

rototyping of Medical Record Quantitative Analysis Information System (Case Study: Patut Patuh Patju Public Hospital, West Lombok)

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Submission date: 12-Apr-2022 12:43PM (UTC+0700)

Submission ID: 1808582637

File name: 4._Paper_ISMoHIM_Sebagai_Penulis_4.pdf (2.98M)

Word count: 2955

Character count: 17663



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ABSTRACT

Nowadays, the use of information and communication technology becomes very emerging to increase effectiveness and efficiency of business processes in almost every companies including hospital. This research conducted at Patut Patuh Patju Hospital in West Lombok. Based on observation in Patut Patuh Patju Hospital, the existing implementation of medical record analysis are by using retrospective approachment and digitalized the data by using Microsoft Excel. However, there still are some problems in using this software to digitalized the data. The first one is the security issue of data storage, because the data are only saved in one local computer and not distributed into a specific server. The other issues are the data could not be accessed by another departments and data processing for final report is conducted manually. The purpose of this research is to design a prototype model of information system of medical record quantitative analysis. This prototype developed by using waterfall model combines with data collection techniques such as observation and interviews. Result of this research is prototype model of information system for medical record quantitative analysis for example the interfaces of form of patient registration, examination data, automatic recapitulation and medical record analysis final reports.

Keywords: Hospital Information System, Medical Record, Quantitative Analysis

I. INTRODUCTION

One of the methods implemented to improve the quality of service in a hospital so that becomes more effective and efficient in this digitalization era is the application of systems and information technology [1].

According to WHO in the book "Design and Implementation of Health Information System" An effective health information system can provide information support for decision making processes at all levels of management. Information systems must also be used as an effective tool for management and decision making [3]. Hospital Management Information System is a communication information technology system that processes and integrates the entire flow of hospital services in the form of a network of coordination, reporting and administrative procedures to obtain information precisely and accurately and is part of the health information system [6]. Medical record is a document that contains records and documents about the patient's identity, examination, treatment, actions and



other services that have been provided to patients. Medical records must be written completely and clearly or electronically [5]. In order to obtain optimal quality medical records, it is necessary to audit and analyze medical records by examining medical records produced by medical and paramedical staff as well as the results examination of medical support units so that the correct placement of diagnosis and completeness of the medical records is accountable [4]. Based on preliminary observations ⁶ November 2018 at Regional Public Hospital of Patut Patuh Patju in West Lombok, the analysis of outgoing and ingoing patient's medical records was carried out retrospectively or after the patient left. In order to obtain optimal quality medical records, it is necessary to audit and analyze medical records by examining medical records produced by medical and paramedical staff as well as the results examination of medical support units so that the correct placement of diagnosis and completeness of the medical records is accountable [4]. Based on preliminary observations in November 2018 at Regional Public Hospital of Patut Patuh Patju in West Lombok, the analysis of outgoing and ingoing patient's medical records was carried out retrospectively or after the patient left.

Regional Public Hospital of Patut Patuh Patju in West Lombok has used the Hospital Management Information System. However, in carrying out medical record analysis, it applies Microsoft Excel. According to the head of the medical record installation room at Regional Public Hospital of Patut Patuh Patju, West Lombok, the use of this software requires accuracy in inputting whether or not the medical record is complete. In addition, data storage is also feared insecure because the computer may experience errors that cause loss of data itself. This can cause the availability of insecure information and affected the decision making by the Director. From the problems as mentioned above, it shows that the use of Microsoft Excel is

not appropriate in processing medical record analysis. To support the effective management of medical record analysis, an information system is needed to help the medical record officer perform his work optimally.

Based on the existing problems, the researcher wants to design a web-based interface of medical record analysis information system at Regional Public Hospital of Patut Patuh Patju, West Lombok.

II. LITERATURE STUDY

A. Medical Record Analysis

Quantitative analysis activities are intended to assess the completeness and accuracy of the inpatient and outpatient health records owned by health service facilities. Processing of incomplete medical record data can be done by incomplete statistical means by processing incomplete medical record data and presenting incomplete figures, so that it can be used as a warning to improve the recording of complete medical records. Incomplete statistics can be calculated by incomplete medical records and delinquent medical records [4].

- Incomplete Medical Record (IMR)

Incomplete medical record is a medical record with specific deficiencies that can still be completed by the health care provider.

- Delinquent Medical Record (DMR)

Delinquent medical record is a medical record that is incomplete according to the time limit.

B. Waterfall Methods

Waterfall is a systematic and sequential information system development model. The stages of development include [7].



- **1** *Requirements analysis and definition*
System services, constraints, and goals are determined by the results of consultations with users who are then defined in detail and function as system specifications.
- *System and software design*
System design stages allocate system requirements both hardware and software by forming the overall system architecture. Software design involves identifying and describing the software system's basic abstraction and its relationships.
- *Implementation and unit testing*
At this stage, software design is realized as a series of programs or program units. The testing involves verifying that each unit fills its specifications.
- *Integration and system testing*
The individual units of the program or program are combined and tested as a complete system to ascertain whether it matches the software requirements or not. After the testing, the software can be sent to the customer.
- *Operation and maintenance*
Usually (although not always), this stage is the longest stage. The system is installed and used significantly. Maintenance involves correcting errors that are not found in the previous stages, increasing the implementation of the system unit, and improving system services as new requirements.

