

Development of A Web-Based System For Monitoring Electronic Medical Record Access Rights At Semen Padang Hospital

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ABSTRACT

Access rights to electronic medical records are authorizations granted by healthcare facility leaders to health workers to protect the security and confidentiality of patient data. At Semen Padang Hospital, requests to activate access to closed records were still submitted manually through WhatsApp messages, so the requester's identity, reason, frequency, and duration of access were poorly documented. This study aimed to develop a web-based system for monitoring electronic medical record access rights. A Research and Development design with the Waterfall model was applied at the Medical Record Unit, with a field trial in June 2026 involving six subjects. Data were collected through observation, interviews, expert validation sheets, system trial forms, and user response questionnaires. The system was designed using use case diagrams, activity diagrams, and interface mockups, and was built with PHP and a MySQL database. It provided access requests, approval by the head of the unit, status notifications, automatic activity logs, and monthly key performance indicator reports. Expert validation reached 91.25% (very feasible), functional testing 100% (fully functional), and user response 93.75% (very good). The system was therefore feasible for implementation at the hospital, although the small trial sample limits generalization.

Keywords : *Electronic Medical Record; Access Right; Monitoring; Website; R&D.*



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INTRODUCTION

The growing dependence on digital technology has pushed the health sector in Indonesia to move from conventional systems toward electronic data management in order to improve efficiency, accuracy, and the availability of accountable medical information [1]. Hospitals, as the spearhead of health services, are required to adopt digitalization comprehensively, including the implementation of electronic medical records, which must uphold the principles of security, confidentiality, and data integrity so that the resulting electronic documents are legally valid [2].

Health data are highly sensitive because they contain patients' disease histories and personal information, so unprofessional security management may lead to data leakage and misuse of information [3]. Granting access rights to electronic medical records is the authority of the head of a healthcare facility, delegated to health workers and other staff to keep data secure and protected; it covers the authority to enter, correct, and view data in accordance with the applicable standard operating procedures [2]. Shakila and Rahayu [4] showed at Cililin Regional Hospital that strict role-based access control effectively restricted illegitimate access according to staff responsibilities. Mulyani et al. [5] found at Dr. Hasan Sadikin General Hospital, Bandung, that digital identities in the form of usernames and passwords used to release electronic medical record information remained vulnerable to misuse and needed to be reinforced with monitoring mechanisms that document user activity transparently. The confidentiality and security of patient data are also a concern in other digital health services, including online health consultations [6], which underlines that data security must be a priority in every electronic health information system.

A preliminary survey conducted on 19 January 2026 with the Head of the Medical Record Unit at Semen Padang Hospital found that access rights to electronic medical records depended heavily on patient registration status. While care was ongoing, data entry access was automatically open to physicians, nurses, and related staff; once the registration status was closed, access had to be requested manually through WhatsApp messages to the head of the unit. A follow-up observation on 23 March 2026 of the hospital information system in use, My Hospital, found that it recorded only who reopened

a record, without capturing the reason for activation, the frequency of requests, or the duration of access. Monitoring of access rights therefore remained manual and informal.

In the studies cited above, the emphasis lay on granting and restricting access [4], [7] and on the vulnerability of digital identities [5], rather than on documenting the full cycle from an access request to the use of that access. This gap underlies the need for a system that automatically records the reason, frequency, and duration of access and that can serve as the basis for monthly key performance indicator (KPI) reports for the head of the medical record unit. Accordingly, this study aimed to develop a web-based system for monitoring and identifying electronic medical record access rights at Semen Padang Hospital, comprising the identification of system requirements, the design of an automatic activity-logging feature, and system testing, so that data can be compiled into accurate reports for internal medical record audits.

RESEARCH METHODS

This study used a Research and Development (R&D) approach with the Waterfall model, a linear and sequential model consisting of requirements analysis, system design, implementation, testing, and maintenance [8]. The study was conducted at the Medical Record Unit of Semen Padang Hospital from January to June 2026, with a field trial on 19–25 June 2026. The trial involved six subjects: the head of the medical record unit, a physician, a nurse, a pharmacist, a nutritionist, and a physiotherapist.

