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Mobile-Based Health Service Information System at Kwala Begumit Village Health Center, Stabat

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Abstract: In Kwala Begumit village, there are health centers, health clinics, and pharmacies, and the average health institution already has a computer-based information system. But there is one thing that is lacking, namely the unavailability of a mobile-based information system that integrates all health institutions in Kwala Begumit village, so it is not easy for the people of Kwala Begumit village to get integrated information from the room or doctor's practice schedule in Kwala Begumit village. Information on patient data, patient visits, Medical Records, drug data, drug procurement, drug enforcement, doctor data, and queues, can be done easily and in a relatively short time with this application, puskesmas Kwala Begumit can improve the quality of health services to the community. The application also overcomes the problem of adding data identical to the accumulation of papers and adding space for files.
Keywords: Health Center System, Health Services, Mobile Based System

INTRODUCTION

Kwala Begumit Village Health Center, Stabat District, in providing Health Services for the Community, must first register with the Kwala Begumit Village Health Center section to obtain Health Services, and this is certainly difficult because every Community must come to the Kwala Begumit Village Health Center. After all, for some of the community the distance from their residence to the Health Center takes quite a long time and if they suddenly to get services must queue first at the Kwala Begumit Village Health Center, for that an information system is needed can help the Kwala Begumit community get fast and effective services from the previous system (Rochaety, 2019).

One of the health services at the Kwala Begumit Village Health Center, Stabat District, namely the patient registration information system is still conventional by archiving and recording in books, such as recording patient medical card registration, registration for treatment, taking medicine, queue numbers, medical cards. Another consequence of this side is that it takes a long time to get patient data, so it is filled with patient queues where every day an average of 100 patients register, not only that, good quality, fast, and cheap services are also highly expected by the community.

Currently, the community's need for integrated information is very important, such as a doctor's practice schedule that informs the practice schedule of a doctor spread across various health institutions, and the availability of real-time room information for health services. The system used in this Information System is a Mobile-based System. Mobile applications or Android applications are Linux-based operating system software that includes operating systems, middleware, and Android applications and provides an open platform for developers to create their applications (Abdullah et al., 2023). Android is a new-generation mobile platform that allows developers to develop according to their wishes (Mas, 2022). This system was chosen because this system can accelerate in terms of obtaining Health Service Information, in this era there are already quite a lot of people who use Android cellphones, so wherever the community there are no obstacles in accessing these health services, researchers hope that with this Health Service Information system it can make it easier for the community and also the Health Center to access Health Service Information, where researchers apply a responsive website to mobile friendly devices for the Public Health Service Information system (Budi Santoso, 2022).

Previous research entitled "Design and Construction of Mobile Applications for Health Service Information Systems in East Purwokerto District" by Muhammad Hery Santoso and Eko Dayu Anggara in 2021 explained the

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creation of a smartphone device with an Android operating system. The technology on the device allows each individual to surf the internet, send e-mails, open electronic documents or ebooks, socialize through social media applications, and enjoy various entertainment. Android itself is an operating system for Linux-based smartphones that provides an open-source platform complete with various tools and APIs (Santoso & Anggara, 2021).

Another study entitled "Web-Based Health Service Information System at the Gocare Clinic" by Iswanto Sulila, Agus Lahinta, and Mohamad Syafri Tuloli in 2020, in the journal explained that the system that had been created was able to carry out health services for patient registration, patient bookings, service bookings, and medical records so that it is hoped that it can facilitate the provision of services (Sulila et al., 2020).

Based on several studies above, the researcher designed a Mobile-based public service information system. This system can help the public to access health services more easily. The system is built using the stages in the Agile method. The stages in the Agile method consist of Implementation, Software Test, Documentation, Deployment, and Maintenance.

LITERATURE REVIEW

The use of this medical record system information can solve problems that occur at the Tidar Kuranji Village Health Center such as difficulty in searching for medical record data, errors in recording patient data, data that is easily lost or scattered, duplication of patient data, data storage that is not well organized and also the absence of a system that can remind certain patients who need routine or further care (Andra et al., 2019).

In previous studies such as those conducted by Yulianti et al., entitled Development of Digitalization of Health Care at the Sumber Mitra Pratama Clinic in Bandar Lampung, to facilitate the service process at the clinic, it was stated that developing a system using the prototype method is one of the software development models in the SDLC model (Sequential Development Life Cycle by creating UML diagrams, namely use case diagrams, activity diagrams, class diagrams as stages of system design (Yulianti, D & Prastowo, A., 2021). Similar research methods also include observations, literature reviews, documentation, and analysis of interview results conducted by Nurhasanah et al., This system was created to help admins manage patient data, drug data, doctor data, medical record data, and polyclinic data (Alghofari & Arifin, 2021).

Furthermore, the research related to this mobile application was conducted by Adidyana P.B., with the title Covid-19 Rapid Test Registration System at the Medika Palangka Raya clinic. The purpose of this study is to be able to manage registration data accurately and to be able to carry out an online registration system in a short time. The model used is a result of the software development life cycle, namely the waterfall model. The running system can accept online registrations, display rapid test history, and display registrant data (Alam et al., 2022). Meanwhile, this study was conducted to be able to make changes from the previous system which still used a conventional system or directly (Primin & Wibowo, 2023), such as the queue for treatment using a number and call system, referral letter submissions were still done manually, and drug stock was checked directly. This research aims to create an application that will be used in health services to store and process health center data in a computerized manner. The role and function of the health information system is to be the center of health development (Usnaini et al., 2021) with the hope of providing the best solution to accelerate more efficient health services and well-documented data reports.

The use of this medical record system information can solve problems that occur at the Tidar Kuranji Village Health Center such as difficulty in searching for medical record data, errors in recording patient data, data that is easily lost or scattered, duplication of patient data, data storage that is not well organized and also the absence of a system that can remind certain patients who need routine or further care (Sasmito & Wiyono, 2022).

The use of this medical record system information can solve problems that occur at the Tidar Kuranji Village Health Center such as difficulty in searching for medical record data, errors in recording patient data, data that is easily lost or scattered, duplication of patient data, data storage that is not well organized and also the absence of a system that can remind certain patients who need routine or further care (Ardilla et al., 2020).

The Application System will be built based on Android and the Application System will be done online so that it can control all existing processes completely.

