



# **An-Najah National University**

Faculty of Engineering & Information Technology Department of  
Computer Engineering

## **Graduation Project I**



**Full Hospital System (CareZone)**

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Presented in partial fulfillment of the requirements for  
**Bachelor Degree in Computer Engineering**

# Acknowledgment

At the end of my project,, I would like to thank all those people who made this project possible and an unforgettable experience for me.

First of all, I would like to express the deepest appreciation to my supervisor **Dr.Abdallah Rashed** who has the attitude and substance of a genius: he continually and convincingly conveyed a spirit of adventure in regard to research and scholarship, and an excitement in regard to teaching. Without his guidance and persistent help this dissertation wouldn't have been possible. I would also like to thank the members of my supervisory committee, my friends, and my colleagues.

Finally, I would like to thank my parents, my brothers, my sisters....etc.

## **Disclaimer:**

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## **Abstract:**

Due to the large number of hospital requirements, and the inability of most patients to reach the hospital in every case, such as booking appointments, accessing medical reports, etc., we have thought of developing this application that helps these patients to do their medical matters in the easiest and fastest way possible.

In the beginning, the patient can access the application by creating his own account and then logging in to the application. Our application includes a mechanism for booking appointments for patients by specifying the specialty and the name of the required doctor, then booking the nearest available appointment. After that, the patient can order a set of examinations that help him and the doctor understand the current health condition and then identify potential risks. As for the medical file service, the medical file includes a list of its appointments. He can get his exam results by sending a PDF file, he can find out the list of bills for different medical services and send them in the form of a PDF file, and many other things related to the medical file.

In emergencies, we have various services such as the rapid response team service, which in turn includes sending a highly trained medical team capable of providing the best health care from home, in addition to the ambulance transport service by locating the patient and thus sending an ambulance. To donate blood, the patient is registered as a donor and contacted when needed. Our application is also distinguished by displaying a group of hospital-specific medicines in a store affiliated with the application, such as an electronic pharmacy that is not available in other pharmacies, and payment is made through an electronic payment mechanism for all hospital affairs. It is possible to communicate with the hospital in general by filling out the contact form, and the message will reach the hospital's e-mail. We also have the ability to communicate with the doctor through direct chatting with him .. Through this feature, the doctor can create private groups for patients and communicate with them, as well as we have a list of tasks that the patient can record his tasks. With, and when you're done, it ranks them in the list of things completed, and finally the app has a dark mode feature.

As for the administrators pages, we have the first type, which is the supervisor (doctors), through which

1-the appointments of this doctor are displayed and he can accept or reject the appointment.

2- The doctor can also send and download the patient's file, and thus the patient will receive a notification of an update, and once he clicks on this notification, he will be transferred to the file that was uploaded by the doctor.

3- Of course, the chat feature is available, so when the doctor enters the application, it transfers him to the conversations, and he can respond to the patients who contacted him, and he can send reports as pictures of the conversation.

4- Finally, he can browse and modify the personal page.

As for the second Admin Page ,we created him through the web page through which the administrator will add doctors to the application or add products in addition to displaying all users who have an account on this application.

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# 1. Introduction

This age has been referred to as the area of information technology because to the significant advancements in technology and medicine, as well as the widespread adoption of televisions, computers, mobile phones, etc. in homes everywhere. With advancements in every area, people are increasingly able to meet their requirements online, particularly through social networking sites.

Today, millions of people utilize social networking sites and mobile applications to purchase goods and have a distinctive shopping experience, and millions of people all over the world now regularly buy stuff online.

due to the Covid-19 emergency, more individuals are realizing the value of online services such as shopping, and many of them believe these services are superior for a variety of reasons. First of all, because there is a wide range of services available. Next is the easy of not having to visit the hospital (saving time and effort), quick discharge procedures, payment alternatives, however, advanced services, such as emergency hospital services, require an ambulance or a medical team that includes a doctor, nurse, etc., at one time. Specific, with great efficiency, guarantee of efficiency and fair price.

Through our application, the patient can choose the doctor he wants to deal with, he can locate him through the map and reach him in several ways, either through the chat system and make his reservation, or by using the reservation system to choose the appropriate time and date, and then send it to doctor. He can also browse his entire medical file through the application.

The doctor receives the patients' request, and fills his appointment schedule as he wishes, either by accepting or rejecting it. The doctor is also responsible for all sending the patient's health reports.

The application admin team also owns the dashboard website to control everything that happens in the application. The administrative team will be

responsible for adding products or doctors and showing all patients who are using the application

In conclusion, we aim to help our application patients and doctors, especially those who find it difficult to reach the hospital.

## **2. Constraints, standards and earlier work**

Because our website and app depend on an internet connection constantly to access their online databases, a poor internet connection was an issue. To overcome this restriction, we improved internet speed. We also had issues with laptops' limited storage capacity and sluggish performance.

One of our biggest worries at first was that we didn't know anything about the front-end programming language 'flutter' and the back-end programming language 'NODE JS' because neither language is covered in university courses! Even Mongo DB, the database management system we utilized, was first difficult to understand.

## 2. Literature Review :

The Internet has a great influence in making our lives easier Offering different services and reaching out to many clients Countries that have less time and effort. However, providing services such as unfamiliar remote hospital services, People use the well-known traditional way they communicate The hospital, whether to request emergency aid or book appointments, etc.. Here are problems that we aim to solve, which is an electronic Application It aims to link the doctor with his patient or the hospital with its clients. So we choose To create an application for online hospital services called“**Care Zone**” to be the first application in the West Bank that brings Together, multiple services are provided by the hospital.

In fact, we haven't found any similar app that works in it West Bank . The idea of getting hospital services online is New to people in our community.

However, we looked in general applications with the same idea and we found many applications available Such as the application of health care in the city of Gaza, and several similar applications are available in different countries, such as Saudi Arabia and the UAE. For example, Application ‘Suliman Habib ’available in the Kingdom of Saudi Arabia.

What sets our app apart from other similar apps is Flexible appointment booking system. time periods for each service It depends on the estimated time, thus saving time and effort for the patient and the doctor.

**CareZone** is a special application available in Palestine that helps both Doctors and Patients. The main reason that encouraged us to develop this idea of the application and work on it is the huge demand of people to obtain efficient medical services easily and quickly.

## **4. Methodology :**

### **4.1. Tools, Programming Languages, and Technologies:**

#### **4.1.1. Mobile application :**

We had a number of possibilities on how to develop the app, but after exploring and reading up on the subject, we chose the following framework.

##### **1) Design :**

We should have had a simple user-friendly application that is not complicated, we saw many applications and designs before we had a clear picture of our application and then we built this design and started programming interfaces.

##### **2) Frameworks:**

We decided to create our application using the Flutter framework.

Why do we select flutter?

Google's Flutter is a free and open-source UI framework that enables the development of native mobile apps for both iOS and Android platforms using a single codebase and programming language. Building iOS and Android apps is made easier and quicker because to this capabilities. Despite being a more recent cross-platform framework, Flutter is increasingly being preferred by businesses over React Native, Xamarin, and Cordova.

##### **Some of the top reasons why development teams choose Flutter**

**Include:**

- Enhanced efficiency
- Excellent performance;
- Simple to learn.
- Can be found on several IDEs.

### **3) Programming languages :**

Our programming language is Node JS, an open-source, cross-platform runtime environment for JavaScript that utilizes a JavaScript Engine. Node JS is simple to comprehend and has extensive documentation, making it simple to correct and troubleshoot any mistakes that may arise.

#### **4.1.2 Website Dashboard :**

**We have created a website, just for admins and services providers.**

##### **1) Frameworks:**

we used a flutter for the front.

##### **2) Programming language**

We used Node JS.

#### **4.1.3 Database :**

Our application directly relies on the database it displays information from, where we used MongoDB database where the relationships between different collections were few and easy . Database is very important in most applications especially for the purpose of Reading, Editing, and Deleting information.

We opted to create our plan without a relational database that enables developers to create apps quickly using documents. MongoDB stores documents in JSON, a format that is based on JavaScript and easier to understand than XML. As we discussed before, the back-end of our application was created using Node.js, and MongoDB is the ideal tool for developing Node.js apps.

#### **4.1.4 IDEs :**

Two IDEs were used to create CareZone:

It was recommended to use Android Studio, which is also operated by Google, for the front-end because it has many benefits, including faster coding and quick iteration, a fast and feature-rich emulator, robust testing mechanisms. As we already mentioned, we built the application using the flutter Framework.

We used VS Code for the back-end because it's a great tool for working with JavaScript and Node. JS The finest support for numerous programming languages, extensions and support, repository, web support, and git support are just a few of the benefits of using Visual Studio Code.

#### **API Endpoints Testing :**

We must test each endpoint before integrating it with the client because our application has a RESTful API on the back-end server. To do this, we utilize Postman.

Application programming interface (API) development tools like Postman make it easier to create, test, and alter APIs. This tool contains almost all of the features that a developer could possibly need.

#### **4.2. Architecture :**

**Our project contains 2 parts that work in syn to reach the optimal results, these parts are:**

- Mobile Application and Website
- Data and API server

### 4.3. Features Of The Application **For User** :

- **determine users' location by map**

All customers need to determine their location to make it easier for Emergency 'Ambulance' and 'HomeCare' services to access them as soon as possible. We find that determining location by map is the best and most efficient way.

- **Booking appointments with the doctor and waiting for the doctor's response :**

The patient reserves the appropriate appointment by specifying the **day** and **hour**, and then waits for the doctor to respond to the reservation, either by refusal or acceptance, and a notification is sent if acceptance or rejection has been made.

- **Browse medical file :**

The medical profile contains several characteristics that will be discussed in detail later.

- **Electronic pharmacy :**

The Care Zone application is characterized by the presence of an electronic pharmacy that contains products that may be difficult to provide in other pharmacies and is specific to our hospital.

- **Invoice service :**

By using the PDF file, the patient's bill is displayed, which is represented by the bill account for all services that were requested by the user.

- **Blood donation service :**

The user is registered as a blood donor by filling in all the required data and then communicating with him when he needs blood.

- **Show the patient's Test Reports :**

The doctor sends the medical examinations to the patient by uploading them to the patient by filling in the patient's email, then downloading the file and sending it.

- **Hospital communication service:**

The user enters the gmail of the hospital and then sends the messages he wants (complaint, request, etc.), so they reach to gmail of the hospital, which responds as soon as possible.

- **To Do List :**

Through it, the user enters the tasks that he has to do, he can modify or delete them if he wants, and he can also, when the task is completed, put it in the completed list.

- **Browse the personal page and modify it**

- **Notifications:**

Notifications are sent to the user when an update occurs. For example, when downloading the patient's medical examinations, a notification is sent that there is an update. Once we click on it, it will transfer us to that update.

- **Chat System :**

Through the chat system, the patient or the doctor can communicate with the person who wants to inquire about anything, in addition to the ability to send pictures. The chat system is distinguished by the ability to create groups between the doctor and patients, and he can search for the person he wants by searching.

## 4.4. Implementation :

### 4.4.1 Mobile Application :

- **Splash Screen :**

This screen consists of our app's logo icon. This screen takes us to the login interface.



Figure 1: welcome screen

### 4.4.1.1 Customer side:

- **Sign up screen as customer:**

In the sign-up page the customer enters the required information, which are the username, email, password and phone number.

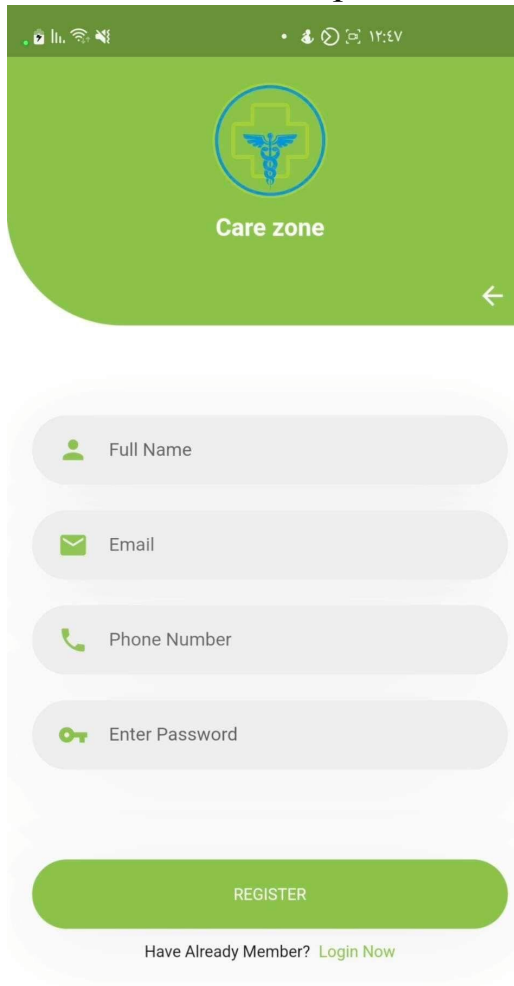


Figure 2: sign up screen

## Login screen :

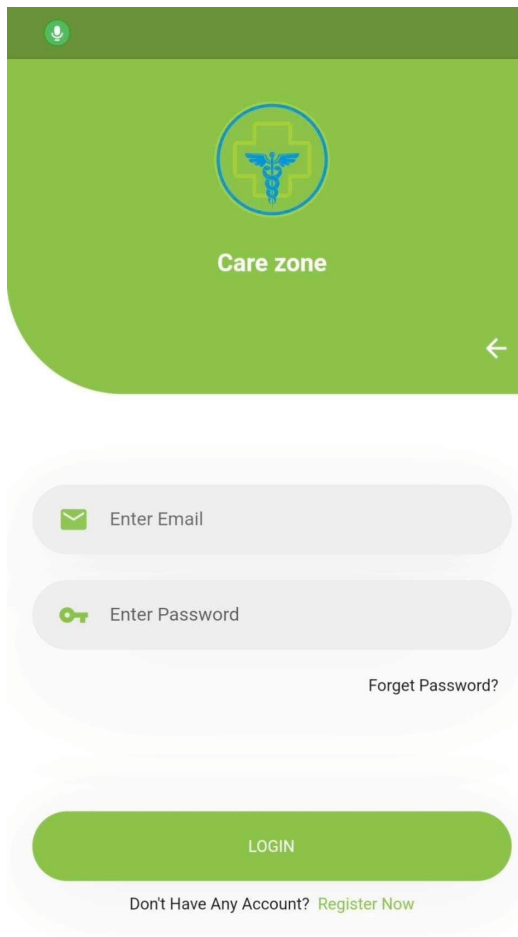
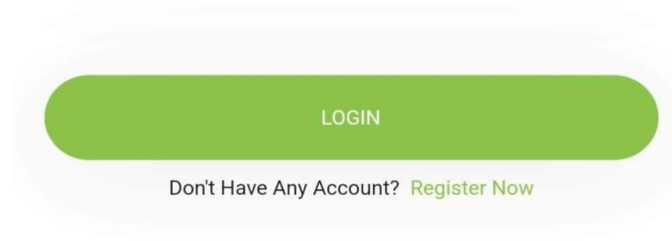


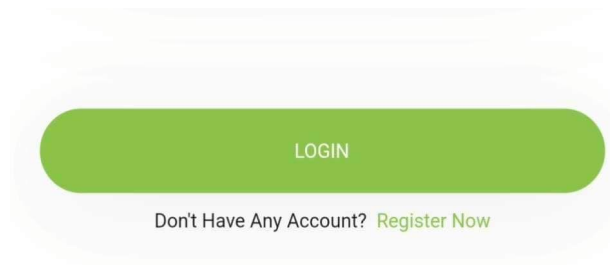
Figure 3: login screen

The user must log in with the right required information, if he enters wrong name or password warnings messages will appear.



