

DESIGN OF INPATIENT REPORTING DASHBOARD USING MICROSOFT ACCESS

Diva Nur A'ami S.Salsakira ¹, Mega Ermasari Muzuh ^{2*}, Sri Wahyuni³

¹²³ Politeknik Baubau

ARTICLE INFORMATION

Received: 3 October 2025

Revised: 11 November 2025

Accepted: 15 December 2025

DOI:

KEYWORDS

Keywords : Dashboard; Inpatient; Microsoft Access; Information System; Inpatient Reporting.

CORRESPONDING AUTHOR

Name : Mega Ermasari Muzuh

Address: Jl.Lakarambau. Kel. Lipu, Baubau

E-mail : megaermasari@gmail.com

A B S T R A C T

Inpatient reporting is an important component of health service management because it serves as a basis for monitoring and evaluating service quality. However, the inpatient reporting process at UPTD Puskesmas Wajo is still conducted manually using register books and partially using Microsoft Excel, resulting in time-consuming data processing and report preparation as well as the risk of recording errors. In addition, calculations of inpatient service indicators such as Bed Occupancy Rate (BOR), Average Length of Stay (AVLOS), Bed Turn Over (BTO), and Turn Over Interval (TOI) have not been carried out completely, resulting in suboptimal service monitoring. This study aimed to design an inpatient reporting dashboard using Microsoft Access at UPTD Puskesmas Wajo in 2026. The method used was the waterfall method, which includes requirements analysis, system design, system development, testing, and evaluation. Data collection techniques were carried out through observation, interviews, and documentation studies. The subject of the design was the head of the inpatient unit. The research results show that the inpatient reporting dashboard was successfully designed with login features, inpatient patient data input, bed data management, doctor data, service indicator reports, and dashboard graphs. Testing results using the black box method indicate that most system functions work well, although obstacles were still found in the calculation of the total BOR. The dashboard can help the processes of data input, data searching, report processing, and inpatient service monitoring in a faster and more organized manner.

INTRODUCTION

The rapid advancement of information technology has provided convenience in carrying out various activities in companies, organizations, and institutions. Information technology not only includes computer technology in the form of hardware and software that used to process and store information, but also includes communication technology to transmit information. The use of information technology in health services can support the process of managing and presenting information more effectively and efficiently ¹.

Medical records are documents that contain patient identity data, examinations, treatment, procedures, and other services that have been provided to patients. With technological advances, medical records can be organized electronically using electronic systems to support health service delivery ². Computerized health information management becomes one of the efforts to improve the quality of health service data management.

The management of inpatient data requires a reporting system capable of generating information quickly and accurately. Research on developing a dashboard application for inpatient patients shows that data management that is still done manually or semi-computerized can cause delays in presenting strategic information for hospital management. The web-based dashboard with interactive graph visualizations can help display the number of active patients, diagnosis distribution, and bed occupancy rate. The results show that implementing the dashboard can improve the effectiveness of service monitoring, speed up reporting processes, and facilitate leadership in real-time evaluation of inpatient service performance ³.

Other studies on inpatient morbidity reporting information systems have shown that reporting processes that are still conducted manually may result in delays in report preparation and potentially lead to errors in data processing. The implementation of computerized information systems enables inpatient morbidity data to be processed in a more structured and timely manner, thereby improving the quality of health service reporting. The use of technology-based information systems in inpatient

reporting processes is therefore necessary to improve data quality and support decision-making in health management.

Based on the initial study results conducted at Puskesmas Wajo, it is known that the process inpatient reporting is still done manually using a register book and some using Microsoft Excel for data recap. The use of Microsoft Excel is still limited to recording and processing simple data. The process of summarizing daily and monthly reports takes a relatively long time and may lead to errors in calculating service indicators such as Bed Occupancy Rate (BOR), Average Length of Stay (AVLOS), Bed Turn Over (BTO), and Turn Over Interval (TOI).

