

# AN ANDROID APP TO HELP THE ELDERLY

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## UM APLICATIVO ANDROID PARA AJUDAR OS IDOSOS

**RESUMO:** Em geral, os idosos possuem conhecimentos básicos de informática, portanto, apresentam limitações para aproveitar os avanços tecnológicos. Em especial, muitas pessoas não sabem utilizar algumas funções do celular, pois não estão preparadas para se adaptar a pessoas com pouco conhecimento, como os idosos. Este artigo descreve uma aplicação Android composta por vários módulos funcionais que visa simplificar o acesso a algumas das funções mais utilizadas pelos idosos, tornando-o simples e intuitivo. Especificamente, foram selecionadas as funções de gerenciamento de contatos, gerenciamento de aplicativos e gerenciamento de medicamentos que as pessoas devem tomar. Desta forma, uma pessoa com pouco conhecimento pode utilizá-los e configurá-los.

**PALAVRAS-CHAVE:** App android, idosos, acessibilidade, medicamentos, agenda digital.

**ABSTRACT:** In general, older people have basic computer skills so they have limitations to take advantage of technological advances. In particular, many people do not know how to use some mobile functions, since they are not prepared to adapt to people with little knowledge, such as the elderly. This article describes an Android app made up of several functional modules that aims to simplify access to some of the functions most used by older people, making it simple and intuitive. Specifically, the functions of contact management, application management and management of medicines that people must take have been selected. In this way, a person with little knowledge can use and configure them.

**KEYWORDS:** Android app, elderly, accessibility, medicines, digital agenda.

## 1 | INTRODUCTION

Currently, the use of mobile devices

has spread, being used for a wide variety of daily tasks (Islam et al, 2010). However, a minimum knowledge is required to use them, and not all people have it. Thus, a specific case is the elderly. In general, this part of the population has an analog background, and they have difficulties handling digital devices (Wong et al, 2018), such as mobile phones. In this sense, if you try to teach any elderly person with difficulties (Devos et al, 2015) using a smartphone to use these complex applications, they will end up frustrated.

Mobile phones offer a large number of application possibilities to solve the needs of the elderly (García-Peñalvo et al, 2014), such as the use of sensors to measure vital signs and control their health, a reminder tool for activities that must be carried out, such as (Jansen-Kosterink et al, 2020) taking medicines or medical appointments (Anthony Berauk et al, 2018), calendar of contacts and events, and other functions. However, the configuration of mobile phones does not offer configuration options (Kalimullah et al, 2017) for this sector of the population (Díaz-Bossini et al, 2014), nor integrated applications (Portenhouse et al, 2021) that cover all these types of needs (they are scattered in different apps). This situation makes it difficult for mobile adoption to take advantage of all these possibilities (Reyes et al, 2018)

In this article, an Android app is presented that is designed to integrate a set of applications and functionalities that are useful to the elderly and offer them in a simple and intuitive way that requires a very simple knowledge of how to use a mobile. Through this application, in an autonomous way, users can manage applications as basic as a contact list, organize a main screen with their favorite applications, and take advantage of the potential of applications through a medication reminder.

There are applications that implement functionality similar (Sarkar et al, 2019) to the one presented in this article, although none of them have all the implemented features. First of all, there is the native application of any Android phone (Basu et al, 2019) that offers functions such as the creation of contacts with different information fields, the configuration of antispam filters for calls or synchronization with the cloud. Another app is Pixel Launcher (De León et al, 2021), which is a launcher that comes installed on Android phones that can be customized. In general, it consists of several home screens where you can add applications or widgets, and a drawer where all installed apps will be. Among its main features, there is the possibility of modifying the elements of the screen by holding down, a news screen, and access to the Google Search search system. Finally, the MyTherapy application (Gao et al, 2013) allows you to set up a free medication reminder with alarms, keep track of the medications the user is taking, perform long-term follow-ups, keep track of measures such as weight or blood pressure, as well as the possibility of manage a health diary.

