HASIL

CEK_60020388_Development and Evaluation of Android Based Notification System to Determine Patient's Medicine for Pharmaceutical Clinic (2)

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Development and Evaluation of Android Based Notification System to Determine Patient's Medicine for Pharmaceutical Clinic

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Abstract— The development of science in the field of health clinical pharmacy grows rapidly in recent years. Based on the data from information was obtained that needs to be done a reparation a learning process in clinical pharmacy to produce them who as requested by users pharmaceutical graduates. According to the results of the information there is a problem that in conducting the process of determining the pharmacys drug it can be made a mistake, especially in patients who have complications disease. The process of checking conducted repeatedly to make sure a medicine that is concocted in accordance with a list of the acts of treat a patient, while patient data not yet integrated into a system that could help them in analysis and determine a drug that in accordance. Notification system that developed using android platform this, the hope can become the tools in the form of a system that can give notification to the farmasis easily accessible at any time through gadgets. Based on the results of testing with the methods alpha test can be concluded the number of feasibility this system reached 88.75%. Thus notification system in the determination of medicine patients rule based as a medium learn students pharmaceutical clinic worthy to used.

Keywords— development, system; android; medicine; clinic.

I. INTRODUCTION

Clinical Pharmacy is the practice of pharmaceutical science in which orientation towards patient is greater than orientation towards products. The term 'pharmaceutical clinic' begins to appear in 1960 in the United States, which is a pharmaceutical discipline that emphasizes function of pharmacies as a caregiver to the patient. Pharmaceutical science aims to improve treatment outcome. The lack understanding of pharmaceutical clinic concept owned by paramedics is one of the factors causing slowness of development of pharmaceutical services in Indonesia. Is still considered or constituting peculiarity if a druggist which was originally serves prepare the drug pharmaceutical in the hospital, then to enter to ward care and monitoring the development of the treatment, especially when have recommendations treatment, as the usual be in the forward.

Based on developments, this research is conducted by running the application on top of Android mobile operating system, which has relatively much users and has several easiness to join with other systems.

II. CURRENT RESEARCH

Literature study that has been done to look references associated to this research topic refers to the article and scientific publication. One of paper stated that warning system-based technology the future holds the promise to give increased access to information security and support cognitive to each of the components of the process warning. Specifically, the aim of enhancing safety users through decisions in connection with the risks the quality of being more high could be achieved by honing the skills interactive technology and their ability to personalisasi information admonition modification content a dynamic [1]. Different by articles formerly research used the systematic to analyze, design, implement, and evaluate system notes nursing electronic based terminology. Research is able to to evaluate the efficacy of a user interface and vocabulary developed, so as to give basic for improvement in order to further research [2]. Next associated research stated that information is main requirements for most people. By using a smartphone, information can be obtained anywhere the location is in a short time. The use of technology in mobile manner the most widely used today is the day smartphone with an operating system Android. Besides used to seek for information, smartphone can also be used to display map and navigation [3].

III. BASIC THEORY

A. Health Information Systems

The advancements in semiconductor and networking technologies resulted in a public health home-care service called Telecare Medicine Information Systems (TMIS). TMIS medical server connects to the patient Body Area Network (BAN) via public Internet and retrieves the real time patient's health data related to heartbeat, blood pressure, etc. [4].

Outpatient clinics are demanding environments. The function of clinics may be different from county to county.

While in the US, most outpatient clinics share some common steps, such as patient checking in, patient data input and updating, resident seeing the patients, and checking out, etc. It's crucial to provide patients with safe, high-quality care. It's important that clinics run effectively and efficiently [5].

Health information system is an information management in the entire extent government in systematically in the execution of public services. The act of regulation that information system health is minister for health decree number 004/menkes/SK/I/2003 on policies and strategies decentralization the field of health and minister for health decree number 932/menkes/SK/VIII/2002 on implementation guidelines of development the report system district health information. Only of the content of the two ministers for health decree containing weakness where they only see system health information from a management health, not utilizing state of the art information technology and no connection to the national information system. Information and communication technology have not elaborated details to make the data served are inappropriate and not punctual.

