

Design of an Automated Monitoring and Alert System for Medical Record Document Retention Periods Using Microsoft Access

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A B S T R A C T

Background: The design of an automatic monitoring and warning information system is the development of a system to monitor the retention period of medical record documents and provide warnings when the documents are approaching or entering the retention period. Slow retention processes can cause document accumulation and reduce storage space capacity. **Objective:** This study aims to design an Automatic Monitoring and Warning Information System for the Retention Period of Medical Record Documents using Microsoft Access. **Research Subject/Object:** The research object is the process of managing the retention period of medical record documents. **Method:** The method used is the Waterfall, which includes requirements analysis, system design, as well as testing and evaluation. **Results:** The analysis results indicate that the identification of documents entering the retention period is still conducted manually, and there is no monitoring system or automatic alert available. The Monitoring and Automatic Alert Information System (SIMORA) was designed using Data Flow Diagram (DFD), Entity Relationship Diagram (ERD), Flowchart, and User Interface (UI), featuring data management, retention period monitoring, automatic alerts, and retention reports. Trial results using the Black Box Testing method showed that the system functions according to the design. **Conclusion:** SIMORA can serve as a tool to improve timeliness, effectiveness, and efficiency in managing the retention period of medical record documents at the Buton Selatan District Hospital.

INTRODUCTION

Advancements in information technology during the digital era have brought about significant changes across various sectors, including healthcare. This digital transformation is characterized by the implementation of health information systems designed to enhance the effectiveness, efficiency, and quality of services provided to the public. One manifestation of digital transformation in healthcare is the implementation of electronic medical records. According to the Regulation of the Minister of Health of the Republic of Indonesia Number 24 of 2022, a medical record is a document containing data regarding patient identity, examinations, treatments, procedures, and other services provided to the patient; an electronic medical record, meanwhile, is a medical record created using an electronic system as part of the health information system (Permenkes No. 24, 2022). However, the implementation of electronic medical records in hospitals is proceeding in stages, meaning that physical medical record documents continue to be generated and must be properly managed.

One of the key activities in medical record management is document retention. Retention aims to reduce document accumulation on active filing shelves, optimize storage space utilization, and serve as a basis for evaluating which documents should be destroyed and which should be permanently preserved (Depkes RI, 2006). Failure to carry out retention activities regularly and according to a schedule can lead to various issues, such as the accumulation of medical records, limited filing space, difficulties in document retrieval, and an increased risk of errors in records management. Delays in retention can also hinder the workflow of medical record staff and impact the effectiveness of administrative services within the hospital.

According to Marsun et al. (2018), delays in the retention process stem from a lack of facilities and infrastructure, as well as irregular retention schedules; consequently, filing staff lack a systematic schedule for transferring documents from active to inactive status before the retention period expires. Furthermore, Gustri Khairunnisa (2022) states that although the retention process follows specific stages, its effectiveness remains suboptimal due to timing issues and staffing shortages within the medical records unit. Other research also indicates that the retention of inactive

medical record files lacks systematic execution, resulting in storage areas becoming overcrowded with medical record documents (Tania et al., 2024).

A preliminary study conducted at the South Buton Regency Regional General Hospital (RSUD) on February 5, 2026, revealed that the storage racks for active medical records had become overcrowded and could no longer accommodate the influx of new files. The process of identifying documents that had reached their retention period was still being performed manually—checking files one by one—which was time-consuming and prone to error. Therefore, an automated monitoring and alert system for medical record retention periods, developed using Microsoft Access, is needed to assist staff in identifying documents that have reached the end of their retention period. This study aims to design such a system for the South Buton Regency Regional General Hospital.

METHOD

This study employs a qualitative design approach aimed at developing an automated monitoring and alert system for medical record document retention periods using Microsoft Access at the South Buton Regency Regional General Hospital (RSUD). The research was conducted at the hospital—located on Jalan Gajah Mada, Masiri, Batauga, Southeast Sulawesi—between April and May 2026. The research subjects consisted of three medical record staff members, while the research object was the design of the aforementioned automated monitoring and alert system.

The system design process utilized the waterfall method, comprising requirements analysis, design, and testing and evaluation phases. The requirements analysis phase involved observation and interviews to identify problems, obstacles, and staff needs regarding the tracking of medical record retention periods. The design phase included the creation of Data Flow Diagrams (DFD) and Entity-Relationship Diagrams (ERD), as well as User Interface (UI) design using Microsoft Access as the platform for processing monitoring data and automated alerts for retention periods. Subsequently, testing and evaluation were conducted to ensure the system functioned according to user requirements.

