time.

The study variables comprised three independent variables—SIMRS system quality, SIMRS information quality, and SIMRS service quality—and two dependent variables: outpatient waiting time and patient satisfaction. All behavioral indicators were measured using a four-point Likert scale without a neutral response option, with scores ranging from 1 to 4 (4 = strongly agree, 3 = agree, 2 = disagree, and 1 = strongly disagree), to minimize central tendency bias among respondents. To facilitate the interpretation of the ordinal data, the assessment scores were further categorized into two objectively defined levels: “good” and “poor.”

The cut-off point for categorizing the study variables was determined based on the median of the empirical total scores for each variable. The median was selected as the cut-off point because ordinal data may exhibit non-normal distributions and may not satisfy the assumptions of parametric measurement. Variables were categorized as “good” when the total score was $\geq$ the median and as “poor” when the total score was $<$ the median. For the continuous variable of outpatient waiting time, categorization was based on compliance with the hospital’s minimum service standard stipulated in Minister of Health Decree No. 129/2008, which defines an acceptable waiting time as ≤ 60 min from patient registration to medication receipt. Accordingly, waiting times of ≤ 60 min were categorized as “good,” whereas waiting times > 60 min were categorized as “poor.”

Data were processed using computerized statistical procedures with a significance level of $\alpha = 0.05$. Prior to the main analysis, the quality of the research instruments was evaluated in a pilot sample of 30 participants who were not included in the study sample. All questionnaire items demonstrated acceptable construct validity, with item–total correlation coefficients (r) ranging from 0.421 to 0.815, exceeding the critical value ($r = 0.361$). The instruments also demonstrated good internal consistency, with Cronbach’s alpha coefficients ranging from 0.742 to 0.891, exceeding the commonly accepted

threshold of 0.70. Descriptive statistics were used to summarize the participants' characteristics and the distribution of the study variables. Bivariate associations between categorical variables were examined using the Pearson chi-square (χ^2) test. The chi-square test was considered appropriate because no more than 20% of the contingency-table cells had an expected frequency of less than five.

Multivariable analysis was performed using modified Poisson regression with a robust variance estimator. This method was selected because the study employed a cross-sectional design and the outcomes of interest had a prevalence >10%. When outcomes are common, binary logistic regression may overestimate the magnitude of association because the odds ratio can substantially differ from the prevalence ratio. Modified Poisson regression with robust variance estimation was therefore used to obtain prevalence ratios (PRs) with corresponding 95% confidence intervals (CIs), providing an appropriate measure of association for the cross-sectional design. Institutional authorization for the study was obtained from the Bandung Barat District Health Office through Lembang Regional General Hospital (RSUD Lembang), as documented in the Research Permission Response Letter No. 400.7.22.2/043.1/Bid.SP & SDK, issued on 5 September 2025. The hospital management authorized the research activities and data collection within RSUD Lembang, subject to coordination with the relevant hospital units and submission of the study report to the Research and Human Resources Development Division of RSUD Lembang, West Bandung Regency.

RESULT AND DISCUSSION

Subject characteristics and distribution of key variables

Table 1 summarizes the sociodemographic characteristics of the 96 participants. The mean age was 49.44 years (SD, 17.31), with a median of 52 years (range, 17–81). Female participants predominated, accounting for 62.5% of the sample (n = 60). Most participants had completed secondary education (60.4%, n = 58), whereas 22.9% (n = 22) had primary education and 16.7% (n = 16) had higher education. Regarding employment status, 44.8% (n = 43) were employed in the private sector or were self-employed, 42.7% (n = 41) were unemployed or housewives, and 12.5% (n = 12) were civil servants. The descriptive analysis was subsequently extended to the primary study variables, including SIMRS system quality, SIMRS information quality, SIMRS service quality, outpatient waiting time, and patient satisfaction. These analyses were performed to characterize the distribution and central tendency of the study variables before inferential statistical testing.