The article is structured as follows. Section 2 describes the objectives of the system. Section 3 presents the architecture and the data model used. Next, section 4 describes the implementation of the functionality carried out. Finally, section 5 presents a set of conclusions and future lines of work.

## 2 | OBJECTIVES

The main objective of the work is the implementation of an application with three functional modules, which allows the elderly to use a smartphone in a simple and intuitive way.

This objective is broken down into the following more specific objectives:

- Development of a functional module that allows calls to be made through a digital dialer or using a previously loaded contact list. In addition, it will offer the possibility of modifying the contact list, through basic operations of adding, editing and deleting a contact. It will also include a basic call log.
- Development of a module with the functionality of a launcher<sup>1</sup>, where the user can see the installed applications and run them. In addition, you will also have the possibility of adding the ones you use the most to a main menu.
- Develop a module that allows the user to see the medications that he has to take in the day, as well as their total. You will also be able to establish reminders, mark the medications taken, or modify the set of medications, being able to add, edit, and delete. Each medication will have different fields, such as the times of day to take it or a date range.

And for this, 3 functional modules have been implemented:

**Call module.** It is made up of the following functions:

- Consult favorite contacts: The user will be able to see the favorite contacts.
- Call a favorite contact: The user will be able to make a call to a favorite contact, without having to enter their phone number.
- Consult contact list: The user will be able to see the contact list.
- Add a contact: The user will be able to add a contact.
- See details of a contact: The user will be able to consult the information of a contact.
- Edit a contact: The user will be able to edit a contact.
- Call a contact: The user will be able to make a call to a specific contact, without having to enter their phone number.
- Delete a contact: The user will be able to add a contact.
- Consult call history: The user will be able to consult the call history.
- Make a redial: The user can make a redial to a number from the call log view.
- Call by dialing a phone number: The user can make a phone call.

**Launcher module.** It is made up of the following functions:

- Consult installed applications: The user will be able to view the list of installed applications.

- Launch an application: The user will be able to view launching an application installed on the system.
- Edit shortcuts: The user will be able to edit the shortcuts on the main screen.
- Change order of shortcuts: The user will be able to edit the order of the shortcuts on the main screen.
- Change wallpaper: The user can change the wallpaper
- Consult shortcuts: The user will be able to view the list of applications with direct access.

**Medicine module.** It is made up of the following functions:

- Consult medication list: The user will be able to see the saved medications.
- View details of a medication: The user will be able to view the details of a medication.
- Edit a medication: The user will be able to edit a medication
- Delete a drug: The user will be able to delete a drug.
- Consult today's medications: The user will be able to see the medications that must be taken today.
- Mark medicine as taken: The user will be able to confirm that he has taken the medicine.
- Add a new medication: The user will be able to add a new medication.

### 3 | ARCHITECTURE OF SYSTEM.

The application has been developed using a Model-View-ViewModel pattern that allows the view (Activity or Fragment in the Android SDK) to be decoupled from the application logic. The layers that compose it are the following:

- Model layer: It is responsible for the abstraction of the different data sources. It works together with the view model to save and/or retrieve data.
- Layer of the view: It is in charge of informing the model of the view of the user's actions. It does not contain any logic and simply waits for changes via an observer.
- View model layer: Its main function is to link between the model and view layers. If the user interacts with the interface, it takes care of passing it to the model, and when the model updates, it notifies the view.

Regarding the data model, the different modules of the developed app will be considered. The telephone module stores the information of the contacts and the call log in the operating system. For this, the contact provider component and the call log provider

respectively are used. The contacts provider manages the central repository of people on Android devices and maintains three types of data about each person, which corresponds to a different table:

- Table of raw contacts (RawContacts). A raw contact represents a person's information that comes from a single account type and account name. This is because data from different services is supported for storing contacts. Most data is stored in one or more rows of the data table (Data), where each row contains a column with the identifier of the parent row in it board.
- Data Table (Data). Contacts linked to a raw contact ID are saved. This allows a contact to have multiple instances of the same data type, for example a landline and a mobile phone, which are saved as separate rows but linked to the same raw contact. Depending on the type of data, the generic ones have different meanings, and go from DATA1 to DATA15. The first is generally used for the most frequent data.
- Contacts Table (Contacts). This table contains the combination of raw contact rows of all account types and names. This facilitates internal management of contacts, whether to view a contact or modify it, since it is possible to create new raw contact rows in an existing contact.