C. PIECES

To identify problems, an analysis of performance, information, economy, security of application, efficiency and customer service must be carried

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C. PIECES

To identify problems, an analysis of performance, information, economy, security of application, efficiency and customer service must be carried out. This guide is known as PIECES analysis (Performance, Information, Economy, Control, Efficiency, and Service) [2].

- *Performance*

Performance analysis is the ability to complete business tasks quickly so that goals are reached immediately. This developed system will provide a sufficient amount of production and response time for management needs.

- *Information*

Information is the focus of a limit or policy. While information analysis examines system output, data analysis examines data stored in a system.

- *Economy*

Economic analysis is a system assessment of the reduction and benefits that will be obtained from the system developed. This system will provide operational savings and increase company profits.

- *Control*

The control system used must be able to secure data from damage, for example by backing up data. In addition, the security system must also be able to secure data from unauthorized access, usually by giving a password to the application form and database.



- *Efficiency*
Efficiency involves how to produce as much output as possible with the smallest possible input.
- *Service*
The growth of an organization depends largely upon the quality of services.

III. RESEARCH METHODOLOGY

This research use the Waterfall Method which includes:

A. ³ Requirements analysis and definition

At this stage, the analysis conducted by researchers is:

- ³ Analysis of old system weaknesses
In the analysis of the weaknesses of the old system the researcher uses analysis with the PIECES framework.
- Requirement analysis

The researcher analyzes the system requirements obtained from the analysis of system weaknesses.

B. ³ System and software design

At this stage the researcher will implement the requirements in the form of blueprints. To assist in making the ³ design of the blueprints, the researcher uses Microsoft Visio 2016. The design stages include:

- *Flowchart* system.
- UML design (Use case diagram and *Sequence diagram*).
- *Entity Relationship Diagram* (ER Diagram).
- *Interface* Design.

The next stages are *Implementation and unit testing, Integration and system testing, and Operation and maintenance*. At this

stage the researcher does not do it because it is not included in the scope of the study.

C. *Data Collection Techniques*

- *Observation*

The researcher observes Hospital Information System (SIMRS) and manages the medical record analysis at Regional Public Hospital of Patut Patuh Patjun West Lombok with the aim of producing an effective information system design for medical records officers.

- *Interview*

In this research the interviews are conducted with the head of the medical record room at Regional Public Hospital of Patut Patuh Patju, West Lombok. The aim is to obtain more detailed system requirements.

IV. RESULTS

A. *Requirements analysis and definition*

Here is the procedure for carrying out medical record analysis.

- Review the complete patient social data (demographics) including information about the patient's identity: name, medical record number, address, age, gender, patient responsibility, signature of consent.
- Examining existing record evidence.
- Reviewing evidence of the validity of records from health workers and other personnel involved in service to patients so that information can be legally accounted for.
- Examine the procedure for recording (administrative) which includes the date, time information, writing in a fixed line and applying the correct way of correction.

Analysis of old system weaknesses

- *Performance*

The medical records officers are unable to complete a quantitative analysis of the medical record.

- *Information*

In SIMRS there is no information regarding quantitative analysis of medical records.

- *Economy*

Officers are not given overtime fees.

- *Control*

Officers do not back-up of data in Microsoft excel.

- *Efficiency*

The medical record analysis is not optimal because the officers are charged with other work.

- *Service*

Human errors in inputting quantitative analysis of medical records.

Requirements analysis

- *Performance*

It takes the design of a medical record analysis information system that can help officers work on medical record analysis on time.

- *Information*

Required information system design that can produce information related to medical record analysis.

- *Economy*

⁶ Because Regional Public Hospital of Patut Patuh Patju in West Lombok in the future plans to provide computers in each poly/ward, the information system that will be designed is very likely to help the hospital in terms of health information management.

- *Control*

A medical record analysis information system is needed that has a backup system and access rights for officers.

- *Efficiency*

The development of a medical record analysis information system is also needed so that it can assist officers in completing their work related to medical record analysis.

- *Service*

An information system is needed in analyzing medical records that can reduce the errors of officers in inputting complete or incomplete medical records.