B. Android

Android powers hundreds of millions of mobile devices in more than 190 countries around the world. It's the largest installed base of any mobile platform and growing fast—every day another million users power up their Android devices for the first time and start looking for apps, games, and other digital content. Android gives you a world-class platform for creating apps and games for Android users everywhere, as well as an open marketplace for distributing to them instantly [6].

Along with the popularity of mobile devices and their growth are created a range of platforms and applications programming environments for them. Different platforms of operating systems like Symbian OS, PalmOS, J2ME, Blackberry, Windows Mobile, iOS and Android are currently used by equipment vendors in their mobile devices [7].

Android have some platform version that supported many devices as a target installation an application. Android having some of the features of them [8]:

1. Access to Hardware, Including Camera, GPS, and Sensors
2. Data Transfer using Wi-Fi, Bluetooth and NFC
3. Maps, Geocoding and Location-based Services
4. Background Services
5. SQLite Database for Data Storage and Retival
6. Shared Data and Inter-Application Communication
7. Extensive Media Support and 2D/3D Graphics
8. Cloud to Devices Messaging
9. Optimized Memory and Process Management.

Android devices have become a special and "anywhere, everywhere" computational resource for a wide range of requirements. It supports various types of application starting from Electronic commerce to navigation, from location-based services to video games entertainments and so on. Due to its 'mobile' nature, it allows people to carry high computational power in their hands where the computational power is comparable against that of a desktop or laptop [9].

C. Rules

Expert system is a kind of computer program that can simulate the thought of human expert. It can solve the complex problems that can be only answered by a particular field expert. And fault diagnosis expert system is also a computer program that utilizes the experiences, technologies and reasoning methods of support experts to detect, isolate and identify the fault of some object. It has a wealth of experiences and expertise, the capability of symbolic manipulation and uncertain information processing, the self-knowledge, clearly separated knowledge base and inference engine [10].

Expert Systems is a branch of Artificial Intelligence that makes extensive usage of specialized knowledge to solve problems at the human expert level [11].

The development of application using the concept of health information system required components: the knowledge base, the rules base and management dialogue as a medium communication between computer and human. In this research focuses to display notification system in the process of giving decision used rule based. The rules bases are built on the base of knowledge, which has obtained before. Table 1 is a form of representation knowledge by use the model production of rules.

TABLE I. THE REPRESENTATION OF KNOWLEDGE WITH THE PRODUCTION OF RULES

Rule Code	Rules
[R1]	**If** the patient 66-year-old (A) **and** gender male (B) **and** having history diagnosed rheumatoid arthritis (C) **and** therapeutic have sulfasalazin, methotrexate **and** hydroxychloroquine used since three months (D) **and** used fenilbutazon **and** are often abdominal pain **and** the pains increased when feeding (E) **and** blood pressure 135 / 85 mmhg (F) **and** speed pulse 86x / minute (G) **and** speed respiratory 21x / minute (H) **and** having disease history rheumatoid arthritis during the three months, dyspepsia for a year ago (F) **and** weight 78kg (I) then K1. 1. Habits buy fenilbutason to ease the pain of stopped. 2. Consul to the doctor to obtain drug a dyspeptic or deliver medicines dyspepsia including gibbons the internet omeprazol or famotidin. 3. Inform the manner of drinking an antacid and medicine dyspepsia right. 4. Drug ulcers diberika ichtyol or containing an antibiotic and including gibbons, an ointment gentamisin sulphate for example.
[R2]	**If** the patient 28 (J) years **and** gender women (K) **and** having history pregnant 30 sunday (L) **and** toothache (M) **and** blood pressure 130 / 80 mmhg (O) **and** the pulse 82x / minute (P) **and** speed respiratory 23x / minute (Q) **and** the acts of the use of a drug sulfasalazin, methotrexate, ydroxychloroquine, mylanta since 3 months ago from **and** weight 87 kg (S) **and** family history father hypertension **and** mother dm type 2 them, then Habits consumption herbs omitted in the pregnancy (K2) 1. A drug that the best kind is paracetamol or to the doctor to obtain a prescription analgetik for pregnant women.

