

DESIGN OF AN EMERGENCY DEPARTMENT (ED) PATIENT VISIT DATA RECORDING SYSTEM USING MICROSOFT ACCESS

Salsyabilah Fitriani^{1*}, Wa Ode Sitti Budiatty², Ahmad Amiruddin³

¹²³ Politeknik Baubau, Kota Bauba, Indonesia

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CORRESPONDING AUTHOR

Name : Salsyabilah Fitriani

Address: Jln. Dayanu Ikhsanuddin

Email : salsyabilahfitriani6@gmail.com

A B S T R A C T

Recording patient visit data in the Emergency Department (ED) at UPTD Puskesmas Wajo is still carried out manually using a registration book, especially after the operating hours of the e-Pus application end. This condition causes the process of searching for data and preparing patient visit reports to still be performed manually, which may lead to recording errors. This study aims to design an ED patient visit data recording system that can help staff in the processes of recording, data retrieval, and reporting of patient visits more effectively and in an organized manner. This study uses a system design method with a Waterfall approach that includes requirements analysis, system design, system development, testing, and evaluation. Data collection was carried out through observation and interviews with ED staff at UPTD Puskesmas Wajo. The system was designed using Microsoft Access with components including doctor data, patient data, visit recording, and reporting. The testing results using the Black Box Testing method indicate that all system features, including login, the main page, doctor data management, patient data management, reporting, and exiting the system, can function properly without any constraints or errors found. The evaluation results also show that the system can help staff perform recording, data retrieval, and preparation of ED patient visit reports more quickly and in a more organized manner. Thus, the system designed using Microsoft Access can be an alternative to support the management of ED patient visit data and reduce dependence on manual recording at UPTD Puskesmas Wajo.

INTRODUCTION

Puskesmas is a primary health care facility that provides health services for the community and individual health services by prioritizing promotive and preventive efforts. public health services and individual health services with an emphasis on promotive and preventive efforts. In the provision of health services, patient data recording becomes one of the important activities because the information produced is used to support services, data tracing, quality evaluation, and health reporting. In Emergency Department (IGD) services, the recording process must be performed quickly, completely, and easily retrievable because IGD services have characteristics that require rapid response to patient conditions.

Medical records are an important part of the health service information system because it contains information about patient identity, examinations, diagnoses, actions, medications, and other services provided to the patient. Good management of medical records requires a recording system that can store, process, and provide information effectively. Developments in health information technology push health facilities to shift from manual recording systems to electronic-based systems so that data management processes become more accurate and efficient.

However, in the implementation of health services, some facilities are still found that using manual recording methods. The use of a register book in patient recording can cause several barriers, such as difficulty in retrieving patient data, longer time in report creation, and increased risk of recording errors. Arida et al. (2020) found that recording patients using a ledgers makes data retrieval harder and reporting takes longer. Additionally, Aksa. (2023) found obstacles in locating patient information and managing IGD service reports due to unstructured recording.

UPTD Puskesmas Wajo has been using the e-Pus application to support health services health services at certain service hours. However, based on observation results, after service hours the e-Pus application ends, IGD patient visit recording is still performed using a manual register book. The recorded data include patient identity, address, date of birth, anamnesis, diagnosis, actions, medications given, and the treating doctor. This condition requires officers to search data through two

different media, namely the e-Pus application and the register book, when needing patient information or visit reports.

The use of computer-based information systems becomes one of the alternatives to overcome the problems of manual recording. An information system can help the processes of input, storage, searching, and presentation of reports more quickly and organized. One software that can be used in designing a simple information system is Microsoft Access. Microsoft Access has capabilities in database management, creating input forms, data storage, and report generation according to user needs.

Several previous studies show that the implementation of information systems can improve the effectiveness of health service data management. Afriyeni et al. (2021) on a data-based patient visit application at a health center shows that the designed system can help staff manage patient visit data and speed up service processes. Hartono, Syahidin, and Sari. (2023) show that the IGD information system can help process data and generate reports more quickly and organized. Additionally, Arida, Sari, and Irawan. (2020) on the design of a Microsoft Access-based medical records information system shows that the application can be tailored to user needs in supporting health information management.

