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Research and Evidence on Knowledge in Administration and Management — Medical Electronic Data and Information Systems

Helpdesk Application Design Electronic Medical Record Reporting

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ABSTRACT

The number of EMR users in RSUP Dr. M.Djamil Padang often occur disorders such as application errors, EMR hank or application can not be opened, employee/user complaints about the problem is not known to have been done. Purpose: This study aims to design a helpdesk application to streamline the reporting of electronic medical record issues, thereby addressing the existing problems. Methods: This study employed a Research and Development (R&D) method. The research was conducted at Dr. M. Djamil Hospital Padang. Data were collected through observations and interviews with two key 2 informants: the head of the Hospital Information System (SIMRS) and one IT staff. A checklist table was also utilized. The application was designed using the waterfall development method. Results: he resulting helpdesk application for electronic medical record (EMR) issues reporting was developed in line with the workflow of the existing EMR reporting process. The helpdesk comprises four main components: user data, report data, problem solving data, and reporting data. Implications: the helpdesk application is necessary to ensure optimal coordination of users and the EMR manager, thereby minimizing the problems that occur. Conclusion: the designed helpdesk application successfully addresses EMR reporting issues that were previously handled manually.

Keywords: *Planning, Application, Helpdesk, Electronic Medical Record (EMR), Issue Reporting*

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INTRODUCTION

Information technology is a field that studies and utilizes electronic devices to store, process, analyze, and distribute various types of information through various media, including the internet, in the form of text, numbers, and images. The development of Information Technology has had a significant impact in various sectors, including the health sector. One of the real implementations of this progress is the implementation of electronic medical records (EMR), which replace conventional paper-based medical record systems. EMR enables the recording, storage, and exchange of patient data digitally, thereby improving service efficiency, reducing the risk of data loss, and speeding up the clinical decision-making process. In addition, the implementation of EMR also contributes to improving coordination between health workers, accuracy of diagnosis, and the overall quality of patient care. Thus, the integration of information technology through EMR is a strategic step in realizing a more effective, efficient, and patient safety-oriented health care system (Ministry of health of the Republic of Indonesia, 2022).

Electronic medical record (EMR) has become one of the important innovations in the provision of health services in Indonesia. The implementation of EMR aims to improve the efficiency, accuracy, and quality of health services, as well as facilitate faster and easier access to Patient Information (Ministry of health of the Republic of Indonesia, 2022) the main challenges in the use of EMR include technical problems, data input errors, system disruptions, and data security problems (Sulistio et al., 2021). Data input errors and system disruptions can compromise the integrity and availability of patients ' medical information, while data security issues can threaten the confidentiality and integrity of sensitive information.

To address these challenges, it is important to have effective mechanisms in place to manage and respond to issues that arise during the use of EMR. One approach that emerged was the implementation of helpdesk applications integrated in the EMR system (Aljarah et al., 2020). The helpdesk app allows EMR users to report any issues or glitches they experience, as well as provide a quick and efficient response from the technical support team. The helpdesk is expected to address various issues within the organization, including internal matters, operational issues, and those related to systems and information technology.

Researchers designed this helpdesk application at Dr. M.Djamil Padang. Dr. M.Djamil Padang is a government hospital which is a referral hospital for the central Sumatra region. Apart from being a government hospital, RSMDJ also acts as a Teaching Hospital, one of which is the Faculty of Medicine. Employees at RSMDJ is approximately 3000 officers, half of the officers are on average using EMR, because of the number of EMR users in RSUP Dr. M.Djamil Padang frequent disturbances such as application errors, EMR hank or application can not be opened, usually to report the problem EMR users make complaints via Telephone, WhatsApp, Telegram or contact directly to the SIMRS and served by the support system.

Based on the results of interviews conducted to one of the officers who were in the installation SIMRS RSUP Dr. M.Djamil Padang in SIMRS installation is divided into 4 parts,

namely operational, hardware, network and programmer. Who has the task to receive complaints from employees/users of EMR is the operational section, the operational section receives complaints from officers via telvon, whatsapp, telegram, or come directly to the SIMRS room. Problems that often occur such as application errors, Hank EMR and applications can not be opened. Employee/user complaints about the problem are not known to have been done or not and there is no recording report from the complaint report that can be reported to the boss.

Based on these problems, it is necessary to create an IT Helpdesk information system that is used to input the name of the officer experiencing problems in the EMR disturbance, the hour and date the problem is resolved, the location of the EMR disturbance in order to help compile a report on the support system staff and also help the management make decisions by looking at a problem related to Information Technology.