From Table 1 was found that the process tracking used to make a decision the act of on a system notification the determination of a cure for clinical pharmaceutical this uses the

tracking forward or forward chaining. In making graph tracking to ease made served with use symbolic letters. Symbol letters represent representation knowledge of any facts so to conclusion. Such as the Figure 1 is illustration of the representation of knowledge to the first case (1). Letter A, B and so on as symbolic that is a representation of any the facts are presented in table 2. With the form of the rules symbolized by letters, so rule 1 as:

```
IF A and B and C and D and E and F and G and H
Then K1
```
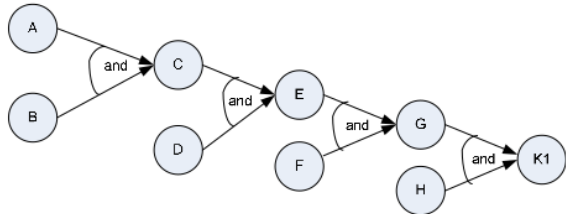

Fig. 1. Ways of working method forward chaining

Figure 1 describes illustration off the grid with the methods forward chaining to rule 1.

IV. RESEARCH METHODS

This research is conducted through waterfall scheme that can be seen in figure 2.

Steps as seen in figure 2, are the milestones of this research, which can be described as follows:

- Requirements

  In this phase information collection related to system requirements in the development of the mobile application was done.

- Design

  Based on requirements that have been found in previous stage, then system design is then conducted. It can be seen as the Figure 3.

- Implementation

  After conducted the design process, then the process of application implementation will be conducted in Android OS technically.This research developed using Android Studio 2016, with the details as follows: webserver, programming language, and should be run at an operating system android 3.x - 6.x.

- Verification

  In this phase verification and testing of the system is conducted. Alpha testing is carried out for this purpose.

- Maintenance

  In this phase evaluation will be done based on user input on the end user tests that user has done on the application.
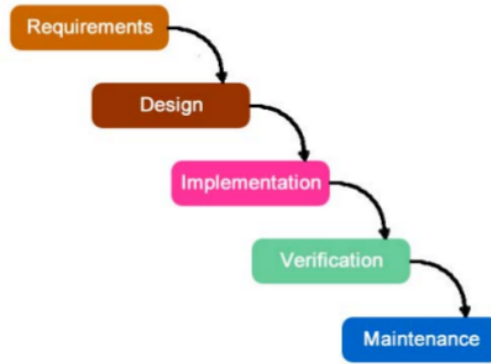

Fig. 2. The development of methods waterfall mobile application

Fig. 3. Design notification android system based

V. RESULT

A. Implementation

Application has been implemented and has features such as login, see and the addition of cases and medicine. Figure 4 show function login, where users can log in by using facilities from login data system. Figure 5 and Figure 6 shows data cases and drugs have been put into the program. Program code is the source for login function. On the program codes, android will have three pieces of widget namely 2 edit text and 1 button. The edit text contains username and password then button will call method login for examining the condition of username and the passwords that were filled.

```
Pseudo Code Login

Start
    Print LayoutLogin
    Input Username
    Input Password
    Input ButtonLogin
    If ButtonLogin Clicked
        Login()
    End If
End
```