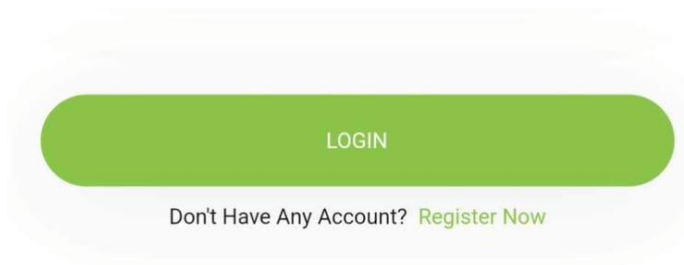
invalid login , user not found

Figure 3.1: log in screen warning message1



invalid login , wrong password

Figure 3.2: log in screen warning Message2



Successfully Login !

Figure 3.3: log in screen Successful login

After the customer logged in successfully he can move to the home screen.

- **Home screen :**

Once the user logs in, he goes to the main page, which contains the various services provided by the application. and once we click to see all the application will view all the services in our application .

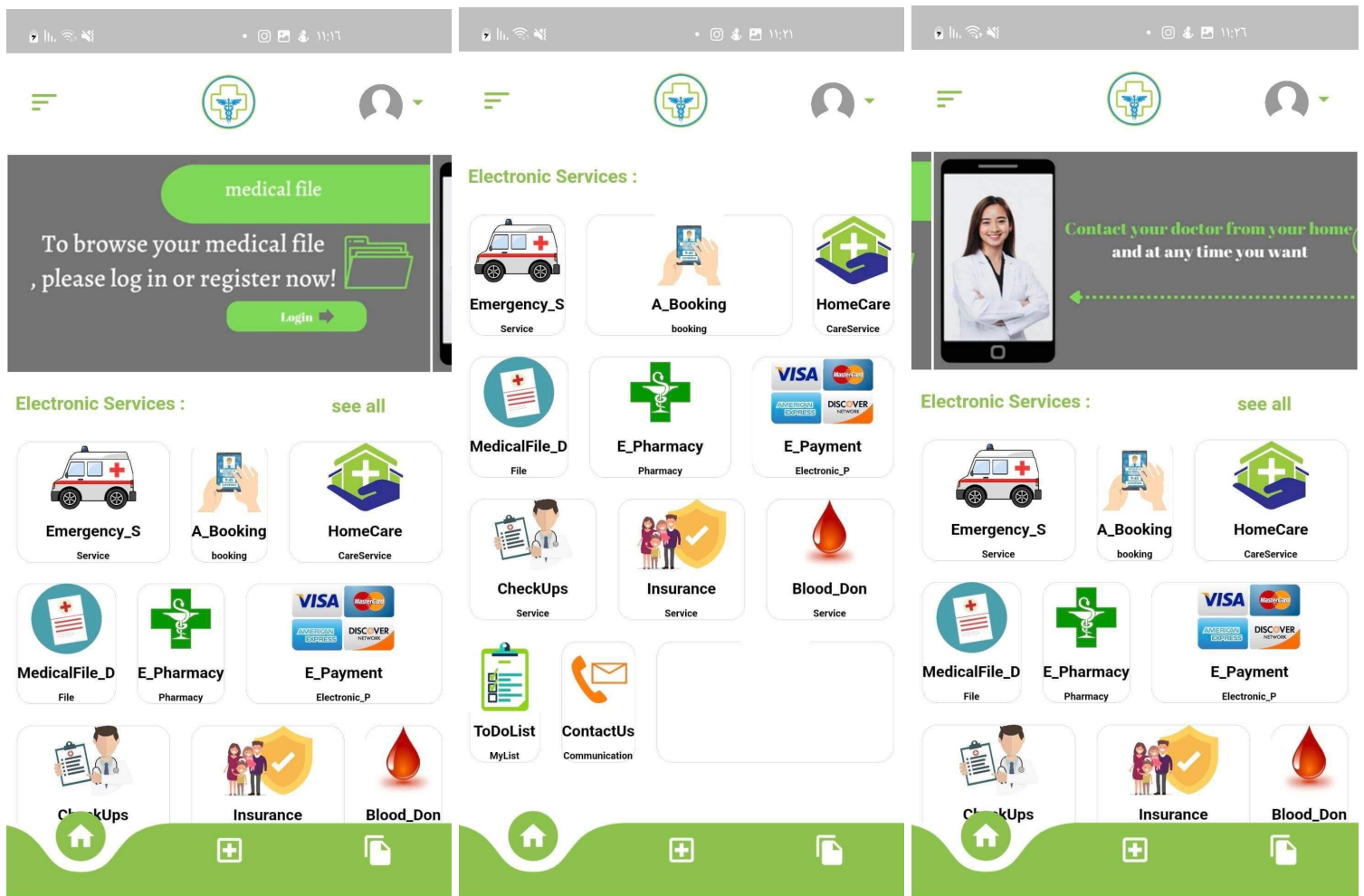


Figure 4: Home screen page

From this page you can open the drawer that had many other needed sections like contact us, notifications, about us, etc , Here ill show the **drawer & About us page**

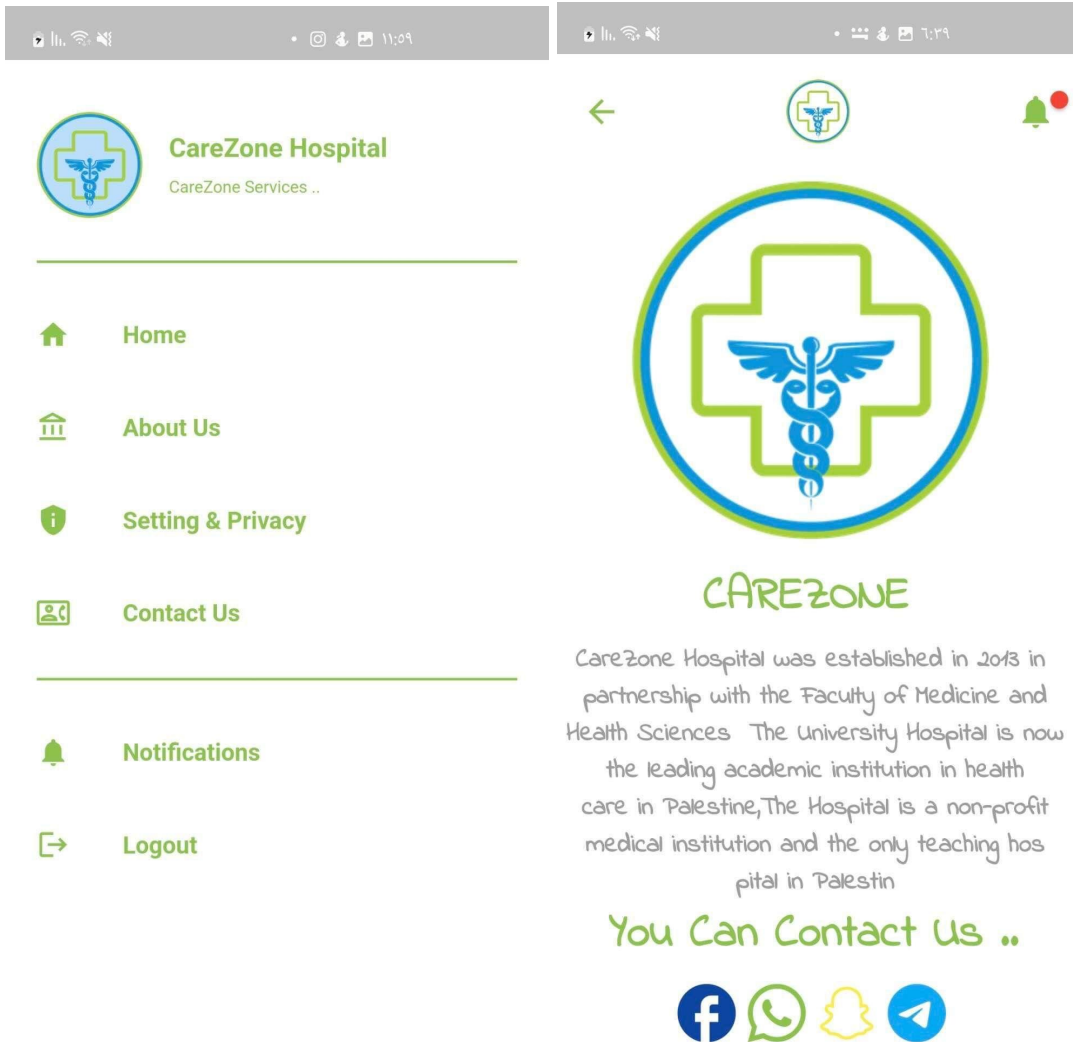


Figure 5: Home page drawer screen

To start the process of request a service from the app, the customer had to click on the wanted category .

## ● Emergency service :

This service allows the user to choose or request an ambulance by specifying the desired direction when clicking on the desired option and pressing Next, then the map will locate the person, then click on the Next button to show us the addition of information, The person can specify the patient's condition, its severity, mention the patient's health status, and then click on the Submit option .