Table 1. Subject characteristics

Variable	Mean (SD)	Median (Min-Max)	n	%
Age (years)	49.44 (17.31)	52 (17-81)		
Sex				
Male			36	37.5
Female			60	62.5
Educational Attainment				
Primary education (elementary/junior high school)			22	22.9
Secondary education (senior high school/vocational)			58	60.4

Variable	Mean (SD)	Median (Min-Max)	n	%
school)				
Higher education (diploma/bachelor's degree)			16	16.7
Employment status				
Not employed/housewife			41	42.7
Private sector/self-employed			43	44.8
Civil servant			12	12.5
Total			96	100.0

Source: Primary data, 2025

Table 2 summarizes the distribution of the primary study variables among the 96 participants. The mean score for SIMRS system quality was 74.02 (SD, 20.80), and 59.4% of participants (n = 57) rated the system quality as good. The mean score for SIMRS information quality was 77.47 (SD, 19.41); however, 55.2% of participants (n = 53) were classified in the poor category. Similarly, SIMRS service quality had a mean score of 76.82 (SD, 16.67), with 51.0% of participants (n = 49) classified as having poor service quality. For outpatient waiting time, 57 participants (59.4%) experienced waiting times of ≤60 min, whereas 39 participants (40.6%) experienced waiting times of >60 min. Patient satisfaction had a mean score of 73.25 (SD, 13.89), with 49 participants (51.0%) classified as having good satisfaction and 47 (49.0%) classified as having poor satisfaction.

Table 2. Distribution of study variables

Variable	Mean (SD)	Median (Min-Max)	n	%
SIMRS system quality	74.02 (20.80)	75.00 (25.00-100.00)		
Good			57	59.4
Poor			39	40.6
SIMRS information quality	77.47 (19.41)	75.00 (37.50-100.00)		
Good			43	44.8
Poor			53	55.2
SIMRS service quality	76.82 (16.67)	75.00 (31.25-100.00)		
Good			47	49.0
Poor			49	51.0
Outpatient waiting time				
≤60 min			57	59.4
>60 min			39	40.6
Patient satisfaction	73.25 (13.89)	75.00 (42,50-100.00)		
Good			49	51.0
Poor			47	49.0
Total			96	100.0

Source: Primary data, 2025.

Analysis of the relationship between SIMRS quality dimensions and outpatient service waiting times

Table 3 shows a significant relationship between the three dimensions of SIMRS quality and outpatient service waiting times (all $p < 0.001$). Among participants who rated system quality as good, 75.4% experienced an acceptable waiting time (PR = 2.10; 95%

CI: 1.34–3.27). Similarly, 83.7% of participants who rated information quality as good experienced an acceptable waiting time (PR = 2.10; 95% CI: 1.47–3.02). The strongest association was observed for service quality, with 87.2% of participants reporting an acceptable waiting time (PR = 2.67; 95% CI: 1.76–4.05). Overall, service quality showed the highest PR, indicating the strongest association with acceptable outpatient waiting time among the three SIMRS quality dimensions.

Table 3. Associations between SIMRS quality dimensions and outpatient waiting time (n=96)

Variable	Good Waiting Time, n (%)	Poor Waiting Time, n (%)	Total, n (%)	p-value	PR(95% CI)
SIMRS system quality					
Good	43 (75.4)	14 (24.6)	57 (100.0)	<0.001*	2.10 (1.34–3.27)
Poor	14 (35.9)	25 (64.1)	39 (100.0)		1.00
SIMRS information quality					
Good	36 (83.7)	7 (16.3)	43 (100.0)	<0.001*	2.10 (1.47–3.02)
Poor	21 (39.6)	32 (60.4)	53 (100.0)		1.00
SIMRS service quality					
Good	41 (87.2)	6 (12.8)	47 (100.0)	<0.001*	2.67 (1.76–4.05)
Poor	16 (32.7)	33 (67.3)	49 (100.0)		1.00

Note: *Chi-square test; significant if p-value < 0.05

Table 4 presents the multivariable modified Poisson regression analysis examining the association between SIMRS quality and outpatient waiting time. All three SIMRS quality dimensions were significantly associated with the likelihood of achieving an acceptable waiting time (≤ 60 min) after mutual adjustment (all $p < 0.001$). SIMRS service quality showed the strongest association (adjusted PR = 2.67, 95% CI: 1.78–4.01), followed by SIMRS system quality (adjusted PR = 2.10, 95% CI: 1.45–3.04) and SIMRS information quality (adjusted PR = 2.10, 95% CI: 1.42–3.11).

Table 4. Multivariate Poisson regression: strength of association (PR) for waiting time (n=96)

Variable	Adjusted PR	95% CI	p-value
SIMRS system quality	2.10	1.45 – 3.04	<0.001*
SIMRS information quality	2.10	1.42 – 3.11	<0.001*
SIMRS service quality	2.67	1.78 – 4.01	<0.001*

Note: *Multivariate modified Poisson regression; significant if p-value < 0.05.