Fig. 7. Display added cases

Fig. 8. Added the appearance of a drug

Fig. 4. Login Form

If the user wants to perform the addition of cases and remedies, from Figure 5 and Figure 6 can affect action click on the Add button, and then fill in the data of the case and the drug data in Figure 7 and Figure 8. Program code indicates the activities to increase case and drug information. The process for displaying the data field of the drug and the case is done by making a fragment, which will display a page with the name of the pager. The layout is displayed with layout format. Tabs containing the Drug and tab of cases save configuration Tab Layout.

```
Pseudo Code added a drug case
Start
   Print LayoutDrug
   Input CaseName
   Input FillCase
   Input ButtonSave
   If ButtonSave
      SaveDrug(CaseName, FillCase)
   End If
End
```
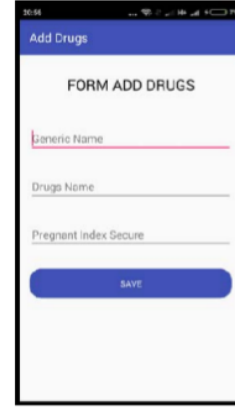
B. Testing

Tests carried out in the research uses alpha testing method, testing was done by experts from pharmaceutical, details of the calculation can be seen as on a Table 2.

TABLE II.   ALPHA TEST RESULTS OF DATA COLLECTION

No	Quistions	SA	A	E	NA	SNA
1	Patient registration process is very easy	3	5	0	0	0
2	Each patient needs to log into the system	5	3	0	0	0
3	The menu in the system easy to understand	2	5	1	0	0
4	The process of case selection is easy to use	3	5	0	0	0
5	Election process of drug is easy to use patient	1	6	1	0	0
6	The system has been running well (no error)	1	5	2	0	0
7	A notification message is easy to understand	3	4	1	0	0
8	The system makes it easy to understand each case	2	4	2	0	0
9	The system is already according to user needs	2	4	2	0	0
10	Overall system useful for the user	7	1	0	0	0
	Quantity	29	42	9	0	0

Fig. 5. Information case

Fig. 6. A drug information data

Each question in Table 2 is tested to determine the user's response while using the system. Tests are emphasized on the operation of the system such as ease of login, ease of consultation process, system response during dialogue between

users and the system. This is important to know the percentage of user acceptance of this system.

Based on the results of testing alpha test on Table 2 obtained the result that respondents who said that really agree 36,25% as much as, of respondents who said they agreed 52.5%. Thus it can be said that whole system can be expressed in accordance to be implemented. From the results of the testing can be represented in graphical form as shown in Figure 9.
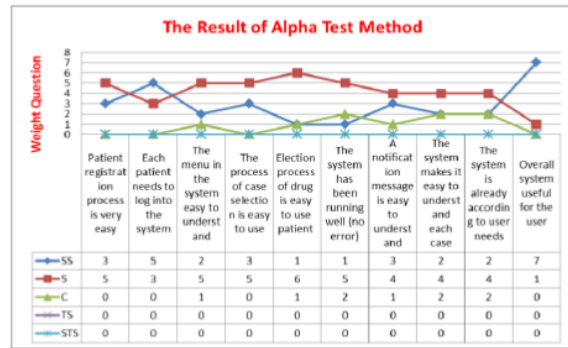

The Result of Alpha Test Method

	Patient registration process is very easy	Each patient needs to log into the system	The menu in the system easy to understand	The process of case selection is easy to use	Election process of drug is easy to use patient	The system has been running well (no error)	A notification message is easy to understand	The system makes it easy to understand and each case	The system is already according to user needs	Overall system useful for the user
SS	3	5	2	3	1	1	3	2	2	7
S	5	3	5	5	6	5	4	4	4	1
C	0	0	1	0	1	2	1	2	2	0
TS	0	0	0	0	0	0	0	0	0	0
STS	0	0	0	0	0	0	0	0	0	0

Fig. 9. A chart representation the results of testing alpha testing

VI. CONCLUSION

This research develop a system that could give notification to the pharmaceutical clinical in giving the determination of medicine for patients when consult in pharmacies. A system that has been made this based android that supported many devices as a target installation an application. Based on the results of testing committed using alpha testing, obtained the results of 88.75 % stated in accordance with a hoped-for goal. Thus notification system in the determination of medicine patients rule based as a medium learn students pharmaceutical clinic worthy to use.

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