Based on the above description, a design for an inpatient reporting dashboard is required using Microsoft Access that can help integrate service data and present information in the form of easy-to-understand graph visualizations. The system is expected to increase reporting process efficiency, minimize data processing errors, and assist the leadership of Puskesmas Wajo in monitoring and data-driven decision making.

METHODOLOGY

This study uses the Waterfall method, a system development method that is carried out step by step and in sequence. The design stages include requirements analysis, information system design, system creation, system testing, and evaluation and maintenance. The Waterfall method was chosen because it provides a systematic and structured development flow so that the system can be designed according to user needs.

The subject of this study is the head of the inpatient ward at Puskesmas Wajo. The selection of the subject was done because the head of the inpatient ward is the user who knows the process of recording, processing, and reporting inpatient data and understands the information needs and constraints that occur in the reporting process that is still done manually.

The object of this study is the manual register book in the inpatient ward of Puskesmas Wajo. The object includes the process of recording inpatient patient data, processing service data, calculating inpatient service indicators such as Bed Occupancy Rate (BOR), Average Length of Stay (AVLOS), Bed Turn Over (BTO), and Turn Over Interval (TOI), and the process of preparing inpatient service reports.

Data collection techniques were carried out through observation, interviews, and documentation. Observation was conducted by directly observing the workflow of staff and the inpatient reporting process to determine the type of data used and system needs. Interviews were conducted to obtain information about reporting problems and user needs, while documentation was used to complete data and reporting formats used in the inpatient ward. inpatient.

RESULTS & DISCUSSION

Needs Analysis

The results of the needs analysis show that the inpatient reporting process at Puskesmas Wajo is still conducted manually using a register book and some using Microsoft Excel for BPJS patient recording. This condition causes data processing and report preparation to take quite a long time because officers must perform manual data recapitulation.

In addition, inpatient service indicator calculations are still limited to Bed Occupancy Rate (BOR), while AVLOS, BTO, and TOI indicators have not been calculated regularly. This condition causes data processing and report preparation to not run optimally. Based on interview results, users want an easy-to-use system that still conforms to the register book format previously used so that adaptation to the new system can be done without significantly changing the workflow.

Based on these analysis results, system requirements are directed towards designing a dashboard inpatient reporting based on Microsoft Access that can assist the data input process, report processing, and monitoring inpatient service indicators in a more structured and computerized manner. Interview results with the head of the inpatient ward also show that the dashboard is valued

Design Process

Use Case Diagram

Use Case Diagram is used to illustrate the relationship between users and system and the functions that can be performed by users. In the inpatient reporting dashboard system, the main users

are inpatient staff. The staff first logs in to access the system. After successful login, staff can perform several activities, namely managing doctor data, managing inpatient data, managing bed data, viewing the reporting dashboard, and logging out.

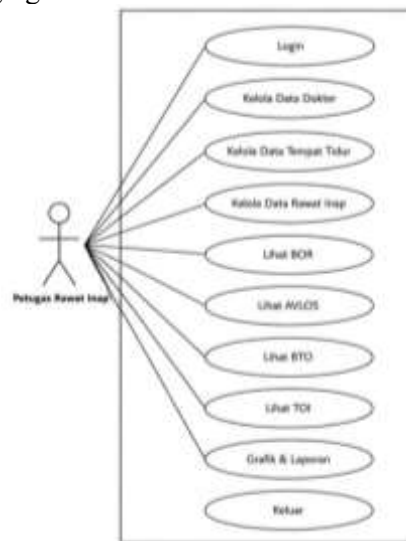


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Activity Diagram

Activity Diagram is used to illustrate the flow of user activities when using the inpatient reporting dashboard system. In this study, the Activity Diagram consists of some workflows, namely the login workflow, doctor data management workflow, inpatient data management workflow, bed data management workflow, and reporting dashboard workflow.

Login Workflow

Activity Diagram Login describes the user authentication process before access to access the inpatient reporting dashboard system. The process starts when the inpatient staff enters a username and password on the login page. Next, the staff selects the login button and the system validates the entered username and password.

