

Introduction

Meaningful interventions based on users collected digital data can play a key role in the management of diabetes, potentially improving how users manage their condition¹. In-range blood glucose level is one of the greatest challenges in managing diabetes. The Dario™ Blood Glucose Monitoring System (BGMS) automatically logs blood glucose measurements, and allows the user to log meals, carbs consumption, insulin intake, physical activity and other parameters into a designated App. All the data collected on the Dario App is stored in the "cloud" and is synchronized and analyzed on-line with the Dario Engage™ platform. The platform allows healthcare providers to review, assess and digitally intervene based on actual behavioral and clinical indicators. The Dario Engage™ platform includes the use of Dario blood glucose meter with the mobile App, weekly progress reports, feedback alerts, relevant content delivery and follow-up with dedicated professional via in-App chat, emails and phone calls.

Objective

The objective of this study is to examine whether digital intervention based on the Dario system contributes to better diabetes management.

Methods

A population of active users measuring with Dario for at least a month before enrolling to the Dario Engage platform (baseline) and having, at least, 3 months data on the Dario Engage was evaluated. Clinical outcomes examined were blood glucose average (BGavg), % in-range measurements (70-180 mg/dL) per the total number of measurements, and the % of population that reduced their blood glucose average below 140 mg/dL following 3 months of digital intervention compared to the baseline.

Results

- 162 users improved their blood glucose average over time (155±42 vs.165±49 on average).
- 45% (73 out of 162) reduced their BGavg under 140mg/dL (equivalent to estimated HbA1C of 6.5) following 3 months on average.
- Subgroup analyses of 101 users out of 162 started with BGavg >140mg/dL revealed an increase of 19% in % in-range (70-180mg/dL) measurements of the total measurements when compared to the baseline on average (65% vs. 54%), Fig 1A.
- Moreover, 51 users in high risk (started with BGavg >180 mg/dL) increased their % in-range measurements by 38% (48% vs. 35%) and reduced their BGavg by 14% (192±39 vs. 224±38.) on average, Fig 1B.

Discussion

- Mobile App-based interventions have been shown to improve blood glucose levels in adult outpatients with diabetes, especially in those with Type 2². Targeted blood glucose time-in-range may be a suitable descriptor of the efficacy and safety of glycemic stability and an index of the quality of care³. One of the international consensuses standardized CGM metrics is time in range 70-180 mg/dL. There is suggestive evidence from several recent studies, including an analysis of the 7-point self-monitored blood glucose (SMBG) showing correlations of time in target range (70-180 mg/dL) with diabetes complications⁴. In this study an increase of 19% of % In-range (70-180 mg/dL) measurements was observed in users with higher BG average and 38% increase in high risk users on average.
- BGavg of less than 140mg/dL is an important threshold. ADA suggests stringent A1C goals such as 6.5% (equivalent to 140mg/dL BGavg) for selected individual patients if this can be achieved without significant hypoglycemia. Moreover, keeping blood glucose at target levels helps people with diabetes to avoid serious complications from their condition⁵. The results of the present study show a reduction in blood glucose average while 45% of the population had improved their average below 140 mg/dL following 3 months.
- The present study findings may be interpreted by the fact that the digital intervention tools may be effective in promoting better understanding of the condition management: giving in-context care near a certain event. The self-care of the user becomes more efficient as one can more easily connect cause to effect. Moreover, the system, by giving the proper experience, helps the users in understanding their actual clinical status and effect of different behavioral action and by that help more effectively manage better their condition, and consequently improve their clinical outcomes.

Conclusion

Patients using a digital intervention platform have the potential to promote behavioral modification and enhance their motivation to manage diabetes, demonstrating better glycemic outcomes.

