Implementation of Digital Prescriptions through an Android-Based Drug Use Information System

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ABSTRACT.
Advances in computer technology have penetrated all fields, one of which is the health sector. The application of advances in computer technology in the health sector can be in the form of developing information systems that can make it easier for health workers to provide services to patients. Based on observations at pharmacies in Yogyakarta, there are still many people who provide information on the use of drugs manually which causes patients to often forget information on drug use that has been conveyed by pharmacists when they return home. Therefore, it is necessary to have an application in the form of a Drug Use Information System so that patients can understand and re-read the drug use information that has been given. The mobile application is designed using the flutter framework. The connection between the mobile and the mysql database is connected via the rest API created with the codeigniter framework. Patients use this application by installing the application on a smartphone. The system development method is through the design process DFD (Data Flow Diagram) Level 0 and DFD Level 1 with the PIECES Analysis system evaluation method (Performance, Information, Economy, Control, Efficiency and Service). To determine the level of usefulness and accuracy of the development of information systems, the system is tested and then filled out a questionnaire. The results of the evaluation conducted by pharmacists and patients showed that most of the users were satisfied and interested in using the Drug Use Information System.

Keywords: Health information system, drug use system, mobile application

1. INTRODUCTION

Advances in computer technology are currently growing very rapidly. Technological advances are not only in hardware and software devices, but technological advances have penetrated all fields, one of which is in the health sector. Many software technologies have become health aids, one of which is an information system that can facilitate human resource management and health services to patients [1].

The development of a good information system must be appropriate to the needs of users, both management of health care facilities and patients. In addition, the Information System must be User Friendly with a friendly UI (User Interface) and UX (User Experience) and make it easier for users to operate it. Information systems are easily accessible anywhere and anytime (real-time). The scope of information systems can be complex or simple.

One application of Information Systems in the field of Health is Digital Prescribing [2].

Manual prescribing has the potential to cause misinterpretation so it has the potential to cause medication errors. Digital prescribing has been carried out in several health care facilities in the Yogyakarta area, Indonesia. Meanwhile, the provision of information on drug use is still mostly done manually . There are many shortcomings in the provision of this information, including that patients often do not understand the treatment instructions given by the pharmacist, and patients forget the information on drug use that has been conveyed by the pharmacist when they return home. This harms the patient's treatment condition [3].

How important is the drug prescription information to the patient for the patient's recovery, it is necessary to have a tool to provide information on drug use. With the application of a drug use information system, patients can

understand and re-read treatment instructions so that they can minimize the negative impact caused by patients forgetting about the treatment they have to take. The existence of this digital prescription makes it easier for pharmacists to input disease diagnoses along with drug prescriptions from doctors [4]. So that patients can easily check the use of drugs on the application only by inputting an account in the form of no_id from a health worker.

Research Puspa Setia Pratiwi et al. Produce an e-prescribing system that functions as digital prescription creation, and drug and disease recording in clinics. E-prescribing can make it easier for doctors to make prescriptions online. Entities involved in the workflow of the system include doctors, pharmacists, and administrators. With e-prescribing, renewal authorization can be an automated process that increases the efficiency of prescribers (doctors) and pharmacists. The online prescription only reaches three system workflow entities, namely doctors, pharmacists, and administrators, there are no facilities to remind patients of medication instructions or use of drugs from prescriptions written by doctors. This is important for patients who have forgotten treatment instructions, so they can re-check the instructions for using drugs on the system by logging in to the no_id account provided by the pharmacist or health worker [5][6].

Yasser's research in 2017 that the use of information technology in health services can improve patient safety by reducing medication errors, reducing adverse drug reactions, and increasing patient compliance with drug use [7].

The Director-General of Health Services at the Ministry of Health of the Republic of Indonesia issued a circular letter number YR.03.03/III/III8/2020 in the form of an appeal for health workers to develop remote services and or online applications in providing services to patients and their families. This is intended as a reference so that health workers, one of which is pharmacists, utilize the use of information and communication technology in providing health services [8].

Christian D. Djong et al's research states that smartphones in the health sector can be used as a medium for consultation and disease diagnosis. Android technology currently makes smartphones have an important role in various areas of human life to help facilitate human work [9]. One of the benefits of the application that is packaged on a mobile basis is to help patients in taking queue numbers and knowing schedule information at the pediatrician's clinic. This mobile technology is also applied to the application of health information systems for drug use so that pharmacists and patients have convenience in inputting drug prescriptions and re-checking drug prescriptions [10].