Data collection techniques included interviews, observation, and document review. Interviews were conducted with the Head of Medical Records and filing staff to gather information on current retention practices, challenges faced, and user requirements for the proposed system. Observations were carried out to assess the condition of the filing room and the medical record management process, while document review involved examining Standard Operating Procedures (SOPs), hospital policies, and other supporting documents related to medical record retention.

The research instruments employed included interview guidelines, observation checklists, note-taking tools, recording devices, and a camera. System design was supported by an ASUS E2110MAB-E210MA laptop running Windows 11, ClickCharts Diagram Flowchart Software for creating DFDs and ERDs, and Microsoft Access for designing the user interface and processing data for the automated monitoring and alert system regarding medical record retention periods.

RESULTS & DISCUSSION

Needs Analysis

Information system requirements analysis encompasses the capabilities, prerequisites, and criteria that an information system must possess and satisfy to fulfill user expectations (D.S.S, 2021). This analysis is conducted through interviews, observations, and document reviews to identify the current state of medical record management and user requirements for the system to be designed. Interview results indicate that the South Buton Regency Regional General Hospital (RSUD) employs a centralized storage system for medical records using the Straight Numerical Filing (SNF) method; all medical records are kept in a single storage location and managed via a retrieval process based on service requirements.

Interview results also indicate that storage rack capacity has reached saturation, forcing some medical records to be kept in cardboard boxes for temporary storage. This situation has resulted in cramped filing space, increased risk of document damage, and slower file retrieval. Furthermore, although the medical records unit has a retention SOP in place, retention procedures are not yet carried out routinely; instead, they are only scheduled periodically due to time and staffing constraints.

Based on interview findings, the determination of retention periods is currently performed manually by checking the year of the last visit on the cover of each medical record document individually. This process is time-consuming, increases staff fatigue, and carries a risk of human error when identifying documents that have reached their retention period. All informants stated the need for an information system capable of monitoring retention periods, providing automatic notifications

when documents reach the retention stage, and facilitating the faster and more accurate preparation of retention reports.

Observations indicate that the medical records unit already has established procedures for record retention, a storage area for inactive files separate from active ones, and shelving for medical record documents. However, issues such as overcrowding on the storage shelves persist, and the selection of medical records for retention is still based solely on the patient's last visit date. A review of documentation further reveals that the unit possesses a retention workflow, standard operating procedures (SOPs), an inactive record storage area, the medical records themselves, and registration file reports to support the retention process. Based on this needs analysis, the proposed system is designed to provide features for retention period monitoring, automated notifications, and retention reporting, thereby facilitating a more effective and efficient medical record retention process.

System Design

System design can be defined as the stage following the requirements analysis phase of the system development lifecycle; it involves defining functional requirements, preparing for implementation, and outlining the system's structure—including the specification of software and hardware components (Nopriandi, 2018). The design of an automated monitoring and alert system for medical record document retention periods was conducted based on a user requirements analysis at the South Buton Regency Regional General Hospital (RSUD). The design phase encompassed the creation of Data Flow Diagrams (DFD), Entity-Relationship Diagrams (ERD), flowcharts, and User Interfaces (UI) using Microsoft Access. This design aims to produce a system that assists staff in monitoring medical record retention periods more effectively and in a structured manner.

Data Flow Diagram (DFD)

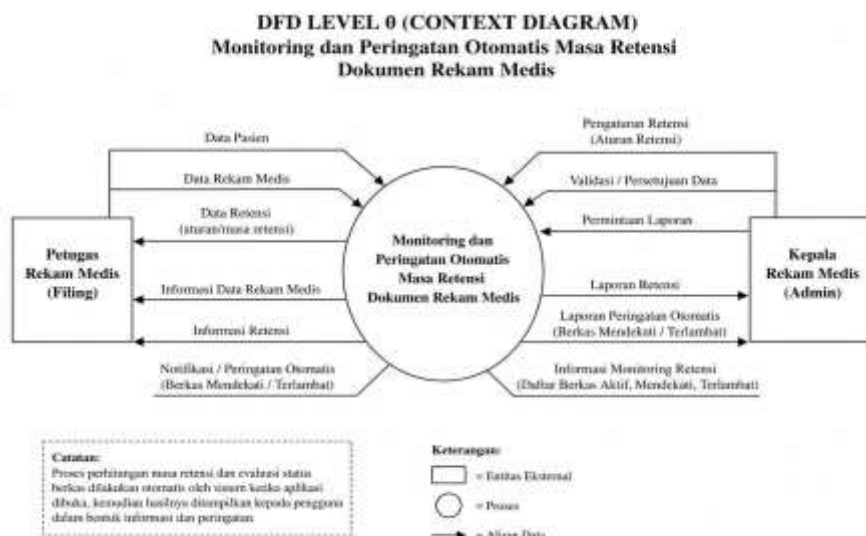


Figure 1. Level 0 DFD

In the diagram above, the system interacts with two external entities: the medical records officer and the head of medical records. The officer provides patient data, medical record data, and retention rules, while receiving retention information and notifications. The head of medical records provides settings, data validation, and report requests, while receiving reports and retention status information. The system processes data automatically, including calculating retention periods and displaying information and notifications to the users.