B. System and Software Design

- *Flowchart System*

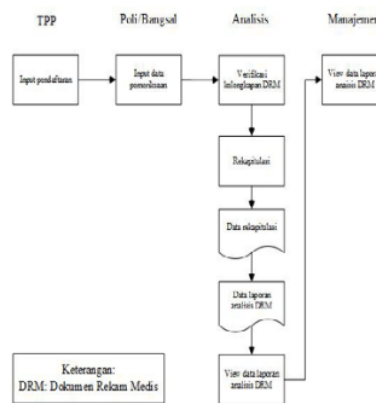


Figure 1. Flowchart System

This flowchart system consists of 4 actors, starting from the Registration officers inputting patient registration, patients who have been served by health care providers, then the examination data in the medical record will be inputted by the clinic

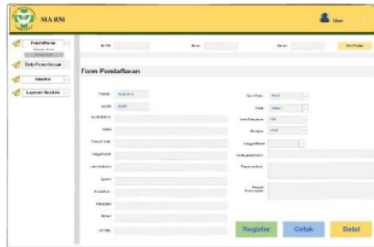


Figure 6. Registration Form Interface

This work is carried out by the Registration Officer. The registration officer can choose register button to continue registration, print button to print the treatment card and cancel button to cancel the patient registration.

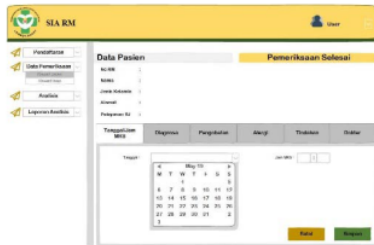


Figure 7. Examination Resume Interface

In order to input the examination data to each patient, the officer can search the patients by using search menu. The officer will input the information from the patient's medical record on the column provided. In each column there is save button which aims to save the inspection data when the officer has finished inputting and cancel button to cancel the action taken previously.

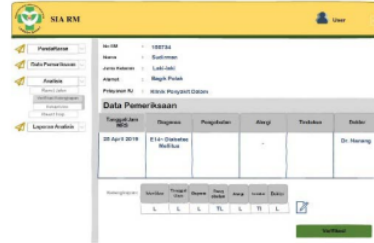


Figure 8. Verification of Outpatient Medical Records Completeness Interface

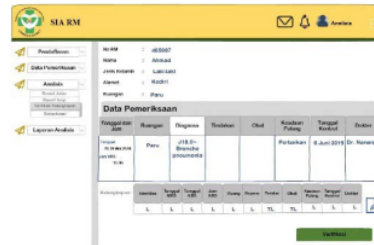


Figure 9. Verification of Inpatient Medical Records Completeness Interface

Based on Figure 8 and 9, it is seen that all of patient examination data can be seen from this menu. The analysis officer will input the completeness based on patient's medical record in the completeness column before the verification process is done.

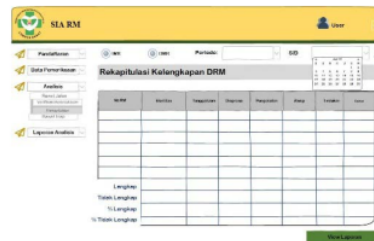


Figure 10. Recapitulation of Inpatient Medical Records Completeness Interface

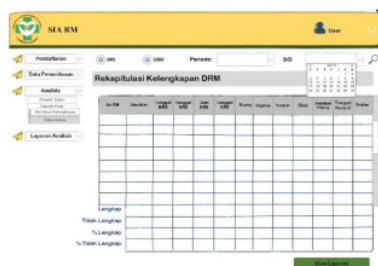


Figure 11. Recapitulation of Outpatient Medical Records Completeness Interface

Based on Figure 10 and 11, the analysis officer can see the details of the completeness and incompleteness of the IMR or DMR analysis for outpatients and inpatients. After that, the officer can see the final report by clicking the report view button.

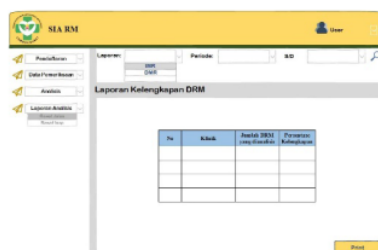


Figure 12. Final Report of Outpatient Medical Records Completeness Interface

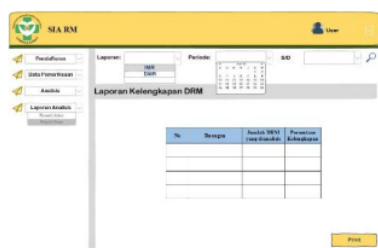


Figure 13. Final Report of Inpatient Medical Records Completeness Interface

Figure 12 and 13 are the final report of IMR and DMR medical record analysis.

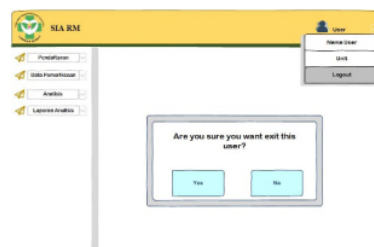


Figure 14. Logout Interface

V. CONCLUSION

The development process of prototype model of the medical record analysis information system adopt waterfall method. The actors in this medical record analysis information system are Registration officers, Clinic officers, analysis officers and management. This information system has user access rights or has their own username and password. This research produces the design of login dashboard interface, patient registration form interface, patient examination data interface, medical record analysis and reporting interfaces, and also logout dashboard interface.

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