METHODS

This study uses the method of Research and Development (R&D) with the aim to produce as well as test the effectiveness of a product, which is a waterfall model-based helpdesk application for electronic Medical Record (EMR) reporting. The R&D Model used refers to the stages developed by Borg and Gall (1983) which include: (1) initial research and Information Collection, (2) Planning, (3) initial product development, (4) limited trials, (5) revision of trial results, (6) main field trials, (7) revision of the final product, and (8) dissemination and implementation. By following these steps, the application development process can be carried out systematically and can be replicated by other researchers in similar contexts.

In this context, the effectiveness of waterfall-based helpdesk application in improving the efficiency of electronic Medical Record (EMR) system disturbance reporting in Dr. M. Djamil Padang, especially in the hospital Management Information System unit (SIMRS). This application was developed to replace the manual reporting process that has caused delays and duplication of information. The stages of application development are based on the waterfall model which consists of: (1) Needs Analysis, (2) system design, (3) implementation or coding, (4) testing, (5) deployment, and (6) maintenance. In the needs analysis phase, data were collected through interviews and observations of support system officers, head of SIMRS installation, and ESDM disturbance reporting section using purposive sampling technique. The system design phase results in interface design and application workflow, while the implementation phase is carried out by building a web-based application that allows online reporting and follow-up of EMR disruptions.

To test the effectiveness of the application, this study used quantitative and qualitative descriptive analysis. Quantitative descriptive analysis is used to measure the level of time efficiency and decrease errors in the reporting process after the use of the application, while qualitative analysis is used to evaluate the level of satisfaction and ease of use of the application

based on user responses. The instruments used include interview guidelines, voice recorders, and checklist tables to assess the accuracy, speed, and reliability of applications developed.

RESULTS

1. Electronic Medical Record Disturbance Complaint Service Process Flow

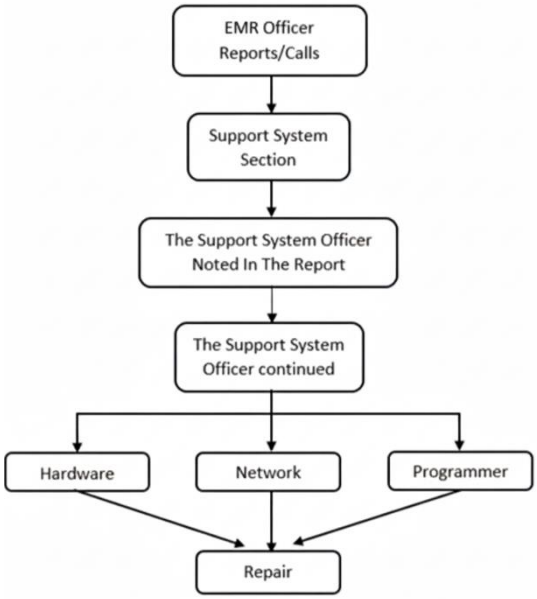

Figure 1. EMR Disturbance Complaint Service Flow Manually

2. Identification of Helpdesk Application Data Components in EMR Fault Reporting

The identification of data components before and after the design of the helpdesk application for RME at Dr. M. Djamil General Hospital Padang is presented as follows:

Table 1. Identification of Data Components Before and After the Helpdesk Application

Before Implementation (Manual Reporting	After Implementation
Name Of Reporter	Reporting Name
Reporting Date	Reporting Hours And Dates
Complaints / Problems	Outdoor
Status	Problems
Results	Problem Level
	Problem Status
	Helpdesk User Data

Based on Table 1, the EMR parts supplier data component manually creates only the name of the supplier, the main responsibility, or EMR problem, the status of the problem (in-process and not in-process), and the results of solving the problem. Meanwhile, the data components in the computerized helpdesk system are more complete, including the name of the reporter (ESDM

user), the hour and date of reporting the ESDM disturbance, the location or room where the problem occurred, the severity of the problem head caries which is categorized into three levels of low, medium, and high and the status of problem handling consisting of opening (not yet forwarded to the officer), in progress (being handled), and closed (the problem has been completed). In addition, the system also records SIMRS user data associated with the report.

New data management on helpdesk applications used to improve efficiency, transparency, and accountability in the process of managing and managing the system environment. Components such as working hours and problem locations allow quick identification of working times and available areas, while problem level assignments help in prioritizing development based on the level of urgency. Higher ownership Status allows users and system owners to monitor the progress of reports in real-time, thus minimizing communication errors and disclosure delays. In addition, the recording of SIMRS usage data is an audit trail (audit trail) that is important for performance evaluation and implementation of gang activities in a structured manner. Thus, the design of the new data component on this helpdesk application not only increases the information available, but also improves efficiency, safety, and accuracy in the management of EMR Environmental Management in the hospital environment.