The call log provider is made up of a single table called the Call Log Table (CallLog), so that access to the call log content is accessed using the Content Provider. This table contains all calls, both incoming and outgoing, as well as missed, made through the device.

Besides, the launcher module shows the complete list of applications on the one hand and, on the other, a list of favourite applications as a "shortcut". That is why it is not necessary to implement a database as such, and a mapping structure that stores key-value pairs is used. The key is going to be obtained by concatenating the application package with its name, and the value has a more complex logic, since it either stores the position it occupies in the list, or contains the value -1. This is done in order to maintain order while simplifying the data structure. In this way, when the user adds a new application to the shortcuts, it is only necessary to consult the number of applications with direct access, to later store it with that value, and increase it by one.

Lastly, with respect to the medicines module, there is a table related to the information of a medicine and on the other, the reminders that are going to be generated based on the medicines.

## 4 | IMPLEMENTATION

This section describes the functionalities implemented.

### 4.1 Launcher module

In order to use the application, access the main menu of the device and search for

the SimpleLauncher application. By clicking on it, the mobile will recognize the launcher and ask the user to set the application as the home application. The user must choose the “Always” option (Figure 1)

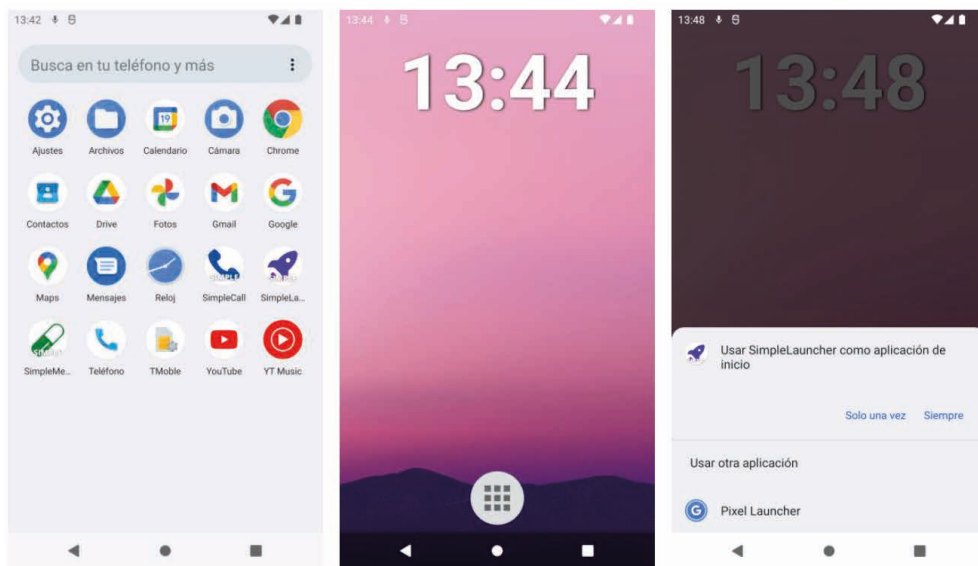


Figure 1. First start of the application

The first time the application is started, an empty desktop is shown, only with the time and a button that leads to the application box. By clicking on it, a list with the installed applications will open, and by means of the button with the three points located at the top, it is able to modify the shortcuts, their order and the wallpaper (Figure 2)

