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### mHealth users come in different types

It's worth remembering too that mHealth users will generally behave in one of two ways when engaging with an app. These are what I call 'initiators', who want to find a specific piece of information or do a specific task quickly or 'investigators' who are looking for general information or education.

So, if your target audience are initiators, for instance those wanting to book an appointment, focus on features which enable them to complete tasks in the smallest number of steps and minimise or discard any functionality which does not help do that. If they are investigators, for instance wanting to check symptoms, look at ways to give them fast and easy access to broad information, then identify ways to give them reason to return.

Don't also forget that if developing platforms and apps that will be shared by patients and professionals that the information recorded must be displayed in a way that is useful and advantageous for both parties and enables discussion and action that improves outcomes.

### You are not alone

Realise that no matter how great your mHealth app it won't be permanently at the centre of the user's universe. By virtue of the smartphone's ubiquity, something is going to distract or interrupt the user of your app - either in their surroundings or from the phone itself.

Keeping your mHealth app simple, intuitive with a clean, clear interface makes it less hard work for the user and allows the task to be completed faster so making them less likely to need to disengage from your app to do other things. But in the real world that is going to happen at some point so also ensure that it's easy to pick up from where they left off if disturbed. To make sure

this happens enable save states, break larger tasks down into smaller chunks, and put context throughout.

Bear in mind that mHealth apps are usually part of a more connected technology service offering (or at least should be) and therefore data ubiquity across devices and form factors is key. Deciding on the amount and type of data to store on the device vs storing in the cloud is important as it can effect performance as well as impact on security and usability.

### A design is never perfect

As the mobile marketplace constantly innovates treat your mHealth apps and platforms as a continuously evolving entities, using data from analytics, user feedback, and advances in technologies to constantly appraise and improve the experience. Don't ever ignore any piece of feedback that comes your way.

There is, however, a point where change becomes counter-productive. Once the app has achieved a critical mass of acceptance it needs to be stabilised before the early majority of users will commit to it.

### Would I really use this?

Don't develop in a healthcare bubble. Look outside of the field of mHealth for the best in consumer apps and see what features could be adapted for the healthcare user.

It's difficult too not to over-emphasise that your own experiences of the real world will put you at a natural advantage in designing the mHealth user experience - after all we are all patients with a vested interest in optimising our own health state.

But you have to be honest with yourself when building an mHealth UX. Ask yourself the question constantly - would I really use this and would I really value what it's going to do for me? ■

# The Path to Digital Health Nirvana is Paved with Data

By: Bill Simpson, Ph.D, Director Data Science at MEMOTEXT

We live in a world of data. Smartphones and powerful wireless networks have put the entire sum of human knowledge in our pocket. At the same time, these devices have completely changed how we interact with each other and the outside world. Today, we can talk to someone halfway across the world, order lunch, read the news or watch our favourite TV shows without ever looking up.

However, while the smartphone (and the internet at large) has revolutionized the way we do things, the health-

care industry remains stubbornly fixed. Despite the widespread adoption of digital health technologies over the past decade<sup>1</sup>, the patient (or "user") experience remains largely unchanged. Many patients must still physically visit a doctor's office to access any kind of care. Today's physicians have also never been busier. 59% of family physicians in the United States spend 16 minutes or less with an individual patient<sup>2</sup>. There is tremendous potential for digital health technologies to fill this gap and improve access, quality of care and patient engagement.

Despite this potential, currently available

interventions tend to fall flat. There are multiple reasons for this and it is unlikely due to feature lists, functionality or intervention cost. Instead, I would suggest that it comes down to patient relevance. In order for a health intervention to be successful, it has to stay relevant, even in the face of changing patient circumstances. For example, an intervention for weight management wouldn't be very useful if it couldn't guide the patient through both the weight loss and maintenance phases. This is the Achilles heel of many existing interventions, they answer a very specific need but are often inflexible and cannot adapt to an individual patient's needs.

So how can we change this? I firmly believe that answer is in the intelligent use of patient data. When we talk about “patient data” we really mean two things; subjective and objective data. Subjective data is data that is reported by the patient. How they are feeling, what their pain rating is or how many times did they take their medication last week? This data is extremely important for understanding what an individual patient needs from their intervention. Just as a physician would ask the patient questions when they are in the office, digital health technology can use patient reported information to add utility to the intervention. However, because of its inherent biases, there are downsides to relying solely on subjective data. Numerous studies have shown that subjective assessments often do not line up with their objective counterparts. A good example is sleep. When patients are asked to rate their sleep quality, it often has little or no correlation with how well their brainwaves say they actually slept<sup>3</sup>. In this way, objective data can be very powerful, providing an unbiased assessment of an important health parameter. The other advantage of using this type of data is that it can often be collected passively, eliminating the need for a patient to input the information. The advent of multiple wearable technologies has really expanded the types of objective data that can be collected. Blood glucose, activity, and sleep patterns are just some examples of available data that could be used by digital health interventions to increase relevance (and utility) for patients.

At MEMOTEXT, we believe in the power of data and we use it to build digital health interventions that improve patient outcomes by targeting medication adherence. To test how “actioning” patient data could improve patient outcomes, in late 2013 we partnered with Green Shield Canada (GSC) to develop a free hypertension and high cholesterol support program for eligible plan members. The goal of the program (Stick2It) was to offer supportive messaging and personalized reminders to improve adherence to medication and thereby achieve better long term health outcomes.

Plan members who signed up for the support program completed an intake survey and were asked how well they were sticking to their medication, what

kinds of supportive educational messaging they would like to receive, and what factors might prevent them from adhering to their treatment. In addition to collecting this subjective data, pharmacy claims information was collected (in real time) for each member. This allowed us to create automated refill reminders while also giving us an objective source of data to measure the outcome.

Based on their responses, members received messages (phone calls, texts, or emails) about their illness, diet and exercise advice and tips for maintaining a healthy lifestyle. The amount of messages members received from each category was based on their own subjective (reported) and objective (claims) data, creating a personalized program for each individual. Six months later, members completed another survey asking them again about their preferences for messaging and how well they were sticking to their medication regimen. These responses were used to further fine-tune the proportion of messages they received from each category.

This data-driven personalization strategy had a significant impact on patient medication adherence. The proportion of patients who stopped taking their medication after one prescription (what we call the “one-and-done”) was cut in half (13.5% of Stick2It members vs. 22.5% controls). Members enrolled in Stick2It also showed a good improvement in medication compliance rate. In total, 49.5% of Stick2It members were classified as “vigilant,” compared to

only 35.6% of the control group (Figure 1). These group differences between compliance rate categories suggest two important things. First, the Stick2It program helped individuals who were in the optimal range of adherence move towards the vigilant range, and second the Stick2It program helped individuals who would have completely stopped taking their medications move into the low and moderate ranges of adherence.

The results of this pilot with GSC showcases the potential power of using digital health interventions to action patient data and improve outcomes. The modern world is one of big data and with big health data just beginning to come online the future looks bright for innovators looking to get the most out of this information. We may never have Facebook or Google Now for health, but data oriented design of digital health interventions can certainly improve outcomes for patients. I look forward to seeing what the future will bring.

## References

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**Figure 1:** Compliance Rate (% of days members had their medication between 2 consecutive prescription refills) between Stick2It and control members.

Adherence Class Breakdown: Low: <50%; Moderate: 50-79%; Optimal: 80-99%; Vigilant: >100%