METHOD

This research was conducted at the Kwala Begumit Village Health Center. This research is included in the type of descriptive survey research to describe and understand the object being studied. The population in this study were all health workers at the Kwala Begumit Village Health Center who worked in the counseling, pharmacist, general poly, dental poly nurses, and KIA/KB poly, with a total of 30 people. The sample in this study was the same as the population, which was 30 people, using the total sampling technique.

Clear scheduling in the development of the Health Service Information System at the Kwala Begumit Village Health Center is needed so that the system can run well and properly. In the flow of the current health certificate-

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making system, the patient takes a queue number and then registers, the registration section manages the patient's registration data, then gives the examination card to the general section, then the general section checks the patient's height, weight, and blood pressure, continues to the doctor, the doctor checks the patient's health, if follow-up is needed, a blood test will be carried out by the laboratory section if not then the doctor will make a prescription. In the laboratory section, the patient's blood is checked, and the blood test results are given to the doctor, if further treatment is needed then the doctor will make a referral letter to the hospital, if not then the doctor will make a prescription. Then the pharmacy section will see the prescription, and start preparing the medicine, if finished then the medicine is given directly to the patient, and the patient receives the medicine.

This study uses the agile method. The Agile method is a method that prioritizes technical excellence when developing software. Simplicity is considered very important for Agile in optimizing the resources it has. Each Agile development team reflects on working effectively and having a good work pattern (Hafiz et al., 2022).

The principles of the Agile Development Method which later became known as the Agile Manifesto. "The Agile Manifesto" consists of 12 main principles, namely: (1) Emphasizing client satisfaction by making it a top priority to produce products early and continuously, (2) Accepting all forms of change during the software development process even though it is in the final stage of development, (3) Producing products in the form of software that is made in a short time frame (2 weeks - 2 months), with proven quality, (4) There is a good cooperation process between developers and business people during the project, (5) Building an environment that contains highly motivated people. To complete a project effectively and efficiently, (6) Direct communication is needed in the software development process. Software that works well and perfectly is a measure of project progress. (7) Agile methods can develop software sustainably with the support of all parties such as sponsors, users, and developers themselves. (8) Technical excellence is a priority in software development using the Agile method. (9) Simplicity here is very important for Agile itself in maximizing existing resources. (10) All architectural and software requirements depend on the management of each development team. (11) Periodically, each development team conducts self-evaluation (reflection) to work more effectively and organize their work patterns. Simplicity is the most important thing in Agile Development. (12) Maximizing existing resources (Hikmah et al., 2021).

System testing is carried out using black box testing, and this testing aims to determine the possibility of functional errors in the system.

System Design with Unified Modeling Language (UML)

UML is one of the most reliable tools in the world of object-oriented system development. This is because UML provides a visual modeling language that allows system developers to create blueprints for their vision in a standard, easy-to-understand form and is equipped with an effective mechanism for sharing and communicating their designs with others (Primadewi, Nugroho, 2022). The following are the stages in UML.

1. Use Case Diagram

Use Case Diagram of the Kwala Begumit Health Service Information System. Use Cases between entities can be seen in the Figure below.

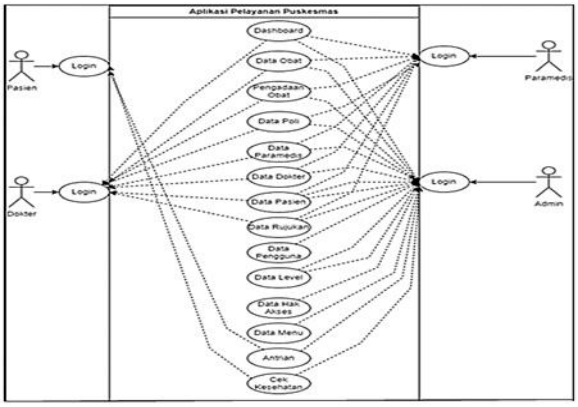

Figure 1. Use Case Between Entities

In the Use Case image above, it is explained that every user, be it Admin, Doctor, Paramedic, and also Patient must first be able to enter the Homepage of the Puskesma Service, here patients can log in, Queue, and also Check Health, Doctors can log in, Dashboard, view and check drug data, Drug Procurement, Poly Data, Paramedic Data,

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Doctor Data, Patient Data, and Referral Data Paramedics can log in, Dashboard, view and check drug data, Drug Procurement, Poly Data, Paramedic Data, Doctor Data, Patient Data, and Referral Data. And the Admin himself can log in, dashboard, record drugs, drug procurement, poly data, paramedic data, doctor data, patient data, record referrals, record user data, level data, access data, menu data, queue and check patient health. Next is the SMS Gateway Use Case.

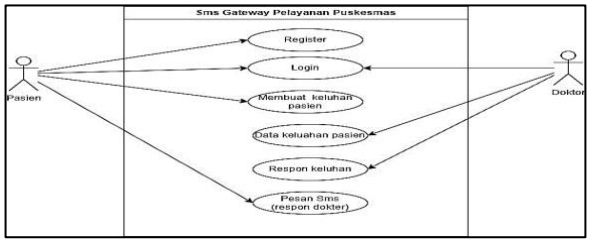

Figure 2. SMS Gateway Use Case

The use case in the image above is a use case of the SMS Gateway for Health Center Services between Patients and Doctors, wherein the SMS gateway the patient can register first, log in, submit a patient complaint and the patient will receive an SMS message (response from the doctor) concerned, while the doctor can log in, view patient complaint data, respond to patient complaints.

2. Activity Diagram

The following is the Activity Diagram for the Web-Based Login of the Kwala Begumit Health Center Service Information System.

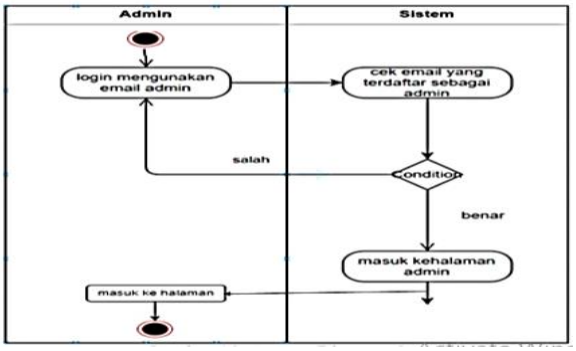

Figure 3. Login Activity Diagram

The image above shows the login activity diagram, where the Admin or user fills in the Username and Password and then presses the Login button. then the system will check the Username and Password in the Database, if correct then the admin enters the main menu page, but if wrong the Admin will re-enter the Login menu. The following is the patient data activity diagram.