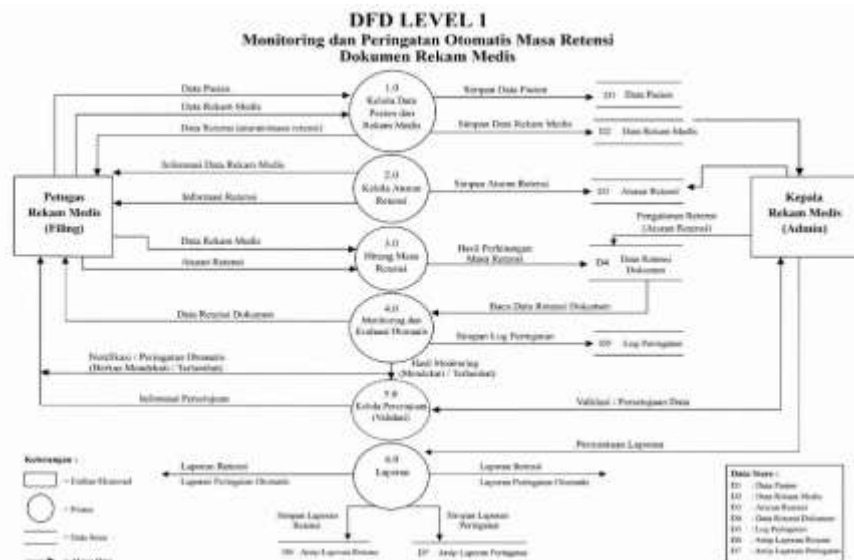


Figure 2. Level 1 DFD

The image above illustrates the data management workflow involving two external entities—the Medical Record Officer (filing) and the Head of Medical Records (admin)—across six main processes. The workflow begins with the management of patient data and medical records (1.0), followed by the management of retention rules (2.0) and the calculation of retention periods (3.0). The results feed into an automated monitoring and evaluation process (4.0) to detect documents nearing or exceeding retention limits and to generate notifications. Subsequently, validation or approval is performed by the admin (5.0) before the system generates retention reports and automated alerts (6.0). This workflow supports the systematic and controlled management of medical record retention.

Entity Relationship Diagram (ERD)

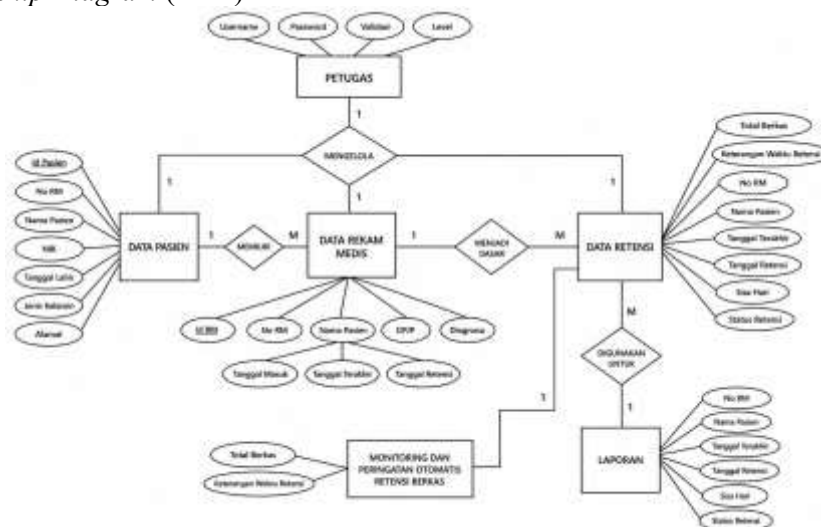


Figure 3. ERD

The image above illustrates the data management workflow involving two external entities—the Medical Record Officer (filing) and the Head of Medical Records (admin)—across six main processes. The workflow begins with the management of patient data and medical records (1.0), which are stored in a data store, followed by the management of retention rules (2.0) and the calculation of retention periods (3.0). The calculation results are utilized in an automated monitoring and evaluation process (4.0) to detect documents nearing or exceeding retention limits and to generate notifications. Subsequently, validation or approval by the admin (5.0) takes place before the system generates retention reports and automated alerts (6.0), which are then archived. This workflow ensures that medical record retention management is systematic and controlled, while also supporting decision-making.