Data were collected through observation and interviews at the requirements analysis stage to explore the constraints of the existing access monitoring; expert validation sheets completed by two validators (a lecturer in medical record management and a lecturer in information technology); a system functional trial form; and a user response questionnaire. The system was designed using Unified Modeling Language (UML) diagrams, namely use case, activity, and class diagrams [9], complemented by a flowchart and interface mockups, and was implemented using the PHP programming language with a MySQL database. Data from expert validation, functional testing, and user responses were analyzed descriptively and quantitatively using the percentage formula below, and the results were classified into feasibility categories to determine the feasibility of the system.

$$P = (\text{obtained score} / \text{maximum score}) \times 100\%$$

RESULTS AND DISCUSSION

Problem identification and requirements analysis

Observation and interviews with the Head of the Medical Record Unit at Semen Padang Hospital confirmed that requests to activate access to electronic medical records were still made through WhatsApp messages, so the requester's identity, the reason for the request, the activation time, the duration of use, and the frequency of requests were not documented systematically. Observation of the My Hospital system confirmed that it recorded only who reopened a medical record.

The requirements analysis identified two main user groups: clinical care providers (physicians, nurses, pharmacists, nutritionists, and physiotherapists), who submit access requests, and the Head of the Medical Record Unit, who acts as the approver. The functional requirements were an access request feature, approval by the head of the unit, automatic activity logging, monitoring of access status and circulation, a time-limit indicator for access use, status notifications, and a monthly recapitulation report as the basis for KPI evaluation. The non-functional requirements were ease of use, data security through login authentication, and accessibility through an internet network.

System design

The system design is presented in the use case diagram in Figure 1. The diagram depicts the interaction of two main actors, the care provider and the Head of the Medical Record Unit as approver, with the functions of login, submitting an access request, monitoring request status, validating access requests, monitoring access circulation, generating the monthly KPI report, and logout. The flow on the approver side is shown in the flowchart in Figure 2, which covers login, review of incoming requests, the decision

to approve or reject a request, monitoring of access circulation, and preparation of the monthly KPI report before logout.

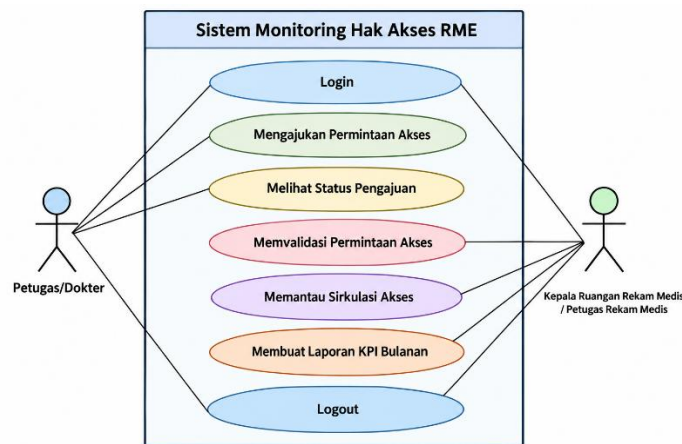


Figure 1. Use Case Diagram of the Electronic Medical Record Access Rights Monitoring System

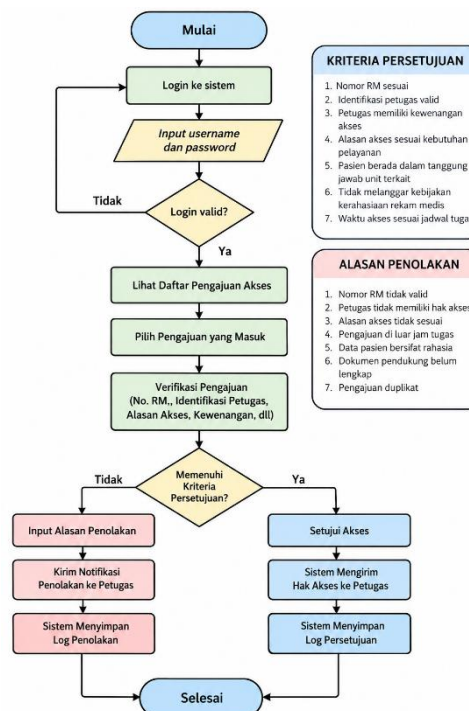
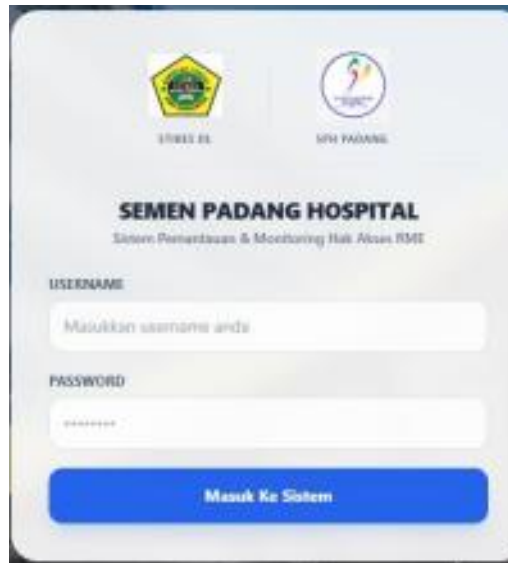