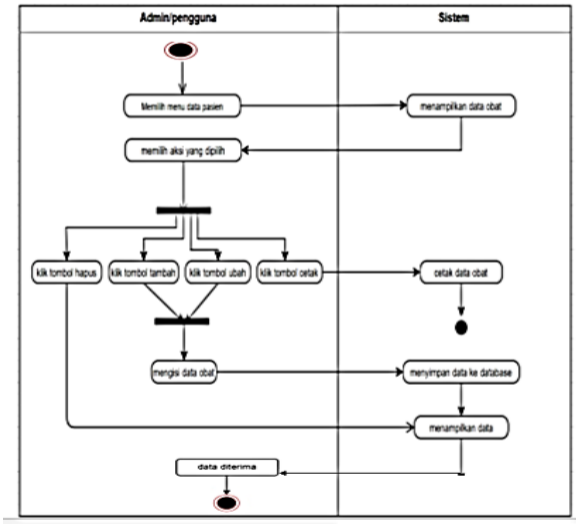

Figure 4. Patient Data Activity Diagram

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The image above shows the patient activity diagram above, where the patient presses the disease data processing button on the patient's main page, then the system displays the disease data page, then the system displays the patient data. On the patient data page, the admin can process patient data from each symptom consisting of adding, deleting, changing and searching for patient data. The following is the doctor data activity diagram.

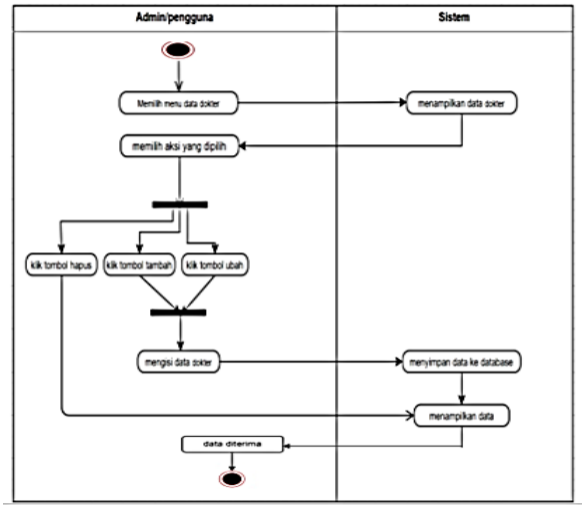

Figure 5. Activity Diagram of Doctor Data

Shows the activity diagram of doctor data, where the admin presses the doctor data processing button on the admin main page then the system displays the doctor data page then the system displays the doctor data. On the doctor page, the admin can manage data consisting of adding, editing and deleting doctor data. The following is an activity diagram of user data.

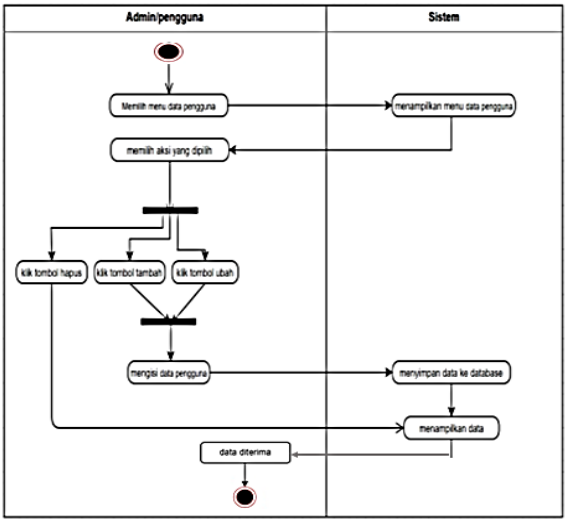

Figure 6. User Data Activity Diagram

Shows the activity diagram of user data where the admin presses the user data processing button on the main page, the admin then the system displays the user data page then the system displays the user data. On the user page the admin can manage data consisting of adding, deleting, and editing user data. The following is an activity diagram of drug data.

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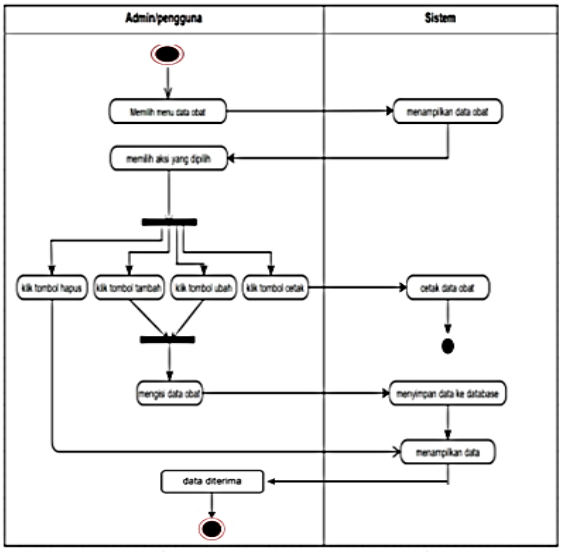

Figure 7. Drug Data Activity Diagram

Shows the activity diagram of drug data where the admin presses the drug data processing button on the admin main page then the system displays the drug data. On the drug data page, the admin can manage data consisting of, add, delete, and edit drug data. The following is a queue activity diagram.