Analysis of the relationship between SIMRS quality dimensions and outpatient satisfaction

Table 5 shows that all three SIMRS quality dimensions were significantly associated with outpatient patient satisfaction (all $p < 0.001$). Good SIMRS system quality was associated with a substantially higher prevalence of good patient satisfaction compared with poor system quality (75.4% vs. 15.4%; PR = 4.90, 95% CI: 2.31–10.38). Similarly, participants who rated SIMRS information quality as good had a higher prevalence of good satisfaction than those who rated it as poor (81.4% vs. 26.4%; PR = 3.08, 95% CI: 1.92–4.93). SIMRS service quality was also significantly associated with patient satisfaction,

with good service quality corresponding to a higher prevalence of good satisfaction compared with poor service quality (80.9% vs. 22.4%; PR = 3.60, 95% CI: 2.10–6.17).

Table 5. Associations between SIMRS quality dimensions and outpatient patient satisfaction (n = 96)

Variable	Good Satisfaction, n (%)	Poor Satisfaction, n (%)	Total, n (%)	p- Value	PR(95% CI)
SIMRS system quality					
Good	43 (75.4)	14 (24.6)	57 (100.0)	<0.001*	4.90 (2.31 – 10.38)
Poor	6 (15.4)	33 (84.6)	39 (100.0)		1.00
SIMRS information quality					
Good	35 (81.4)	8 (18.6)	43 (100.0)	<0.001*	3.08 (1.92 – 4.93)
Poor	14 (26.4)	39 (73.6)	53 (100.0)		1.00
SIMRS service quality					
Good	38 (80.9)	9 (19.1)	47 (100.0)	<0.001*	3.60 (2.10 – 6.17)
Poor	11 (22.4)	38 (77.6)	49 (100.0)		1.00

Note: *Chi-square test; significant if p-value < 0.05

Table 6 presents the final multivariable Poisson regression model examining the association between SIMRS quality dimensions and patient satisfaction. All three dimensions—system quality, information quality, and service quality—were significantly associated with patient satisfaction after adjustment for potential confounding factors. SIMRS system quality demonstrated the strongest association with patient satisfaction (adjusted PR = 4.90; 95% CI: 2.85–8.42; $p < 0.001$). These findings indicate that system quality was the strongest predictor in the final model, with patients experiencing better SIMRS system quality being approximately 4.9 times as likely to report satisfaction as those experiencing poorer system quality.

Table 6. Multivariable poisson regression analysis of the association between SIMRS quality dimensions and patient satisfaction (n = 96)

Variabel	Adjusted PR	95% CI	p-value
SIMRS system quality	4.90	2.85 – 8.42	<0.001*
SIMRS information quality	3.08	1.89 – 5.02	<0.001*
SIMRS service quality	3.60	2.12 – 6.11	<0.001*

Note: *Multivariate modified Poisson regression; significant if p-value < 0.05

Association between SIMRS quality and outpatient waiting time at Lembang Regional General Hospital

The findings demonstrated a significant association between SIMRS implementation quality and outpatient waiting time at Lembang Regional General Hospital. The digitalization of health information management may facilitate more streamlined, transparent, and efficient outpatient workflows by improving the availability and coordination of patient-related information (Nguyen et al., 2022). Notably, service quality emerged as the strongest predictor of outpatient waiting time, highlighting the importance of operational support in the implementation of digital health systems in Type C regional hospitals. This finding supports the Information Systems Success Model, which conceptualizes information system success as being influenced not only by system quality

and information quality but also by service quality (Zygiaris et al., 2022). In the present study, the prominent role of service quality suggests that staff responsiveness and assurance, particularly among information technology and administrative personnel, may be critical to minimizing workflow bottlenecks and facilitating efficient patient flow. Thus, effective SIMRS implementation requires not only reliable technological infrastructure and accurate information but also responsive and competent human resources to ensure that digital systems translate into more efficient outpatient service processes.