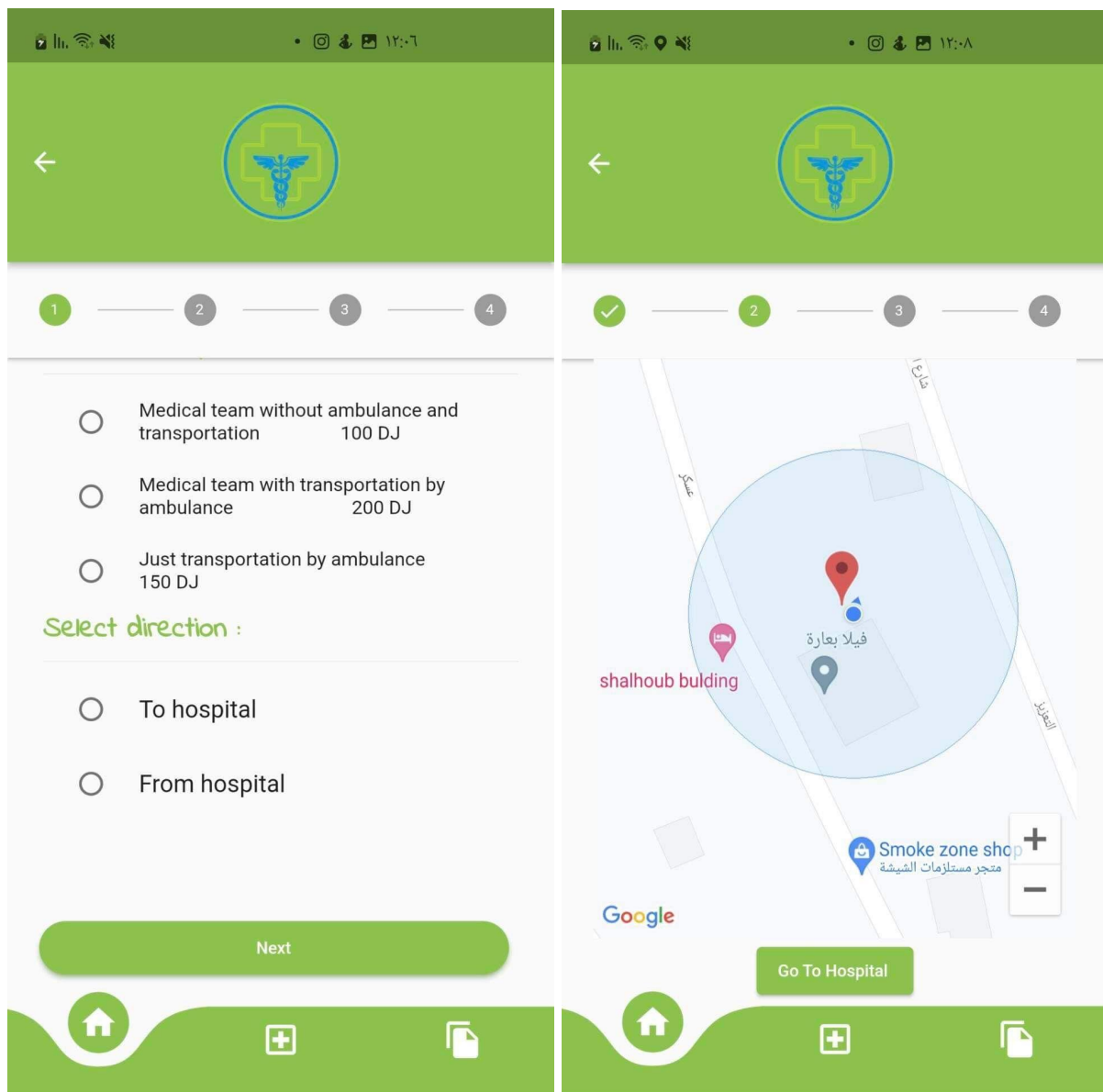


Figure 6.1: Emergency Services

Figure 6.2: Map Current Location

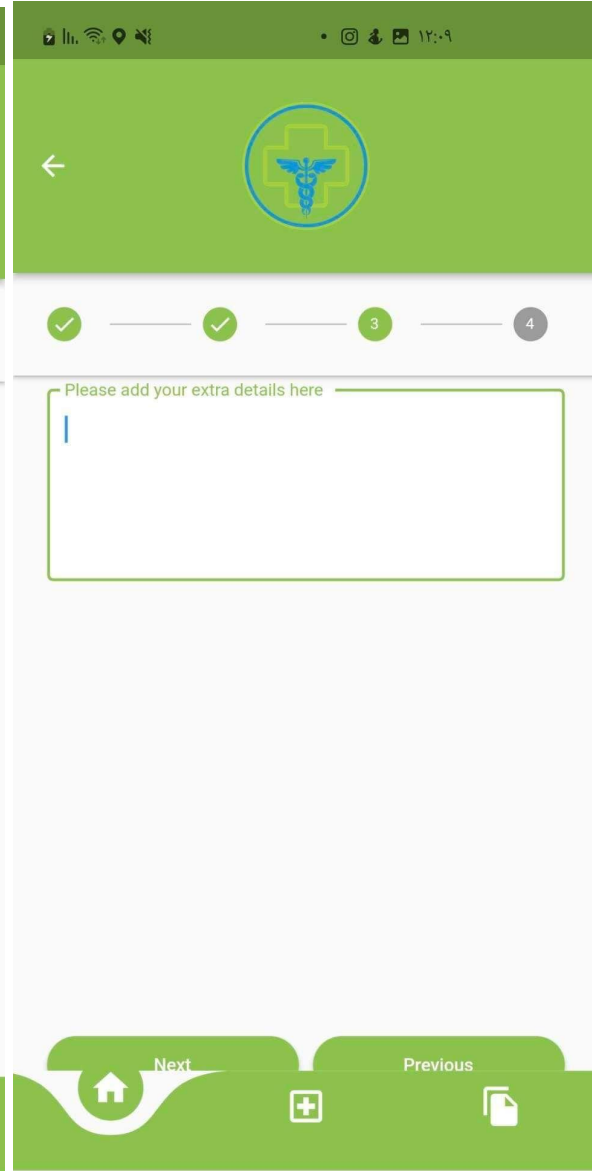
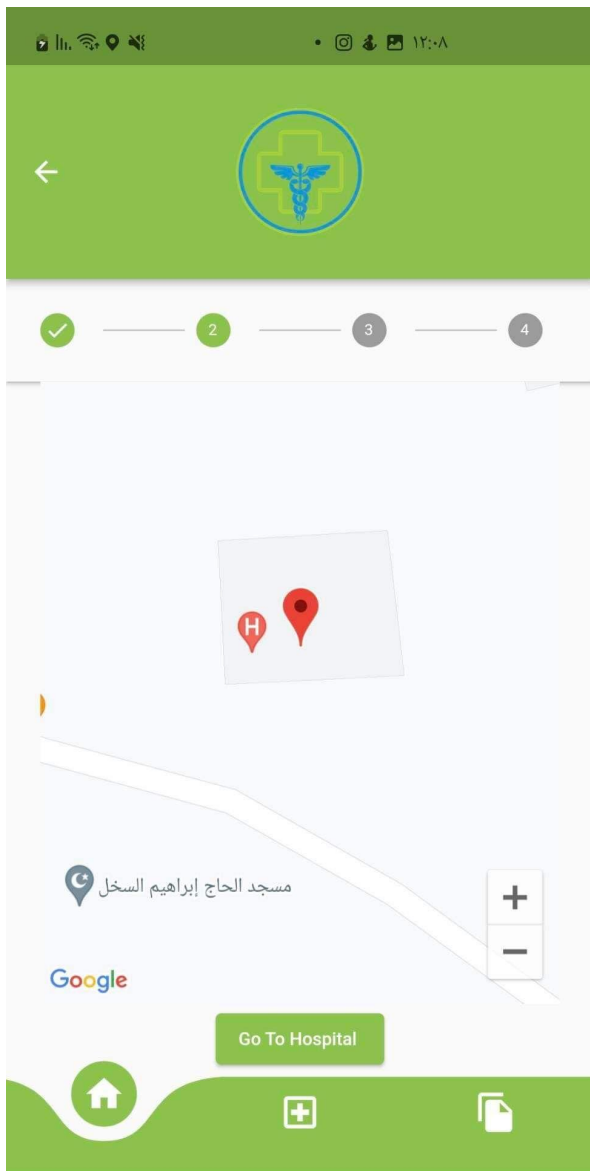


Figure 6.3: Hospital Location

Figure 6.4: More Details

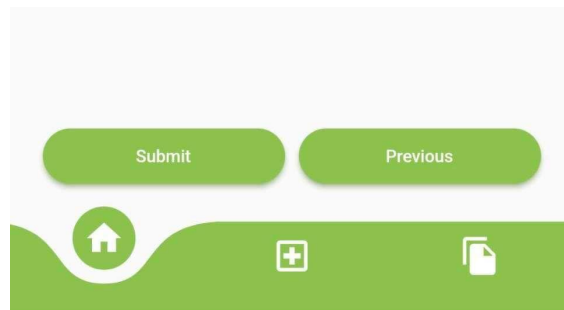


Figure 6.5: Submit

- **Home service :**

The same steps as the previous one, but different from the first page

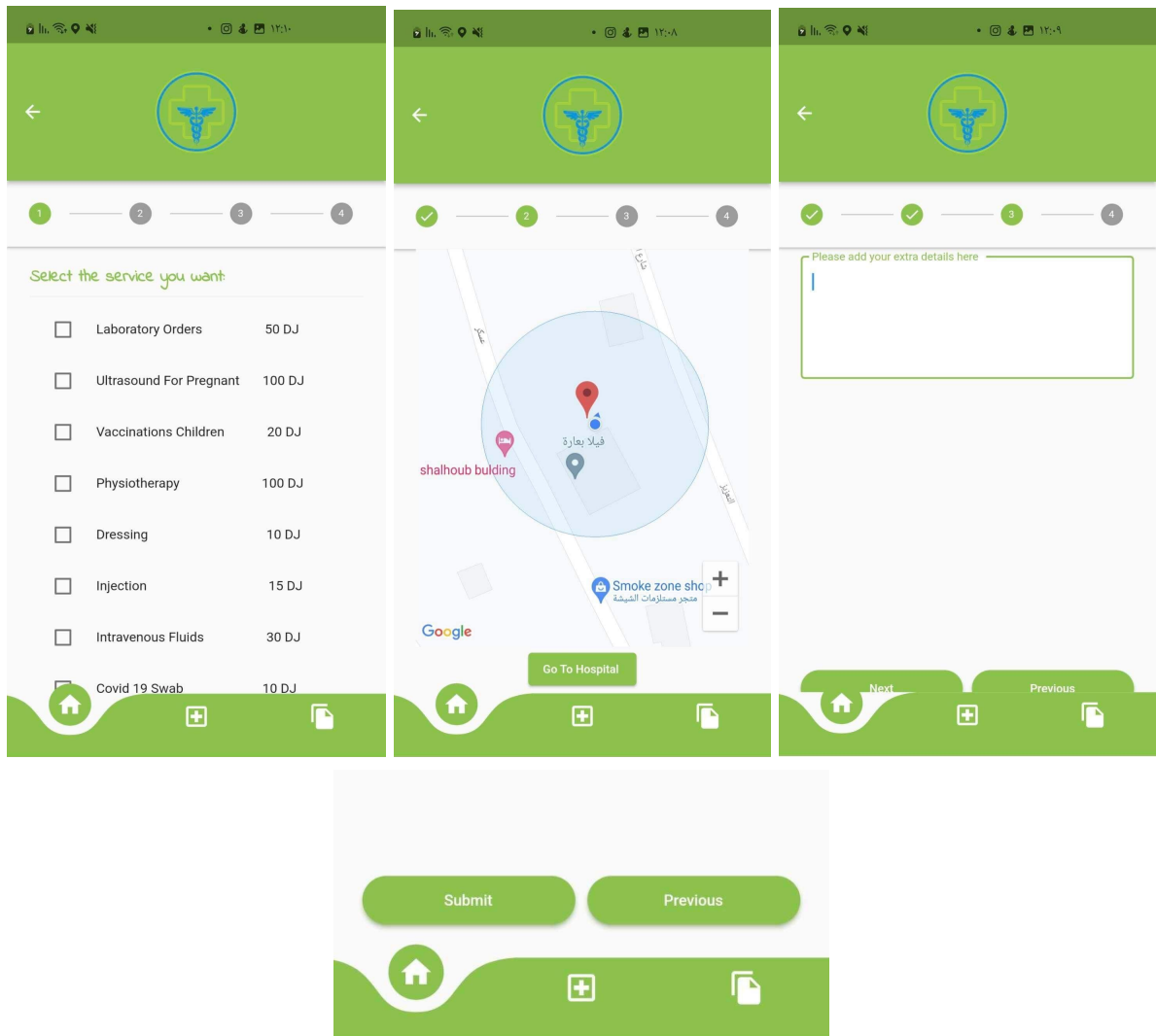


Figure 7: HomeCare

- **Booking :**

The patient reserves the appropriate appointment by specifying the **date** , **day** and **hour**, and then waits for the doctor to respond to the reservation, either by refusal or acceptance, and a notification is sent if acceptance or rejection has been made.



- **Electronic Pharmacy :**

Through the electronic pharmacy, the user can access many types of medicines and browse this pharmacy. He can also view product details in addition to the possibility of adding the medicine to the shopping cart. The pharmacy is distinguished by the ability to **search** for the product by writing the name of the product that he wants to show him this product without the need to browse the pharmacy to find it.