References

1. Lyndsay A. Nelson et al. "mHealth Intervention Elements and User Characteristics Determine Utility: A Mixed-Methods Analysis" Diabetes Technology & Therapeutics, 2017
2. Yuan Wu et al. "Mobile App-Based Interventions to Support Diabetes Self-Management: A Systematic Review of Randomized Controlled Trials to Identify Functions Associated with Glycemic Efficacy" JMIR, 2017.
3. James S Krinsley and Jean-Charles Preiser, "Time in blood glucose range 70 to 140 mg/dl >80% is strongly associated with increased survival in non-diabetic critically ill →adults" Critical Care (2015) 19:179
4. Battelino et al. "Clinical Targets for Continuous Glucose Monitoring Data Interpretation: Recommendations from the International Consensus on Time in Range". Diabetes Care (2019) 42:1593-1603
5. American Diabetes Association, Diabetes Care 2019.

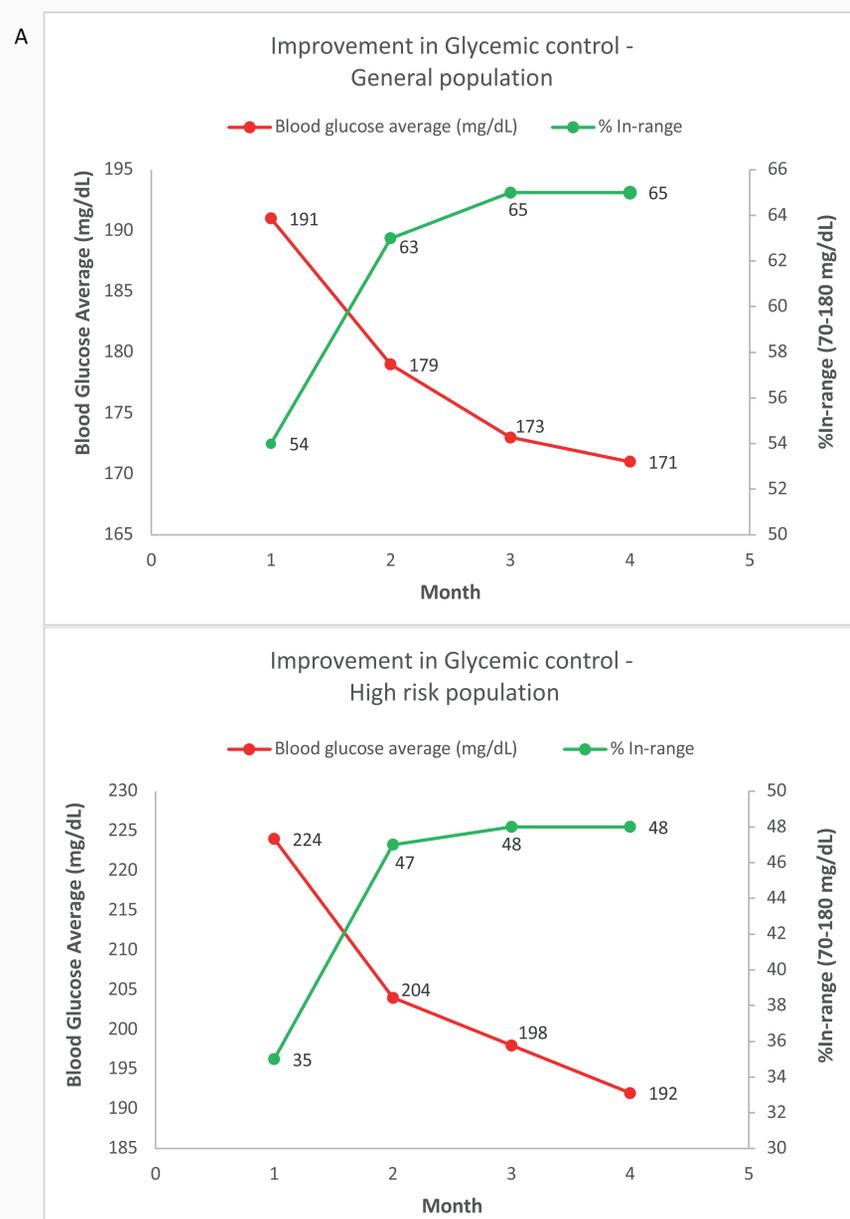


Figure 1: Reduction in blood glucose average and increase in % In-range under Dario digital intervention over 3 months [A] General population [B] High risk population.