

Mobile Prescription Therapy: The Potential for Patient Engagement to Enhance Outcomes

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Introduction

Mobile health is an emerging field of medicine which aims to leverage technology to improve health outcomes. Mobile health resources may coach patients with chronic medical conditions in between provider visits and may deliver clinical decision support to providers at the time of the visit. The first mobile prescription therapy (MPT), WellDoc, Inc's BlueStar, (1,2) was launched in 2014 for patients with type 2 diabetes. We report here on initial measures of patient engagement based on analysis of de-identified observational data of BlueStar users.

Methods

Starting in 2014, medical providers have been prescribing the product for patients with type 2 diabetes. The software is downloaded onto smart phones with the iOS or Android operating systems. Users interact with the product on the phone or on a personal computer via a web portal. Data is encrypted and uploaded to WellDoc servers. For the purpose of this analysis, user data was de-identified in accordance with the Health Insurance Portability and Accountability Act of 1996 (HIPAA) Privacy Rule. In this initial view of user engagement data, we report observations from commercially-insured users from a health plan for a 6 month enrollment period. A single engagement was defined as a user accessing any feature of the device, such as entering a BG or a medication. Persistence is defined as one or more user engagements per month.

Results

Prescription Data

| Data collection period | Sep 1, 2014 – Mar 26, 2015 |
|----------------------------|----------------------------|
| Number of prescriptions | 226 |
| Number initiated | 198 |
| Users longer than 4 months | 137 |
| Mean A1C | 8.7% |
| Percentage A1C >7% | 79% |
| Mean Age | 53 (range 23 – 73) |
| Gender | 59%M |

Population demographics of MPT users shows that most users had uncontrolled diabetes and were older than expected.

User Entry Data: Web vs. Mobile

| Group | Web portal use | Mobile phone use |
|-----------|----------------|------------------|
| All users | 18% | 82% |

The majority of MPT users engaged with the product on their mobile device.

User Entry Data: Engagement

| Total engagements | 66,242 |
|-----------------------|--------|
| Medication entries | 28,977 |
| BG entries | 11,149 |
| User notes | 3,710 |
| Labs/exams/screenings | 1,521 |

Engagement with various MPT features was high among active users

User Entry Data: Engagement by Age

| Age group | Percent of total users | Percent of total engagements |
|-----------|------------------------|------------------------------|
| >60 | 27% | 34% |
| 50-59 | 43% | 42% |
| 40-49 | 20% | 19% |

Engagement was seen across age groups with higher than expected engagement in the >60 age group

User Entry Data: Persistence

| Engagement over time | | | | | |
|---------------------------------------|---------|----------|----------|----------|-----------|
| For users who activated MPT >120 days | 1 month | 2 months | 3 months | 4 months | >4 months |
| | 70% | 59% | 54% | 49% | 47% |

Over half of users were continuing to use this MPT product at 3 months

User Entry Data: SMBG

| Number of BG entries by meal types (n=11,149) | | | | | | | | |
|---|------|------|-----|------|-----|------|-----|-----|
| | F | BB | AB | BL | AL | BD | AD | BT |
| Number of BG entries | 1403 | 3734 | 929 | 1093 | 695 | 1587 | 964 | 744 |

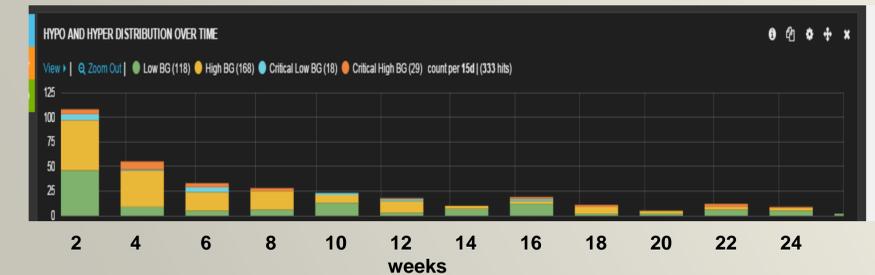
Users entered BG values across all meal types (F=fasting, BB=before breakfast, AB=after breakfast, BL=before lunch, AL=after lunch, BD=before dinner, AD=after dinner, BT=bedtime)

Change in BG values entered between day 1 and day 120

| Change in mean BG (mg/dL) | fasting | post-prandial |
|---------------------------|---------|---------------|
| | -31 | -16 |

The mean BG of users was lower after 120 days of use. Fasting BG improved more than post-prandial BG.

Hyper- and Hypoglycemia Trends



Reductions were seen in MPT users in extreme BG value entries over time (low BG<70 mg/dL, critical low BG<50 mg/dL, high BG>300 mg/dL, critical high BG>400 mg/dL)

A1C Trends

| A1C change (n=99) | | | |
|---------------------------|--------------|---------------------|--------|
| | Baseline A1C | 2 nd A1C | Change |
| mean | 8.72% | 7.87% | -0.84% |
| SD | 1.9 | 1.7 | |
| Two-tailed t test p=0.001 | | | |

A subset of MPT users reported a second A1C value. The mean A1C of the second value was significantly lower than the first.

A1C change by baseline A1C (n=99)

| Baseline A1C | n | Percent | Change in A1C |
|--------------|----|---------|---------------|
| <7% | 19 | 19.1% | 0% |
| 7-8% | 24 | 24.2% | -.3% |
| >8% | 56 | 56.6% | -1.4% |

The users who were in target at baseline maintained their target; as expected, the most improvement was seen in users with high baseline A1C values; 61% of users had a second A1C at target or improved by >=1%

Conclusions

In summary, high degrees of patient engagement are observed with this novel mobile prescription therapy platform. Engagement was surprisingly high in older users. Persistent use was seen across all age groups. BG values were entered across all meal types. Preliminary trends show improvements in BG entries as well as A1C reduction. This MPT platform appears to be an effective tool for engaging patients as key participants in improving diabetes-related outcomes.

References

- Quinn C et al. Cluster-Randomized Trial of a Mobile Phone Personalized Behavioral Intervention for Blood Glucose Control Diabetes Care September 2011; vol. 34 no. 9: 1934-1942
- <https://www.bluestardiabetes.com/>