DARIO HEALTH

Scientific Research Publication

Type 2 Diabetes Users of a Digital Diabetes Management System Experience a Shift from Greater than 180 mg/dL to Normal Glucose Levels with Sustainable Results

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Introduction

One of the goals of a digital diabetes management system is to improve patients' self-management and control of their condition. Self-monitoring of blood glucose is a valuable tool for helping users achieve and maintain target blood glucose levels to reduce the risk of diabetes-related complications. When performed and utilized properly, blood glucose tests for self-measurement of blood glucose allow users to determine their blood glucose level and to use the information as part of their treatment program.

Reducing blood glucose levels and sustaining lower ("in-range") levels is one of the greatest challenges in managing diabetes. Digital engagement can play a pivotal role in the care of patients with diabetes, potentially improving patient's glycemic control.[1]

Dario's Blood Glucose Monitoring System (BGMS) is a connected device. The blood glucose measurement is taken using a small glucose meter that connects physically to the user's smartphone. The blood glucose level is presented to the user via a dedicated smartphone application. The mobile app allows the user to enter additional data in the context of the measurement, that includes physical activity, mood, carbohydrates ("carbs") counting, diabetes type, insulin type etc.

The app utilizes the smartphone's internet connectivity to store the user's data on the Dario secured cloud. The system facilitates 100% data capture and synchronization to the Dario™ Cloud.

Methods

Exploratory data analysis was completed with raw data preparation, creation of overall population, study period and analysis using the following:

- Automated data captured during glucose measurement includes: blood glucose concentration, date, time and location of the measurement.
- Data voluntarily recorded or set by the user in the diabetes profile information in the mobile app includes: insulin intake (basal and bolus), diabetes type, time since diagnosis, target ranges and personal information.
- Selected population according to defined criteria such as: glucose measurements average, frequency of measurements and region.

A population of all active Type 2 Diabetes (T2D) users that took measurements with the Dario BGMS with an average of 20 measurements per month during 2017 was evaluated. The study assessed the ratio of all high blood glucose readings (180-400 mg/dL) and the ratio of all normal blood glucose readings (80-120 mg/dL) in their first month of use through to their last month of use during 2017 as recorded in the database.

Results

Considering 17,156 T2D active users during 2017:

- Average ratio of high blood glucose events (180-400 mg/dL) was reduced by 19.3% (from 28.4% to 22.9% for the entire range of measurements).

• The ratio of normal blood glucose range readings (80–120 mg/dL) increased by 11.3% (from 25.6% to 28.5% for the entire range of measurements).

• The most significant shift occurred after one month of usage (a 14% decrease) and remained stable over the following months and throughout the full year.

• Updated Analysis combining 2017 and 2018 data which totals 38,838 T2D active users and 3,318,014 measurements show comparable results of 180–400 mg/dL and 80–120 mg/dL ratios.

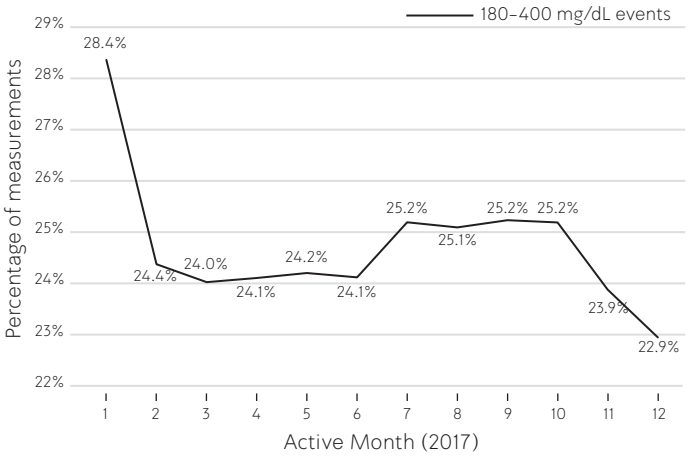

Figure 1: Percentage of High Glucose Readings among T2D, 2017
The graph represents the percentage of high blood glucose events (180–400 mg/dL) over a year for Dario users. The table summarizes the percentage of 180–400 mg/dL events from total measurements per active month (1–12) on average.

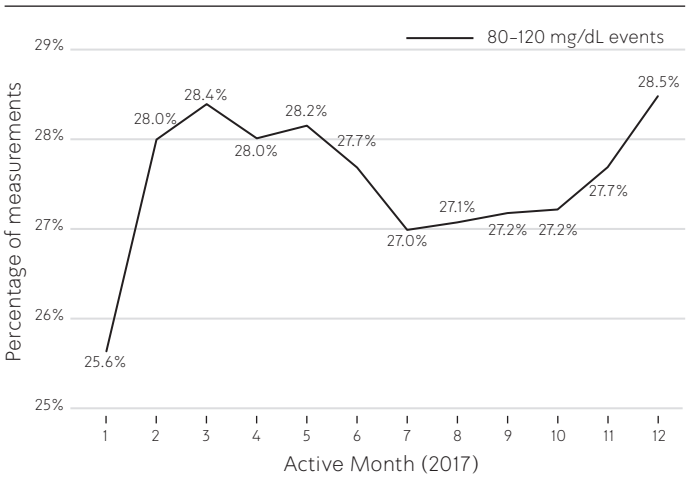

Figure 2: Percentage of In-range Readings among T2D, 2017
The graph represents the percentage of normal blood glucose events (80–120 mg/dL) over a year for Dario users. The table summarizes the percentage of 80–120 mg/dL events from total measurements per active month (1–12) on average.

Discussion

A large, real-world group of people with Type 2 Diabetes was used in this study to analyze important components of diabetes management in clinical practice.

Percentage of time in target range, i.e.70–180 mg/dL and percentage of time in hyperglycemic range, i.e.180 mg/dL and higher are metrics proposed to provide information to aid in achieving glycemic targets.[2]

According to the American Diabetes Association (ADA), keeping blood glucose at target levels helps people with diabetes avoid serious complications from the disease, and reduces postprandial glucose values to less than 180 mg/dL (10.0 mmol/L) may help to lower A1C.[2]
The results of the present study show a reduction in hyperglycemic measurements in Type 2 Dario users and sustainment of in-range blood glucose levels.

Those findings may be interpreted by the fact that the Dario App provides the users several features to understand their clinical results such as: Dario App color indication to the user on their measurement compared to their target range (red – low, green – in range, purple – high).

While opening the App, the main screen shows the in-range percentage of measurements that may motivate the user to improve. The App gives a set of graphs and a clear logbook in which the user can browse and easily learn the cause and effect of actions taken and the corresponding blood glucose levels.

These digital diabetes elements may help users to enhance their awareness, better understand and manage the condition, and consequently improve their clinical outcomes. Previous supported studies had shown that users of mobile digital platform had fewer hyperglycemic events compared to the control group and that the display of data from a mobile application can contribute to improving glycemic control. [3,4,5,6]

Conclusions

• The digital diabetes management platform solution may promote behavioral modification and create sustainable improvements in glycemic control that is not necessarily driven from increasing blood glucose measurements. The study demonstrates an improvement in glycemic outcomes and sustainment over a significant time period which exceeds one year.

• We have identified a large, real-world cohort of people with Type 2 Diabetes which was used to investigate important clinical components of diabetes management. This big data provides rich opportunities for pooling data and for exploring aspects of self-management and for therapeutic outcomes [7,8].

References

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