Estimated A1C Reduction in High-Risk Patients Over Two Years of Using a Digital Diabetes Management Platform

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Introduction

A digital diabetes management platform aims to improve diabetes self-management. Glycemic control is best evaluated by the combination of blood glucose average (BGavg) and A1C¹. Frequent fluctuations of blood glucose may contribute to diabetes-related complications ². Long-term management of type 2 diabetes (T2D) remains challenging to significant numbers of patients who may see improvements with the use of digital approaches to condition management. This study followed glycemic parameters observed over 2-years in patients using a digital management and behavior change platform.

Method

A retrospective study of high-risk users (BG avg >180 mg/dL equivalent to e A1c 8.0)² with type 2 diabetes that measured their blood glucose using the Dario[®] platform database over two consecutive years was performed. The minimum engagement level for inclusion was at least two blood glucose measurements per day on average taken in Month 1 and Month 24. Actual blood glucose readings were taken by the Dario meter and loaded into the cloud database. These were evaluated for the blood glucose average (BGavg), estimated A1c (eA1c) values and glycemic variability (by Standard Deviation; SD) following 24 months compared to the first month (baseline).

Results

 368 high-risk, T2D active and engaged users for at least consecutive 2 years were identified and assessed for their risk-level and insulin usage.

 A group of 148 T2D, non-Insulin users that started with a blood glucose average (BG avg) >180 mg/dl (equivalent to eA1c>8.0) consistently reduced their BG avg by 18% on average and sustained these values (179±45 vs. 219±56 mg/dL) following 2 years on the Dario platform (Figure 1, Table 1). Glycemic variability was reduced over two years by 20% on average (SD: 45 vs. 56) (Figure 2, Table 1).

• Substantial reductions were observed for higher risk groups (insulin and non-insulin treated). The subset that started with average BG levels > 212 mg/dL (eA1c >9.0) and average BG levels >240 mg/dL (eA1c >10) reduced their average BG by 22.5% and 25.7% respectively on average over two years. The equivalent reductions in eA1c were 1.95 and 2.42 percent (Table 1).



Figure 1: The graph represents the average blood glucose (mg/dL) over two years in T2D non-Insulin

Discussion

Clinical outcomes for users of the Dario platform were examined across two years.

• In this study users achieved a substantial sustained absolute blood glucose average reduction and glycemic variability reduction with an average of 18% and 20%, respectively over two years (Figure 1, Figure 2, Table 1). Reductions of this magnitude have been associated with prevention of serious diabetes complications ³. According to the American Diabetes Association (ADA), keeping blood glucose at target levels helps people with diabetes avoid serious complications ¹. • The present study reports two key clinical indicators BGavg (eA1c) and glycemic variability over two years, extending our previous progress reported on six months and one year. It examines the relationship between engagement on a digital management platform and clinical results at various time points. From baseline to two years, users starting with high levels of eA1C (eA1c > 9.0; eA1c>10.0) showed sustained reduction of 1.95 and 2.42 percent in their average levels and 20% in glycemic variability (Table 1). Digital health platforms have strong potential to make a difference in diabetes management by the confluence of connected devices, a software platform that provides behavioral support, and content delivery to improve clinical outcomes at lower costs. HbA1c is the most common metric to assess glucose control by providers and reflect the levels of blood glucose in the last three months. Closely monitoring blood glucose provides a clear view of glycemic variability and fluctuations. Hence, among the benefits delivered via the digital health platform are high and low glucose levels trends and their frequency along with blood glucose monthly averages that provide an indication of how high the patient's risk is 5.

• Digital diabetes management systems may help users to enhance their awareness, understanding and management of their condition. They demonstrate links between cause and effect which are individualized to users. Consequently, the system triggers behavioral change and improves clinical outcomes. This study demonstrates significant long-term, sustainable, reductions in BG avg (eA1c) and glycemic variability.

Conclusion

This study indicates the potential for a digital diabetes management solution to effect and sustain glycemic control improvements and demonstrates long term reduction of blood glucose average (eA1c) and glycemic variability in type 2 diabetes over two years. The system assists users through a variety of mechanisms including behavior modification in diabetes self-management and in long-term routines for self-care.

References

1. Diabetes Care. Standards of Medical Care in Diabetes. American Diabetes Association, 2020.

2. https://www.mayoclinic.org/tests-procedures/a1c-test/about/pac-20384643 Mayoclinic - A1c Test.

3. " Update on the treatment of type 2 diabetes mellitus" World J Diabetes 2016 September 354-395

Population			Blood glucose values						
N	Criteria	Analysis	BGavg month 1	BGavg month 24	Change in BGavg over 24 months	Glycemic variability	Baseline eA1c month 1	eA1C month 24	Change in eA1c over 24 months
			mg/dL	mg/dL	%	SD	%	%	%
N=148 T2D, Non-Insulin	BG avg >180mg/dL (eA1c > 8.0)	24 months	219 ± 56	179 ± 45	-18.3%	-20%	9.26±1.35%	7.88±1.8%	-1.42
N=147 T2D	BG avg >212mg/dL (eA1c > 9.0)	24 months	249 <u>+</u> 69	193 ± 55	-22.5%	-20%	10.31±1.8%	8.36±1.2%	-1.95
N=148 T2D, Non-Insulin	BG avg >240mg/dL (eA1c > 10.0)	24 months	273 ± 74	204 ± 59	-25.7%	-20%	11.15±1.2%	8.73±2.1%	-2.42

Table 1: Changes in blood glucose values over two years in T2D Dario users

Figure 2: The graph represents glycemic variability (SD) average over two years in T2D non-Insulin users

4. "Switch-over Study with Fast-acting Insulin Aspart Showing Lower Glycemic Variability in Type 2 Diabetics with Stage 4 Chronic Kidney 5. "Challenges in Diabetes Care: Can Digital Health Help Address Them?" Varun lyengar etal, Clin Diabetes. 2016 Jul; 34(3): 133–141.







