Managing Diabetes in a Virtual and Physical Setting

Caccelli M*, Said Y, Mojado J, Palsky C, Hashemi A, Almarzooqi I

Department of Endocrinology, GluCare Integrated Diabetes Center, 268 Al Wasl Road, Jumeirah Dubai, United Arab Emirates

Corresponding Author*

Caccelli M

Department of Endocrinology, GluCare Integrated Diabetes Center, 268 Al Wasl Road, Jumeirah Dubai, United Arab Emirates

Email: milena@glucare.health

Received: 01-Mar-2022, Manuscript No. jdm-22-16535; **Editor assigned:** 03-Mar-2022, PreQC No: jdm-22-16535(PQ); **Reviewed:** 17-Mar-2022, QC No. jdm-22-16535; **Revised:** 19-Mar-2022, Manuscript No. jdm-22-16535(R); **Published:** 26-Mar-2022, DOI: 10.35248/2155-6156.1000925

Abstract

Introduction: Many factors have contributed to the global increase of Diabetes Mellitus (DM) and metabolic disorders worldwide. In the United Arab Emirates (UAE), the International rapid urbanization and socioeconomic development has led to an increased prevalence of diabetes, reaching 16.3%. In line with global patterns, adherence to recommended diabetes management in the UAE remains a challenge with low compliance. Clinical inertia, ineffective health system programs, lack of performance based reimbursement models, and outdated communication tools for physicians and patients are responsible for diabetes treatment failure over many years. Single-biomarker remote monitoring strategies, such as glucose monitoring, have demonstrated reduced medical spending due to lower mean glucose values. The GluCare care model encompasses two components, a physical component and a continuous digital monitoring component termed Remote Continuous Data Monitoring (RCDM) as a standard methodology of care for patients with diabetes. Continuous real-time monitoring and analysis of numerous parameters, under the responsibility of the primary caregiver, such as glucose, sleep patterns, dietary choices, activity, weight, amongst others, allow for data-driven actionable insights by the care team.

Methods: A retrospective and observational 3 month study of the GluCare model of care was conducted. Primary and secondary outcomes were described. In addition, food logging and patient interactions and their correlations with the primary and secondary outcomes were analysed.

Results: Initial data (n=22) indicate that patient engagement via the GluCare model lead to significant improvement in HbA1c (-2.14% point, p=0.00013) and other metabolic parameters such as LDL-cholesterol (-17.25%, p=0.0071), body mass index (-4.55%, p=0.0003), triglycerides (-18.52%, p=0.0165) and uric acid (-20.4%, p=0.0052) within 90 days of program initiation.

Conclusion: These initial findings suggest that management of diabetes under the GluCare model of care has the potential to significantly improve diabetes outcomes.

Abbreviations

RCDM: Remote Continuous Data Monitoring; HbA1c: Glycosylated Hemoglobin; DM: Diabetes Mellitus; UAE: United Arab Emirates; IDF: International Diabetes Federation; CGM: Continuous Blood Glucose Monitor; BGM: Blood Glucose Monitor; EMR: Electronic Medical Record; NHANES: National Health and Nutrition Examination Survey; NAFLD: Nonalcoholic Fatty Liver Disease; NASH: Nonalcoholic Steatohepatitis; BG: Blood Glucose; HR: Heart Rate; HRV: Heart Rate Variability; RR: Respiratory Rate; BP: Blood Pressure; TIR: Time In Range; TG: Triglycerides; ALT: Liver Transaminase; hsCRP: High-Sensitivity C-Reactive Protein; LADA: Latent Autoimmune Diabetes in Adults; SPD: Steps Per Day; DPP: Diabetes Prevention Program.

