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Assessment of Implementation of the Modern Outpatient Information Systems in Indonesia: A Public Health Collaborative Approach

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Abstract

Each year, Indonesian hospitals delivers around 5.8 million outpatient appointments of which around one quarter are new and three quarters are return appointments. It is vitally important that people get fast access to advice and support, self-management information, and, where needed, get to see the right health professional as quickly as possible to ensure care is delivered in as responsive and person-centred a manner as possible, and, critically, as close to home as possible. We have also seen significant growth in Outpatient numbers – over 400,000 extra patients now being seen on an annual basis compared to 2017. Looking to the future, a new approach must fit with a wider plan for transformation, in particular transformation of general practice, primary care and community health services. The new approach is about promoting collaboration between clinical teams in primary, secondary and tertiary care to develop solutions that best meet the needs of the local population and at the same time appropriately managing workload across the system, valuing the contribution of all staff. To ensure genuine collaboration we undertake a need assessment to focus our attention on the local interface between primary and secondary care, bringing local decision makers together to promote innovation and the solutions that best meet local needs. The Modern Outpatient Information System will be progressed over a three-year time span starting with strategic planning in December 2019 and will build on the direction set within the Primary Care Transformation Program and National Clinical Strategy in 2020 and 2021 respectively.

Keywords: Outpatient information system, Collaborative healthcare

Introduction

The hospital is one of the health care facilities that are very much needed in supporting the health community services. Organizing health services in hospitals has very complex characteristics and organizations. Regulation of the Minister of Health of the Republic of Indonesia No. 1171 / MENKES / PER / VI / 2011 in article 1 paragraph (1) states that each hospital is obliged to implement a hospital information system (SIRS), and paragraph (2) SIRS as mentioned in paragraph (1) is a collection process, processing, and presenting hospital data and information. One of the breakthroughs that are widely used in hospitals today is to improve efficiency by using computers for hospital management. Information systems can be used as a strategic form to provide services oriented in order to meet patient satisfaction. Computers in hospitals are considered very useful for improving service quality. In addition to facilitating services, computerized systems in hospitals are not only used in administration, especially in the personnel department, but computerization can be used in various service units.

Nowadays mobile collaboration technology is adopted for multi purposes (Syafar et al., 2014; Syafar & Gao, 2013a; Syafar et al., 2013b) including for healthcare services. Outpatient healthcare is increasingly a modern collaborative effort involving all health stakeholders from several different institutions providing services to the same patient. According to Syafar and Husain (2017), current systems require mobility and intra-organizational collaboration.

Current problems in hospitals include, among other things, the lack of continuous information systems produced by the hospital. One reason is that human resources are inadequate, especially in the information technology (IT) section.

Outpatient care is one form of first-rate individual health care efforts. Outpatient services are one of the work units in the puskesmas and hospitals that serve outpatients and provide 24-hour services. Outpatient is a service to people who enter the health center or hospital, for the purposes of observation, diagnosis, treatment, medical rehabilitation, and other health services without having to stay in the inpatient room. While outpatient services are services provided in functional outpatient units consisting of general polyclinics and specialist polyclinics and emergency units.

According to data from the Makassar City Health Office, there are currently around 22 type C hospitals, and will increase to 24 in 2020 when the construction of the Batua and Jumpandang Baru hospital buildings also changes to hospital status. The entire type C health care institution requires the existence of an accurate and reliable information system, and is sufficient enough to improve its services to patients and other related environments. Ladden et al. (2013) emphasised that with a vast service environment, of course there are many complex problems that occur in the service process. Futhermore, Joynt et al. (2011) and Baskaran et al (2008) have found the number of variables in the hospital also determines the speed of information flow needed by users or outpatients.

Based on the identification of the above problems it is considered necessary and urgent to conduct research with the title "Analysis of Needs for Outpatient Patient Information Systems in Makassar City Type C Hospital".

Research Questions

1   What is the current state (status) of outpatient patient data management at the current type C hospital in Makassar City?
2   How to design and create an outpatient information system in Makassar City Type C Hospital?
3   How to build an information system that can handle the process of registering outpatients in Makassar City Type C Hospital?
4   How to design a distributed database of outpatient information systems in Makassar Type C Hospital?
5   How to make a data report for reporting accurate information to end users in Makassar City Type C Hospital?
6   How to build an information system that can be used to store information about doctors and the existing schedule at Type C Hospital in Makassar City?

Research Objectives

1   Know the current status of patient data management to determine the outpatient information system that suits healthcare institution needs.
2   Analysing the manual process of the outpatient registration system.
3   Creating an information system report that is being used for the benefit of accessing end user information consisting of patients, doctors and pharmacies.

Urgency of Research

Data management in all type C hospitals in Makassar is one of the important components in realizing an outpatient information system, where data management is currently still manual even though using

a computer (not based on information systems) has many weaknesses, besides requiring a long time. , less accurate, so the possibility of errors is very large. With the support of existing information technology, manual data management work can be replaced with an information system that in addition to being faster and easier, data management is also more accurate. The increase in outpatients in all hospitals caused a lack of health care.

Theoretical Foundation

International Telecommunication Union (2010) defines that a system is a group of elements that are integrated with the same goals to achieve goals. Broadly speaking, an information system consists of three main components. The three components include software, hardware, and brainware. These three components are related to each other. Software includes all software that is built with a particular programming language, library, to then become an operating system, applications and drivers. Operating systems, applications, drivers, work together so that the computer can run properly. Hardware includes all hardware that is put together into a computer. Brainware includes the capabilities of the human brain, which includes ideas, thinking, analysis, in creating and combining hardware and software. It is this combination of software and hardware with brainware assistance that can create a system that is useful for users (Fletcher et al, 2012).