3. Helpdesk Application Design in Electronic Medical Record Interference

a. Use Case Diagram

Use cases describe the interaction between the actor and the system. In this use case, the actors are admin officers and Clinic Leaders. Admin Officer ; responsible for managing user accounts, assigning tickets, and monitoring progress. Clinic Leader ; responsible for viewing reports and monitoring problem resolution.

b. Activity Diagram

Activity diagrams describe the activities that occur in the system. The following activity diagram of the helpdesk application design in EMR disturbance reporting:

1) Activity Diagram Login

The Login activity diagram illustrates the workflow when a user logs into the application, starting when the attendant accesses the login page and the system displays a form. The officer then enters a username and password, and the system displays a successful login result or an error message.

2) Activity Diagram Entry Ticket EMR Disruption Report

Activity diagram entry ticket or EMR disruption report describes the user's interaction with the system starting from the selection of the add new ticket menu, where the system will display the data entry page of the reporter and the officer to then be filled in and sent as a report to the officer. After the user presses the create ticket button, the system will create a new ticket and display it on the My Ticket menu if the data is complete, while if the data is not complete, the system will display an error message.

3) Activity Diagram of Ticket Delivery to Officers

The activity Diagram of sending user tickets to attendants by admins illustrates the interaction between admins and the system when handling tickets. The Admin reviews the open ticket and assigns it to the attendant, then the system displays that the ticket has been successfully submitted.

4) Activity Diagram Problem Solving

A diagram of troubleshooting activities by an attendant illustrates the interaction between the attendant and the system when handling tickets. The officer opens and reviews the ticket details, then resolves the problem and updates the status until the system displays that the ticket has been completed.

5) Activity Diagram Adding Users

The Add User helpdesk activity diagram illustrates the interaction between the admin and the system, where the admin selects the Add User menu to display the user's addition form. After the admin fills in data such as name, mobile number, email, password, and user type (admin, user, or officer), the system will save the data if the filling is correct and complete, or display a warning message if there is an error.

6) Activity Diagram Logout

The logout activity diagram describes the interaction between the admin and the system starting with the admin selecting the logout menu then the admin clicking the logout button, then the system will logout.

4. The Results of the Trial Use of the Helpdesk Application in Reporting Electronic Medical Record Issues

In this study, researchers have tested the use of helpdesk applications in reporting electronic medical record interference, the application runs without any obstacles in the testing process and researchers ensure that the system can run tasks related to the application so as to produce the correct report.

Tabel 2. Application Test Class

Test Class	Expected Results	Results
Access the Login page	The Login page is well accessible	Results
Perform Login correctly	Enter the main menu	Successful
Incorrect Login	Unable to log in to the main menu and issue a warning message	Successful
Add user	The inputted user Data is saved after clicking the Save button	Successful
Enter user data according to existing columns	failed to save	Successful

Displays successfully saved data		Successful
Add User	Save patient data to database	Successful
Do not enter data according to existing columns	Data failed to save	Successful
Change Password		Successful
Fill in the correct data	Exit warning message	Successful

DISCUSSION

1. Helpdesk System Process Flow in Electronic Medical Record Interruption Reporting

Based on the results of observations and interviews with officers, the flow of complaints of EMR disorders that is still done manually shows some fundamental weaknesses. Currently, officers report problems over the phone to the support system, which then forwards the complaint to the relevant hardware, network or programmer unit. This manual process does not have an adequate monitoring mechanism, so the support system does not know if the problem has been resolved or not. The inability to monitor the status of reports in real-time has the potential to cause delays in handling, duplication of reports, loss of important information, as well as communication errors between units. In addition, manual logging in Excel is prone to input errors, data inconsistencies, and the difficulty of managing large amounts of reports.

Previous research by Ari Purwanto and Verdi Yasin (2021) shows that the application of the helpdesk application allows reporting complaints to be done directly through the system, so that recording becomes more systematic, computerized, and accuracy is guaranteed. With this app, the status of each report can be monitored in real-time, issue priority can be determined based on severity, and admins can generate reports that are structured by issue category. This not only increases efficiency and accountability, but also provides data that can be analyzed for subsequent planning and development of the system (Bahrudin et al., 2019).

Based on the researchers ' analysis, the manual system proved to be less effective because it does not support monitoring, tracking, and data management in an integrated manner, while the helpdesk application overcomes these weaknesses through digitization, automation of reporting flows, and providing accurate, fast, and easily accessible information to all stakeholders. Thus, the use of the helpdesk application is a strategic solution to improve the quality of management of complaints of EMR disorders in hospitals.