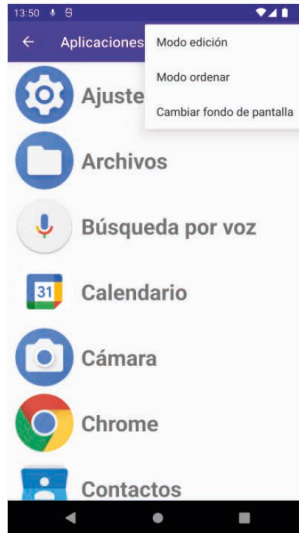


Figure 2. Application view

Next, in order to change the shortcuts, the user must press the “Edit mode” option. Once this is done, a checkbox will appear in each application, which the user must press to add an application. Once ones have been selected, to exit then it must be pressed the three dots button again. When it has been performed this action, an informative message will appear on the screen (Figure 3)

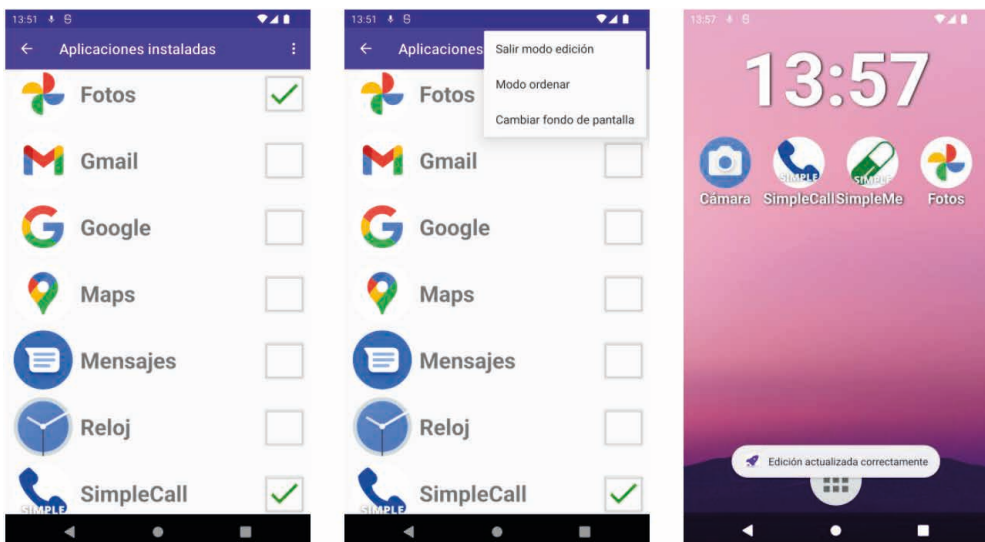


Figure 3. Screen to change shortcuts

Besides, in order to change the order in which the applications appear in the main menu, the user must press the “Order mode” option. Now only those applications with direct access will appear and the user must interact with the arrows to change the order. As in the previous option, when finished, a message will appear on the screen (Figure 4)