Flowchart

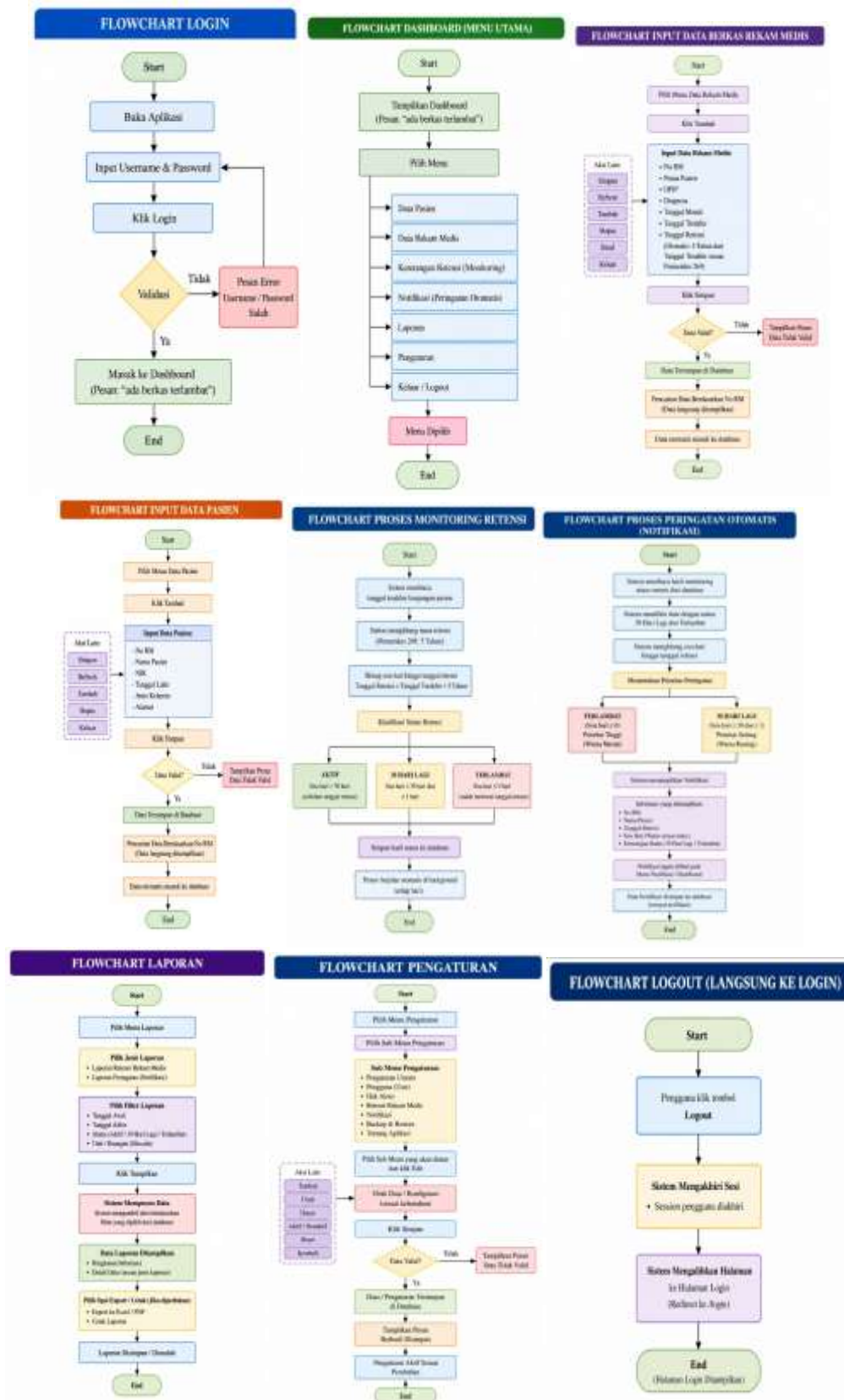


Figure 4. Flowchart

Flowcharts are used to illustrate the workflow of each system process, including login, dashboard, patient data entry, medical record data entry, retention monitoring, automated alerts, reporting, settings, and logout. During the monitoring process, the system calculates the retention period based on the patient's last visit date and categorizes document status as active, approaching retention expiry, or overdue. Subsequently, the system automatically displays notifications for documents that are nearing or have passed their retention period.