Previous research conducted by Wa Ode Sitti Budiatty. (2022) also highlights the importance of utilizing information systems to support data management in healthcare services. This study serves as a relevant reference, as it addresses the use of information technology to facilitate the management and presentation of information, thereby enabling staff to perform their tasks in a more structured manner. The study's findings demonstrate that the implementation of information systems can help mitigate issues arising from manual data management processes specifically regarding the recording, storage, and retrieval of necessary information.

Based on these problems, a system for recording patient visit data is required in IGD that can integrate the processes of input, storage, search, and reporting of data in a more structured way. The design of this system is expected to help IGD staff reduce reliance on manual recording and improve the effectiveness of patient information management.

Therefore, this study aims to design a system for recording visit data for IGD patients using Microsoft Access at UPTD Puskesmas Wajo. The designed system it is expected to be a solution in supporting the process of recording and reporting patient visitations CDU that is faster, more accurate, and organized according to staff needs.

METHODOLOGY

This study is a system design study using the method Waterfall system development method. The Waterfall method was chosen because it has systematic and structured stages, including requirements analysis, system design, system development, testing, and evaluation. This study aims to produce a data recording system for patient visits at the Emergency Installation (IGD) using Microsoft Access that can help staff in managing patient data more effectively and organized.

The study was conducted at UPTD Puskesmas Wajo with the research subjects being staff IGD as the system user, while the research object is the process of recording IGD patient visit data which was previously done using manual register books.

Data collection was carried out through observation and interviews. Observation was conducted to directly know the flow of recording IGD patient visits, the recording media used, and obstacles in data management. Interviews were conducted with IGD staff to obtain information about system requirements, required data, recording procedures, data retrieval constraints, and reporting needs. In addition, documentation studies were used as supporting data in understanding the existing recording formats.

System design was carried out using Microsoft Access as the creation medium database and system interface. The system design was created using several models, namely Use Case Diagram, Activity Diagram, Entity Relationship Diagram (ERD), and User Interface. The designed system has several main features including a login menu, home page, management of doctor data, patient data management, patient visit recording, reporting, visit charts, and top 10 disease charts.

System testing was performed using Black Box Testing by testing the function/main functions of the system based on usage scenarios. Testing was conducted on the login feature, home page, doctor data management, patient data management, reporting, and system exit functions. The test results were then used as the basis for evaluation to determine how well the system matches the user needs.

RESULTS & DISCUSSION

Requirements Analysis

The results of the requirements analysis show that the process of recording patient visit data Emergency Installation (IGD) at UPTD Puskesmas Wajo still uses two recording media, namely the e-Pus application during specific service hours and manual register books after service hours. This condition causes patient visit data to be stored on different media, making it difficult for staff to search for patient data again or compile visit reports.

Based on observations and interviews with IGD staff, it was found that the data that is recorded includes patient identity, address, date of birth, anamnesis, diagnosis, actions, medications given, and the doctor handling the patient. However, data processing is still done manually, requiring more time in recapitulation and reporting. This condition shows a need for a system that can store data in a structured manner and provide search and report processing facilities more effectively.

System design was based on user needs, namely IGD staff as the main users of the system. The system should provide features for managing patient data, doctor data, patient visit recording, data search, and creating IGD patient visit reports. In addition, the system is designed with visit chart visuals and top 10 charts of diseases as supporting information in service evaluation.

Design Process

Use Case Diagram

Use Case Diagram is used to illustrate the relationship between users and the IGD patient visit recording system designed. In this system, IGD staff is the primary user who interacts directly with the system. Staff can perform a login process to enter the system, then access the menu for managing doctor data, patient data, reporting, as well as exit the system. The Use Case Diagram also describes the main functions that staff can perform in operating the patient visit data recording system IGD.