Based on some of the studies mentioned above, explains the essence of research and appropriate updates to be applied to the application of drug use information systems. The conclusion that can be formulated is that it is necessary to update digital prescriptions that not only involve doctors, pharmacists, and administrators but also involve patients. In this case, the patient is an important entity in the workflow of the treatment system. Patients must be able to know or be able to re-check treatment instructions for diagnosing the disease they are experiencing in an easy or user-friendly way. Application development makes it easier for patients to re-check treatment instructions by simply inputting the no_id obtained from health workers on an Android-based mobile basis. Patients simply download and install the application.

2. MATERIALS AND METHODS

Digital Prescription Checking through the Android-Based Drug Use Information System in this study uses information system development tools in the form of DFD (Data Flow Diagram) and ERD (Entity Relationship Data)). DFD consists of Context Diagram Level 0 to DFD Level 1 with the PIECES Analysis system evaluation method (Performance, Information, Economy, Control, Efficiency, and Service) [11]. This health information system is made mobile-based so that by entering the patient's medical record number on the website that has been created, information on drug use that has been previously inputted by the pharmacy will appear.

2.1. System Design Stage

The system design stage begins with designing the UI (user interface) and UX (user experience) of Android-based applications. The process design used is Context diagram/DFD Level 0 to DFD Level 1. As follows:
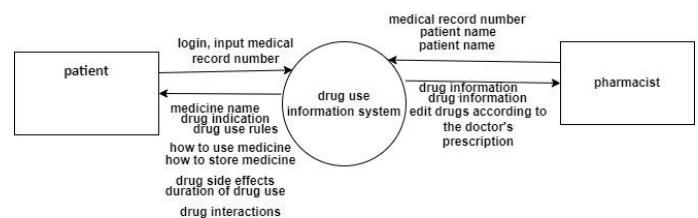
FIGURE 1. Context/Level 0 Diagram of Drug Use Information System

Explanation of picture 1. The drug use information system consists of 2 entities involved, namely the patient and the pharmacist. The pharmacist already knows the patient's medical record no_id and the patient's name, the pharmacist only inputs the patient's diagnosis from the doctor into the system. Pharmacists can view the drug database information that is in the system, pharmacists can carry out activities to add digital drug prescriptions into the system, of course, based on hard prescriptions given by doctors. Pharmacists can change drug samples according to doctors' prescriptions and store them. Patients can log into the system by entering the medical record no_id given by the health worker, in this case, the pharmacist. After the patient has successfully logged into the system, then the patient can click the button to view the treatment instructions so that the information on drug use can be read to the patient.
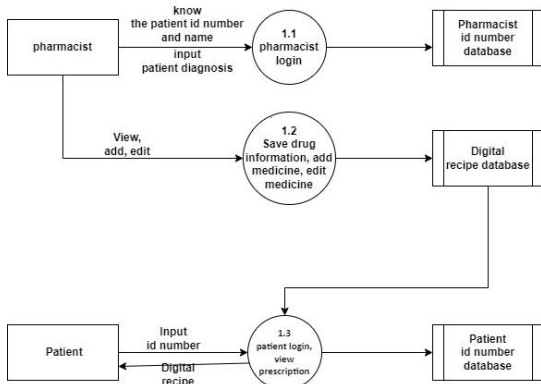

FIGURE 2. DFD Level 1 Drug Use Information System

Explanation of Figure 2. Pharmacists can log in to the system by inputting a user name and password. After successfully logging in, the pharmacist can find out the Patient's No_Id and Name through a search, the pharmacist can input the patient's diagnosis through a doctor's prescription. The hard prescription given by the doctor is converted into a digital prescription by the pharmacist by inputting the type of drug in the application and being able to edit the drug data according to the doctor's prescription. Patients can review the medication instructions or digital prescriptions entered by the pharmacist through the application by logging in and entering the no_id of the health worker/pharmacist.

The context diagram becomes an illustration of designing the flow or system process. In addition, it is also a reference to describe the design of the user interface and user experience system. The draft system is described as follows:
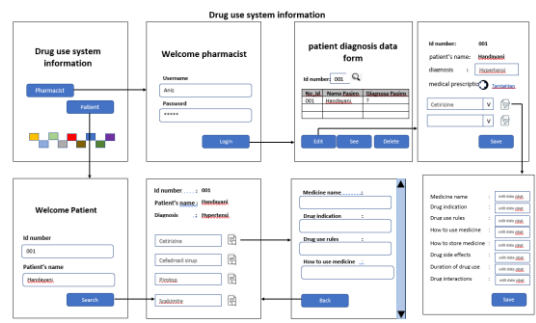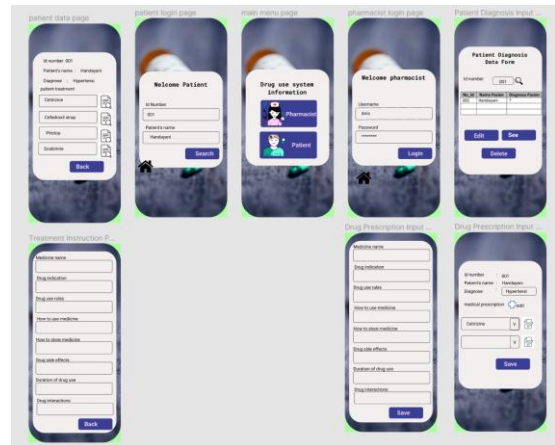