User Interface (UI) Design



Figure 5. Login Screen

The SIMORA login page features three input fields: username, password, and validation. Additionally, there is a login button used to enter SIMORA and access the main menu. User access rights are differentiated by role; administrators have full access to all menus, whereas staff members cannot access the settings section. If the entered data is correct, the user is redirected to the main page (dashboard) and presented with a notification indicating "overdue files." This is illustrated in the following image:

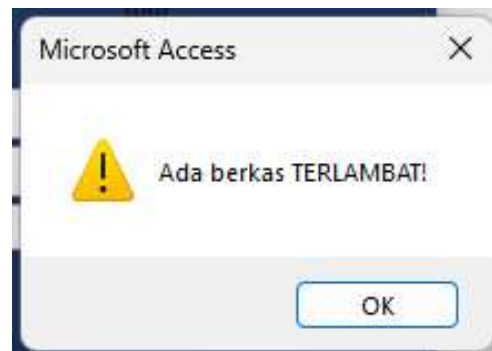


Figure 6. Warning



Figure 7. Main Menu (Dashboard) Screen

The SIMORA main menu (Dashboard) displays information on the total number of medical record files, including those nearing the end of their retention period, those that have reached the retention period, and active files. Additionally, SIMORA provides automated notifications for documents entering the retention period, as well as a monitoring table containing details such as medical record numbers, dates of last visits, remaining days, and retention status.

Testing and Evaluation

Testing is the activity of executing a program with the aim of identifying errors. It is conducted to ensure that the software or application being developed operates according to its intended functionality. System testing also aims to evaluate the application's capabilities and determine whether the developed program aligns with expected outcomes (Febriyanti et al., 2021). Evaluation is a process that provides information on the extent to which specific activities have been achieved, compares these achievements against established standards to identify any discrepancies, and assesses the value of the work performed relative to desired expectations (Kaban & Nasution, 2025). System testing was carried out using the Black Box Testing method to verify the alignment of the medical record document retention monitoring and automated alert system with user requirements. Testing covered all key system features, including login, dashboard, patient data, medical record data, data search, retention monitoring, automated alerts, reporting, and logout.

Table 1. Black Box Testing

No.	Component	Test Scenario	Test Results	Information
1	Login	Users can log into the system using a username, password, and valid authentication. Upon successful login, a message appears if there are overdue files, whereas an error message appears if the credentials are incorrect. User roles are restricted to administrators (who can access all features) and staff members (who cannot access settings).	Succeed	In accordance
2	Main Menu (Dashboard)	Capable of executing the main menu, comprising patient data, medical record data, retention details (monitoring), notifications (automated alerts), reports, settings, and exit/logout.	Succeed	In accordance
3	Patient Data	Allows for data entry (Medical Record Number, Patient Name, NIK/ID Number, Date of Birth, Gender, Address) and the use of buttons to: save (save data), refresh (reload/refresh data), add (input new data), delete (remove data), and exit to the main menu, with data automatically saved to the database.	Succeed	In accordance
4	Medical Record Data	Allows for data entry (Medical Record Number, Patient Name, NIK, Date of Birth, Gender, Address) and the use of buttons to: save (save data), refresh (reload/refresh data), add (input new data), delete (remove data), and exit to the main menu, with data automatically saved to the database.	Succeed	In accordance
5	Data Search	Able to search for data based on medical record number.	Succeed	In accordance
6	Retention Monitoring	Able to calculate the retention period based on the patient's last visit date.	Succeed	In accordance
7	Automatic Alert	Can display data for which the retention period has expired.	Succeed	In accordance
8	Report	Can display and print reports on documents designated for retention.	Succeed	In accordance
9	Logout	Users can exit the application.	Succeed	In accordance

CLOSING

Research findings indicate that the management of medical record document retention at the South Buton Regency Regional General Hospital (RSUD) faces several challenges: limited storage shelving, a manual and unscheduled process for identifying retention periods, and the absence of a systematic method for marking retention periods. These conditions result in a time-consuming retention process that is prone to human error. Based on the needs analysis, an automated monitoring and alert information system for medical record retention periods—named SIMORA—was designed using Microsoft Access, utilizing Data Flow Diagrams (DFD), Entity Relationship Diagrams (ERD), and flowcharts as the design foundation. The designed system includes features for user login, patient data management, medical record data management, retention period monitoring, automated notifications, and retention reporting. Black Box Testing results demonstrate that all system functions operate correctly according to user requirements, enabling the system to assist in monitoring medical record retention periods more effectively and efficiently. A limitation of this study is that the designed information system is not integrated with the Hospital Management Information System (SIMRS), as

the design focused exclusively on the automated monitoring and alert system for medical record retention periods using Microsoft Access.

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