Figure 2. Flowchart of the System Flow (Approver Side)

System development

Based on the requirements analysis and design, the system was developed in PHP with a MySQL database named `db_identifikasi_monitoring_hakakses`, which consists of six interrelated tables. Development proceeded through system structure design, interface design, implementation, and testing. The resulting website consists of several integrated main pages that help the Head of the Medical Record Unit and the care providers manage electronic medical record access rights. The screenshots in Figures 3 to 9 are taken from the Indonesian-language version of the system.

The login page (Figure 3) gives the head of the unit and the care providers access to the system with different usernames and passwords according to their roles and authority. The approver menu (Figure 4) provides navigation to three main features, namely access requests, monitoring, and monthly reports, so that the head of the unit can move between access management features from one place.



The login page features the logos of RSUD EL and SPH PADANG at the top. Below them is the title 'SEMEN PADANG HOSPITAL' and the subtitle 'Sistem Pemantauan & Monitoring Hak Akses RME'. The page includes a 'USERNAME' field with a placeholder 'Masukkan username anda', a 'PASSWORD' field with a placeholder '*****', and a blue 'Masuk Ke Sistem' button.

Figure 3. Login Page of the System

The access request list (Figure 5) contains the requests submitted by care providers, complete with the medical record number, service category, reason for the access need, and submission time, so the head of the unit can approve or reject each request directly. The monitoring menu (Figure 6) displays all ongoing access activity, including the name of the staff member accessing the record, medical record number, number of accesses, type of service, approval time, maximum time limit, document session status, and verifying officer, together with color indicators (green, yellow, and red) that show compliance with the access time limit.

1. Permintaan Akses 2. Menu Monitoring 3. Laporan Bulanan					
DAFTAR PERMINTAAN AKSES RME PASIEN (PENDING)					
Peminta Akses	Nomor RM	Kategori Layanan	Alasan Kebutuhan	Waktu Masuk	Aksi Keputusan Verifikasi
dr. Hany Lestari, Sp.N Dokter Spesialis Saraf	RM-2026- 8054112	Rawat jalan	koding penyakit	2026-07-27 19:47:06	Setuju Tolak
Oktoberti, S.Kep Perawat Rawat Inap	987665	Rawat jalan	mengisi catatan pemberian obat	2026-07-27 14:26:02	Setuju Tolak
apt. Nila, S.Farm Apteker Dapet Patman	817655	Rawat inap	mengisi pemantauan terapi obat	2026-07-27 14:28:02	Setuju Tolak
Desi, S.Gz APN Gizi Klinis	514255	Rawat inap	melengkapi screening resiko nutrisi	2026-07-27 14:29:32	Setuju Tolak
Muthia, S.Ft., Ftr. Fisioterapi Klinis	872155	Rawat jalan	melengkapi evaluasi fungsi gerak/alat bantu dan respon terapi fisik pasien	2026-07-27 14:31:20	Setuju Tolak