Application errors during SIMRS queue-number processing may disrupt outpatient workflows and contribute to patient accumulation. However, timely intervention by IT support personnel through rapid adaptation of manual and digital procedures may mitigate these disruptions and maintain continuity of patient flow from registration to medication dispensing. This finding highlights the potential role of service quality as an operational buffer that reduces the effects of technical limitations and supports the continuity of outpatient services within established minimum service standards. Therefore, inefficiencies in SIMRS-mediated waiting-time reduction may reflect not only system-related limitations but also suboptimal interface transitions, workflow configuration, and system responsiveness (Khalifa, 2016). These findings are consistent with Isprasetya et al. (2025), who reported a strong and significant association between perceived SIMRS implementation quality and outpatient service efficiency. A reliable, responsive, and user-friendly SIMRS may facilitate the coordination of registration and medical-record processes, reduce administrative bottlenecks, and contribute to more efficient patient flow. Collectively, these findings suggest that optimizing SIMRS performance requires an integrated approach that combines technological reliability with responsive technical support and workflow-oriented system design (Pratiwi et al., 2026).

Service quality emerged as an important component of outpatient workflow efficiency at Lembang Regional General Hospital, particularly through staff responsiveness and the effective use of SIMRS-supported processes. Observational data showed that digital processing reduced the average patient registration time from approximately 10 min under the manual system to 2–3 min using the SIMRS interface. This reduction indicates that responsive staff support and efficient digital workflows may facilitate faster administrative processing and reduce potential bottlenecks at the registration stage. Service assurance was further supported by the integration of SIMRS with electronic queue displays, which provided patients with real-time information regarding their queue status and may have reduced uncertainty during the waiting process. Despite the partial implementation of SIMRS, integration between the main registration unit and the laboratory enabled real-time updating of patient records, thereby reducing the risk of misplaced records and interruptions in interdepartmental workflows. Overall, these findings suggest that effective IT service quality, supported by responsive personnel and functional system integration, can strengthen perceived system reliability and partially mitigate the operational impact of network infrastructure limitations (Naini et al., 2022).

The ≤60-min national standard for outpatient waiting time, established by Indonesian Ministry of Health Decree No. 129/2008, provides an important benchmark for evaluating outpatient service performance (Biya et al., 2022). Consistent with previous studies, the present findings indicate a significant association between waiting time and patient satisfaction, with longer waiting times generally corresponding to lower satisfaction. Waiting time may therefore serve as a key operational indicator of service efficiency and an important pathway through which SIMRS performance influences patients' service experiences. Efficient information management and streamlined workflows may reduce administrative delays and improve patient flow, thereby supporting more satisfactory

outpatient care experiences.

The implementation of SIMRS at Lembang Regional General Hospital was associated with shorter outpatient waiting times; however, the observed efficiency remains amenable to further improvement. Evidence from a previous study in an Indonesian regional hospital demonstrated that an integrated SIMRS reduced service duration by approximately 85%, from 60 to 15 min, following the automation of clinical procedure and pharmaceutical prescription data entry (Azizah, 2025). This substantial reduction highlights the critical role of system integration in translating digitalization into measurable operational efficiency. In contrast, the predominantly partial and unidirectional integration currently implemented at Lembang Regional General Hospital may constrain the full efficiency gains achievable through SIMRS.

To address these limitations, hospital management should prioritize end-to-end integration of SIMRS modules across outpatient services, including electronic medical records in specialist clinics and pharmacy systems, to minimize workflow interruptions, redundant data entry, and information-transfer delays. Continuous investment in workforce digital competency is equally important, particularly through structured training for administrative and clinical personnel (Jatmiko *et al.*, 2025). Strengthening both system interoperability and operator competency may enhance SIMRS utilization and support sustained improvements in outpatient waiting-time efficiency (Hardini and Imananda, 2025).

Association between SIMRS and Outpatient Patient Satisfaction at Lembang Regional General Hospital

The significant association between SIMRS system quality and patient satisfaction observed in this study underscores the importance of system stability and reliability in outpatient healthcare delivery, where timely and uninterrupted service processes are essential to the patient experience. System responsiveness, interface usability, and operational stability, including minimal occurrence of application errors, represent critical technical attributes that may shape patients' perceptions of service quality and satisfaction. These findings suggest that reliable system performance constitutes a fundamental prerequisite for effective SIMRS utilization and patient-centered service delivery. The findings are consistent with those of Putra and Siswanto (2016), who reported a strong association between network infrastructure performance, application reliability, and user satisfaction at Kalisat Regional Hospital, Jember. This consistency supports the broader applicability of system reliability and technical performance as key determinants of successful SIMRS implementation in public healthcare settings.

