

# “See Medication”: An Arabic Assistive Mobile Application for Asthmatic Visually Impaired Patients

Afnan F. Alsadhan<sup>1</sup>, Sarah M. Bin Mahfodh<sup>1</sup>,  
Nada M. Alsuhbany<sup>2(✉)</sup>, Hind A. Bin Ajlan<sup>1</sup>,  
Hana A. Al-Alashaykh<sup>2</sup>, Asma A. Alzahrani<sup>2</sup>, and Rafeef M. Aqel<sup>2</sup>

<sup>1</sup> College of Computer and Information Sciences, King Saud University,  
Riyadh, Saudi Arabia  
aalsadhan@ksu.edu.sa,

{sarah.binmahfodh,hind.binajlan}@gmail.com

<sup>2</sup> College of Pharmacy, King Saud University, Riyadh, Saudi Arabia  
{nalsuhbany,hana.alashaykh,rafeef.aqel}@gmail.com,  
aaz.alzahrani@yahoo.com

**Abstract.** This paper introduces the development of See Medication system that helps visually impaired patients or low-vision patients who are suffering from asthma to know about their medications by VoiceOver. “See Medication” is an interactive healthcare system that works as a channel between mainly asthmatic visually impaired patients and pharmacists. This system consists of two components: mobile application and website. It is available in two languages: Arabic and English, in order to serve a broader population. The aim of the application is to improve the quality of utilizing asthma medications and raising the independence of visually impaired patients.

**Keywords:** Asthma · Visually impaired · iOS app · Pharmacy

## 1 Introduction

Asthma is a chronic disease of the airway of the lungs. Around 235 million people suffer from asthma. It occurs in all countries regardless of the level of development [1].

Nowadays, mobile technology is starting to transform into healthcare [2]. Since June 2014, a shift in the digital market has occurred, as the average daily use of health and fitness apps grew by 62 %, exceeding the use of apps overall, at only 33 % growth [3]. There are various medication tools that could help patients to identify their drugs and understand the instructions found in the market as a solution for this problem; such as pillboxes and medication reminders with sounds and alert. Some mobile applications on different platforms such as iOS and Android were developed to help asthmatic patients. The “Asthma Buddy” [4] application enables the patients to record their medications, email their action plan to their doctors and have access to education materials. The “AsthmaMD” [5] application helps to track the asthma condition and how medications are helping the patient. Also, it connects doctors to it so they could

conduct research. The “Use Inhaler App” [6] helps the patient to manage the inhaler technique by a video assistance and has a dose reminder too.

Despite the usefulness and benefits of the available applications that target asthmatic patients, visually disabled patients are still finding it not easy to identify their medications, and the need for assistive aid to help them safely recognizing their drugs and managing their medication use is also not fulfilled. Many pharmacists are facing challenges with visually impaired patients, either blind or very low vision patients, in tailoring the best care plan that fits their needs. The World Health Organization (WHO) estimated that 285 million people are visually impaired worldwide: 39 million are blind and 246 million have low-vision [7].

See Medication project targets all asthma patients, especially visually impaired patients by providing barcodes to all their medications and the ability of the mobile application to scan it and read it for the patient.

## 2 Method

This extended abstract presents “See Medication”, an interactive healthcare system that works as a channel between asthmatic blind patients and pharmacists. The system serves different types of users, so it involves an iOS mobile application for patients and a website for management, and both connected to one comprehensive database, which contains medication information, patient record and pharmacist log. “See medication” aims to help asthmatic patients to identify and utilize their medications effectively and to improve the independence of visually impaired patients.

### 2.1 Mobile Application

The application was developed for iOS devices. According to the consumer preferences presented in an article conducted by J. Morris and J. Mueller, that assessed blind and deaf preferences for Android and iOS smartphones. The percentage of blind smartphone users who prefer iPhone is 86 %, while only 18 % of the blind users preferred Android. In terms of ease of use, 85 % of blind iPhone users described their devices as ‘Easy’ or ‘Very easy’ to use. On the other hand, 42 % of blind Android smartphone owners described their devices as ‘Easy’ or ‘Very easy’ to use [8].

Visually impaired patients can easily use the application after enabling the VoiceOver on the device. And the application provides different features, which are as follows:

1. **Medication Scan** – it reads and displays medication’s information after scanning the medication’s QR-code on the container.
2. **Puff counter** – it counts and displays the number of remaining puffs in the inhaler.
3. **Medication List** – it shows all patients’ medications with details.
4. **Reminder** – it reminds the patient about his/her doses, time to refill, and expiry date of the medications.
5. **Weather Alert** – it notifies the patient when there is any dust in the air, so that he/she can take precautions.

- 6. **Peak Flow Meter** – it allows the patient to enter the last measured peak flow reading, to determine in which zone the patient is (Classified into three zones: green, yellow, and red according to the disease control status).
- 7. **How to use inhalers** – video and audio educational materials.

### 2.2 Website

The website works as management tool, where the administrator is authorized to register, delete and modify pharmacist. In addition, the pharmacists are allowed to register the patients, update patients’ profile, and update medications information, also to manage the patient’s action plan.

## 3 Results

The proposed “See Medication” project has two main components: the website and the iOS application. Figure 1 shows the scenario of the project in general. Pharmacist uses the website to add a new patient, whom is assigned to, with complete information that includes; demographics, new medication list and the action plan. Then, the website synchronizes all patient’s information on his/her installed iOS application on iPhone device. Patient is able to review the current medication list, including the each medication’s information, weather status, and receive medication notifications. Also patient can follow up his/her plan with puff counter function and peak flow functions.



Fig. 1. General scenario of see medication

### 3.1 Preliminary Evaluation

An evaluation was performed to verify the correctness as well as the accuracy of the application. A group of seven visually impaired people with a good experience in using mobile phones in daily life was invited to try the application using iOS7 smart phones.

The participants ranged in age between (18–30) years old. At the beginning, an introduction about the App and its functions was given with brief explanation about how to use it. Then, they were asked to utilize each function of the mobile application.

At the end of the test, the participants were surveyed about their experience. The answers ranged from strongly agree to strongly disagree. Table 1 shows the responses to the survey questions according to Likert scale (1 = strongly disagree, 5 = strongly agree).

**Table 1.** Mean response for seven visually impaired people. 1 is strongly disagree, 5 is strongly agree.

Usefulness as an assistive application	4.66
Ease of use	4.71
Reliability of the application	3.85
Satisfaction	3.28

The survey mean response results show a positive feedback of the application. However, the satisfaction had the lowest score, with emphasize on barcode method improvement to make it easier to handle.

## 4 Conclusion

In this extended abstract we presented the development of “See Medication” system. This system is designed to help asthmatic visually impaired patients to improve their independency, medication utilization, keeping the disease condition well controlled and to reduce the confusion between medications or medication overdose by facilitating their medication identification before administration, medications’ reminders to improve adherence, providing comprehensive and easy to understand information and instructions, sending alerts when medication is near to expire or when the weather is dusty. To insure the safety for the patient, “See Medication” enables pharmacists track the patients, and control their action plans.

For future development, See Medication will be developed for Android devices, to reach and help more patients.

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