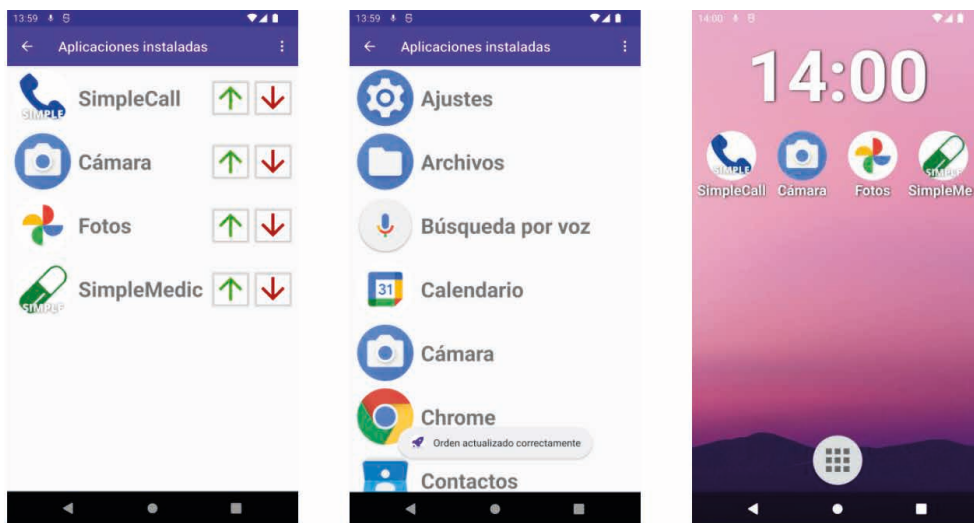


Figure 3. Screen to sort apps

Last, in order to change the wallpaper, follow the same steps, selecting the option “Change wallpaper”.

## 4.2 Call module

In order to access the calls module (Figure X), click on the icon of a telephone with the name “SimpleCall”. Next, some permissions are requested that must be accepted. If there are any contacts stored in the device, they will be listed directly (same for the call log). To navigate through the module, the user will click on the buttons at the top.



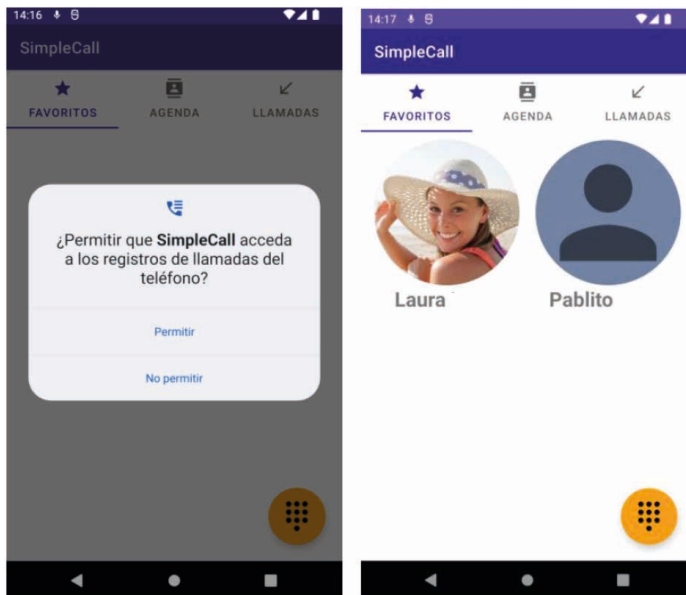


Figure 4. Start of the call module

The main functions on contacts are:

- View details of a contact and edit. The user consults the “Agenda” section and selects a user. To edit, click on the icon with the pencil located in the lower right corner. Once the edition is done, press the save icon. You can also delete the contact by pressing the trash can button (Figure 5)

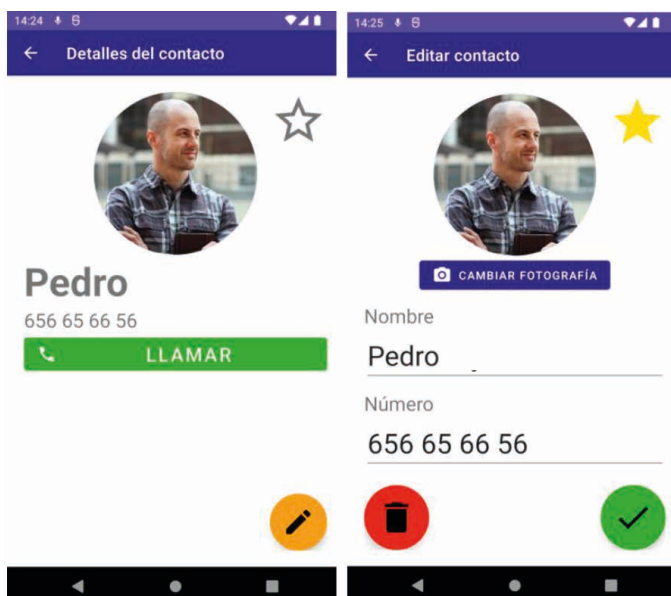


Figure 5. View and edit a contact

- Call a contact. The user must press the call button. It is also possible to make a call from the favorites tab or the call log. In this case, click on the desired contact. If the user wishes, manual telephone dialing can be done through the icon at the bottom of the main screen. The user must enter the number and press the call button (Figure 6)