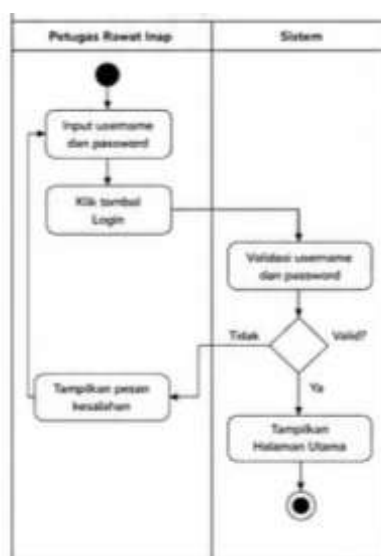


Figure 2.Image Activity Diagram Login

If the login data entered does not match, the system displays an error message and the user is redirected back to the login page to enter the correct data. If the username and password match, the system displays the main page of the inpatient reporting dashboard. Thus, the login process functions as an authentication step before the user can access the menus available in the system.

Doctor Data Workflow

Activity Diagram Doctor Data describes the staff activities in managing doctor data contained in the system. The process starts when the staff selects the Doctor Data menu, then the system displays the doctor data form.



Figure 3. Image Activity Diagram Doctor Data

In that form, officers can perform several activities, namely adding, editing, deleting, and searching for doctor data. In the process of adding or updating data, officers enter or change the doctor's information according to needs. After the data is fully managed, officers select the save or delete button according to the activity performed. Next, the system processes the data changes and displays information that the process has been successful. The updated doctor data is then re-displayed in the doctor data list so the information available in the system is the latest data.

Inpatient Data Flow

The Inpatient Data Activity Diagram illustrates the process of managing inpatients' data by officers. The process starts when officers select the Inpatient Data menu, then the system displays the inpatient data form.

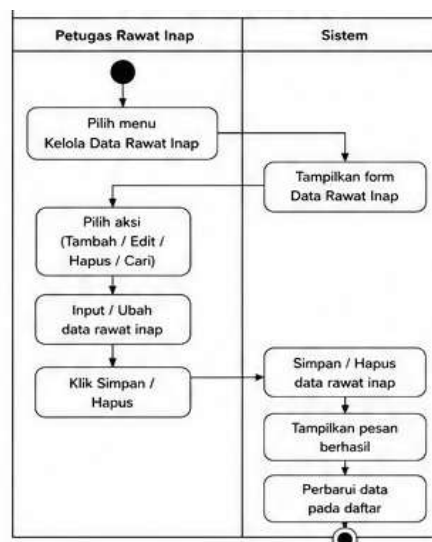


Figure 4.Image Activity Diagram Inpatient Data

Officers can enter inpatient patient data into the system. The data that can be managed includes medical record number, patient name, admission date, discharge date, diagnosis, treatment room, and length of stay. After the data is entered, officers select the save button and the system saves the data into the database.

In addition to data entry, officers can also perform searches, modifications, and deletion of data as needed. After the process is complete, the system updates the inpatient data list so that the data displayed is the latest. This inpatient data management feature is designed to help officers in recording and processing data patients.

Bed Data Flow

The Bed Data Activity Diagram illustrates the process of managing information about the number and availability of beds in the inpatient room. The process starts when officers select the Bed Data menu, and the system displays the bed data management form.

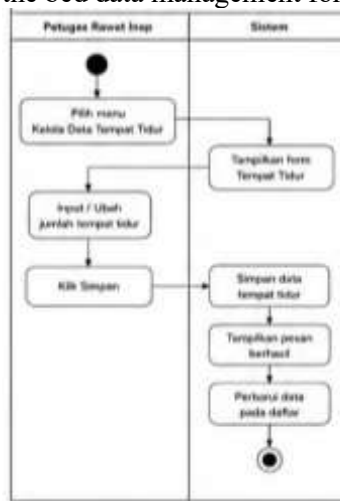


Figure 5.Image Activity Diagram Bed Data

Staff can input or update the number of beds according to actual conditions actual. After the data is entered or updated, the staff selects the save button. The system then processes and stores the data into the database.

