# MediCuris - Secure Mobile Polling

## 1 Highlights

1. Smartphones are in everyone's hands, but many people are unwilling or unable to install apps.
2. Meanwhile, there is an entire class of problems that can be solved by secure, private polling of people.
3. A smartphone polling mechanism, so long as it does not need an app to be installed, is a great solution.
4. Problems include Patient Reported Outcome surveys in healthcare, or voting in elections, or even newsgathering in hostile environments.
5. In healthcare, we further enhance the usefulness of polls by integrating IOT devices for physical measurements along with the polls.

## 2 The problem

While smartphones are ubiquitous, installing and using specialize apps is difficult for many users. The typical voter may not be tech savvy at all, may not know how to download and install an app. Similarly, the typical patient may not even be able to create an account or remember a password. Additionally, the very act of downloading an app is a breach of privacy, requiring the user to divulge his or her identity to a third party, viz., the appstore.

As a result, we are unable to utilize the already available, economical and powerful mobile technology for many otherwise ideal applications where the convenience of mobile technology would benefit users and increase participation. In healthcare, it could save lives and decrease costs or, in the case of voting, it could increase participation which is the very first requirement of democracy.

The types of polls we are considering have non-negotiable privacy and security requirements. Not only must the privacy of the polltaker be protected, but also the results of the polls must be protected, wherever they are stored.

In summary, our problem is one of creating a non-app solution that can guarantee privacy and security, while still using the public networks and off-the-shelf smartphones.

## 3 The solution

We use specialized web-apps, whose links are transmitted via text messages or emails along with several other technological innovations to guarantee security and privacy.

The use cases we consider are quite typical. For example, extended monitoring and polling, e.g. after a surgery, can help a doctor assure that his patient is not developing any complications. Another example is to rule out an alternate prognosis by letting the doctor be more confident in his decision-making via passive observations after a visit. Such follow-up care and monitoring can be expensive if they necessitate hospital visits.  At the same time, it is safe to assume that most patients already have smartphones and are quite comfortable using them.  We utilize the ubiquitous smartphone and increase monitoring without increasing hospital visits and achieve substantial improvements by utilizing the time of the doctor/nurse more efficiently.

Finally, the entire system is initiated by the doctor if and only if he/she thinks it is advantageous. And it can be terminated by the doctor at any time too.

Our cloud based system also assures the benefits of electronic data storage and integration with other systems, including research and development, that we now take for granted.
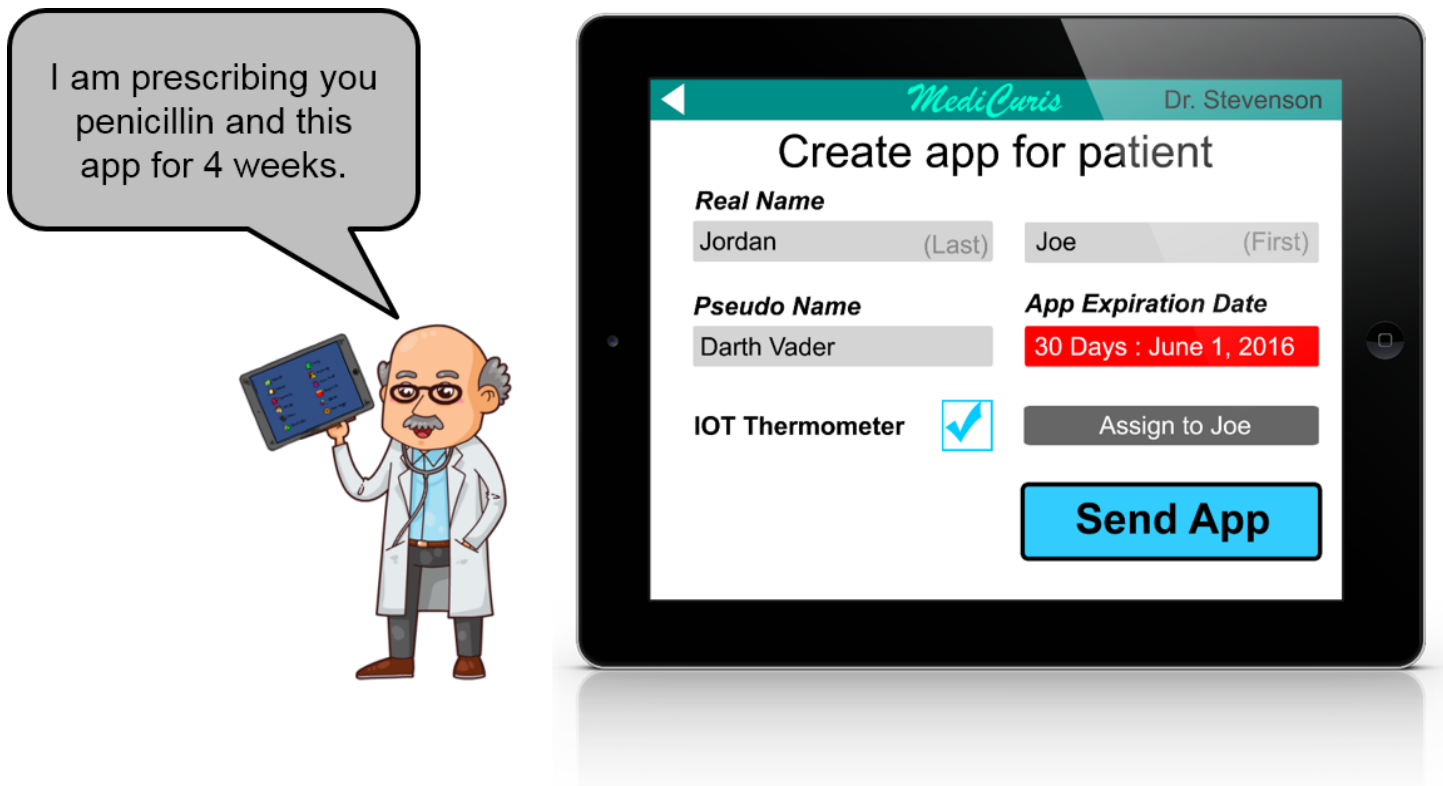
# 4   How it works