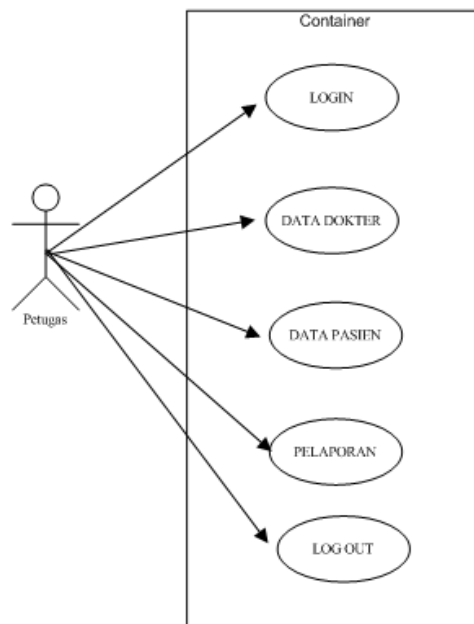


Figure 1. Use Case Diagram

Activity Diagram

Activity Diagram is used to illustrate the flow of activities carried out by the user when running the system. The system flow starts from the login process, followed by user verification, menu selection, data input or data management, data storage, until the user ends the system usage session.

Doctor Data Flow

Staff can access the doctor data menu to manage doctors' information. The activities performed include adding data, saving data, editing data, deleting data, and searching doctor data. The managed data is then stored in the system so that it can be used in the process of recording patient

visits and reporting needs. The doctor data management feature is designed so that doctors' information can be stored in a more structured.

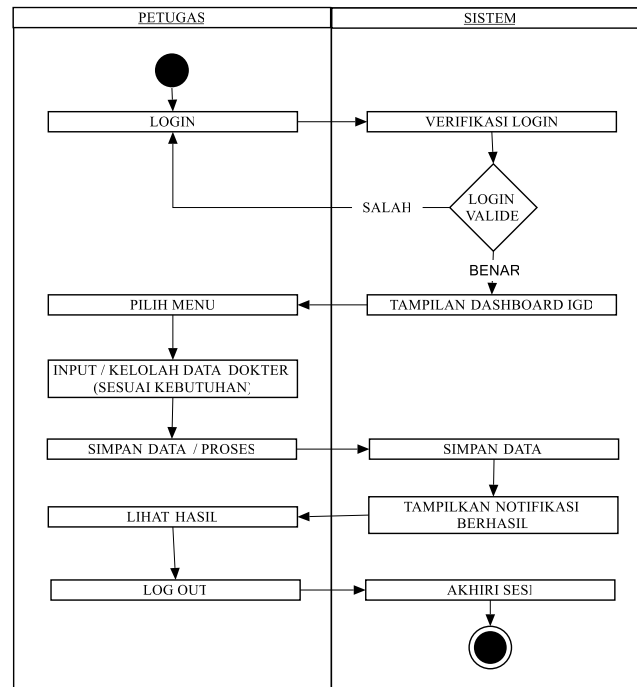


Figure 2. Image Activity Diagram Doctor Data

Patient Data Flow

Staff can manage patient data through the patient data menu. Activities start by selecting the patient data menu, then staff can enter patient data and perform the storage process. The system also provides functions to edit, delete, and search patient data. The information managed includes patient identity, NIK/BPJS, age, gender, address, complaints, diagnosis, procedures, doctor, and discharge approach.

