

EVALUATING SUCCESS FOR BEHAVIORAL CHANGE IN DIABETES VIA MHEALTH AND GAMIFICATION: MYSUGR'S KEYS TO RETENTION AND PATIENT ENGAGEMENT

mySugr

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BACKGROUND

The logbook, or journal, is a powerful tool help a patient with self-management of diabetes. However, patients also often consider it as the most undesirable task prescribed by health care professionals in diabetes therapy after injecting insulin/collecting blood. The objective of this study was to determine the driving factors for behavior around this task and examine which methods and technology have achieved compliance amongst patients, in turn impacting their ability to maintain glycemic control.

*"73% of us do not document and of those few who do, more than 50% admit to not being truthful."*¹

- TOP 3 REASONS FOR NOT USING A LOGBOOK CORRECTLY OR AT ALL²**
- Low motivation (Typically due to negative or long feedback loops)
 - "Doesn't seem to be helpful"
 - Forgetting / Too Busy

- TOP 3 WISHES FOR IMPROVING LOGBOOKS^{2,3}**
- Have simple and straightforward use of the data
 - Receive feedback
 - Obtain support

METHODS

PART A
Multiple interviews/survey sessions were conducted in Europe, N. America, and the Middle East over a 6 month period. Over 600 people were surveyed who had Type 1 and Type 2 diabetes. They were each asked the same questions to determine if and how they were managing their diabetes data.

PART B
For the purposes of this study, data collected from trial mySugr UX-62366:42 was analysed. The trial was carried out as part of the usability engineering work required by IEC 62366:2007. Eligibility was restricted to patients with Type 1 diabetes (IDDM) aged from 10-50 years old, >1 year post diagnosis. 17 Type 1 diabetics were enrolled, average age of 12-48 (30.4 ± 10.2) years, duration of disease 16 ± 11.6 years, gender: 47% male, average hemoglobin A_{1c}: 7.0 ± 0.5.

PROTOCOL

Each trial participant was provided a tutorial to the mySugr diabetes management system's Companion Smartphone App. They were provided instructions on how to download the application and asked to begin using it from day one. Over the next ten months, monthly email sessions were used to answer users' questions and collect feedback. Within mySugr, the challenge system monitored progress of each user for specific challenges (like those for increased physical activity or blood glucose testing).

MEASURED OUTCOMES

Retention: An active user was defined as one that opened the app and entered data 5 days per week over a period of 12 weeks. The repeated activity of each user was carefully measured and usage patterns were monitored on a per entry basis.

Blood Glucose Testing: Users' testing habits were measured via total number of entries submitted per day.

Statistical analysis was performed using basic data mining algorithms implemented in SQL and the MixPanel API.

Additional Measurements: Hemoglobin A_{1c} laboratory blood test results were self-reported at baseline and again at the conclusion of the trial. Anecdotal observations in diabetes management therapy and decision-making were collected by trial coordinators.

Smartphone app and web service



FOR MORE INFORMATION

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RESPONSE

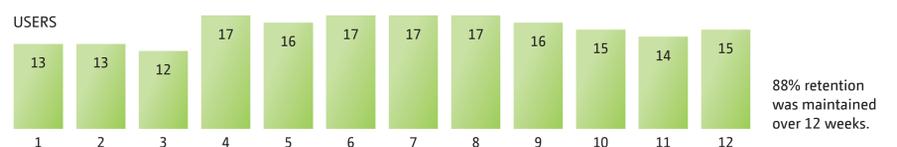
Based on survey response^{2,3}, we focused on the following elements of interaction for engaging and retaining users:

- MOBILE SOLUTION**
Today, people with diabetes are more likely to have their mobile phone with them than their diabetes equipment – so this platform should be used in order to provide a seamless addition to the 'diabetes toolkit'.
- USEFUL, PRACTICAL, & REAL-TIME SOLUTIONS TO DAILY ROUTINE**
In addition to the convenience of less hardware, the features of the offering must add enough value to merit becoming part of the daily routine.
- GAMIFICATION: FUN, SIMPLE, AND SOPHISTICATED**
Focus on the experience and offer rewards using challenges or points to encourage recommended actions and behavior. Pairing blood glucose tests before and after meals or activities would be a simple form of a challenge. Exclusive access online or otherwise (frequent flyer miles) is a popular reward example.
- COMMUNITY: CARING AND SHARING**
Interacting with your community needs to mean more: comparing numbers, helping drive new diabetes research, and/or sharing a profound connection with those in need. Connecting users becomes personal and emotional by linking their actions with emotional and humanitarian efforts such as saving lives.

RESULTS

RETENTION

Number of Active Users Shown by Individual Week



GLUCOSE TESTS PER DAY

An increase of 10-20% per user in the number of blood glucose tests per day was reported in all patients over the first 4 weeks and then remained stable for the remainder of the trial.

ADDITIONAL MEASUREMENTS:

HEMOGLOBIN A_{1c} LABORATORY BLOOD TEST

A reduction in HbA_{1c} levels was observed ranging from 0.4-1.4% (n = 8).

PSYCHOLOGICAL FACTORS

A majority of individuals in the trial reported both actions and reflections that suggested a higher level of understanding and confidence in their diabetes therapy and decision making.

WHAT DOESN'T WORK? AND WHAT WORKS WELL?

- WORKS**
 - Focus on experience
 - User centric evolution
 - Short term goals
 - Emotional effects
 - Humor
- DOESN'T WORK**
 - Scaring tactics
 - Focus on outcomes
 - Nagging

The peak usage was achieved during challenges with a deep connection to the user (as with Sante Diabete Mali and JDRF).

CONCLUSION

Mobile health apps now provide a new channel of access for healthcare professionals to influence the behavior of people with diabetes, however rarely do phone applications successfully engage and retain usage from users. The mySugr Diabetes Management System was used in a trial based on feedback from a large group of people with diabetes (n=643) and customized for their needs. In an independent group of 17 Type 1 diabetics (IDDM), the retention of active mySugr users was measured at 88% over a 12 week period. Further investigation showed that over the following 28 weeks, retention of these same users was measured at 70%. Alongside the significant retention achieved, self-reported clinical outcomes included a reduction of HbA_{1c} blood results, however further study will be required to understand which specific parameters contributed to these high levels of retention and which aspects triggered behavioral change. A randomized control trial investigating these factors for this new category of medical product is scheduled to begin in Q3 2013.

¹Compliance von Diabetikern - Nicole Arnold 2005 http://edoc.ub.uni-muenchen.de/4972/1/Arnold-Woerner_Nicole.pdf

²Survey of 643 type 1 and type 2 diabetics over 6 month period in German speaking Europe, 2011

³Interviews with 70 people with Type 1 diabetes (IDDM), globally, 2011