When a doctor or nurse determines that a patient need more direct access or monitoring, a custom web-app is created, by the doctor specifically for that patient. This app is not only encrypted, but does not even require any login. The identity of the patient is completely absent in the app, thereby guaranteeing ultimate privacy. The doctor 'sends' this app to the patient via text or email. For the patient there is no further action required, no login to remember, and there is no trace in some app store of ever having downloaded app. The app can contain questionnaires, the ability to chat, upload pictures or even chat as decided by the doctor. New questionnaires can be added after deployment. Like any prescription, the app can have a time-limit, after which it will be deactivated.

As the patient uses the app and uploads information or answers questions, the doctor can see them at his own time, via the iPad app where the true identity of the patient is decrypted and made available. By avoiding real-time communication, the doctor or nurse is allowed to better utilize his time instead of live communications which are more demanding of his time.

Finally, utilizing IOT, the doctor can add thermometers or other devices, provisioned over the air, to the app so that the results are made available to him.

The MediCuris system requires no significant hardware installation or large upfront financial investment by the hospital or the doctor. It can also be deployed one doctor or nurse at a time.  Meanwhile, the data that is collected, is in

electronic form on cloud-based services and therefore can be used for all sorts of larger monitoring and analysis or the development of expert systems. In effect, the MediCuris system can offer, eventually, all the benefits of largescale enterprise-wide systems without requiring an upfront commitment and allowing a hospital or an individual practitioner to start small.

## 5   Doctors will not be overwhelmed

"**21% won't prescribe apps because it would generate an overwhelming amount of patient data**"
Source: https://www.prlog.org/12286663-quantiamd-poll-finds-physicians-are-split-on-use-of-medical-apps-and-42-believe-more-regulation.html

Doctors are busier than ever; the Health Resources and Services Administration reports a shortfall of 8,200 primary-care physicians.

In short, there are fewer doctors than we need and they are already busy. Our objective is not only to allow passive monitoring by use of 'patient reported surveys' but also to allow the doctor to have full control over when this data is reviewed by him. To be specific, doctors are concerned of a data-deluge that can happen if all sorts of measurements and information are sent to them without the doctors being able to have a say in what they need to see. Therefore, our platform is designed to give full authority to the doctor / hospital not only to choose monitoring type and initiation time but also to decide when such monitoring should be terminated. We believe that any successful technology introduced in the current healthcare eco-system must first have the doctors on board.

## 6   Current status

We have created the technological building blocks that are required to implement our goal of security and privacy. We are able to demonstrate these using real polls sent to a user. Given that novel technology is basis of our solution, we have made sure that the details of how security and privacy are guaranteed is already implemented and tested.

We are seeking seed investment for creating a patient reported outcome (PRO) survey system with real PROs, and a real hospital (preferably academic) to evaluate its functionality. We plan to use FDA approved PROs already in existence and our system satisfies basic HIPAA compliance.