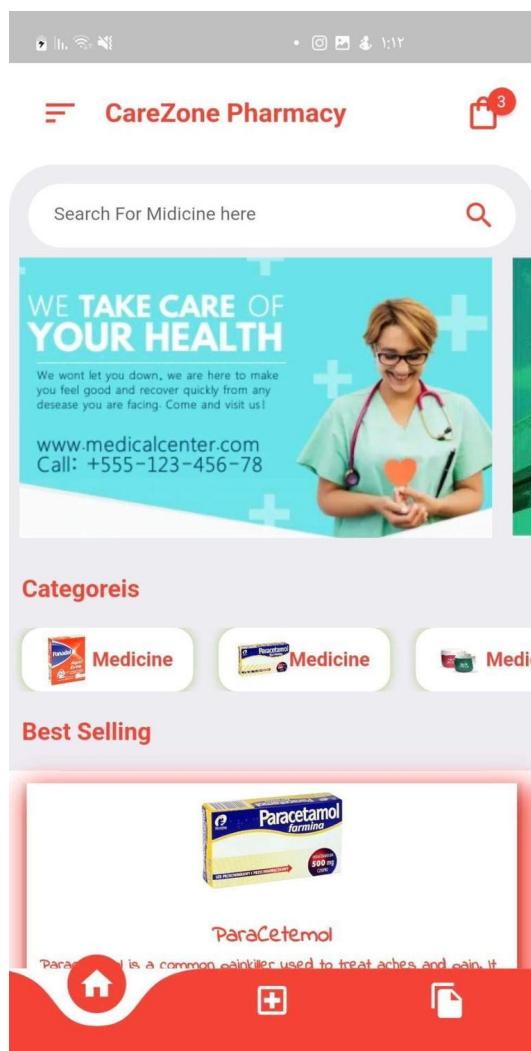


Figure 8.1: Electronic Pharmacy

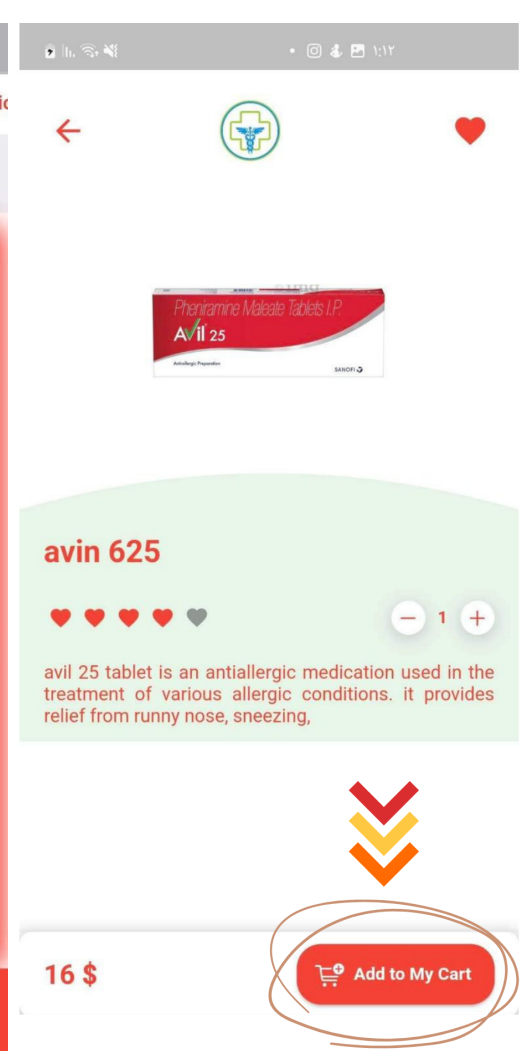


Figure 8.2: View Medicine Details



Figure 8.3: Cart Details

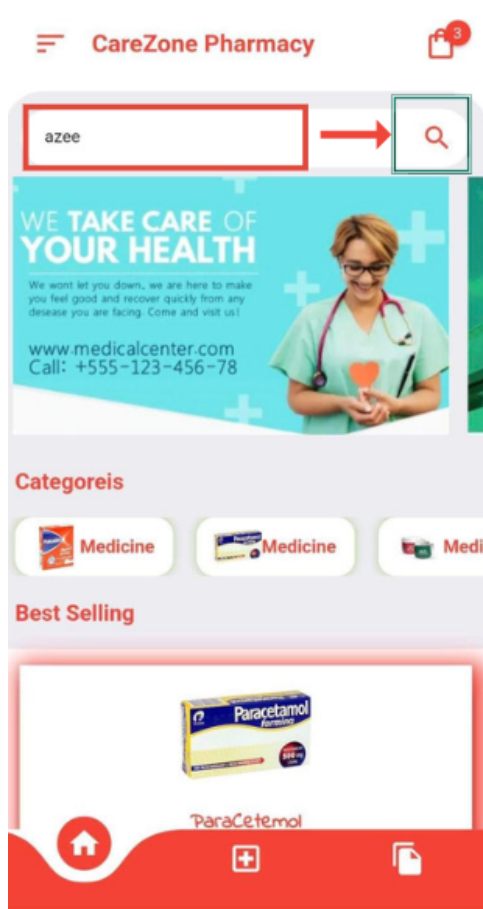
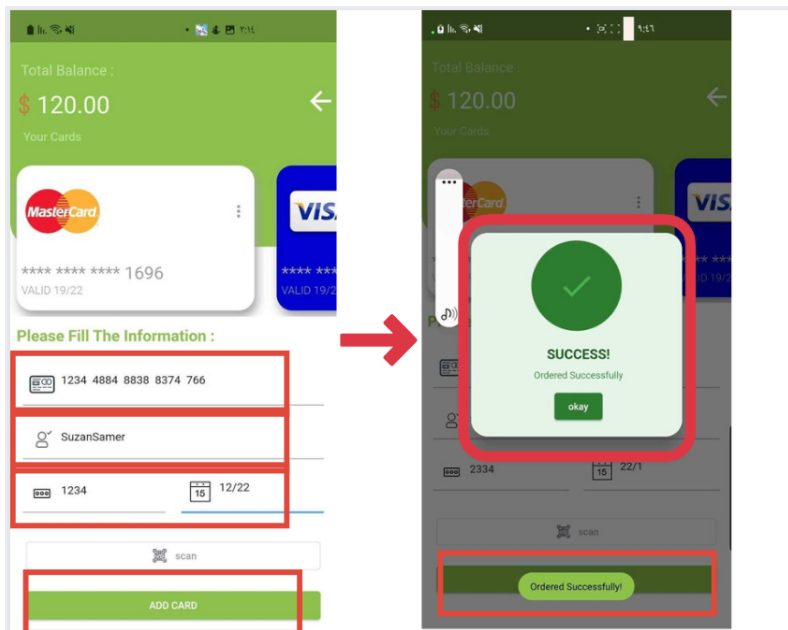
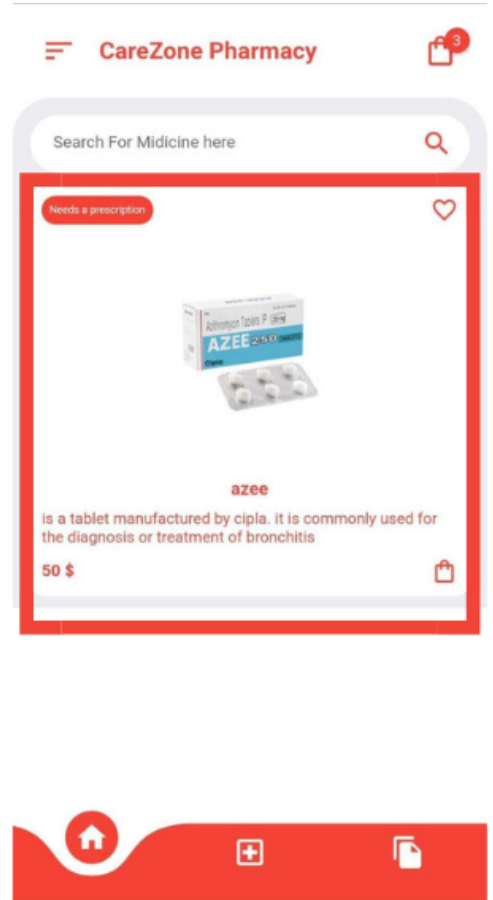


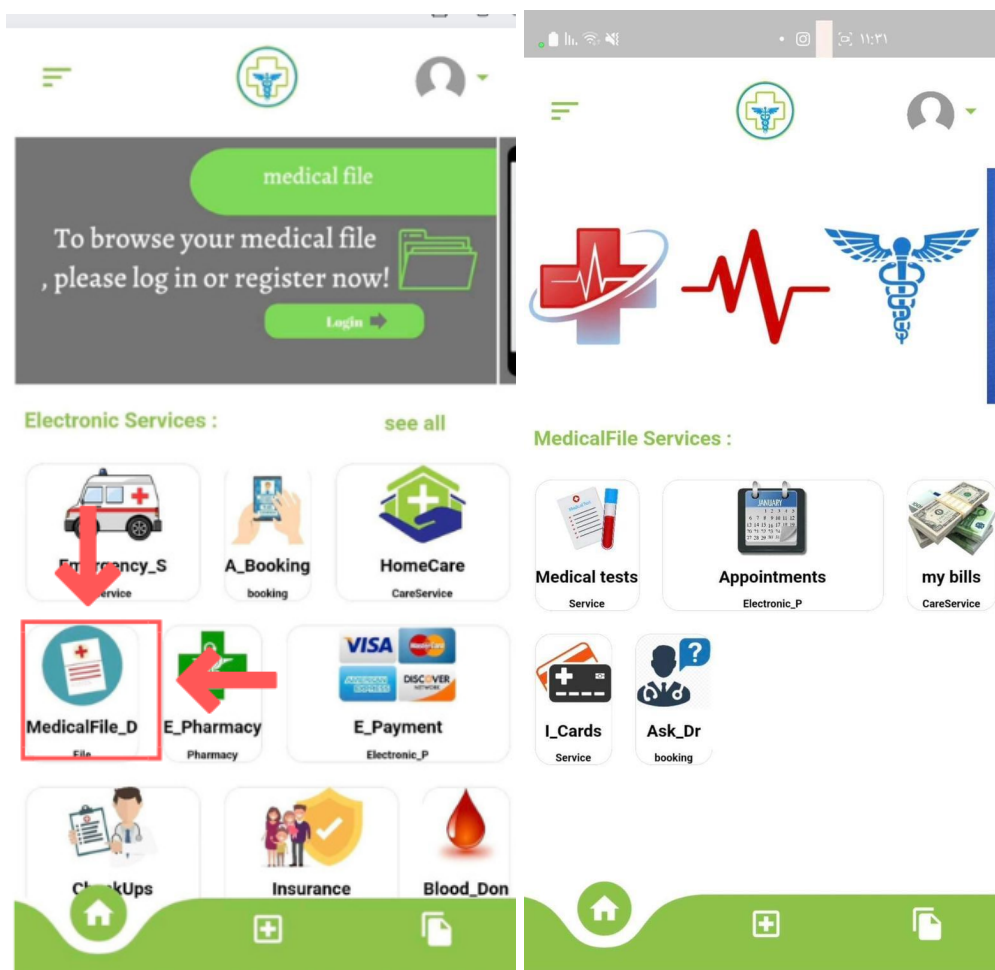
Figure 8.4 : Search and view the product



- **Medical File Services :**

When clicking on the patient's medical file, a group of services related to the medical file will appear to him, which are:

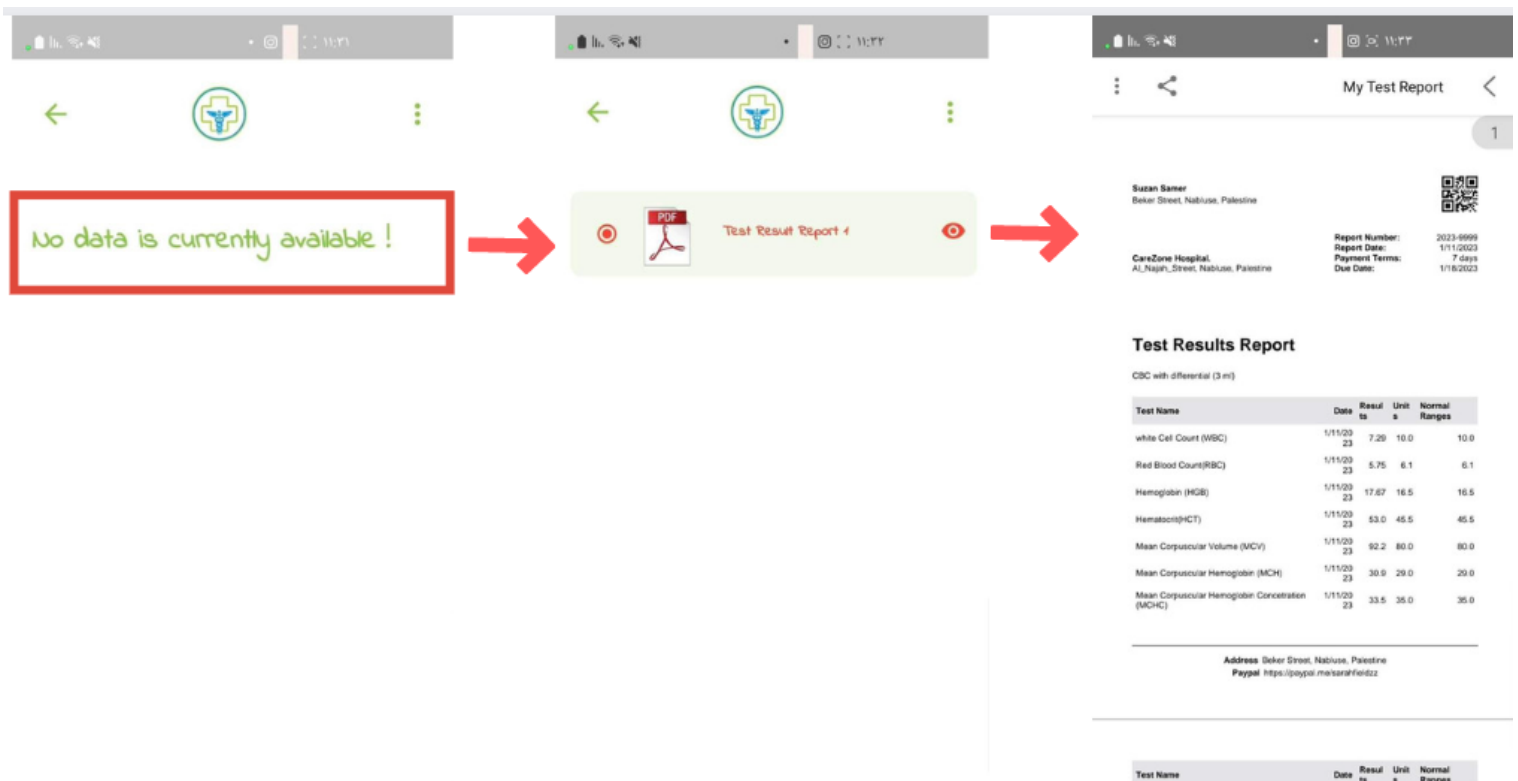
1. Show the results of the patient's examinations, which are sent by the doctor.
2. All appointments are shown to the patient.
3. The patient bill service is also available, in which all bill details are displayed for the patient + the I\_card.
4. Finally, the medical file contains the chat system communication service.



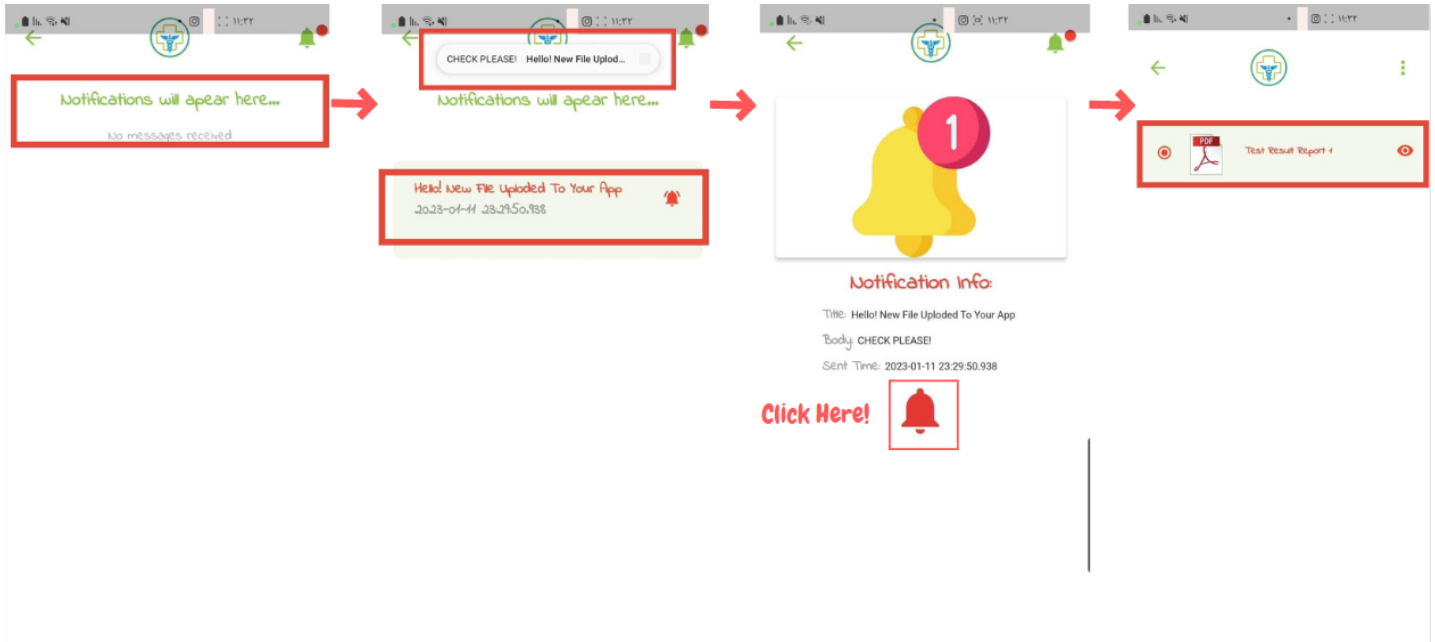
- **Medical File Services :**

- ❖ **Test Reports :**

When the examinations are downloaded by the doctor, they appear as A notification to the patient in the form of a PDF file .