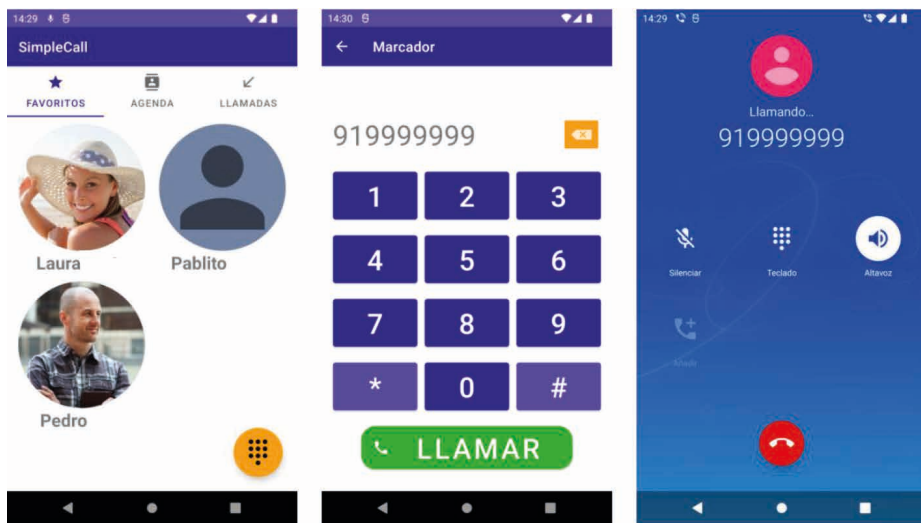


Figure 6. Dialer phone call

- Add new contacts. From the agenda view, click the “Add a contact” button, located at the top. As a result, a new window will open to fill in the data of the new contact. In order to save it must be pressed the green button (Figure 7)

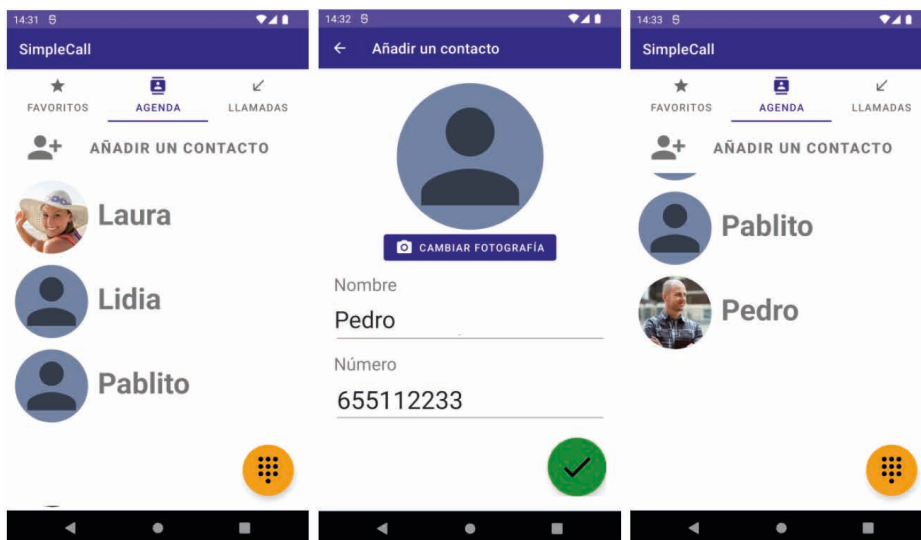


Figure 7. Add new contacts

### 4.3 Medicine module

In order to access the module medicine, the user must press the start button and search for the “SimpleMedicine” application. At the beginning, there will be no medicine, so the user must press the orange button in the lower right corner to add a new one (Figure 8).