After the storage process is successful, the system updates the bed list so that the bed count information displayed matches the latest data. Management of bed data is used to support inpatient service information and the monitoring needs of bed usage.

Reporting Dashboard Flow

The Reporting Dashboard Activity Diagram describes the system process in presenting inpatient service information in dashboard form. After the staff successfully logs in, the staff can select the Dashboard menu on the main page.

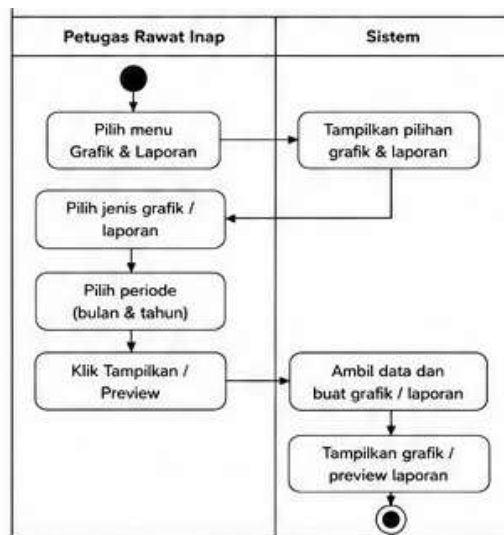


Figure 6. Image Activity Diagram Reporting Dashboard

The system then retrieves and processes data stored in the database to be displayed as visualizations. The dashboard shows several visualization forms, namely pie chart, bar chart, and indicator graphs for inpatient services such as Bed Occupancy Rate (BOR).

Staff can view the information presented on the dashboard to assist the process of monitoring inpatient services. With these visualizations, service information can be viewed more quickly and easily understood compared to viewing data manually.

Entity Relationship Diagram

Entity Relationship Diagram (ERD) is used to describe the relationships between entities that exist in the inpatient reporting dashboard system database. ERD is designed based on data needs obtained in the requirements analysis stage.

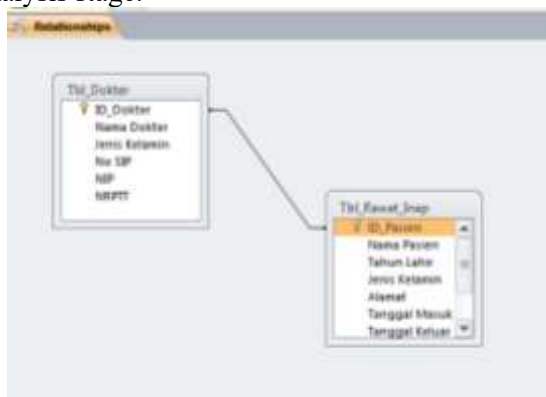


Figure 7.Image Entity Relationship Diagram

The designed system has two main entities, namely Tbl_Dokter and Tbl_Rawat_Inap. The Tbl_Dokter entity is used to store doctor data, while the Tbl_Rawat_Inap entity is used to store patient data and inpatient services.

The Tbl_Dokter entity has attributes ID_Dokter, Nama_Dokter, and Spesialis. Meanwhile, the Tbl_Rawat_Inap entity has attributes related to patient data and inpatient services, including medical record number, patient name, admission date, discharge date, diagnosis, treatment room, and length of stay.

The relationship between Tbl_Dokter and Tbl_Rawat_Inap uses the ID_Dokter attribute. The relationship formed is one-to-many (1:M), meaning one doctor can handle several inpatient patients, while each inpatient patient data has an associated doctor. The relationship is used to connect doctor data with inpatient patient service data in the system database.

User Interface Design

User interface design is the stage of designing the system's appearance used as a medium of interaction between users and the inpatient reporting dashboard system. The interface design in this study is kept simple and tailored to the needs of inpatient staff so that the system is easy to use in data

input, management, and presentation. The layout design includes the login page, main page, doctor data page, inpatient data page, bed data page, and dashboard reporting page.