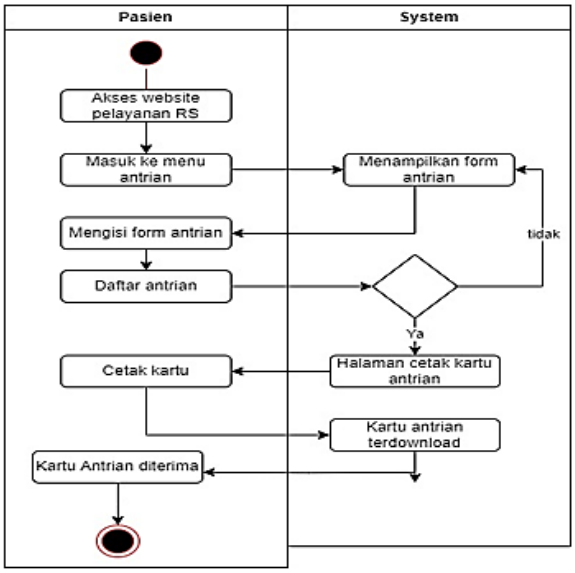

Figure 8. Queue Activity Diagram

The image above explains the Puskesmas Service website, where after entering the queue menu, a queue form will appear, and then the queue form will be filled in, after being filled in, it will enter the queue list, then the queue card print page will appear, then the print card will be selected, then the queue card will be downloaded. The following is an activity diagram of referral data.

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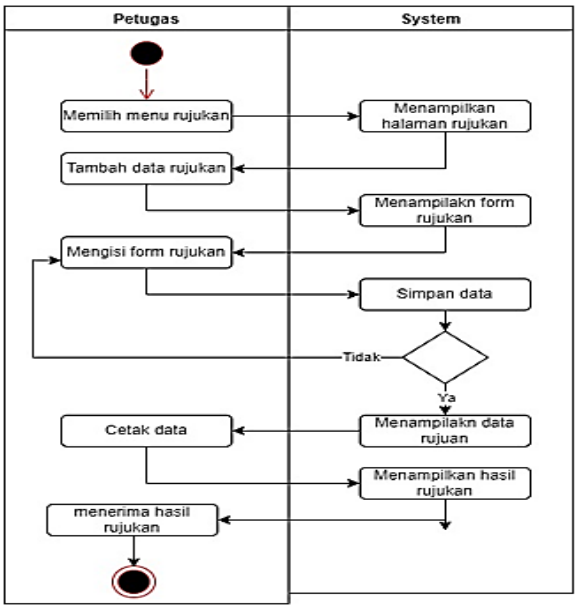

Figure 9. Activity Diagram Reference Data

In the image above, the referral data is directed to select the referral menu, then the referral page will appear, then the referral data is added, then the referral form will appear, then fill in the referral form, the referral data is saved, after being saved, the referral data will appear, the data can be printed and the referral results will appear. The following is an activity diagram of a health check.

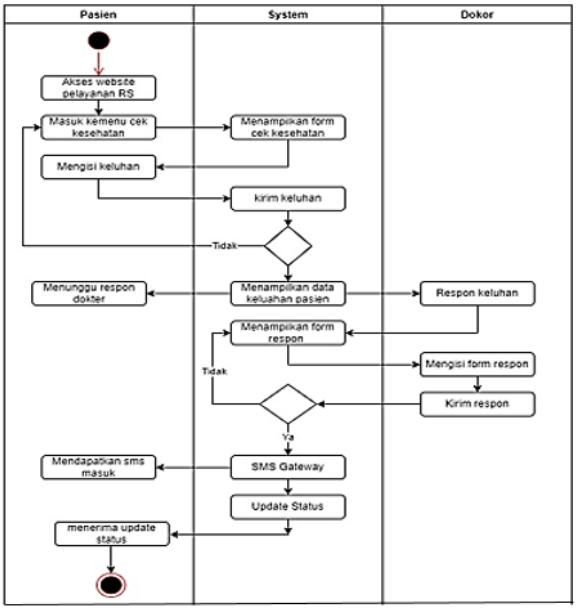

Figure 10. Health Check Activity Diagram

In the image above, where the checking between patients and doctors is carried out, there is a system that helps, after accessing the health center service, the patient enters the health menu, a health form will appear, the patient will fill in the complaint, send the complaint to the system, after being processed, the patient's complaint display will appear, then a response from the doctor will be requested from the patient's complaint, after being responded to by the doctor, it will enter the response form, fill in the response form and the response is sent via SMS Gateway, the SMS will come in. The following is an activity diagram of the SMS Gateway for patients, systems, and doctors.

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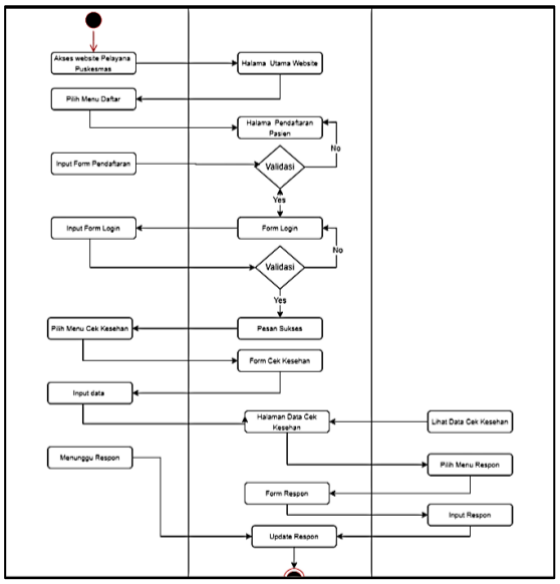

Figure 11. Activity Diagram of SMS Gateway for Patients, Systems, and Doctors

In the activity diagram image above, it can be seen that by using SMS Gateway, patients can enter the main page of the website, patients can also select the register menu to enter the patient registration page, the system will validate, enter the registration form, when registering, patients or doctors must log in first, login successfully, and enter the health check menu, then a health form will appear, input data, the system will enter the health check, and the health report will be sent by the system to the Doctor, the doctor will check and respond to complaints or illnesses from patients being treated, and this response will also be sent to the patient, the system will also always be up to date for responses from the Doctor.

3. Sequence Diagram

A sequence Diagram is one of the interaction diagrams that explains how an operation is performed, the messages sent, and when it is executed. Here is a login sequence diagram.

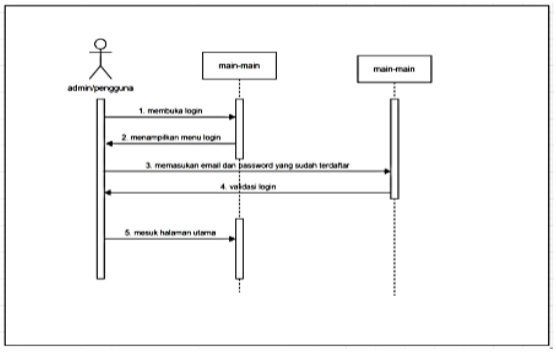

Figure 12. Login Sequence Diagram

Shows that the admin enters the login form and the admin logs in with the data in the Admin table if invalid returns to the Login Form if valid then it will be directed to the admin main menu form. The following is a sequence diagram of patient data processing.