Figure 4. Access Request List Menu

Siapa yang Akses	Nomor RM	Berapa Banyak Akses Dokter	Jenis Layanan	Waktu Approval	Batas Maksimal	Status Sesi Dokumen	Petugas Verifikator	Sistem Indikator Warna
Muthia, S.Ft., Ptr. Fisioterapi Klinis	872155	1 Kali	Rawat jalan	2026-07-27 14:40:45	2026-07-27 14:40:45	Sedang Diakses	Kepala Unit Rekam Medis Kapala Rekam Medis	KUNING (Masa Aktif)
Desi, S.Gz Ahli Gizi Klinis	514255	1 Kali	Rawat inap	2026-07-27 14:40:40	2026-07-27 14:40:40	Sedang Diakses	Kepala Unit Rekam Medis Kapala Rekam Medis	KUNING (Masa Aktif)
apt. Nila, S.Farm Apoteker Depo-Farmasi	817655	1 Kali	Rawat inap	2026-07-27 14:40:35	2026-07-27 14:40:35	Sedang Diakses	Kepala Unit Rekam Medis Kapala Rekam Medis	KUNING (Masa Aktif)
Oktoberli, S.Kep Perawat Rawat Inap	987665	2 Kali	Rawat jalan	2026-07-27 14:40:29	2026-07-27 14:40:29	Sedang Diakses	Kepala Unit Rekam Medis Kapala Rekam Medis	KUNING (Masa Aktif)
Oktoberli, S.Kep Perawat Rawat Inap	456373	2 Kali	Rawat inap	2026-07-27 14:33:47	2026-07-27 14:33:47	Sedang Diakses	Kepala Unit Rekam Medis Kapala Rekam Medis	KUNING (Masa Aktif)
dr. Hary Lestari, Sp.N Dokter Spesialis Saraf	RM-2026-0054112	1 Kali	Rawat jalan	2026-07-27 14:40:23	2026-07-27 14:40:23	Sedang Diakses	Kepala Unit Rekam Medis Kapala Rekam Medis	KUNING (Masa Aktif)
dr. Ahmad Fauzi Dokter Umum	RM-2026-0078123	1 Kali	Rawat jalan	2026-07-27 14:41:05	2026-07-27 14:41:05	Sedang Diakses	Kepala Unit Rekam Medis Kapala Rekam Medis	KUNING (Masa Aktif)

Figure 5. Monitoring Menu

Care providers submit requests through the access authorization form (Figure 7) by entering the medical record number, service category, access validity period, and the reason for the access need before the request is sent to the head of the unit for validation. The request portal (Figure 8) shows each care provider's summary of submissions, including the total number of requests, the numbers approved and rejected, and a log of authorization requests with their validation status and synchronization status with the hospital management information system. The report menu (Figure 9) presents the monthly recapitulation of access frequency for each staff member as the basis for the monthly KPI report of the head of the unit.

Portal Permintaan Akses Rekam Medis

Selamat Datang, dr. Ahmad Fauzi, Sp.PD (Dokter Spesialis Penyakit Dalam)

Ajukan Akses RM Baru

Keluar

Sistem Mengirim Hak Akses ke Petugas: Pengajuan berkas pasien RM-2026-001133 telah **DISEKUTUJUKAN** oleh Kepala Unit pada 20/06/2026 - 19:43 WIB. Sesi edit RME SIMRS terbuka!

TOTAL PENGANTARAN ANDA

11 Berkas

PERMINTAAN DISEKUTUJUKAN

8 Berkas

PERMINTAAN DITOLAK

1 Berkas

LOG PENGANTARAN OTORISASI REKAM MEDIS

Nomor RM Pasien	Unit Layanan	Alasan Kebutuhan Akses	Waktu Pengajuan	Masa Aktif Sesi	Status Validasi	Sinkronisasi SIMRS (Feedback)
RM-2026-0054756	Rawat jalan	klaim asuransi	2026-06-20 19:46:30	24 Jam	PENDING	N/A (Pending)
RM-2026-005467	Rawat jalan	koding penyakit	2026-06-20 19:46:11	24 Jam	PENDING	N/A (Pending)
Sudah Bisa Diakses						

Figure 6. Access Request Portal

dr. Amanda Putri, Sp.KK	0	0	0	0	0	0	0	0	0	0	0	0
Ns. Herlina, S.Kep	0	0	0	0	0	0	0	0	0	0	0	0
Ns. Fitriani, S.Kep	0	0	0	0	0	0	0	0	0	0	0	0
Oktoberti, S.Kep	0	0	0	0	0	0	0	2	0	0	0	0
Aulia Fitri, A.Md.Keb / S.Farm	0	0	0	0	0	0	0	0	0	0	0	0
Desi, S.Gz	0	0	0	0	0	0	0	1	0	0	0	0
apt. Nila, S.Farm	0	0	0	0	0	0	0	1	0	0	0	0
Muthia, S.Ft., Ftr	0	0	0	0	0	0	0	1	0	0	0	0

Figure 7. Monthly Recapitulation Report

Product validation and user trial

The developed product was validated by two expert validators, a lecturer in medical record management and a lecturer in information technology, on the aspects of interface appearance, completeness of material, system function, ease of use, and implementation feasibility. The results of expert validation, functional testing, and user response are summarized in Table 1. Expert validation obtained a total score of 73 out of a maximum of 80 (91.25%), which falls into the very feasible category. The functional trial obtained 48 out of 48 (100%), which falls into the fully functional category, and the user response questionnaire obtained 135 out of 144 (93.75%), which falls into the very good category.