FIGURE 3. Draft digital recipe application

Explanation of Figure 3. The main page consists of 2 menus, namely the pharmacist login menu and the patient login menu. In this case, there is only one pharmacist with anis username and password then click the login button, and it will go to the pharmacist page. The pharmacist can input the no_id listed on the hard prescription then search and the patient's name will appear. Pharmacists can enter the diagnosis of the disease listed in the doctor's hard prescription into the system. In addition, pharmacists can input all drugs and change drug data in drug details according to the doctor's hard prescription by clicking the add/add symbol and then saving. Pharmacists can also delete the type of drug entered by clicking the trash can/delete symbol. The task of the pharmacist has been completed until this stage, it is the patient's turn to be able to check the digital prescription by logging in the patient inputting the no_id given by the health worker or pharmacist then clicking the search button. After clicking the search button, information on drug use will appear in the form of the type of drug and its description.

The following is an implementation of the draft system into a prototype digital recipe system. This prototype has been adapted for interface design and button navigation. This prototype is an overview of the system when it is run. This prototype was created using a tool called figma.com [12].

The digital recipe application prototype

Figure 4 is a prototype of a Drug Use Information System designed using Figma tools. The prototype can be run like a ready-made application. The prototype can provide an overview of the system to the user. The display design includes the main menu page, pharmacist login page, patient diagnosis input form, drug prescription input form, digital prescription form, patient login page, and patient data page.

3.   RESULTS AND DISCUSSION

The prototype system is then implemented into an Android-based digital recipe application. The mobile application is designed using the flutter framework, and the connection between the mobile and the MySQL database is connected through the rest API which is made with the Codeigniter framework [13]. Patients can easily use this application simply by downloading and installing the application on an Android smartphone. Then the patient logs in to the application using the account provided by the Health Officer
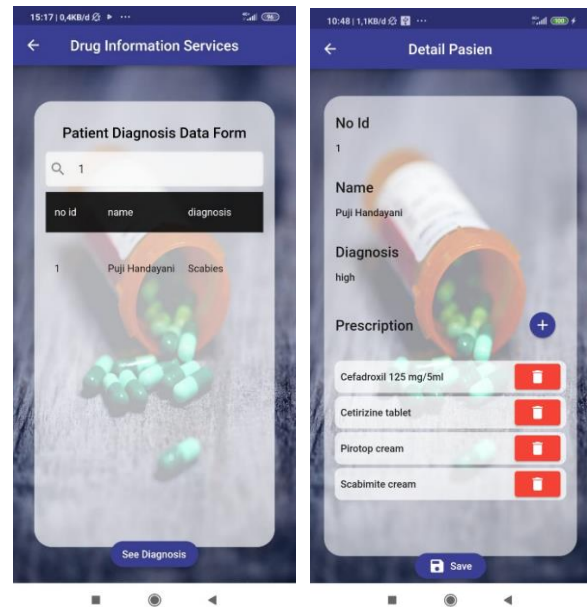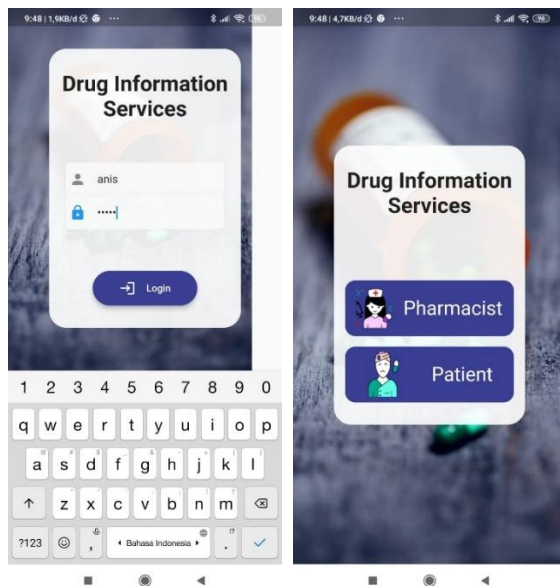
FIGURE 5. Pharmacist login page display