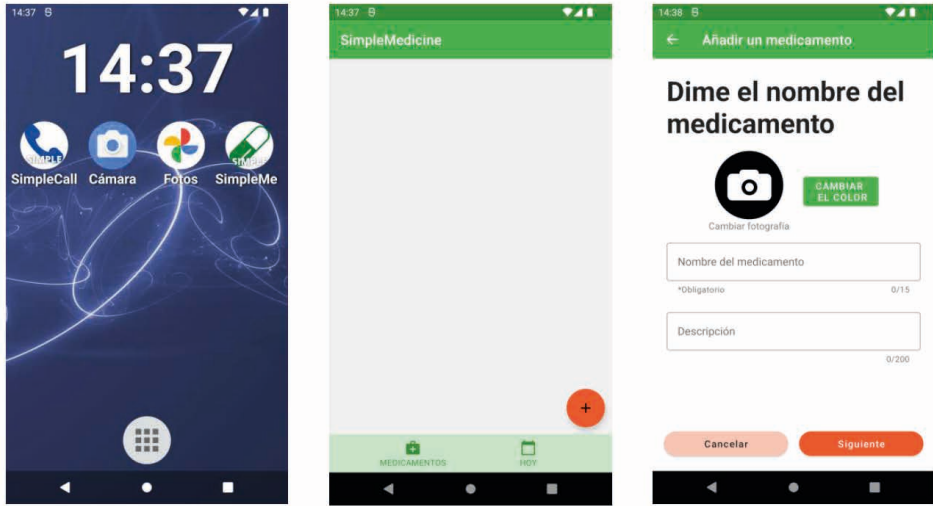


Figure 8. Start of the medicine module

Next, the user will fill in the different screens, advancing by pressing the “Next” button. When the user reaches the last screen, the “Save” button is pressed, and the medication appears in the medication list and the corresponding notification (Figure 9).

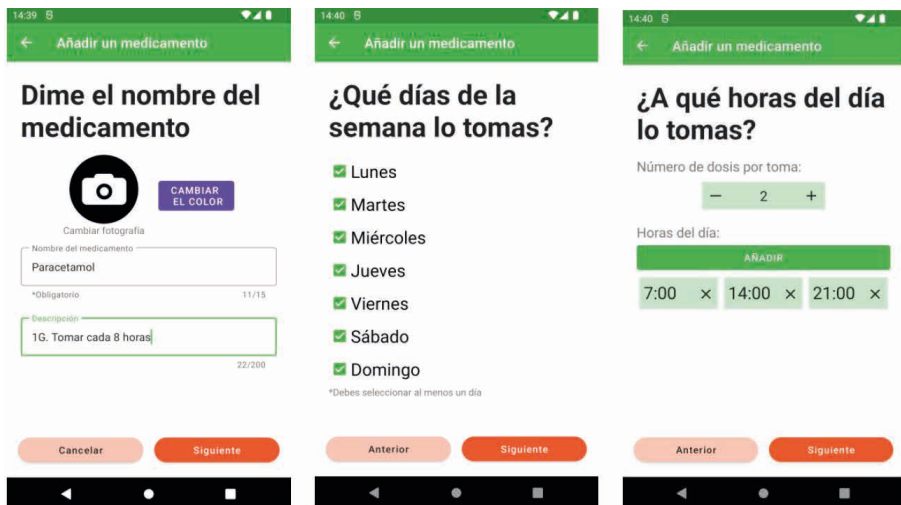


Figure 9. Add a medicine

The user can view the details of a medication by tapping on it, and edit or delete it using the icon with the three dots that appears at the top (Figure 10).