At Lembang Regional General Hospital, system quality is reflected in patients' direct interaction with digital infrastructure at the initial stages of outpatient care, particularly through self-service queue-number printing and fingerprint-based registration. Reliable and responsive system performance during these initial encounters may contribute to patients' perceptions of efficient and well-organized service delivery. By contrast, information quality, including the completeness and accuracy of electronic medical records, and service quality, including IT staff support, are less directly observable during patients' initial interactions with the hospital's digital infrastructure. The relatively stronger association between system quality and patient satisfaction may therefore reflect the immediate and visible nature of patients' interactions with digital systems during registration. Maintaining stable, responsive, and user-friendly SIMRS infrastructure can minimize registration-related disruptions and support a more seamless outpatient service experience. These findings reinforce the importance of system reliability and usability as core components of patient-centered SIMRS implementation.

SIMRS system quality, particularly its usability and technical reliability, was significantly associated with patient satisfaction at Lembang Regional General Hospital following the implementation of the system in 2021. In contrast to [Sari et al. \(2023\)](#), which examined overall patient satisfaction, the present multivariable analysis identified system quality as the strongest factor associated with patient satisfaction. Patients exposed to good system quality had a 4.90-fold higher prevalence of satisfaction than those exposed to poor system quality (adjusted PR = 4.90; 95% CI: 2.85–8.42; $p < 0.001$). This finding underscores the importance of stable, responsive, and usable digital infrastructure in supporting patient-centered outpatient services. Although the overall technical performance of the SIMRS in the outpatient department was rated favorably, the presence of patients reporting poor system quality indicates that technical disruptions may still occur. Intermittent network latency and interface-related problems may become more apparent during periods of high service demand and potentially interfere with the continuity of digital registration processes. Furthermore, information quality was relatively poor, which may be attributable to the partial implementation of the SIMRS across hospital units. Limited interoperability among specialist outpatient clinics may hinder the real-time synchronization and updating of electronic medical record data. Strengthening system integration and interoperability is therefore essential to improve information quality, enhance system performance, and maximize the potential benefits of SIMRS implementation for outpatient care.

The findings show that SIMRS service quality at Lembang Regional General Hospital is still suboptimal, particularly in terms of staff responsiveness. This finding indicates the need for more consistent digital competency training among IT support staff. Despite these limitations, outpatient service performance was generally favorable. Most patients experienced waiting times of <60 min, which is consistent with the national outpatient service standard established by Indonesian Ministry of Health Decree No. 129/2008. The digitalization of the registration process in 2021 may have contributed to shorter waiting times at the initial registration stage. However, some patients still experienced waiting times of >60 min, mainly due to delays at the pharmacy and outpatient clinic stages. Shorter waiting times may improve patients' perceptions of service efficiency and comfort, which may explain the relatively high level of patient satisfaction observed in this study. Although SIMRS integration has not been completed across all hospital units, the use of SIMRS during the initial registration process appears to provide important operational benefits. This finding is consistent with [Sari et al. \(2023\)](#), who reported that 63% of participants were satisfied with SIMRS when the system operated smoothly and without errors, particularly when the interface was easy to use and the system response was fast. Previous evidence from Type C regional hospitals also indicates that SIMRS integration can reduce waiting times when registration, laboratory, pharmacy, and physician services are connected through a single system. Integrated systems allow patient information to be transferred automatically between units, laboratory results to be accessed through electronic medical records, and prescriptions to be processed by the pharmacy without repeated registration or additional queues. Therefore, improving SIMRS integration across hospital units is important for reducing waiting times and improving patient satisfaction ([Saputra, 2025](#)).

CONCLUSION

The findings indicate that SIMRS quality is significantly associated with patient satisfaction and outpatient service efficiency at Lembang Regional General Hospital.

System quality demonstrated the strongest association with patient satisfaction, highlighting the importance of reliable SIMRS infrastructure in supporting patient-centered service delivery. Meanwhile, service quality, particularly the responsiveness and competence of technology support staff, was associated with maintaining outpatient waiting times within national standards despite partial digital integration. These findings underscore the importance of integrating reliable information technology infrastructure with competent human resources to support effective digital health service delivery.

Based on these findings, hospital management should prioritize the full integration of SIMRS modules across service units, particularly specialist outpatient clinics and the pharmacy department, while strengthening staff digital competencies through regular training. Given the cross-sectional design and single-center setting of this study, future research should employ longitudinal and multicenter designs to assess the sustainability of SIMRS performance and improve the generalizability of the findings. Such evidence may contribute to the development of more comprehensive SIMRS implementation strategies and inform digital health policy in regional hospitals.

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