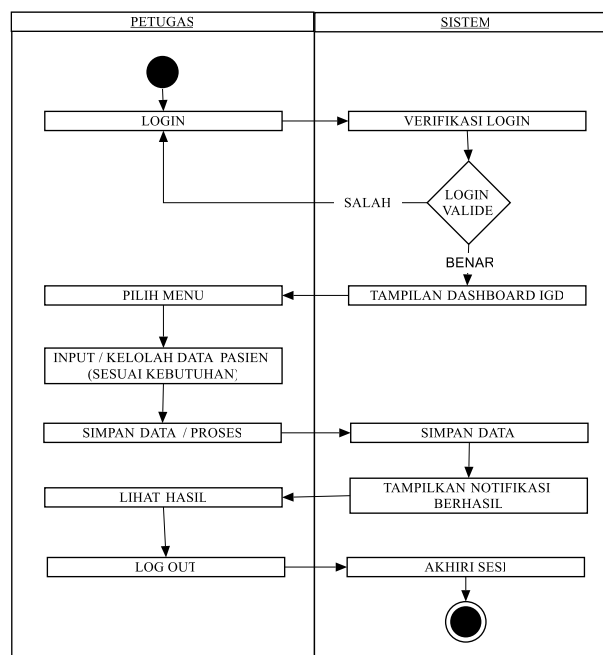


Figure 3. Image Activity Diagram Data Patient Flow

Reporting Management Flow

Staff can access the reporting menu to view and print visit reports ER patient visits. Staff can define the report period based on month and year, then the system displays data according to the selected period. After the data is displayed, staff can search and print reports. This feature is designed to help staff in organizing patient visit reports more quickly and systematically.

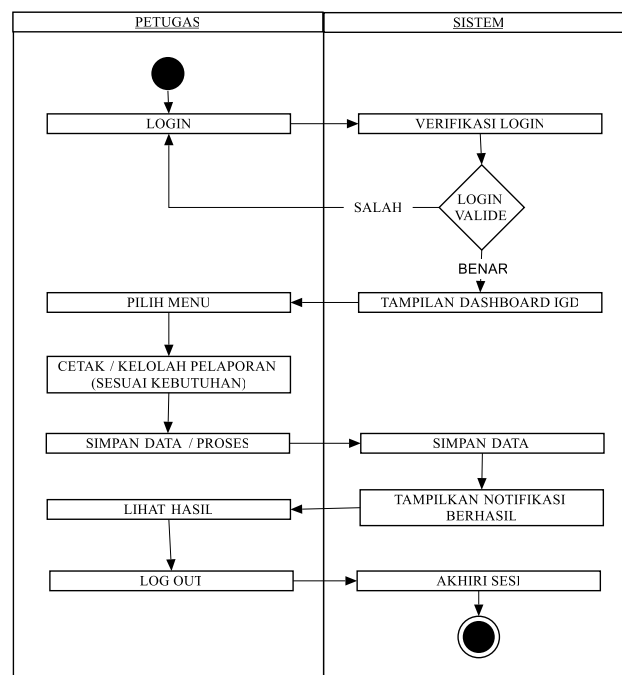


Figure 4. Image Activity Diagram Reporting Management Flow

Entity Relationship Diagram

Entity Relationship Diagram (ERD) is used to illustrate the relationships between entities which exist in the Emergency Department patient visit data recording system. The ERD is designed so that patient data and doctor data can be stored in a structured manner and used in the management and reporting process of visit data.

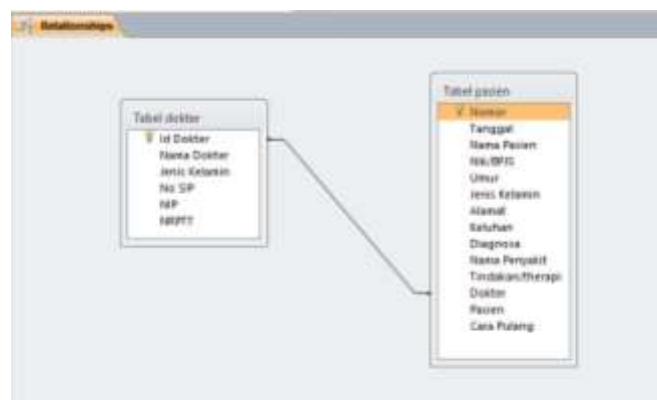


Figure 5.Image Entity Relationship

Based on system requirements, the data managed include patient data, doctor data, and data Emergency Department patient visit. Patient data include patient identity, NIK/BPJS, age, gender,

address, complaints, diagnosis, actions, attending doctor, and discharge method. Doctor data is used to store information about the doctor treating the patient, while visit data is used in the process of recording ED patient service. The relationships between entities are designed to support recording, searching, managing, and reporting of patient visit data.