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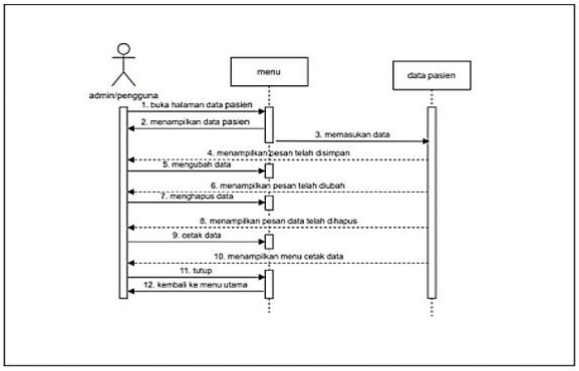

Figure 13. Sequence Diagram of Patient Data Processing

Shows that the admin enters the patient data processing, enters the add data, and then saves the data to the patient table, then if the data is successfully saved back to the data processing. Likewise in the change and delete process. The following is a sequence diagram of doctor data processing.

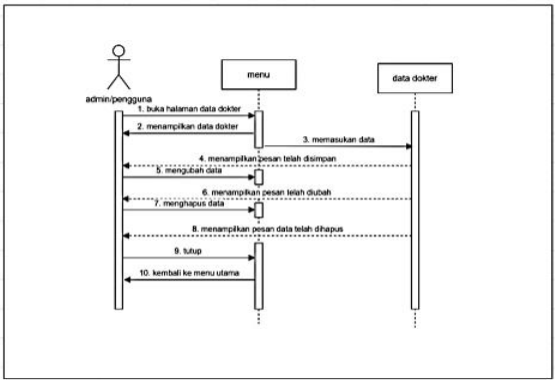

Figure 14. Sequence Diagram of Doctor Data Processing

Shows that the admin enters the Doctor data processing page. The rule data then saves the data to the next doctor table if the data is successfully saved and returned to the data processing. Likewise for the process of changing and deleting Doctor data. The following is a sequence diagram of user data processing.

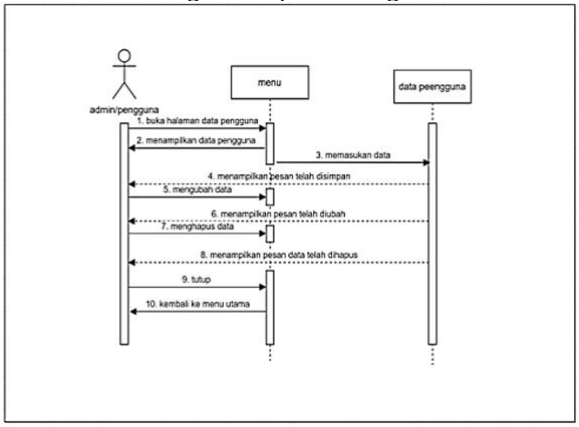

Figure 15. Sequence Diagram for User Data Processing

Shows that the admin enters the User data processing page. The user data then saves the data to the next user table if the data is successful, it is saved back to data processing. Likewise in the process of deleting and changing User data. The following is a sequence diagram of drug data processing.

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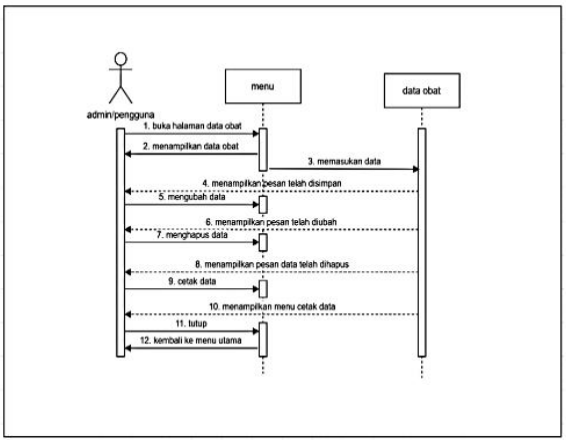

Figure 16. Sequence Diagram of Drug Data Processing

Shows that the admin enters the drug data processing page. Enter add data, then save the data to the next drug table, if the data is successfully saved back to the drug data processing. Likewise in the process of deleting and re-treating drug data. The following is a sequence diagram of registration data processing.

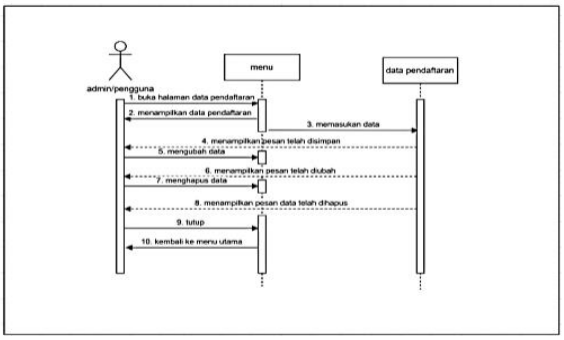

Figure 17. Sequence Diagram for Registration Data Processing

Shows that the admin enters the Registration data processing page, enters the add data, and saves the data to the Registration table, then if the data is successfully saved back to the registration data processing data. Likewise, it is done for the process of deleting and changing data.

4. Class Diagram

The following is a class diagram between tables for the Kwala Begumit Community Health Center health service information system.

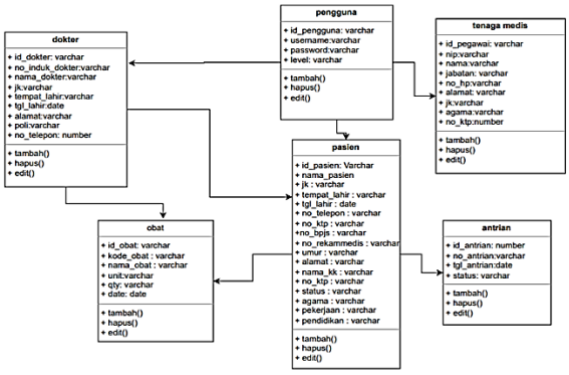

Figure 18. Class Diagram Between Tables

The class diagram image above illustrates the structure and description of classes, packages, and objects along with their relationships with each other, such as containment, inheritance, association, etc. It can be explained that

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the admin carries out the login process to be able to manage drugs, patients and doctors, user data, and also registration data.