- ❖ **Notifications :**

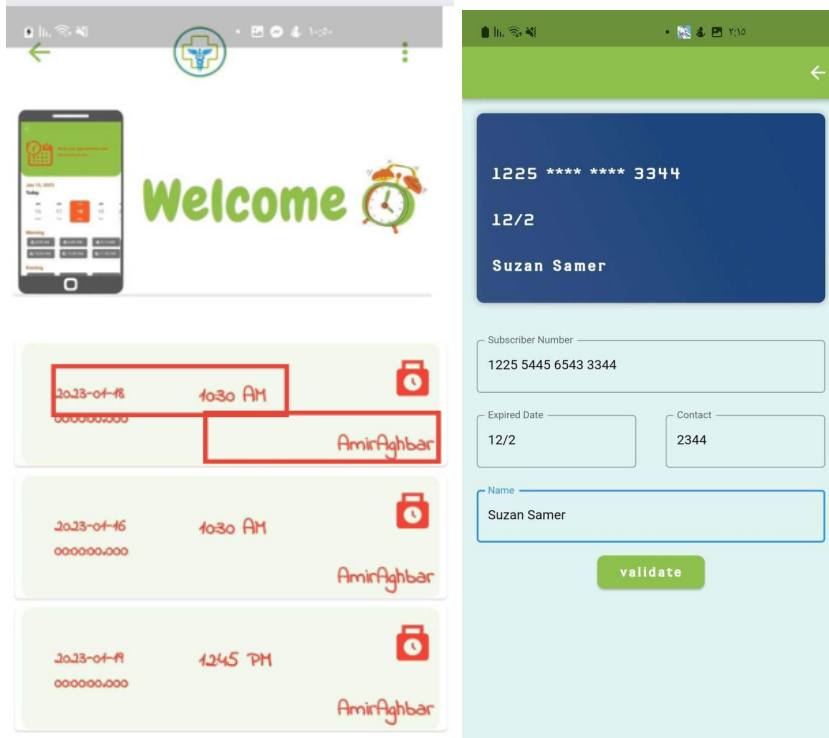


❖ **Bills:**

The invoice is displayed in a PDF file containing the invoices for the various services, in addition to the insurance discount.

Description	Date	Quantity	Unit Price	Ins	Total
Laboratory Orders	1/14/2023	3	\$ 50.0	0.45 %	\$ 217.50
Dressing	1/14/2023	8	\$ 10.0	0.45 %	\$ 116.00
Physiotherapy	1/14/2023	1	\$ 2.99	0.45 %	\$ 4.34
Covid_19 Swab	1/14/2023	2	\$ 10.0	0.45 %	\$ 29.00
<b>total</b>					<b>\$ 252.99</b>
<b>Insurance 45.0 %</b>					<b>\$ 113.85</b>
<b>Total amount</b>					<b>\$ 139.14</b>

❖ **View User Appointment :**



## ❖ Ask Doctor (CHAT SYSTEM):

Through the **chat system**, the patient or the doctor can communicate with the person who wants to inquire about anything, in addition to the ability to send pictures. The chat system is distinguished by the ability to **create groups** between the doctor and patients, and he can search for the person he wants by searching.

Care Zone Doctors ..

You can communicate directly with your preferred doctor by writing to him directly

Our Doctors :

Please Search Here :

Search

Search

Care Zone Doctors ..

You can communicate directly with your preferred doctor by writing to him directly

Our Doctors :

Please Search Here :

DrAmir

Search

DrAmir  
amir@gmail.com

DrAmir  
Online

hello doctor...

can I ask something

Ill send a photo

please check it

My Test Report

Test Results Report

Send Message

DrAmir  
amir@gmail.com

GROUPS

ADD MEMBERS

DrAmir  
amir@gmail.com

DrAmir  
amir@gmail.com

DrRaghad  
raghad@gmail.com

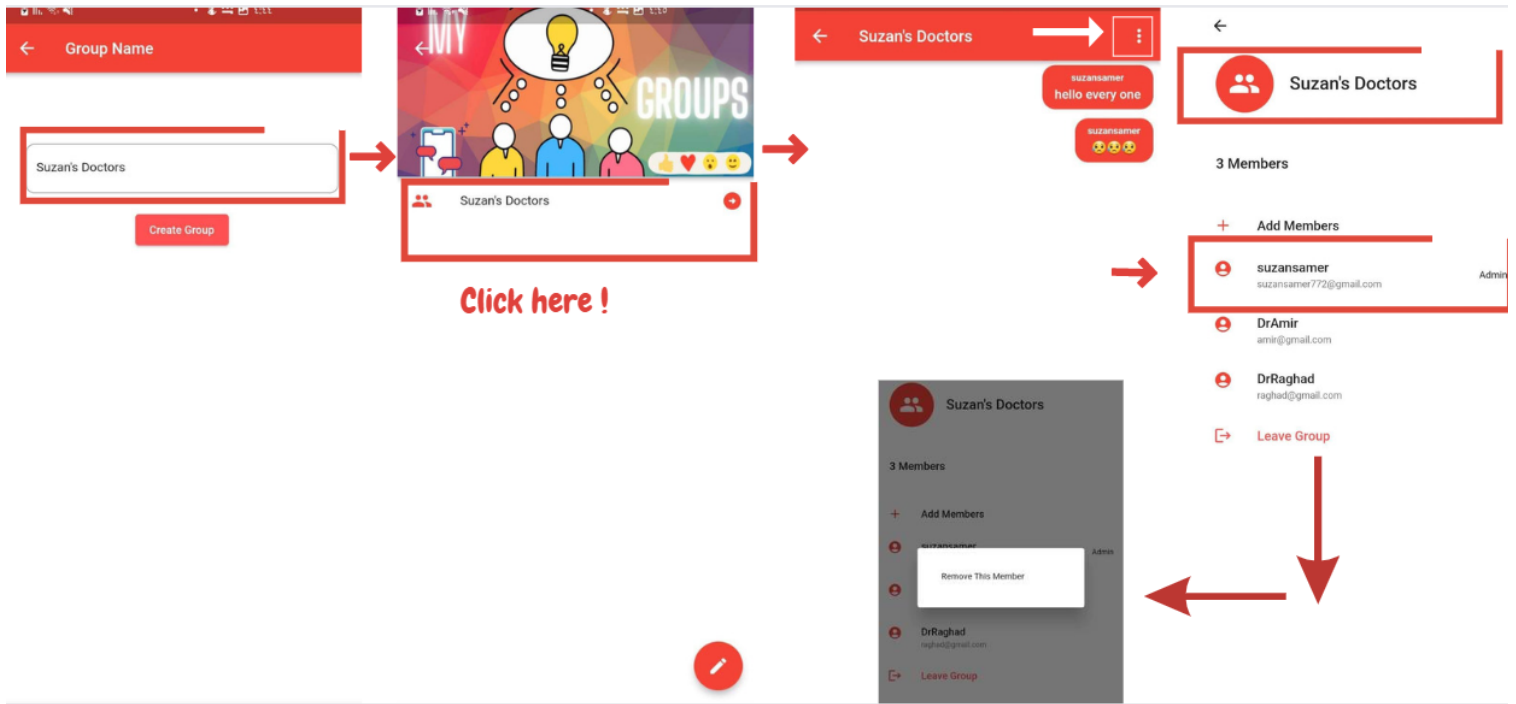
DrRaghad

Search

Click here!

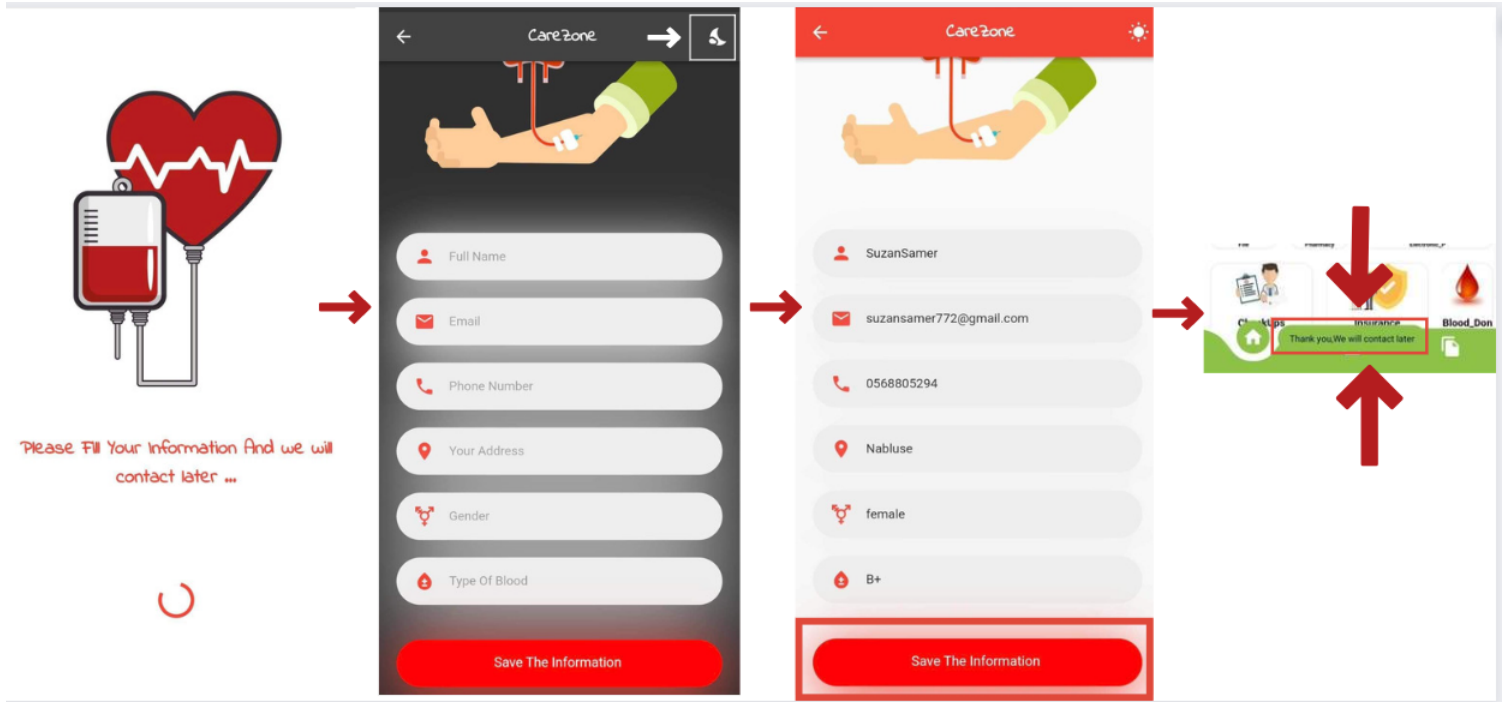
Click here!

We Can Create the group by adding the **name** then the group will appear in (My group Page) when we click on it we can start chatting , once we click on the **top icon** the info of the group appears and the admin can **remove any member** .



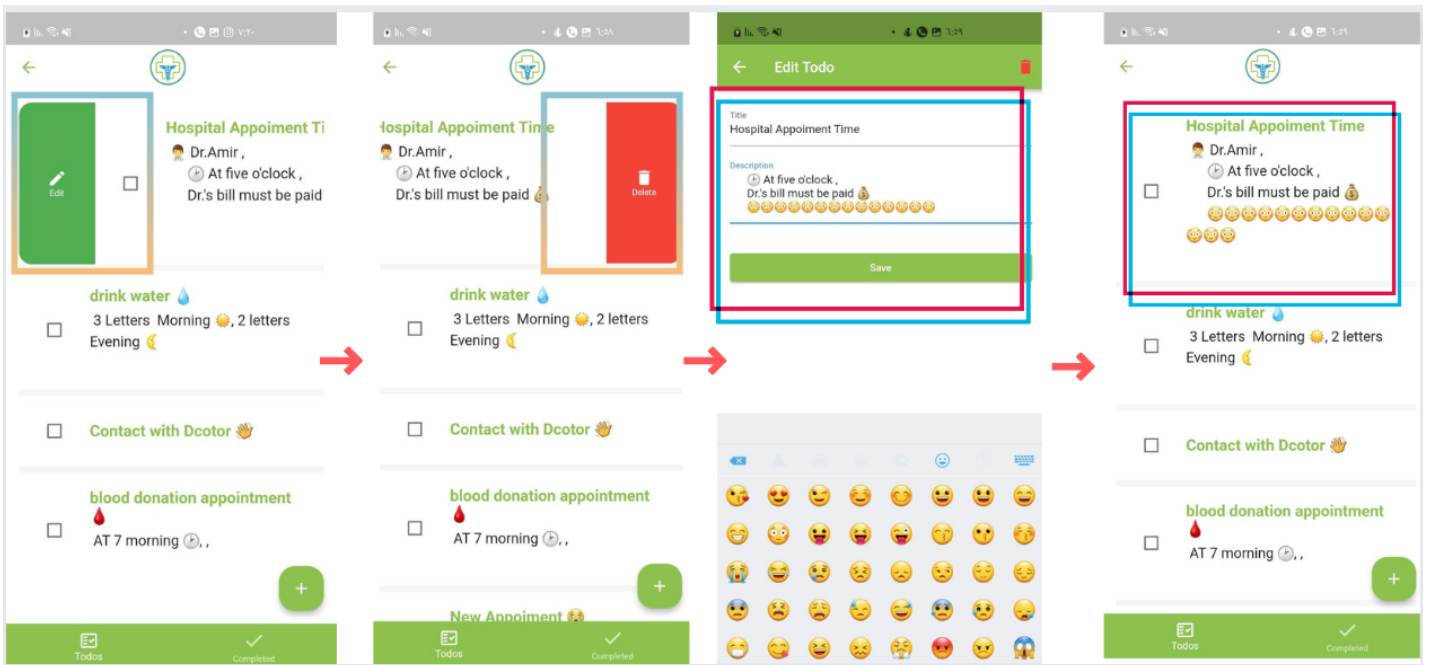
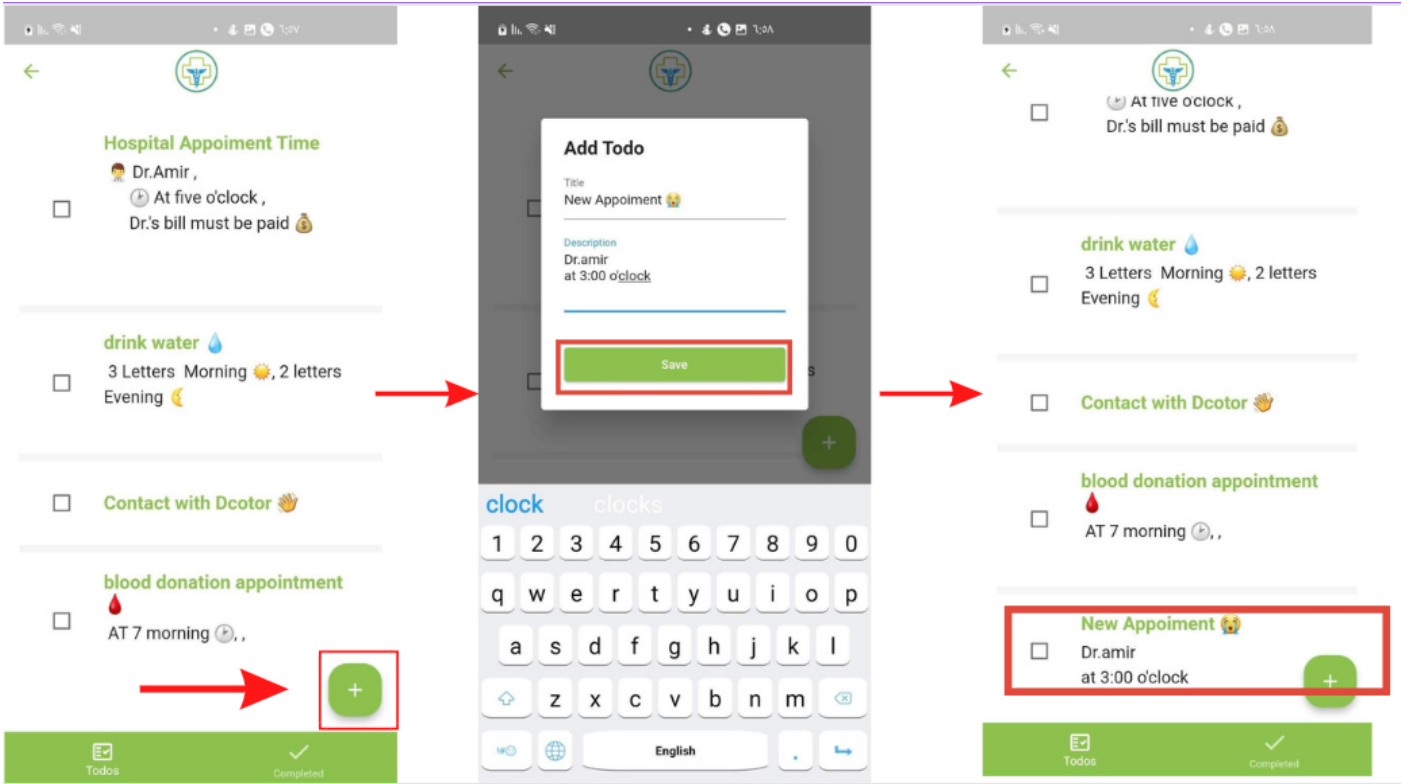
- **Blood Donation Services :**