Login Page Design



Figure 8. User Interface Login

The login page is the initial display when the system is run. This page is used as the user authentication process before accessing the inpatient reporting dashboard system. On the login page there are username and password fields and a Login button. The inpatient staff enter the predefined username and password, then press the Login button. The system will verify the entered data. If the username and password are correct, the user is directed to the system's main page. Conversely, if the data is incorrect, the user remains on the login page and must re-enter the correct data.

Main Page/Dashboard



Figure 9. User Interface Main Page

The main page is the display that appears after the user successfully performs login. This page serves as the navigation hub to access the various features available in the inpatient reporting dashboard system. On the main page there are several menus that can be selected by staff, namely Doctor Data, Inpatient Data, Bed Data, Dashboard/Reports, and the Logout button. Each menu directs the user to the corresponding page according to the chosen function. The main page is designed as the central system management hub so staff can move easily from one function to another. The main page also serves as the initial display for users in managing inpatient care services data.

Doctor Page

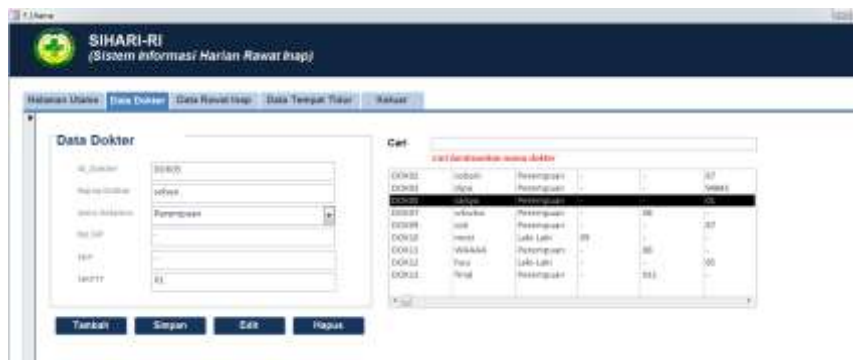


Figure 10. User Interface Doctor Page

The doctor data page is used to manage doctor information that relates to inpatient care. In this page there is a section to enter doctor data and a table used to display the stored data. Staff can perform several activities, namely add, save, edit, delete, and search doctor data. The entered doctor data is then saved to the database so it can be used in managing inpatient care data. The doctor data available in the system includes ID Doctors, doctor names, and specialists. This data is also used in database relationships with inpatient data via Doctor ID.

Inpatient Page



Figure 11. User Interface Inpatient page

The inpatient data page is one of the main views in the system because used to record and manage inpatient data. On this page, staff can enter patient data originating from inpatient care processes. The data that can be entered and managed include medical record number, patient name, admission date, discharge date, diagnosis, treatment room, and length of stay. After data is entered, staff can save it to the database. This page is also equipped with search, edit, and delete functions. With these functions, staff can manage patient data if there are changes or errors in recording. The design of the inpatient data page was made to adapt to recording needs previously performed using a register book. Thus, the system maintains the essential information needed by staff while changing the recording process to computerized.

Bed Page



Figure 12. User Interface Bed Page

The bed data page is used to manage information about beds that available in inpatient care. This page provides facilities to enter and update bed data according to service conditions. Staff can add, save, modify, delete, and search bed data. The managed data is then stored in the system so it can be used as part of the inpatient care information. The design of the bed data page is required because bed information relates to the management of inpatient care and bed occupancy indicators. The data also supports the process of presenting information on the dashboard.

System Testing

System testing is conducted using the black box method. The test results show that most of the system functions have been running according to the design.