RESULT

Based on the research that has been done, the researcher got the results of the problem where the author conducted a study on the Health Center Service whose case study was at the Kwala Begumit Health Center where the results of all the Website and SMS Gateway displays are seen in the image below. The following is a display of the Kwala Begumit Health Center service login menu.

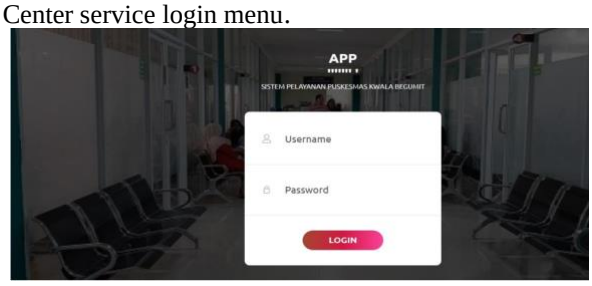

Figure 19. Kwala Begumit Health Center Service Login Menu Display

This login registration display will appear first when you want to enter the Main Health Center Service menu. So, admins, patients, and doctors are required to log in first. The login page for the registration section is web-based so it can be accessed via anything, including laptops and so on (Anamisa, 2020). The following is the main menu display for the Kwala Begumit Health Center service.

Figure 20. Main Menu Display of Kwala Begumit Health Center Services

The home page of the registration section will appear first when the registration section is successfully logged in. On the home page, there are 14 menus, namely Dashboard, Drug Data, Drug Procurement Data, Drug Expenditure Data, Poly Data, Paramedical Data, Doctor Data, Patient Data, Referral Data, Health Check Data, Queue Data, Menu Data, Level and User Data. The following is a display of drug data.

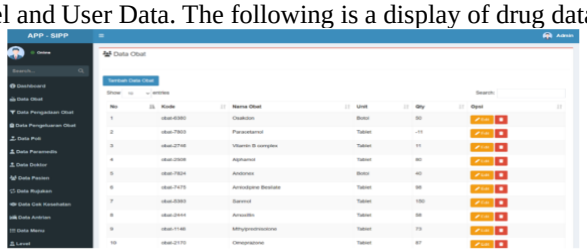

Figure 21. Drug Data Display

On the Drug page fill in drug data, starting from filling in the form, no, code, drug name, unit, and qty, and in it there are also useful options to delete or edit drug data. The following is a display of drug procurement data.

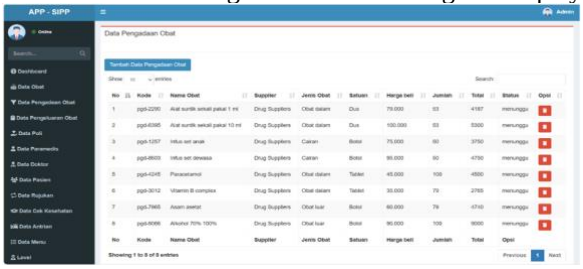

Figure 22. Drug Procurement Data Display

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On the Drug Procurement Data page, this function is to provide drugs and to make the drug procurement, you must add drug procurement data by filling in the drug data, starting from filling in the form, no, code, drug name, Supplier, Drug Type, Unit, Drug Price, Quantity, Total, status and the option to delete drug procurement. The following is a display of drug expenditure data.

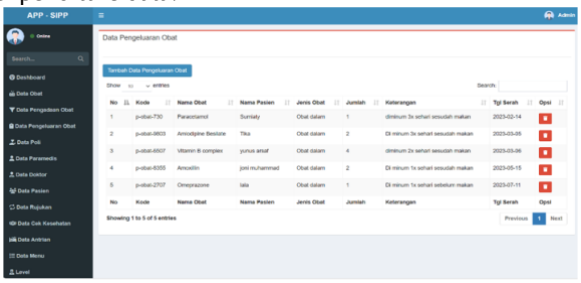

Figure 23. Drug Expenditure Data Display

On the Drug Expenditure Data page, this drug functions to carry out activities in managing outgoing drugs, and to make the drug expenditure, you must add drug expenditure data by filling in the drug data, starting from filling in the form, no, code, drug name, patient name, Drug Type, Amount, description, delivery date and the option to delete drug expenditure. The following is a display of poly data.

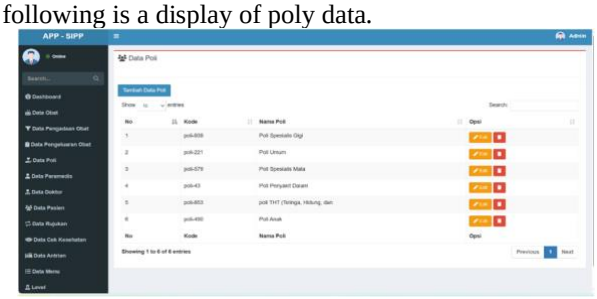

Figure 24. Poly Data Display

On the Poly Data page, it functions to enter poly data, in the form there are no, codes, poly names or options that are useful for editing or deleting poly data. The following is a display of the list of medical personnel.

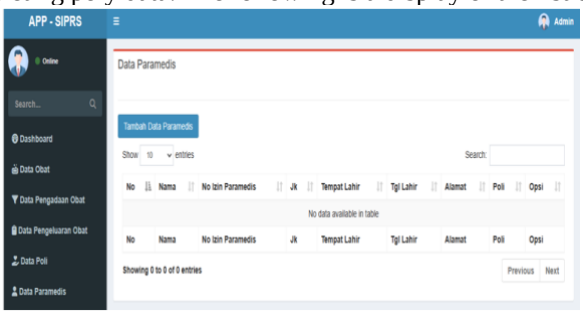

Figure 25. Medical List View

In this medical list page, there is a data page for medical personnel, in the form there is no, name, paramedic permit number, jk, place of birth, date of birth, address, polyclinic, and also options. The following is a display of doctor data.