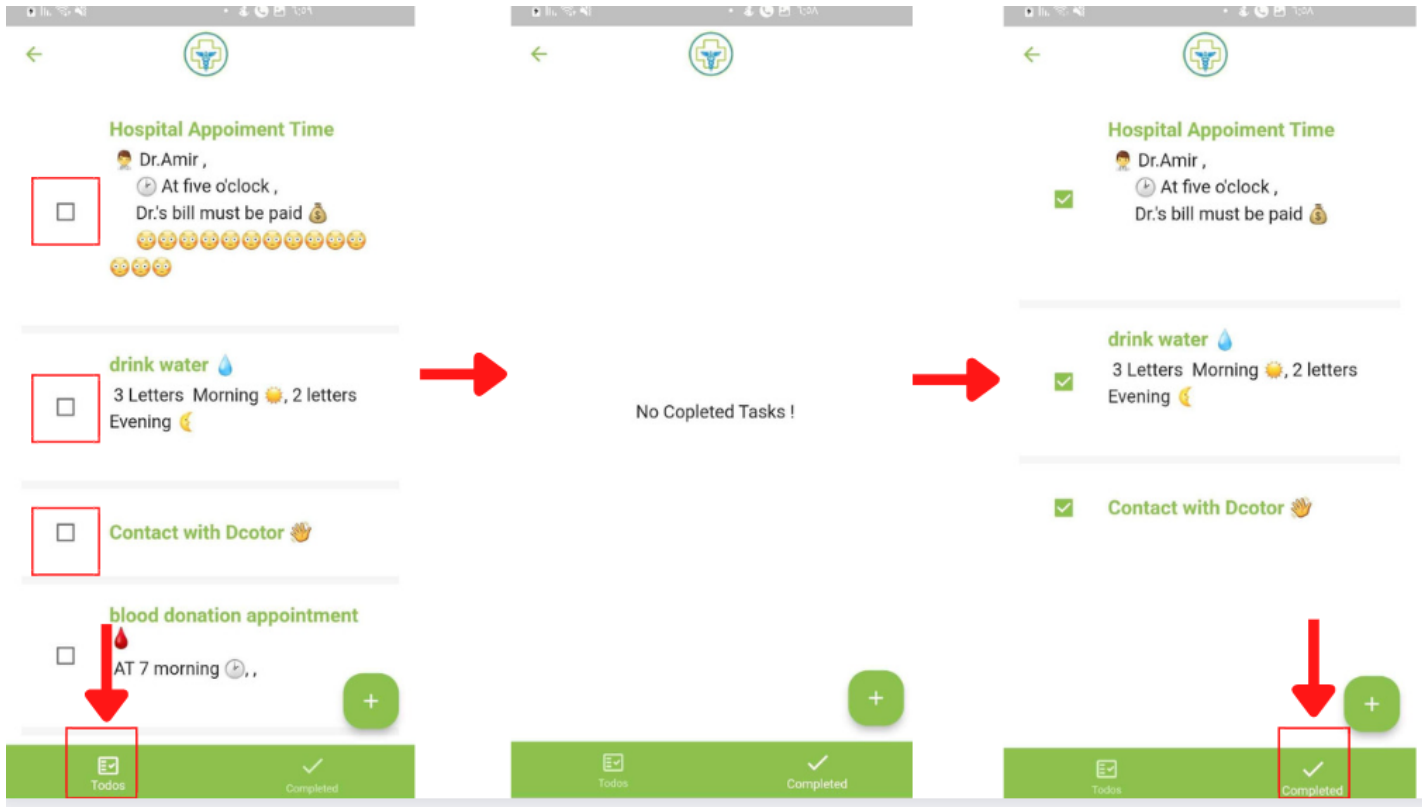
Through this service, the user records all his information, such as name, phone number, blood type, etc. For example, when calling an ambulance for a critical condition, the hospital staff can search for the appropriate blood type and communicate directly with the person in order to donate blood.



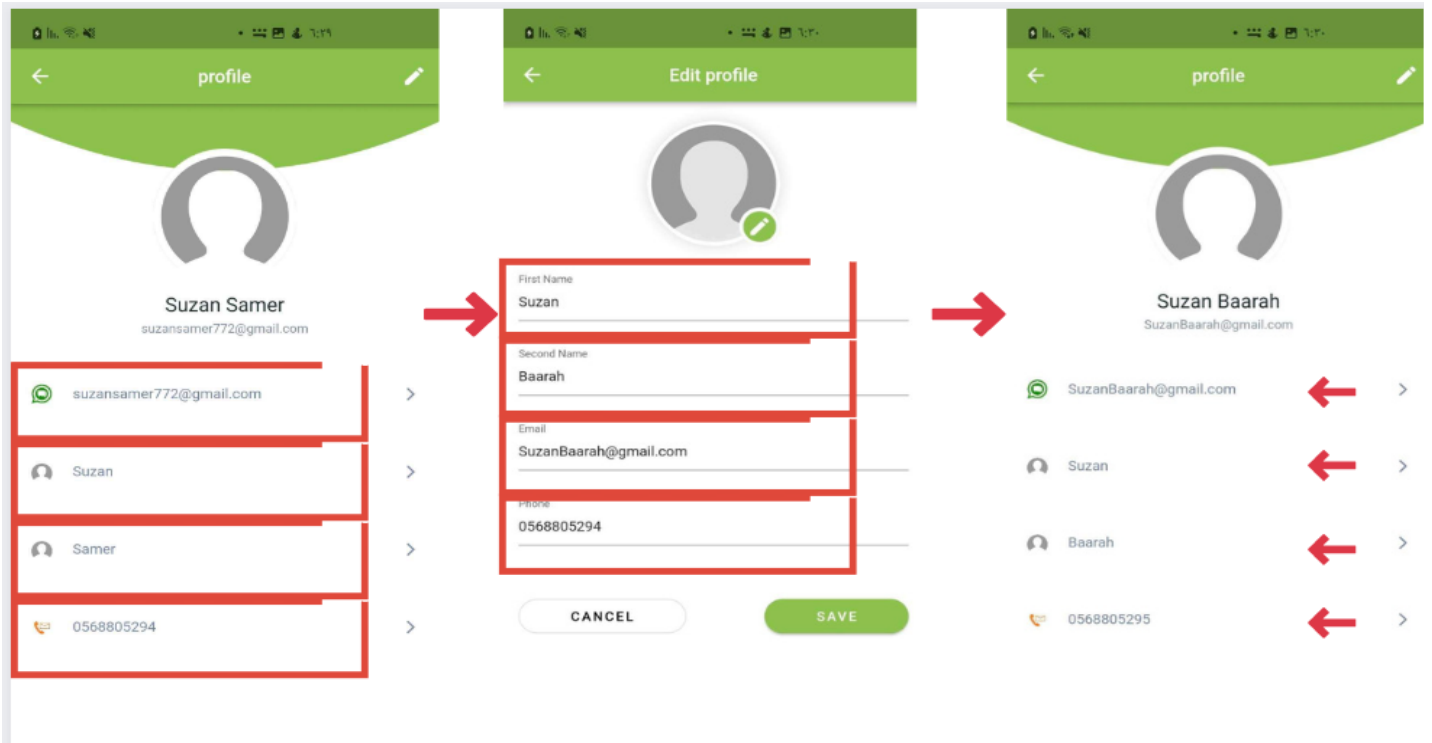
- **To do List Services :**

Through it, the user enters the tasks that he has to do, he can **modify** or **delete** them if he wants or **add a new todo**, and he can also, when the task is completed, put it in the **completed list**.



