

Mobile Application for Improvement of Self-Management of Type 2 Diabetes: Usability Pilot Test

Andreia PINTO ^{a,1}, João VIANA ^a, Glória CONCEIÇÃO ^a, Paulo SANTOS ^a, Cristina SANTOS ^a and Alberto FREITAS ^a

^a*CINTESIS@RISE, MEDCIDS, Faculty of Medicine of the University of Porto, Portugal*

Abstract. We intend to evaluate the usability of a mobile app developed for the self-management of T2DM. A pilot usability cross-sectional study was performed with a convenience sample of 6 smartphone users aged 45 years. Participants performed tasks autonomously in a mobile app to assess if users could complete them and filled out a usability and satisfaction questionnaire. About half of the tasks had a successful completion rate. The result of the usability questionnaire was 64/100, below the acceptable value, but the satisfaction value was considered good. This study was fundamental as it allowed us to verify which improvements should be implemented in the next version of the app, contributing to its better acceptance.

Keywords. Usability, tasks, mobile applications, Type 2 diabetes mellitus, T2DM

1. Introduction

Diabetes is one of the most prevalent diseases worldwide [1]. Taking into consideration the growing use of mHealth, the number of apps aiming to help patients with type 2 diabetes (T2DM) patients has increased. However, not all of them truly test whether the app meets the needs of its target audience [2]. This paper aims to evaluate the usability of the first version of a mobile app developed to help manage T2DM.

2. Methods

A pilot usability cross-sectional study was performed. We recruited a convenience sample of non-diabetics who were smartphone users and aged 45 years or older, as we just wanted to verify if the application had good usability. The mobile application has features to improve the lifestyle behavior of the participants, in particular for controlling and monitoring food, physical activity, medication, and glycemic control. Participants were asked to perform a set of 13 pre-defined tasks created to evaluate the implemented features, in particular, to check the operation of the food detection feature. In addition, the participants completed a usability questionnaire, namely the System Usability Scale (SUS), and also a satisfaction scale: User Satisfaction Evaluation Questionnaire (USEQ). The Ethics Committee Faculty of Medicine of the University of Porto approved the study.

¹ Corresponding Author: Andreia Pinto, E-mail: andreiapinhopinto@gmail.com

3. Results

The sample was composed of six participants, of which 67% were female and with an average age of 59 years-old. A maximum percentage of success was observed in about half of the tasks. The tasks that were least successful were mostly those that asked to edit what had been previously added. All participants were successfully able to identify a food through the photography option, though the meal recognition system was not always accurate. Regarding the questionnaires completed by the participants, a score of 64/100 was obtained according to the SUS, which was considered below the acceptable value (<68). On the other hand, considering a maximum of 30 possible points, the USEQ scale obtained a value of 23.5, which was considered that the app had good satisfaction.

4. Discussion

The pilot usability study was conducted to verify if the first version of our mobile app had good usability before we implement the next features. We verified that the food recognition system by photography was still not adequately accurate, and will need further improvements in next versions. However, participants understood how to use this functionality, since it was successfully completed by all of them. The resulting value of the score obtained by the SUS follows the identified problems, thus, being below what is considered acceptable for good usability, indicating that the app needs improvements. However, despite this, satisfaction was considered good and this is one of the essential steps for the intention of continuing to use the app and reducing the dropout values.

5. Conclusions

Despite having carried out a small study and with a convenience sample, it was possible to learn lessons for the next version and to obtain an app suited to the needs of users.

Acknowledgment

This research work was developed under the project Food Friend - “Autonomous and easy-to-use tool for monitoring of personal food intake and personalized feedback (ITEA 18032), co-financed by the North Regional Operational Program (NORTE 2020) under the Portugal 2020 and European Regional Development Fund (ERDF) with the reference NORTE-01-0247-FEDER-047381. Andreia Pinto was funded by FCT, Portugal under PhD grant number UI/BD/151485/2021.

References

- [1] Whiting DR, Guariguata L, Weil C, Shaw J. IDF Diabetes Atlas: Global estimates of the prevalence of diabetes for 2011 and 2030. *Diabetes Research and Clinical Practice*. 2011;94(3):311-21.
- [2] Baptista S, Trawley S, Pouwer F, Oldenburg B, Wadley G, Speight J. What Do Adults with Type 2 Diabetes Want from the "perfect" App? Results from the Second Diabetes MILES: Australia (MILES-2) Study. *Diabetes Technology and Therapeutics*. 2019;21(7):393-9.