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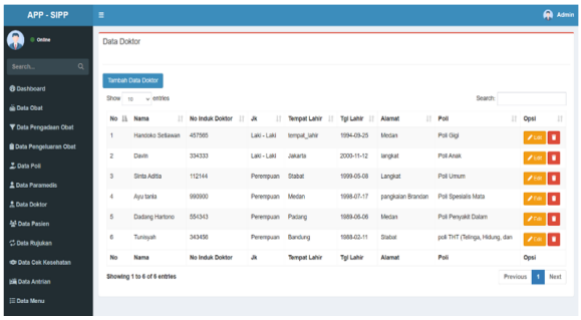

Figure 26. Doctor Data Display

On this doctor data page, there is data from the Doctors, where the form also contains, no, name, doctor's main number, jk, place of birth, date of birth, address, polyclinic, and also options that can be used to edit and delete doctor data. The following is a display of patient data.

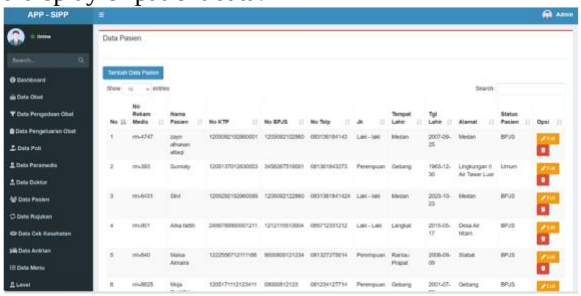

Figure 27. Patient Data Display

The patient data page functions to add patient data, and it also contains mandatory forms that must be filled in, namely, no, medical record number, patient name, ID card number, BPJS number, telephone number, JK, place of birth, date of birth, address, and patient status. The following is a display of referral data.

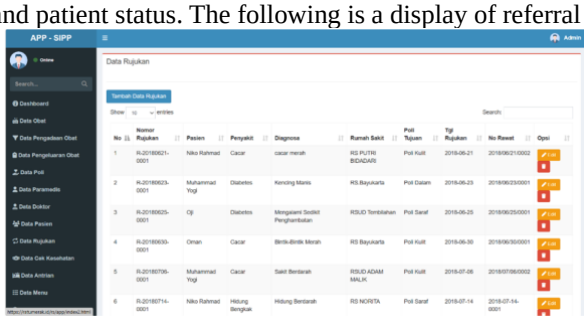

Figure 28. Referral Data Display

On this referral data page, there is a form that contains several fields, namely: no, referral number, patient, disease, diagnosis, hospital, destination polyclinic, referral date, treatment number, and options to edit and delete referral data. The following is a display of health check data.

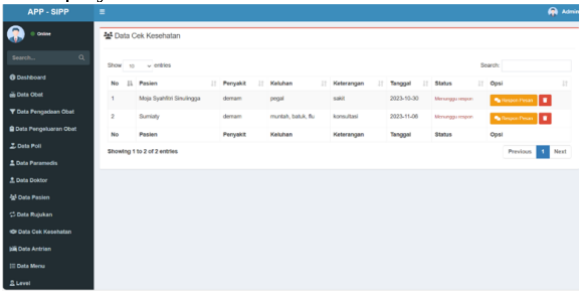

Figure 29. Health Check Data Display

On the health check data page, functions to check the patient's health, where there is a form that must be filled in when the patient wants to check their health, in the form there is a patient number, disease, complaint,

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description, date, status, and options to edit and also delete health check data from the patient. The following is a display of queue data.

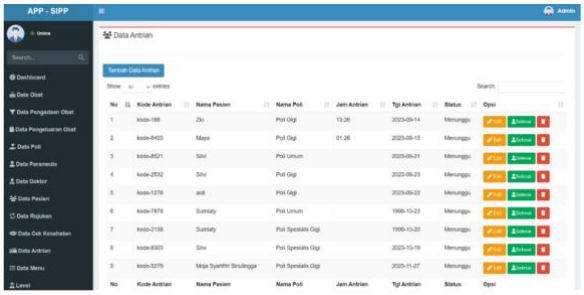

Figure 30. Queue Data Display

This queue data page functions to create a list of patient queues who want to check their health. The following is a level display.

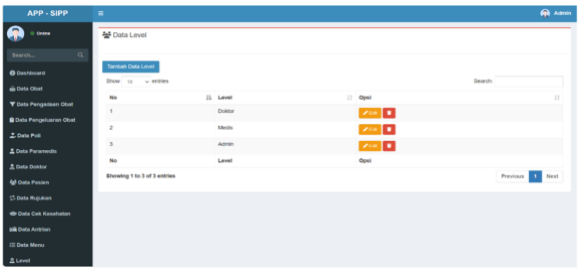

Figure 31. Level View

This page is useful for adding level data, such as doctor, admin, patient, medical, and so on, and in it, there are also useful options for deleting or editing Level data. The following is a display of user data.

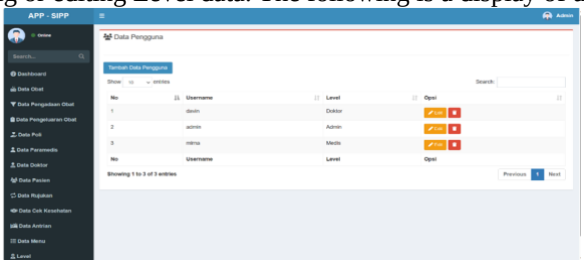

Figure 32. User Data Display

On this page add user data to the Kwala Begumit health center service. The following is a display of the mobile-based service login menu.

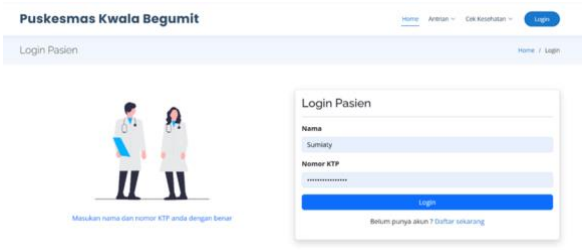

Figure 33. Mobile-Based Waiter Login Menu Display

This home page will appear first when you want to register or log in for those who already have an account. The following is a display of the patient page.

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Figure 34. Patient Page View

On this page, patients or users can access the queue service and health check service. The following is a display of the queue list.