User Interface

User interface is designed using Microsoft Access with a layout that adapting to officer needs. The main page serves as the navigation hub to patient data, doctor data, reporting, visit graphs, and top 10 disease charts. The doctor data form provides add, save, edit, delete, and search functions. The patient data form includes identity, NIK/BPJS, age, gender, address, complaints, diagnosis, actions, doctor, and discharge method. The report form provides month and year filters as well as search and print capabilities.

Home Page

the main page is the initial display after the officer successfully logs into the system. This page serves as the navigation hub to access the menus available in the system. The available menus include patient data, doctor data, reporting, visit graphs, and top 10 disease charts. The main page design aims to facilitate officers in selecting the functions needed during the process of managing ED patient visit data.



Figure 6. Image Use Case Home Page

Doctor Data

The doctor data is used to manage doctor data contained in the system. This form provides functions to add, save, edit, delete, and search doctor data. Stored doctor data can be used in the process of recording patient data and IGD visit services. With this form, doctor data management can be more structured than manual recording.

No	Nama Dokter	Jenis Kelamin	Jenis Spesialisasi	Jenis Pelayanan	Jenis Asuransi	Jenis Lain
001	DR. H. A. A. A.	Laki-laki	1000000000000000	50	Laki-laki	1000000000000000
002	DR. H. A. A. A.	Laki-laki	1000000000000000	40	Laki-laki	1000000000000000
003	DR. H. A. A. A.	Laki-laki	1000000000000000	30	Laki-laki	1000000000000000
004	DR. H. A. A. A.	Laki-laki	1000000000000000	20	Laki-laki	1000000000000000
005	DR. H. A. A. A.	Laki-laki	1000000000000000	10	Laki-laki	1000000000000000
006	DR. H. A. A. A.	Laki-laki	1000000000000000	0	Laki-laki	1000000000000000
007	DR. H. A. A. A.	Laki-laki	1000000000000000	0	Laki-laki	1000000000000000
008	DR. H. A. A. A.	Laki-laki	1000000000000000	0	Laki-laki	1000000000000000
009	DR. H. A. A. A.	Laki-laki	1000000000000000	0	Laki-laki	1000000000000000
010	DR. H. A. A. A.	Laki-laki	1000000000000000	0	Laki-laki	1000000000000000

Figure 7. Image Use Case Doctor Data

Patient Data

Patient data is used to input and manage patient information that visits the ER. The data available in the form includes patient identity, NIK/BPJS, age, gender, address, complaints, diagnosis, actions, doctor, and discharge. The form also provides functions to add, save, edit, delete, and search patient data. With the patient data form, patient information can be stored in a structured way and easier to locate when needed

Figure 8. Image Patient Data

Reporting Page

the reporting is used to display and manage ED patient visit reports. This form provides a filter facility by month and year, so staff can display visit data for the required period. In addition, there are facilities for searching and printing reports. These features help staff in preparing patient visit reports without manual calculation from the register book.

System Testing

Rekap Laporan Emergency					
					23 May 2026 07:27:02
Bulan	Nama Pasien	Jenis Kelamin	Diagnosa	Pasien	Cara Pulang
2026-03	HASLIM	Laki-laki	I	Emergensi	

Rekap laporan Pasien Poli					23 May 2026 07:27:57
Bulan	Nama Pasien	Jenis Kelamin	Diagnosa	Pasien	
2026-03	FIQIH DARMAWAN	Laki-laki	SERUMEN	Poli	
2026-03	SAFARIA	Perempuan	POST OP	Poli	
2026-03	BRAHIM RAMADHAN	Laki-laki	POST VL	Poli	
2026-03	ABDUL RACA	Laki-laki	POST OP	Poli	
2026-03	NADA ARYLIA	Perempuan	SERUMEN	Poli	
2026-03	ASRARRA ASY	Perempuan		Poli	
2026-03	ANALSYAH SYFAA	Perempuan	POST VL	Poli	
2026-03	SIRAJ ALTHAF	Laki-laki	POST VL	Poli	
2026-03	BASRI	Laki-laki	POST DM	Poli	
2026-03	THAMRIN	Laki-laki	POST OP	Poli	
2026-05	gfh	Perempuan	hty	Poli	