From the explanation it can be concluded that the system is a group of elements that are interrelated and work together to achieve certain goals. The system must have elements or system parts that are related to one another (Winpenny et al. (2016).

Basic Concepts of Information Systems

According to Jensen (2016), Information systems are a combination of four main parts. The four main areas include software, hardware, infrastructure, trained human resources and human resources. Whereas according to Bang et al. (2005) that information systems are a system within an organization that brings together daily transaction processing needs that support a managerial organization's operational functions with strategic activities of an organization to be able to provide reports needed by certain outside parties. From the two theories it can be concluded that the definition of information systems is a unity of various information which are interrelated and interact with each other for specific purposes and purposes.

Information System Benefits

Users of information systems in this era are increasing along with the rapid development of computer technology (software, hardware), the internet and the public's awareness and enthusiasm to use computers to facilitate their work. An information system provides many benefits including the following: (Jensen, 2016; Su and Shih, 2003)

1   Centralized data.
2   Ease in Accessing Information.
3   Time efficiency.
4   Information coverage and dissemination is broader and faster.
5   Facilitating business and work processes.
6   Low costs for access and provision of information.
7   Cheap, efficient and reliable communication solutions.
8   Data storage can be more developed as needed.

Basic Components of Information Systems

An information system has a number of components in it. These components have their respective functions and tasks which are interrelated with each other. The linkages between these components form a work unit, which makes the information system able to achieve the goals and functions that

the user wants to address and develop the information system in question. These components include: (Crossing the Quality Chasm, 2001; Ofcom, 2009)

1. Input (input). An information comes from data that has been processed and verified so that it is accurate, useful, and has value. This input component serves to receive all input (input) from the user. Inputs received in the form of data. This data comes from one or several sources. Data refers to quality data and information as required, relevant, and updated (Syafar et al., 2017).
2. Output (Output). An information system will produce output as information. The output component serves to present the final results to information system users. The information presented is the result of processing the data that was previously infused.
3. Software (Software). Component software (software) includes all software used in information systems. This software component performs data processing, information presentation, data calculation, and others. Software components include operating systems, applications and drivers.
4. Hardware (Hardware). Hardware components (hardware) include all computer hardware that is used physically in information systems, both on the server computer and on the client computer.
5. Database (Database). Data base (database) is the storage of all data and information into one or several tables. Each table has its own field, has its own functions (Syafar et al., 2017, and between tables can also occur relations (relationships).
6. Controls and Procedures. Controls and procedures are two components that become one. Component Control functions to prevent various disruptions and threats to data and information contained in the information system.

Research Methods

Framework

To assist in the preparation of this study, it is necessary to have a clear framework for the stages. This framework is the steps that will be taken in solving the problem to be discussed or a series of ideas arranged systematically, logically, clearly, structurally and regularly.

Plan for System Design Recommendations

In analyzing the needs of this outpatient service information system, researchers will use the basic method of developing the System Development Life Cycle (SDLC) system with the waterfall model reference for the benefit of recommendations.

This reference model can be explained in 4 (four) stages, namely:

First, the analysis phase. This stage is the process of identifying and evaluating the problems that occur, and the expected needs of the Type C Hospital in Makassar City. The ongoing system analysis process is described using:
1. Literature Study
   At this stage a search for theoretical foundations is obtained from various books and journals to complement the vocabulary of concepts and theories, so that they have good and appropriate foundation and knowledge.
2. Data Collection
   At this stage the data collection process is carried out by interview and observation methods to make observations and analysis of the actual state of management of outpatient information data in Makassar Type C Hospital so that data and information are needed by researchers for information system development needs.
3. Old System Analysis
   At this stage identification of problems in the current system (manual or computerized) is carried out. Thus, researchers are expected to find solutions to problems and needs.

Second, the design stage. This stage determines the overall system architecture, design of making software programs, and coding procedures. At this stage system design is carried out which consists of designing ERD (Entity Relational Diagram), software architecture, interface design using UML tools. After that the interface design for web-based information systems was carried out until the Beta version.

In the system design recommendation stage, follow these steps:

1   Process Modelling. Modelling information systems outpatient services using system use case and activity diagrams. system use case which is a more detailed description of what the actor does in the outpatient service information system. While the activity diagram is a detailed description of the procedures performed in the outpatient service process.
2   Data Modelling. Data modelling in the outpatient service information system includes the description of entity relationship diagrams, designing the tables needed in the database, and making relations between tables. Entity Relationship that is made has a relationship between data one with the other data. The tables that have been designed are then realized between tables with one another to support the smooth processing of data.
3   The interface design, the application interface design is used to provide an overview of the outpatient service information system designed. Interface design Check function to enter patient check data. In the patient interface design check, the user can search data, add data, save data, edit data and delete data.
4   Implementation of the system, the hardware needed to develop an Outpatient Patient Information System is a desktop computer. The testing method used is black box testing, which is by giving input from the user to the system that is already running and observing the output of the system.

Third stage of coding. At this stage, software design is realized as a set of programs or program units. System implementation is done using the PHP, HTML, java script, and PostgreSQL database languages.

The fourth stage of testing. At this stage, software testing is carried out to ensure that all system requirements are met and ensure that the output gives results that match the needs. In this study system testing was carried out using black-box testing. To compare the test results according to the functional that has been determined.
The system development method that will be used on the recommendations of the analysis of information system development needs is the System Development Life Cycle (SDLC).

Conclusion

It is expected that the research finding will build a unique framework addressing the following issues (1) the existing conditions of outpatient data management, and (2) current manual registration system. By analysing the need assessment, information system that beneficial for accessing information regarding to patients, doctors and pharmacies, will be more easy to be implemented. This conceptual assessment will guide the planning for identifying system development life cycle in the perspectives of modern outpatient information system.

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