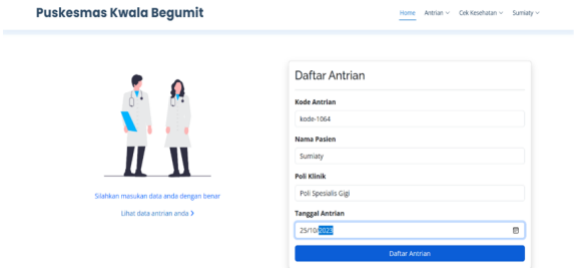

Figure 35. Queue List View

On this page, patients can fill in their data to register themselves to get a queue number. The following is a view of the queue service.

Figure 36. Queue Service View

on this page, the registration is successful and the queue card can be downloaded directly. The following is a display of the queue letter.

APLIKASI PELAYANAN PUSKESMAS KWALA BEGUMIT
SURAT DAFTAR ANTRIAN

KODE ANTRIAN : kode-1064
NOMOR ANTRIAN : 1

Kode Antrian	Nama Pasien	Poli	Tanggal	No Antrian
kode-1064	Sumiaty	Poli Spesialis Gigi	2023-10-25	1

Surat ini adalah bukti bahwasanya anda telah melukan antrian di sistem kami

Terimakasih sudah melakukan antrian

Figure 37. Queue Letter Display

This queue letter has been downloaded and can be brought and submitted to the administrative staff of the Kwala Begumit village health center, Stabat sub-district when seeking treatment. The following is a display of queue data.

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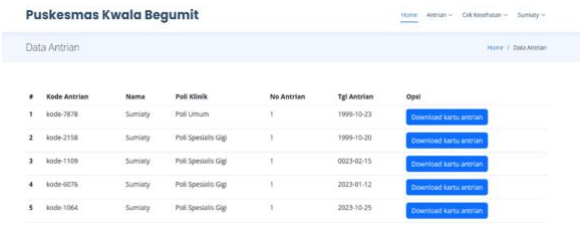

Figure 38. Queue Data Display

On this page, patients can see how many times they have registered their queue number. The following is a display of the health check.

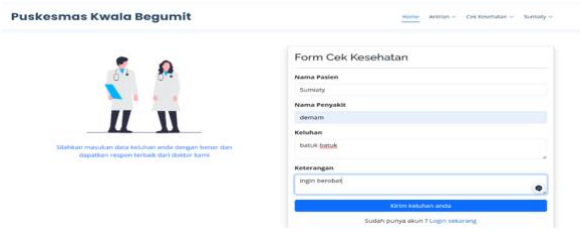

Figure 39. Health Check Display

Patients can do a health check by filling out this form which consists of the patient's name, disease name, complaint, and information first. The following is a display of the health check request status.

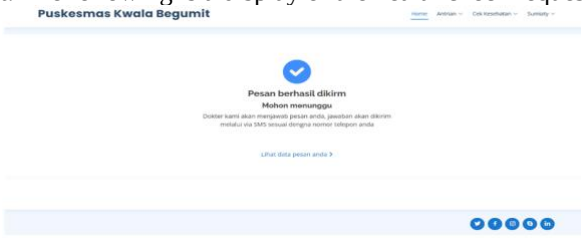

Figure 40. Health Check Request Status Display

On this page, the patient's message has been successfully sent and the patient is expected to wait for a reply from the doctor which will be sent via SMS according to the patient's telephone number. The following is a display of the SMS gateway machine.

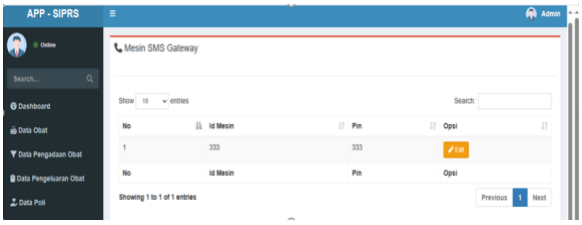

Figure 41. SMS Gateway Machine Display

The display above is a display of the SMS Gateway, which will be interconnected with the Health Service Website of the Kwala Begumit Health Center.

DISCUSSIONS

At this stage, the testing used is Blackbox Testing, the researcher conducted a trial of the system that had been built with the following results.

Table 1. Registration Page Testing

No	Functions tested	Testing method	Expected Page	Test results
1	Login	Input user name and password	Registration Section successfully entered the main page	Success

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2	Registration data input	Input patient registration data	Registration data	Success
3	Complaint input	Input patient complaint data	Patient successfully saved	Success
4	Check patient	Select the patient data report menu	Patient complaint data was successfully saved	Success

The table above is a black box testing table on the registration page.

Table 2. General Section Page Testing

No	Functions tested	Testing method	Expected page	Test result
1	Login	Input username and password	General section Successfully logged in to the main page	Success
2	Input health data	Input patient health data	Health data	Success
3	View health data	Select the menu to view patient health data	Patient successfully saved	Success

The table above is a black box testing table on the general section page.

Table 3. Doctor Page Testing

No	Functions tested	Testing method	Expected Page	Test results
1	Login	Input username and password	Doctor successfully	Success
2	View blood test data	Select the menu to view blood test data	Enter the main page	Success
3	Input patient diagnosis	Input diagnosis	Blood test data successfully	Success
4	Input prescription	patient	displayed	Success
5	drug	Input prescription data	Patient diagnosis data was successfully saved	Success

The table above is a black box testing table on the doctor's page.

Table 4. Lab Section Page Testing

No	Functions tested	Testing method	Expected page	Test result
1	Login	Input user name and password	The lab section successfully entered the main page	Success
2	Input blood test results	Input blood test results	Blood test result data	Success
3	View blood test data	Select the menu to view blood test data	successfully saved	Success

The table above is a black box testing table on the lab section page.

This application also goes through a testing process using a mental system model that shows the results of the representation functioning well and being easily understood by users so that the application is suitable for use. The Implementation of a mobile-based Application for health services produces a mobile application that can maximize the delivery of information related to the doctor's practice schedule that can be accessed anytime and anywhere, prospective patients can register for treatment online, the patient's medical record history can be accessed via smartphone, and referral letters can be submitted online. In implementing this implementation, it is also expected to provide convenience in obtaining fast and precise health services with an easy health center operational activity experience that meets user needs in real-time, consistently, and accurately.

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