FIGURE 5. In this study, there is still one pharmacist login account. The pharmacist logs in to the system by selecting the pharmacist button then inputting the user and password, and clicking the login button. On the patient diagnosis form page, the pharmacist inputs the patient's no_id as the sample no_id of patient 1 and then searches. After the search, the name ownership of the no_id will appear. To view and change the data can be through the button view diagnosis. View diagnosis displays patient no_id information, patient name, patient diagnosis, and drug data. Drug data can be added via the + (add) symbol and drug data can be deleted via the red delete/garbage button.
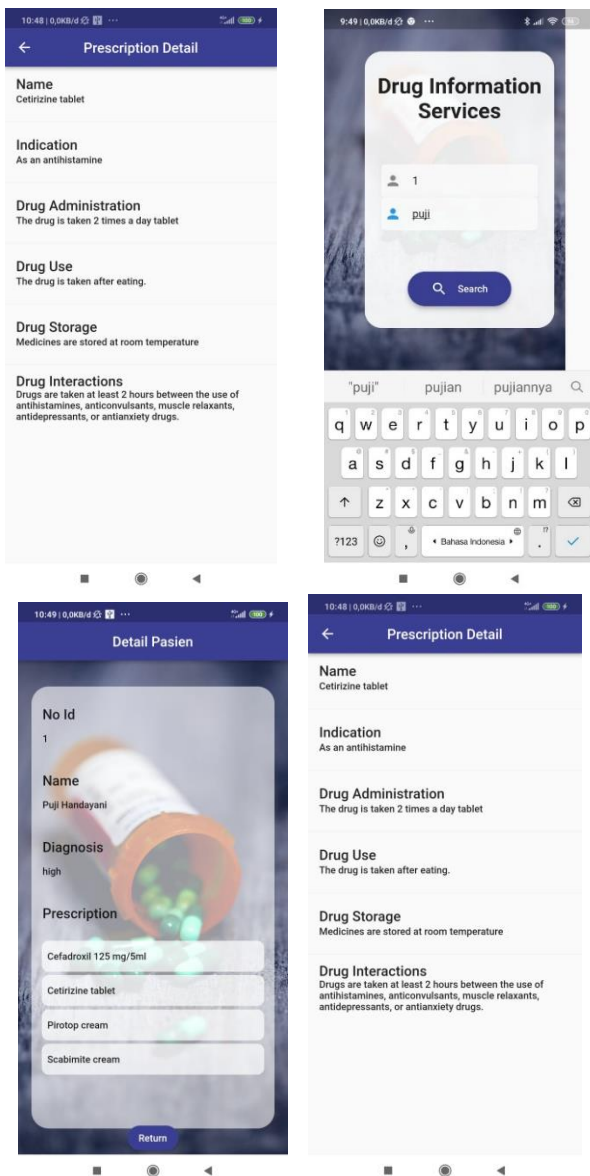
FIGURE 6. Page view for the patient

FIGURE 6. This study still has one patient login account, for example, user account no_id 1 with a patient named Puji. Enter the user account and pass then log in to be able to go to the next form. The patient detail form provides information about a digital prescription that has been written by the doctor and has been inputted by the pharmacist, namely in the form of no_id information, patient name, disease diagnosis, and drug data along with their descriptions. To view the details of the drug name and its description, the patient only has to click on one of the drug names listed in the system. The existence of this information system supports the convenience of patients in receiving pharmaceutical services [14].

System testing is carried out by pharmacists, patients, and doctors. The results of the user satisfaction questionnaire that the information system meets the user's information processing needs and that the information system shows that it is effective (64.3%) and efficient (64.3%). The results of the user interest questionnaire show that users are interested (71.4%) in using the system routinely or in routine operations. The results of the information system quality questionnaire show that users strongly agree (78.6%) that the Drug Use Information System is user-friendly. The use of information systems in the health sector will reduce medication errors and improve health services [15][16].

4. CONCLUSION

Digital prescriptions through an Android-based Drug Use Information System are very simple to use because they can make it easier for pharmacists to input hard prescription information written by doctors. Patients have the convenience of re-checking drug use information so it can be an alternative solution if the patient experiences the forgetting factor. The results of evaluations conducted by pharmacists, patients, and doctors showed that the usefulness and quality of the information system were quite good. The information system shows that it is effective (64.3%) and efficient (64.3%), users are interested in using the system for routine operations (71.4%), and the quality of the information system is user-friendly (making it easy for users) (78.6%).

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