Figure 9. Image Reporting Page

System Testing

Testing is performed by ED staff on May 18, 2026 using Black Box Testing. Test results for six main components are presented in Table 1. All scenarios show successful results and no issues were found.

Table 1.Table Results of Testing the Patient ER Visit Data Recording System

Component	Test Scenario	Constraints/Issues	Result
Login	System login with username No issues Success and password	Not Issues	Succes
Main Page	Displaying top 10 charts None Success disease	Not Issues	Succes
Doctor Data	Add, save, delete, and search None Success doctor data	Not Issues	Succes
Patient Data	Add, save, modify, delete, None Success and search patient data	Not Issues	Succes
Reporting	Displaying and printing None Success monthly report	Not Issues	Succes
Exit	Exit the application and return None Success to the login page	Not Issues	Succes

System testing was conducted to determine whether the visit data recording system for ER patients that has been designed can run according to user needs. Testing was carried out using the Black Box Testing method. This method focuses on testing system functions based on the inputs and outputs produced without looking at the program code used.

Based on the test results, there are six main components tested, namely login, page main, doctor data, patient data, reporting, and system exit. The test results show that all components can function properly and no issues were found. In the login feature, the system successfully received username and password so that users can log into the system. The main page can also display the top 10 disease charts according to the design.

In the doctor data form, the add, save, delete, and search functions can be executed with good. Meanwhile, on the patient data form, the add, save, edit, delete, and search functions can also be used without obstacles. These results indicate that the data management functions have met the basic needs of staff in entering and managing patient and doctor data.

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This study's results align with the research by Ningsih, Agushyvana, and Sedyono (2019) regarding the Development of Web-Based Standard Reporting for Emergency Medical Services Standard. The study showed that developing an emergency reporting system can help overcome difficulties in data retrieval and speed up information presentation. The similarity seen in this study is that the designed system aims to assist the management of emergency service information so that data can be presented more easily and in a structured way.

In addition, this study's results also relate to Maulidayanti. (2021) which discusses the analysis of outpatient visit data at Haurngombong Community Health Center. The thesis notes that previous research found problems with patient data recording still using paper sheets and ledgers, making it difficult for staff to search for patient data and manage reports. This condition is similar to the problems found at UPTD Puskesmas Wajo before the system was designed, i.e., manual recording caused data searching and processing to take longer.

These results are in line with Hartono, Syahidin, and Sari (2023) which show that the ER visit information system can help staff process data and prepare reports more quickly. Ningsih, Agushybana, and Sedyono (2019) also showed that the development of an emergency reporting system can help overcome data retrieval difficulties and accelerate information presentation. The design in this study has a simpler characteristic as it is aimed at the operational needs of ER in health service facilities. first level.

The results of this study can also be linked to the research by Rangga *et al.* (2021). In the technical report, the study by Rangga *et al.* (2021). is cited as one of the earlier studies that used observation techniques to identify system requirements. This is relevant to the present study because observation was used to gather information about staff workflows and data requirements before the system was designed. The results of the observations in this study revealed new data requirements.

Next, the study by Mileni Astri Linda Bitjara *et al.* (2022), which applied observational techniques in the needs identification process. Its relevance to this study lies in the use of observation as a basis for understanding work processes and user needs prior to system design. In this study, observation helped identify issues with manual record-keeping as well as staff needs for a system capable of entering, storing, searching, and reporting patient data in a more structured manner.