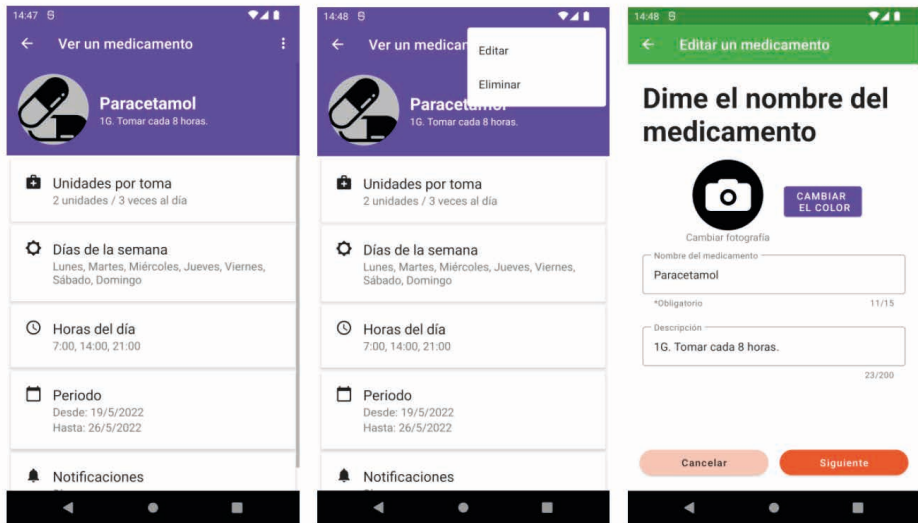


Figure 10. View details of medicine

On the other hand, the user can mark as completed those notifications whose medication has already been taken. To do this, click on the button with the green check, which will become disabled. If there are several medications with the same time, they will appear grouped in the same notification (Figure 11)

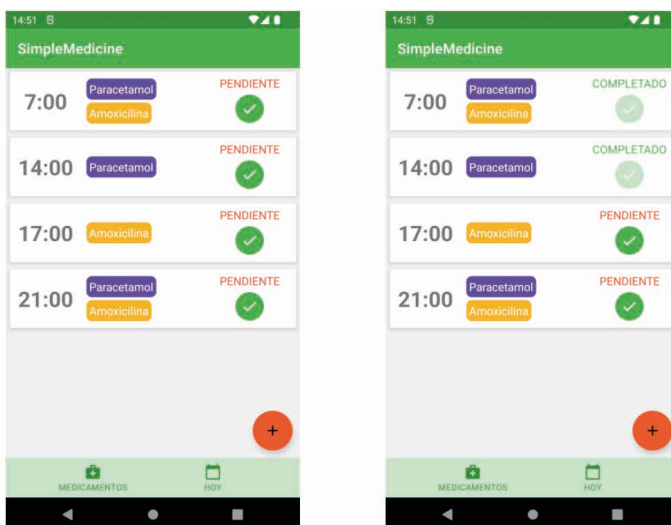


Figure 11. Confirmation of medicines

Finally, the application will send a notification to the user to let them know that the medicine must be taken (Figure 12).



Figure 12. Notification

## 5 | CONCLUSIONS AND FUTURE WORK

In this article, an Android application has been presented that aims to help the elderly to access the functions of a mobile in a simple and intuitive way. For this, an interface has been developed that allows managing basic functions on a contact list, making phone calls, launching third-party applications and managing the medications that a person needs to take without depending on anyone. In this sense, the application is designed for people with basic knowledge of using mobile applications.

However, the application can be improved. In this sense, there are the following lines of future work:

- **Settings function:** The application could integrate a settings service where you can configure the size of the text or limit the actions that the user can do to adapt to the physical capabilities of the users.
- **Accessibility by voice:** It consists of adding a button on the mobile where some of the functions of the mobile can be managed by voice.
- **Improve notifications:** It consists of expanding the information of the notifications with specific information on the medicines.
- **Video calls:** It consists of adding functionality to the calls module to offer video conferences.
- **Manage doctor's appointments:** It consists of adding one more tab in the medication module that allows users to add doctor's appointments.
- **History of medications:** This function would manage a history of medications using the system calendar.
- **Report errors:** This functionality would allow reporting errors or making suggestions to users to improve the application.

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