Tabel 1. System Test Results

No	Komponen	Skenario Uji	Kendala	Keterangan
1	Login	Masuk sistem dengan username dan password	Tidak ada	Sukses
2	Halaman Utama	Dapat menampilkan grafik barber Jonshon, Diagram Pie 10 besar penyakit dan Diagram Batang Pasien Masuk	Tidak ada	Sukses
3	Data Rawat Inap	Dapat menambahkan, menyimpan, menghapus, dan mencari data pasien dengan baik	Tidak ada	Sukses
4	Data Tempat Tidur	Dapat menambahkan, menyimpan, mengubah, menghapus, dan mencari data tempat tidur dengan baik	Tidak ada	Sukses
5	Data Dokter	Dapat menambahkan, menyimpan, mengubah, menghapus, dan mencari data tdokter dengan baik	Tidak Ada	Sukses
6	Logout	Sistem dapat keluar dari aplikasi dan kembali ke halaman login	Tidak ada	Sukses

Test results show that the inpatient reporting dashboard system has been able to to meet the basic needs of users in managing inpatient data. Before the system was designed, reporting processes at Puskesmas Wajo still used a register book and some used Microsoft Excel, making the recapitulation process quite time-consuming. With the system, input, search, and data processing can be performed through a single computerized system.

The success of the main functions of the system shows that the design made has in accordance with user needs. This is also supported by evaluation results showing that the system can assist staff in inputting patient data, searching data, and creating graphs and charts more quickly and in an organized manner.

This research is aligned with the study by I. G. Agung *et al.* (2024) regarding development inpatient dashboard application at Hospital XYZ using the Laravel framework. The study showed that the inpatient dashboard can help improve the effectiveness of service monitoring, accelerate reporting processes, and ease leadership in evaluating the performance of inpatient services. The similarity with this study lies in the use of dashboards to process and present information about inpatient service in visual form.

The findings of this study are also consistent with those of A. Agung *et al.* (2025). regarding the development of a *business intelligence*-based dashboard. The study demonstrated that dashboards can be used to present information through visualizations, thereby facilitating user monitoring and supporting the decision-making process. The similarity between that study and the present study lies in the use of dashboards as a medium for presenting information, enabling processed data to be understood more easily.

System Evaluation

Evaluation results show that the dashboard provides ease of monitoring inpatient care services. Data that has been entered can be displayed in the form of graphs and diagrams so that service information is easier to understand. Thus, users not only obtain data in tabular form, but can also view service information through more concise visualizations.

From the usage aspect, the system has been able to provide the functions needed by officers, starting from login process, management of doctor data, inpatient data management, bed data management, to dashboard presentation. Tests of these functions show successful results, so the system can generally be used according to the design.

This research result is in line with the study by I. G. Agung *et al.* (2024) regarding the development of an inpatient dashboard application at XYZ Hospital using the Laravel framework. The study shows that the dashboard can improve monitoring effectiveness, speed up reporting, and make it easier for leadership to evaluate inpatient service performance. The similarity with this study lies in using the dashboard as a medium to present inpatient service information to aid monitoring and evaluation.

The results of this study also align with the research by Wahab & Humairoh. (2025) regarding the analysis of morbidity data processing to enhance the quality of inpatient reporting. That study emphasized the importance of structured data processing in supporting the quality of inpatient reporting. This is consistent with the system evaluation findings in the present study, which indicate that the use of a computerized system facilitates the input, retrieval, processing, and presentation of inpatient data in a more organized manner.

Limitations of the Study

This study uses Microsoft Access as the system design platform. The use of that platform is adjusted to the needs and conditions at Puskesmas Wajo, but future system development is still necessary if the system will be used on a wider scale or integrated with other health information systems.

CONCLUSION

The system was successfully designed based on user needs and problems that were found in the inpatient reporting process, which previously was done manually using a register book and partially Microsoft Excel.

System design using the Waterfall method which includes requirements analysis, system design, system creation, testing, and evaluation. The resulting system has several main features, namely login, management of doctor data, inpatient data, bed data, service indicator reports, as well as a dashboard with graph and diagram visualizations. The system is designed to help officers input, search, process, and present inpatient service data in a more structured way.

Tests using the Black Box Testing method show that the main functions of the system, including login, inpatient data management, doctor data, bed data, dashboard display, and logout function, can run according to the design. The evaluation also shows that the system can help officers

input patient data, search data, and create graphs and diagrams more quickly and in an organized manner.

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