Table 1. Summary of Testing Results for the Electronic Medical Record Access Rights Monitoring System

No.	Testing Aspect	Score	Percentage	Category
1	Expert validation	73/80	91.25%	Very feasible
2	System functional testing	48/48	100%	Fully functional
3	User response	135/144	93.75%	Very good

The field trial was carried out with six subjects at the Medical Record Unit on 19–25 June 2026 to obtain user responses to the developed system. All respondents were able to use the system easily without significant obstacles. Login and access verification ran smoothly, the list of access requests was clear, approval and rejection worked as intended, and the color indicators on the monitoring menu made it easier to track access time limits. Documentation of the trial with the medical record staff is shown in Figure 10.

Discussion

The findings show that the need for a documented system for monitoring electronic medical record access rights at Semen Padang Hospital was high. Before the system was developed, access activation requests were made manually through WhatsApp messages, so the identity of the requester, the reason, the frequency, and the duration of access were not recorded properly. This condition indicates that the previous mechanism could not guarantee the security and accountability of patient data access management. The finding is consistent with the Ministry of Health regulation [2], which states that access rights are given only to health workers and authorized parties according to their duties and responsibilities in order to maintain the confidentiality, integrity, and availability of patient data, and that this should be supported by an audit trail, an electronic record of all user activity, so that every access can be traced. Mulyani et al. [5] likewise found that digital identities without adequate monitoring remain vulnerable to misuse, which reinforces the need for a system that documents user activity transparently. The requirements identified in this study, which record the reason, duration, and frequency of access as material for KPI evaluation, became the basis for the system features that fit the operational needs of the unit.

The system was designed from the identified user requirements, using a use case diagram, flowchart, activity diagram, and class diagram [9], and was then implemented as a web application in PHP and MySQL. This approach follows Pressman and Maxim [10], who state that an information

system should be built systematically through requirements analysis, design, implementation, testing, and maintenance so that it fits user needs. The use of PHP and MySQL allowed the system to manage data in an integrated manner and to generate monthly recapitulation reports.

The results are in line with Sandra [7], who developed a medical record website based on User Centered Design to manage access permissions to medical record data, applying role-based access control so that patient data security improves according to user authority. Both studies aim to improve the security of electronic medical record access management through a web-based system. The difference is that the present study focuses on identifying monitoring needs that record the reason, duration, and frequency of access as material for KPI evaluation, rather than solely on the permission mechanism.

The testing results fell into the categories of very feasible to very good, with expert validation at 91.25%, functional testing at 100%, and user response at 93.75%. The field trial also showed that all respondents, both the head of the unit and the care providers, could use the system easily and that the available features worked as intended. This is supported by Suhariyono et al. [11], who emphasized that automatic and consistent recording of user activity is an important factor in preventing access misuse and facilitating internal audits in healthcare facilities. These results indicate that the system design fits the operational needs of the Medical Record Unit and has the potential to replace the previously undocumented manual process with one that is automatic, structured, and transparent, thereby supporting the head of the unit in managing patient data security.

Several limitations should be considered. The trial involved only six subjects at a single hospital, and the system was not compared with the previous manual process, so the results cannot be generalized. The evaluation addressed feasibility, function, and user response; the effect of the system on security incidents or audit outcomes was not measured. For the hospital, regular socialization and training for the care providers and the head of the Medical Record Unit are recommended so that the transition from WhatsApp to the web-based system runs optimally. Future research may develop the system into a mobile application, add automatic notifications through email or an SMS gateway, present the complete set of design diagrams, expand the number of trial respondents to make validation more representative, and integrate the system directly with the hospital information system.

CONCLUSION

The components needed for a web-based system for monitoring and identifying electronic medical record access rights at Semen Padang Hospital were identified through observation and interviews, and comprised login, an access request form, approval by the head of the Medical Record Unit, status notifications, monitoring of access circulation, and monthly KPI reports, none of which existed in the manual WhatsApp-based mechanism. The system was designed with a flowchart, use case diagram, activity diagram, and class diagram, and was implemented in PHP with a MySQL database of six interrelated tables. Expert validation (91.25%), functional testing (100%), and user response (93.75%) placed the system in the highest feasibility categories, which indicates that it is feasible to implement as a replacement for the WhatsApp-based mechanism in the unit. Evaluation with a larger sample and over a longer period is still needed to confirm its effect on the security of patient data.

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