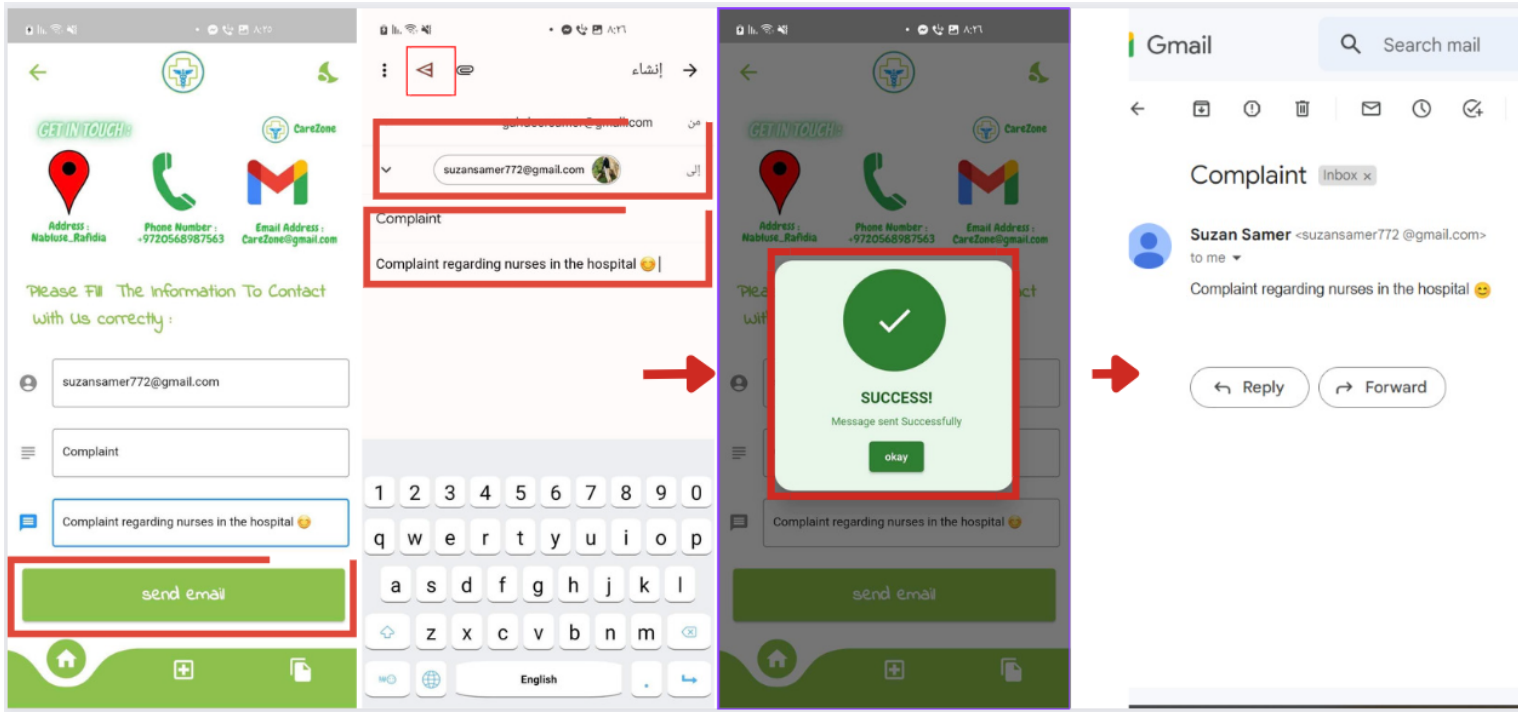


• **View and Edit Profile :**



- **Contact Us Services :**

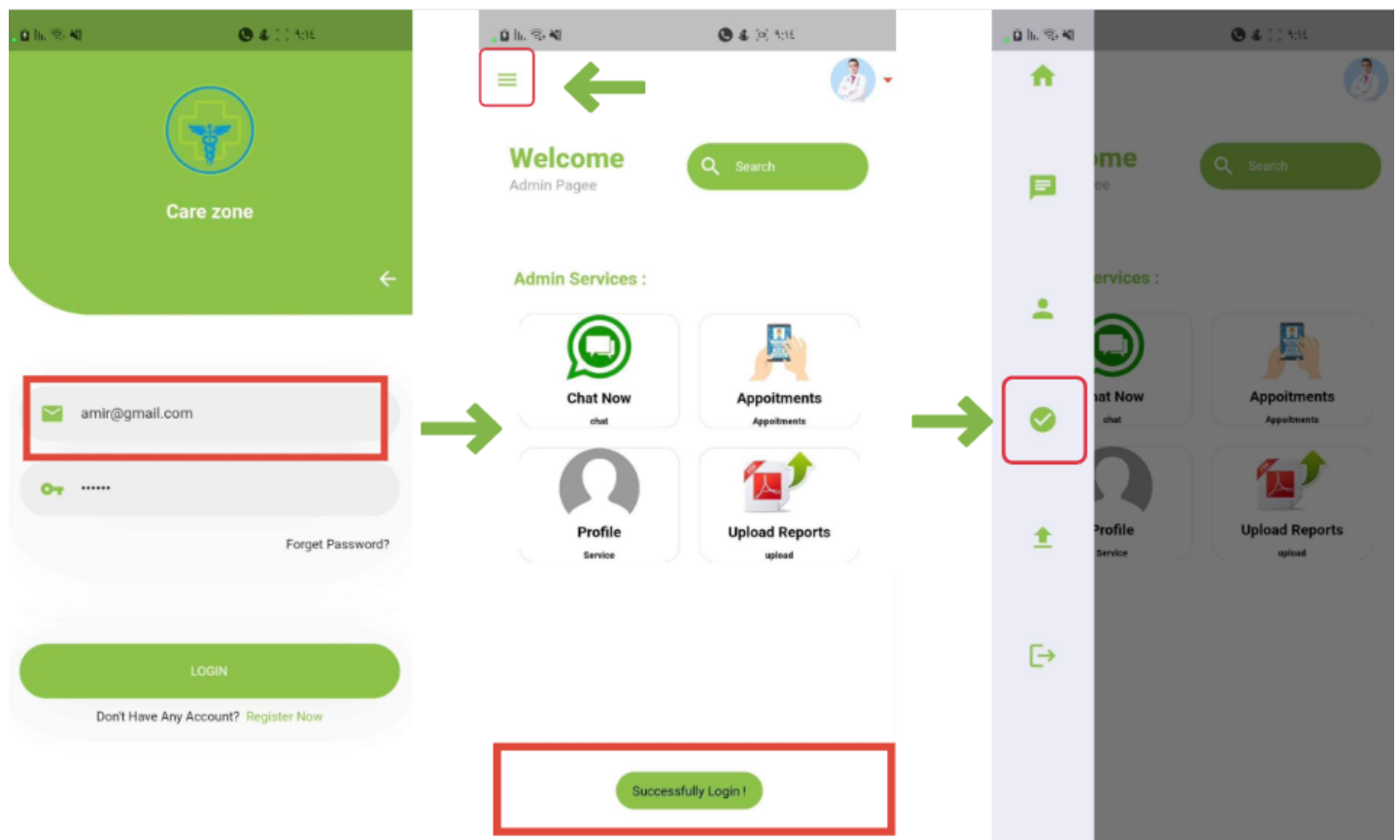
If we want to contact or send an Complaint to the responsible person in the hospital , the user fills all the information contains the (CareZone Gmail), then send the Email .



## Implementation (For Admin ) :

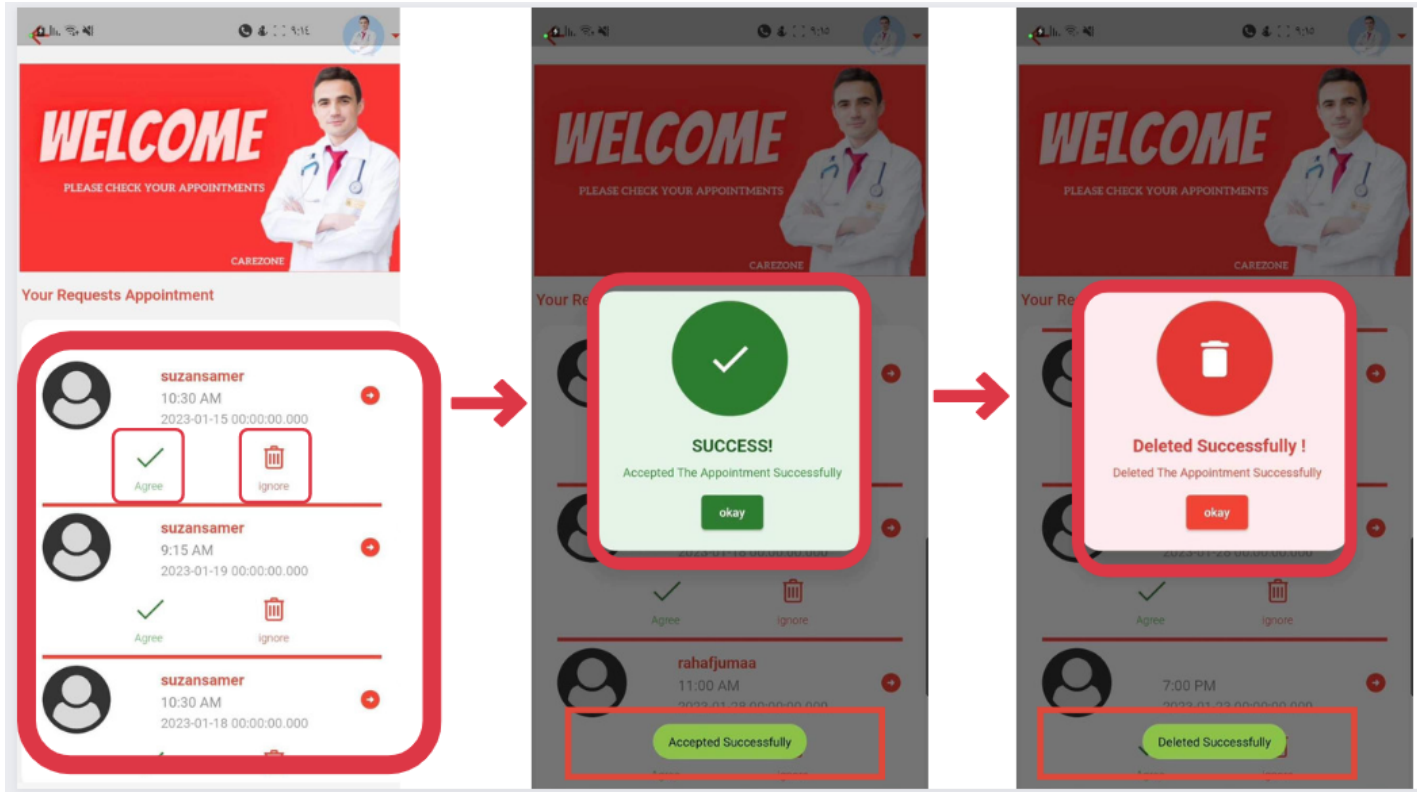
### First Admin (Doctors ) :

Here are Login & Home Page for Admin (Doctor):

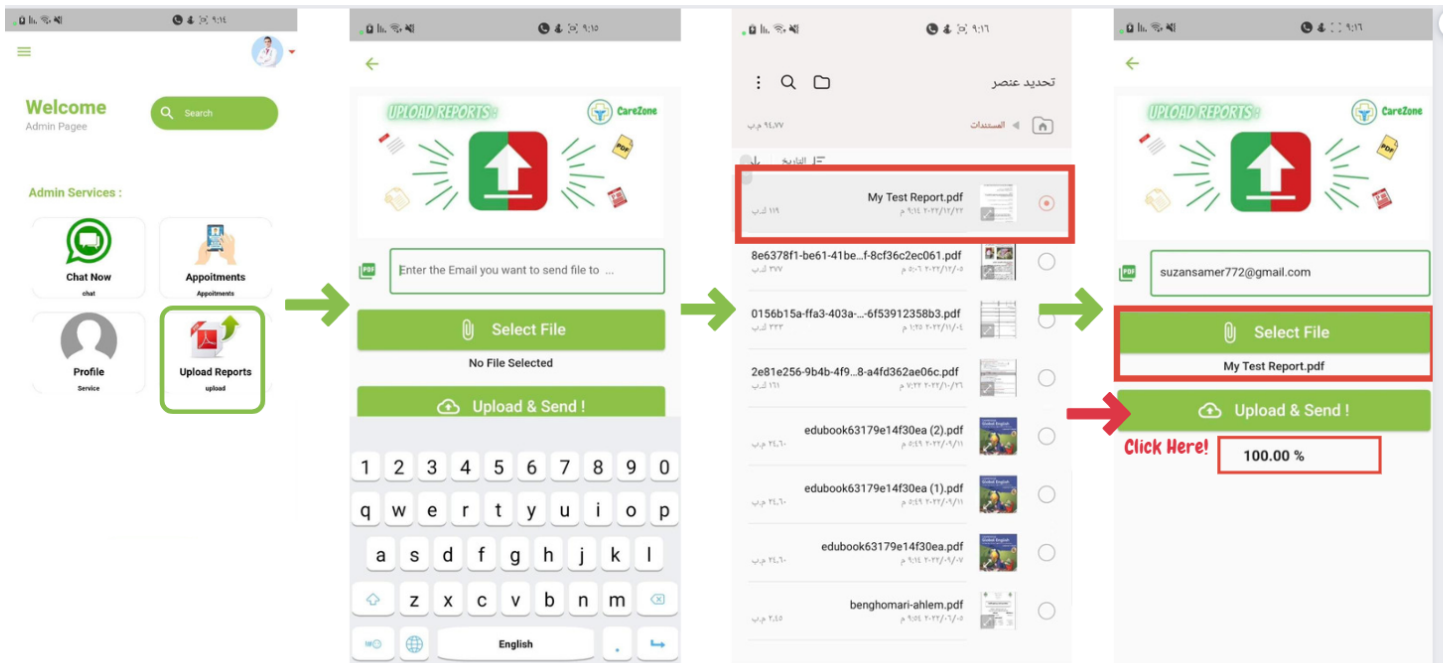


### ❖ Check Doctor Appointment (Accept OR Delete) :

Doctor Can check All his Appointments to accept or delete them , here are some picture about that :



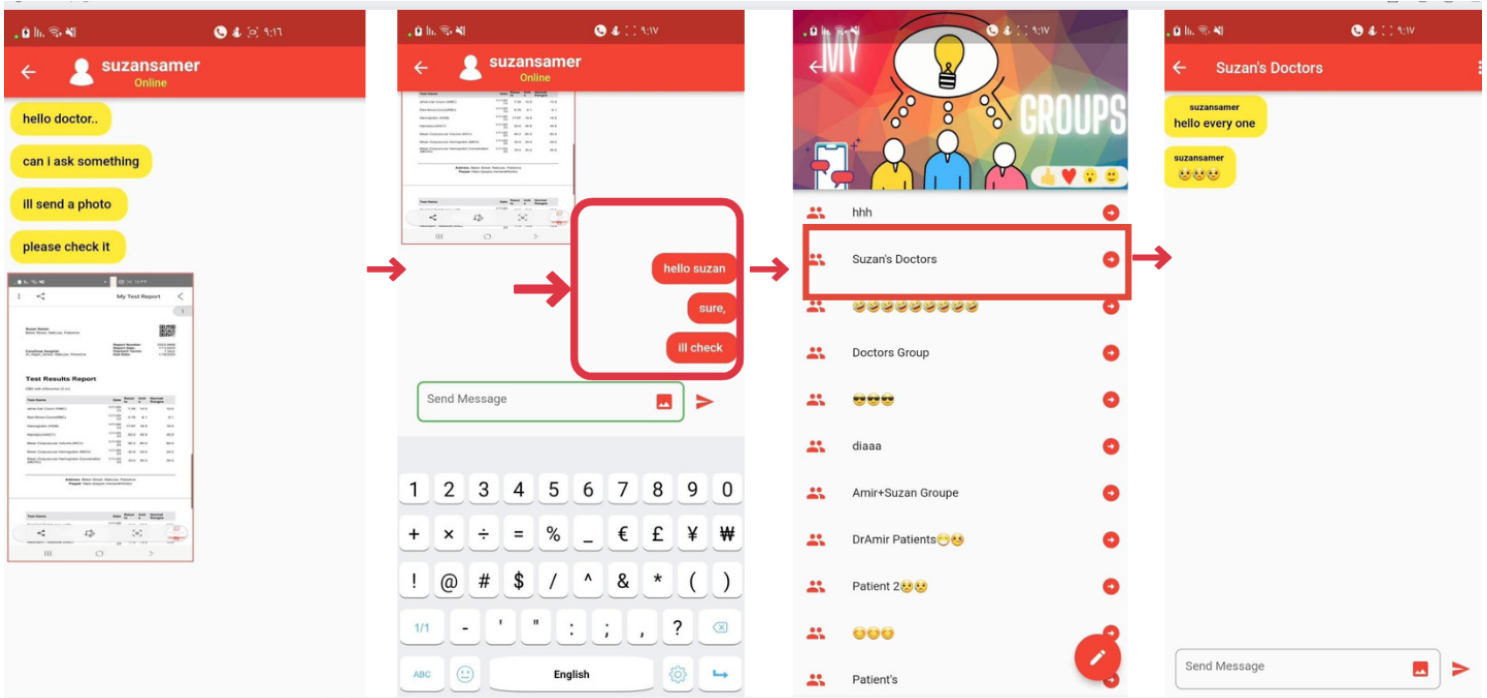
❖ **Upload file To user :**



❖ **View Profile and edit it :**

**As User**

❖ **Chat (Reply to user) :**



## **5. Results and Discussion :**

We have created an application that aims to provide new services that the hospital can provide by connecting doctors with patients online. Many reliable services can be obtained through the application.

### **5.1 Learning**

Learning something new takes patience, effort and a lot of research. We learned a lot from this project and used a lot of new technologies that we didn't know before. We chose to learn and use flutter for the frontend, Node JS for the backend and use Mongo DB for the database. Internet sites helped us a lot in our journey of learning these new languages, we were known nothing about how to build a mobile application before this project so Programming tutorials were extremely helpful.