2. Identification of Input Components of Helpdesk Application Design in Electronic Medical Record Interference Reporting

The results of the identification of input components helpdesk application design tailored to the needs of hospitals, these input components include data and information needed to operate

the system efficiently and effectively, the components needed in the design of helpdesk applications are 4 components, namely :

a. User Data

Containing staff information (name, position, department, contact, email) for authentication and communication. Accurate user data supports traceability and accountability (Susanto & Mulyati, 2023).

b. Report Data

Including ticket number, report date and time, description, problem category, and severity level. This allows prioritization and efficient handling (Handiwidjojo, 2020).

c. Troubleshooting Data

Documenting the steps taken, responsible technician, and final status (new, in progress, closed). A detailed troubleshooting record ensures problem-solving continuity (Fadillah & Fachrizal, 2018).

d. Reporting Data

Summarizing the number of cases, resolution rates, and recurring issues to support managerial evaluation and preventive action (Susanto & Mulyati, 2023).

3. Design of Helpdesk Application in Electronic Medical Record Interference With Waterfall Method

Based on the process of designing a web-based helpdesk application for electronic medical record (EMR) with a database using XAMPP, SQLyog, and PHP, this design applies the waterfall development method because the approach is systematic with clear stages, ranging from needs analysis to implementation and maintenance. The design starts with UML (Unified Modeling Language) modeling, which includes use case diagrams, activity diagrams, section diagrams, and class diagrams to describe the activities performed by actors and systems. The Output of this design is in the form of an EMR helpdesk application with login menu features, new ticket input, input and edit Officer data, ticket Report display, and a list of available tickets.

According to (Fahrezi et al., 2021) the waterfall method provides a systematic structure and clear stages, making it easier to manage information systems development projects. With successive stages, the waterfall method allows developers to focus on one phase at a time, reducing complexity and improving the quality of the final result (Abdul Wahid, 2020).

Berdasarkan desain aplikasi helpdesk untuk melaporkan gangguan rekam medis elektronik, para peneliti menerapkan metode pengembangan waterfall, yang menyediakan struktur yang jelas dan sistematis, memastikan bahwa setiap tahap-mulai dari analisis persyaratan hingga implementasi dan pemeliharaan-diselesaikan secara berurutan. Pendekatan ini terbukti efektif karena menyelaraskan fungsionalitas sistem dengan kebutuhan pengguna, mengurangi kesalahan pengembangan, dan menghasilkan sistem helpdesk yang andal, terorganisir dengan baik, dan mudah dirawat.

4. The Effectiveness of Helpdesk Applications in the Interruption of Electronic Medical Records

The trial results of the helpdesk application for EMR interference showed significant effectiveness, characterized by increased response speed, high user satisfaction, reduced downtime, and ease of use. The application runs smoothly without a hitch, making it easier for officers to create EMR disturbance reports, and generate monthly reports for evaluation of frequent problems, thereby improving the efficiency and quality of health services in hospitals.

Although the results of trials conducted on the helpdesk application at Dr. M.Djamil Padang has shown effectiveness in various aspects, but there are still some shortcomings that need to be addressed to further improve performance and user satisfaction. One of the main issues identified is the absence of a notification feature when a new fault report ticket enters the system, in the absence of an automatic notification, the helpdesk admin may not be immediately aware of a new reporting ticket. For this reason, the researchers advised hospitals to develop automatic notification features into the EMR disturbance reporting ticket system. Whenever a new ticket is created, the system should send a notification directly to the helpdesk admin via email, SMS, or instant messaging application used to increase the responsiveness of the helpdesk admin, ensuring that any new ticket is immediately known and handled without delay.

CONCLUSIONS

This study shows that the process of reporting Electronic Medical Record (EMR) disturbances in RSUP Dr. M. Djamil Padang is still done manually, which causes limitations in tracking problem resolution and reduces operational efficiency. Therefore, a website-based helpdesk application was designed using the waterfall method that aimed to automate the process of reporting, recording, and handling EMR disturbances to make the process more systematic and efficient. The process of identifying input components such as user data, report data, troubleshooting data, and reporting data was an important foundation in designing the application to fit user needs of users in a hospital environment.

The helpdesk application was developed using the waterfall approach because it has a structured workflow and allows the development process to be carried out in stages, from needs analysis to implementation and maintenance. The app has various key features such as fault ticket input, staff data management, and problem reporting, which are visualized through UML modeling. With the implementation of this system, fault reports can be handled more quickly and be well-documented, as well as providing convenience for officers and technical teams in responding to and resolving problems.

Test results of the application showed high effectiveness in dealing with EMR interference, including increased response speed, reduced interference time, and user satisfaction. The app also makes routine evaluations easier through monthly reporting. However, there are still shortcomings such as the absence of an automatic notification feature for new fault tickets.

Therefore, the development of the notification feature is highly recommended so that the system becomes more responsive and prevents delays in handling problems in the future.

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