The results of the system testing in this study can be linked to the research by Pembri Kurniadi. (2022). Which is listed in the bibliography of this scientific paper. That study serves as one of the references in the field of patient data management and health information systems. Its relevance to this study lies in the need to manage patient data electronically so that the stored information can be reused in the service delivery process. In this study, this need was addressed through patient data features that allow staff to add, store, modify, delete, and search for data. The results of the Black Box Testing showed that all of these functions worked properly without any issues.

System Evaluation

Evaluations conducted by ER staff show that the system assists the process records input, retrieval, storage, and report generation become faster, neater, and easier to manage. The system also provides visit graphs and top 10 disease graphs that can be used as supporting information for evaluating service. In terms of data management, the system provides ease for staff because patient and doctor data can be entered and stored in the database. Staff can also perform searches and manage data without having to consult a manual register. This aligns with the needs found in the analysis stage, namely the need for a system that makes the recording process faster, neater, and easier to manage.

In addition, the system provides period-based reporting facilities so that staff can obtain patient visit reports as needed. The system also includes visit graphs and top 10 disease graphs that can be used as supporting information in evaluating ER services. With this information presentation, data that was previously only stored in a register book can be processed into information that is easier to understand.

However, the system is not yet integrated with e-Pus. This limitation causes data to still be managed separately from the service application that has been used. Future development needs to consider integration or data exchange mechanisms so that recording does not occur on two media. Thus, the system can evolve from a local design to part of a more integrated service information management flow.

This evaluation result is in line with the research by Setiatin and Abdussalaam. (2021) regarding . Design of an Information System for Loans and Returns of Outpatient Medical Records at Muhammadiyah Bandung Hospital. The study was used in the thesis as one of the previous studies related to the design of medical record information systems. Its similarity to this study lies in the use of information systems to assist in managing medical record data so that the data management process becomes more structured.

This system evaluation can also be linked to Muhyidin et al. (2020) regarding UI/UX Design of the My CIC Student Academic Information Service Application. The study is listed in the KTI bibliography and discusses user interface design. In this study, ease of use is also an important part because the system is designed so that staff can understand the menu and operate system functions as needed. A simple interface layout helps staff access patient data, doctor data, and reports.

The findings of this study are related to the research by Rifdi Salawati & Erix Gunawan, (2022). That study served as prior research that employed observational techniques to gather information about system requirements. In this study, observation also served as the basis for understanding staff workflows, the types of data recorded, and user needs regarding the system. The results of these observations were then used to determine system functions, such as the management of patient data, physician data, and patient visit reporting.

The results of the system evaluation are also relevant to the study (Devitra, 2019). The study identified several issues in data management, including difficulties in retrieving data on past patients, managing patient morbidity reports, and the occurrence of duplicate case numbers in medical records. These issues highlight the importance of using a system capable of storing and managing data in a structured manner. In this study, the system designed using Microsoft Access provides facilities for storing and retrieving patient data as well as generating visit reports based on specific time periods. Thus, the system can help reduce the difficulty staff face in retrieving patient data and simplify the report-generation process compared to manual record-keeping using paper registers.

Based on the results of this evaluation, the designed system has been able to meet the basic needs of emergency room staff in recording and managing patient visit data. The system provides benefits, particularly in speeding up the data recording process, simplifying data searches, and assisting in report generation. Thus, the patient visit data recording system for the emergency room using Microsoft Access can serve as an alternative to support the management of patient visit data at the Wajo Community Health Center (UPTD Puskesmas Wajo).

CONCLUSION

Based on the design results, the ED patient visit data recording system using Microsoft Access was successfully developed according to staff needs. The system provides login, management of doctor and patient data, data search, period-based reporting, report printing, and graphical displays. Black Box Testing results for six components show all functions run without issues. Staff evaluations indicate the system helps the recording, searching, storing, and reporting processes become faster and more organized. Thus, the system design can form the basis for developing more structured ED patient visit data management.

Limitations of the study lie in the system not yet integrated with e-Pus. The system also remains focused on the needs of recording and reporting ED patient visits in the designed work environment, so further development is needed for data integration, broader access rights, and connected system use.

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