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# Digital Allergy Card: Design and Users' Perceptions

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**Abstract.** This paper presents the design and the users' perceptions of a Digital Allergy Card for recording, sharing and tracing information on drug allergies.

**Keywords.** Digital allergy card, mobile application, healthcare, allergy, mhealth.

## 1. Introduction

The reliability of the label "drug allergic" is important because it guides the physician for drug prescription and treatment administration [1]. Therefore, the documentation of a drug allergy should ideally be detailed and allow for proper classification. Currently, there is no solution to reliably report drug allergies in all European countries, despite the various existing solutions such as oral transmission from patient to physician which is limited when the patient is unconscious, paper cards that can easily get lost, and drug allergy reports held in Electronic Health Records (EHR) that are not accessible to other hospitals [2]. Therefore, the European Academy of Allergy and Clinical Immunology (EAACI) encourages development of digital solutions for reliable and accurate documentation on drug allergies [3]. Our paper aims to present 1) the design of such a digital solution as a Digital Allergy Card (DAC), 2) the users' perceptions related to this DAC.

## 2. Design process

According to the EAACI's recommendation to design and implement a DAC to better manage drug allergy information we rely on the need to go through such a project. Firstly, needs were identified based on an analysis of the allergy information process, which highlighted the fact that at several levels of the process, information may be missing, unreliable or lost. Secondly, the modeling of the solution has resulted in the design of interactive mock-ups which were tested by six patients. The feedback from this evaluation was taken into account for the development of the first version of the app. The evaluation of this first version took place with five patients and five physicians.

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At the end of this process, we obtained an app that allows to collect, access, secure and trace drug allergy information under the control of the patient, except in emergencies situations where the physician may exceptionally access the patient's account without his or her authorization. To achieve this level of security, control and decentralization of data management in this app, we used a permissioned blockchain [2]. We have provided for physicians the possibility to use the app directly or to access it from their usual working tool. On the other hand, the evaluation iterations were conducted through functional testing with eleven patients (six for mock-ups and five for the app) and five physicians only for the app. Users testing was performed through interviews after the test of the app. We started with open questions on the interviewees' personal context concerning drug allergy and allergy card and their representation about a DAC, and then we asked them about their perceptions of the mock-ups or app that they have tested. Data analysis was performed using the grounded theory [4], as follows: data were first coded by a first code, closed to respondents' words; then, a more general coding was performed. Hence the users' perceptions presented below.

### 3. Users' Perceptions

At the end of the interviews, both patients and physicians reported insufficient usability and time consuming process for registration into the app. In addition, they stated several issues related to ease of use and usability. For example, a patient said that allergy information should be presented directly when the app was launched. The general practitioners outlined need of ease of use and interoperability with the clinical systems that they had already used.

Furthermore, physicians reported the need that the app provides guidelines on drug allergy diagnosis while patients reported the need to be led by a physician in recording information on drug allergy suspicion. In other words, they both feared to make information errors which would led to diagnosis errors. Moreover, for patients, the app was considered useful especially in mobility situation (travelling) or emergency as their daily care was provided by the same practitioners who had known their clinical history.

### 4. Conclusions

This paper presented the user centered design of DAC using a permissioned blockchain to record and share patients' information on drug allergy with high traceability and reliability. We reported here the users' perceptions on usability and usefulness. These perceptions are important both to improve the app and to target the communication for patients, i.e. especially for travelling and emergency situations.

### References

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