### **5.2 Challenges**

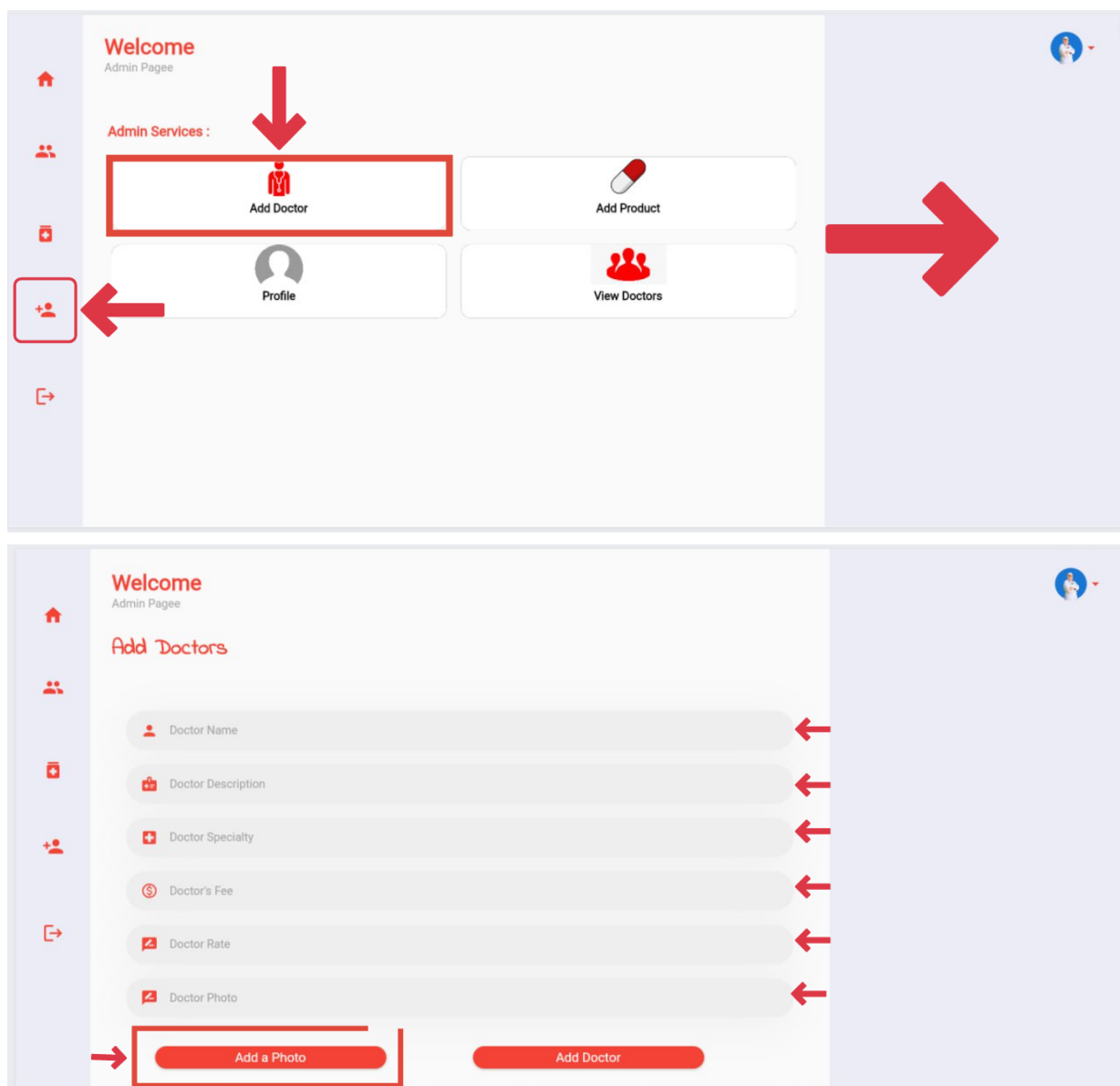
It takes a lot of time and effort to look for a dependable source to learn a new programming language. We don't always resolve the issues we encountered. The dependency versions of the flutter packages we wanted to use also had a problem.

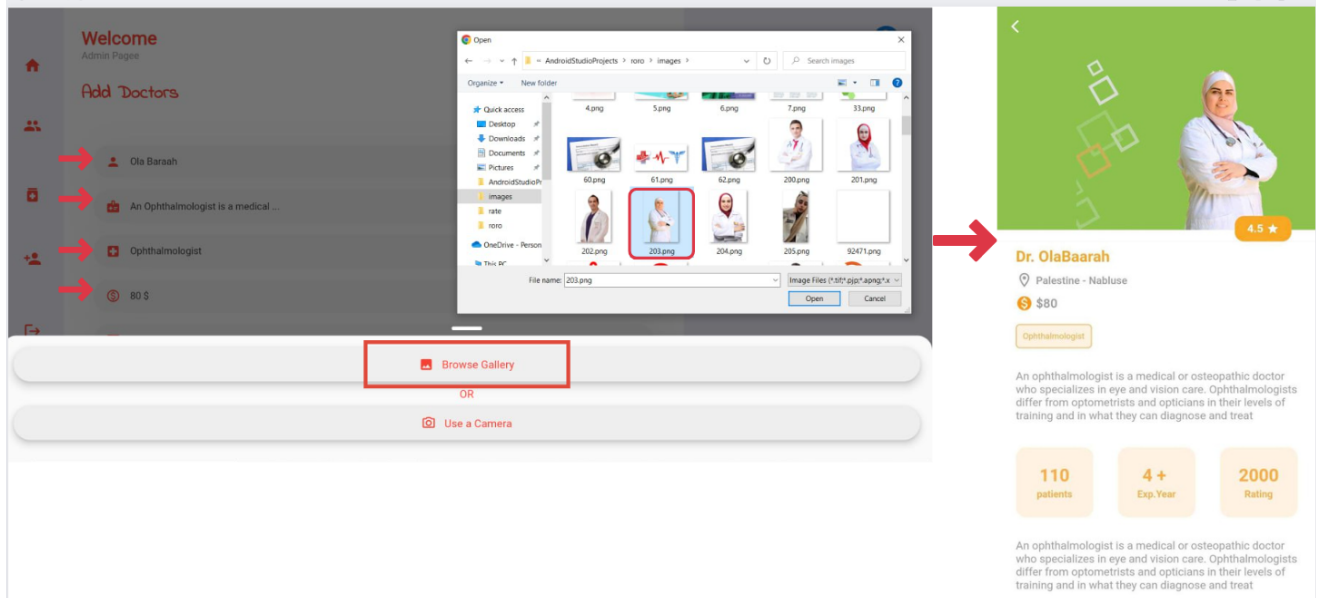
## Second Admin (**Hospital**) :

We view the information by using Web Dashboard

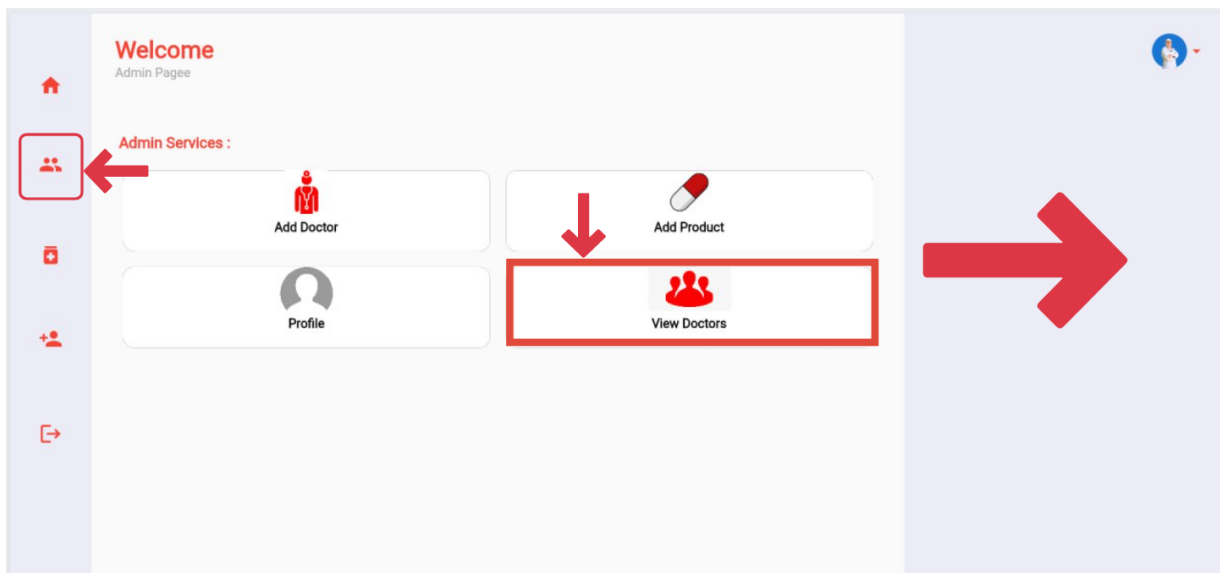
Home Page for Admin (Hospital) :

### ❖ Add Doctor :





## ❖ View Doctors :



**Welcome**  
Admin Pagee


**Doctors**

Name	Specialty	Description	Fee	Rating
Amir Aghbar	Urology Specialist	A urologist is a medical ...	80	★★★★★
Raghad Baraah	Pediatrician Specialist	A paediatrician is a child ...	80	★★★★★
Diaa Qamhia	Embryology Specialist	Embryologists are highly ...	80	★★★★★

## ❖ Add Product :


**Welcome**  
Admin Pagee

**Admin Services :**

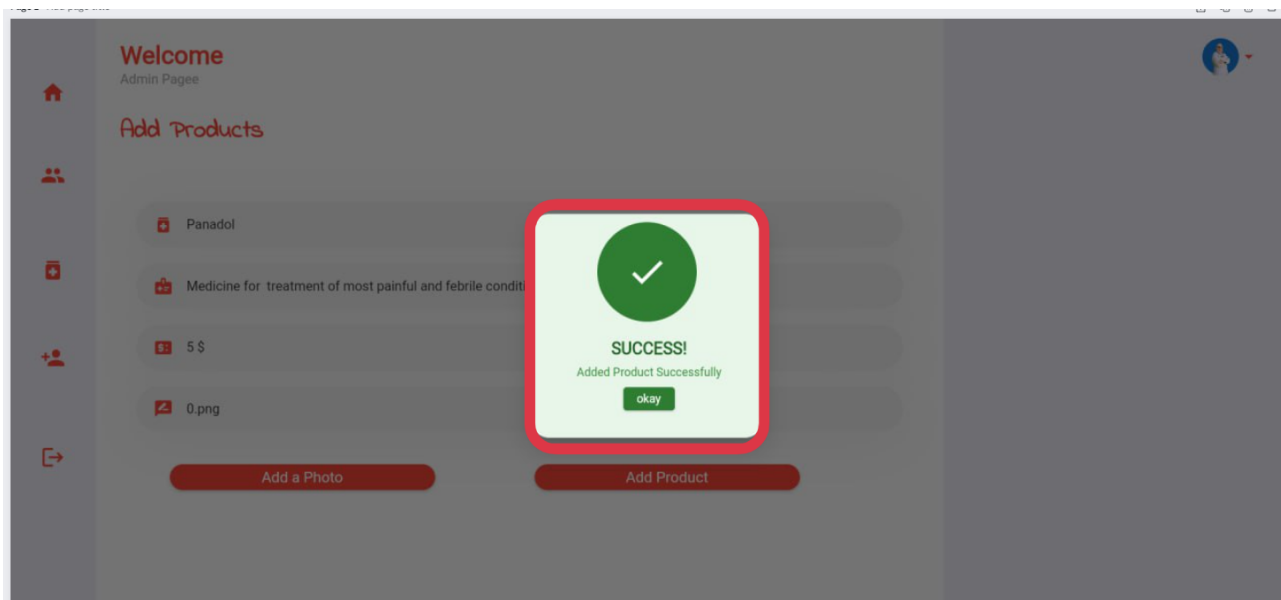
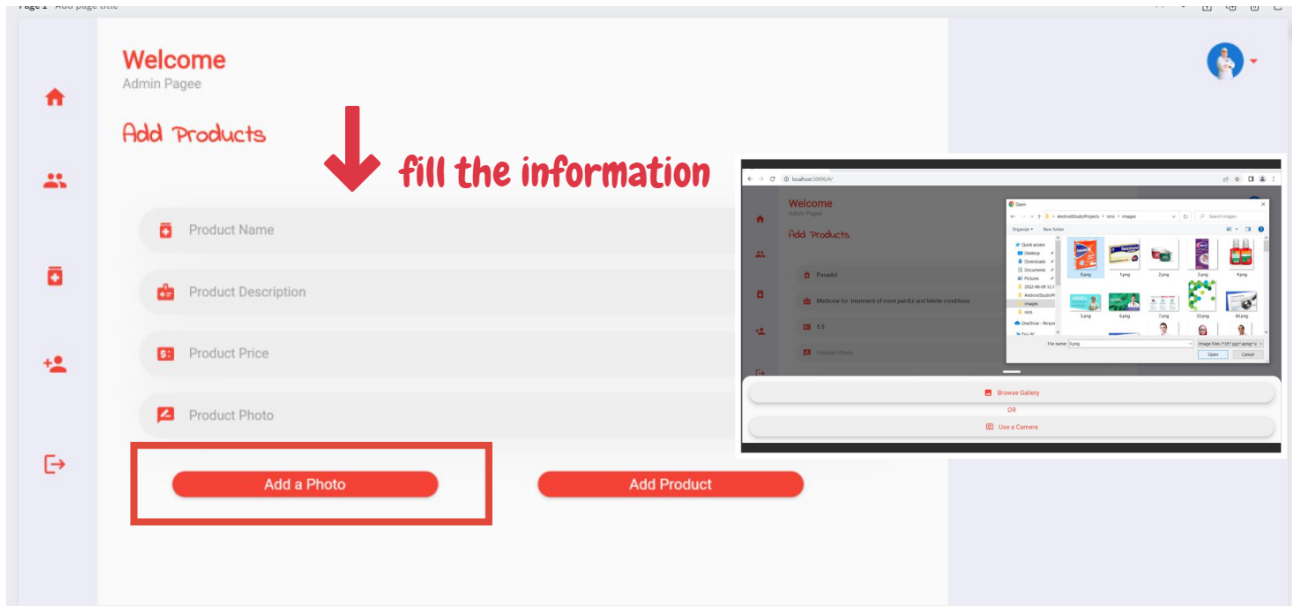
  
 Add Doctor

  
 Add Product

  
 Profile

  
 View Doctors

*Note: A red arrow points to the 'Add Product' button, and a red box highlights it. A red arrow also points to the 'Add Product' icon in the sidebar menu.*



❖ Profile (As Admin & User before)

## **6. Conclusions and Recommendation :**

### **6.1 Conclusion:**

We were able to create a 'Care Zone ' application as a solution for many problems that face Doctors and Patients.

### **6.2 Recommendations:**

In order to improve the application, we can add Several hospitals for the application, so that in emergency cases, the hospital closest to the patient is chosen.

### **6.3 What we learned:**

Flutter framework with dart language

On the Server side we used Node js language with an express framework.

## **7. References**

[1] Dr.Sulaiman al habib app

[2] <https://pub.dev/>

[3] <https://www.mongodb.com/docs/manual/>