Introduction

Many factors have contributed to the global increase of Diabetes Mellitus (DM) and metabolic disorders worldwide. In the United Arab Emirates (UAE), the International rapid urbanization and socioeconomic development has led to an increased prevalence of diabetes, reaching 16.3% [1]. In line with global patterns, adherence to recommended diabetes management in the UAE remains a challenge with low compliance. Clinical inertia, ineffective health system programs, lack of performance based reimbursement models, and outdated communication tools for physicians and patients are responsible for diabetes treatment failure over many years. Single-biomarker remote monitoring strategies, such as glucose monitoring, have demonstrated reduced medical spending due to lower mean glucose values. It is well documented that strategies that reduce HbA1c can lead to significant reductions in both diabetes-related comorbidities and overall healthcare costs [2]. Beyond direct healthcare costs, diabetes and the associated complications lead to reduced productivity and increased absenteeism. Despite increasing options for diabetes medication, lifestyle modification programs, and availability of new technologies for monitoring diabetes, most provider-reported outcomes have not improved significantly over time or led to sustainable cost reduction. Digital models of care have yielded good results; however, have remained siloed, and not fully integrated with traditional diabetes provider practices. Few advances in diabetes technology have been used with traditional treatment programs. Research has shown that diabetes technology, when coupled with education and follow-up, can improve the lives and health of people with diabetes [3]. Coaching and increased frequency of communication and education have also shown improvement in outcomes for diabetes better than standard in-clinic visits. Remote Continuous Data Monitoring (RCDM) is a relatively new category of personalized, preventative healthcare services that utilizes continuous health information from users combined with cloud based artificial intelligence (AI) tools that work alongside medical professionals to assist patients in self- management on a continual basis. This report describes the RCDM approach of managing diabetes and the associated outcomes on preliminary clinical data and patient engagement at GluCare from the patient's initial visit through their 3 month follow up visit.

Remote Continuous Data Monitoring, despite its field being young within the digital health space, can be effectively used by providers to drive evidence-based therapeutic interventions in real-time or near real-time. Similar to the positive results for digital therapeutic solutions, RCDM can be used independently or alongside medications, devices or other therapies to optimize patient´s care and health outcomes. Since the beginning of the 2000s, applications that support healthy eating habits were suggested to be integrated with applications for managing blood glucose data and physical activity data. Medical literature shows that mobile health care via cell phone technology is a promising tool for improving the results and efficiency of diabetes management and education [4], and can be useful to avoid clinical inertia. This initial study by GluCare found that RCDM practiced within a provider setting is effective in lowering HbA1c and improving cardiovascular risk and comorbidities such as dyslipidemia and hyperuricemia in a 3 month period. Historically, it is well documented that 1% reduction in HbA1c with an intensive treatment can lead to reductions in end-point disease, death, heart attack and microvascular complications (21%, 21%, 14%, 37% respectively). In addition to HbA1c, the application of CGM has become mainstream in diabetes clinical practice, and TIR has become a useful tool to guide diabetes [5] treatment in patients using CGM. Effective TIR is associated with lower risk of microvascular complications, has become an accepTABLE endpoint for clinical studies and can be used for assessment of glycemic control. Our

results showed an HbA1c average reduction of 2.14% points, and data from 13 CGM using participants, 76.9% achieved TIR average above 70% over the follow-up period. This is a relevant outcome considering that the intervention occurred over a 3 month period, despite being a small and heterogeneous sample. One of the aims of this study was to demonstrate improvements in other metabolic parameters beyond glucose control such as LDL-cholesterol, triglycerides and inflammation status linked with higher BMI and hsCRP. LDL reduction plays a critical role to prevent incident CVD and some data has also shown the role of reduced TG in CVD prevention in T2DM. Hyperuricemia is a potential risk factor for CHD. Therefore, lowering these variables is crucial in the prevention and treatment of CVD. Our study shows a reduction of 17.3%, 18.5% and 20.4% in LDL, TG and Uric Acid respectively. We also observed an increase of 5.19% in HDL, although this did not reach statistical significance. Since 1992, literature has described excess body fat and its distribution related to risk for T2D and CVD. Improvement of excess body fat and its distribution with reduction of visceral tissue, BMI (4.55%, p=0.0003), weight (4.49%, p= 0.0003), waist circumference (6.15%, p<0.001) were statistically significant in our retrospective study. As part of determining the risk of heart disease, we included hsCRP as a routine parameter endorsed by the American Heart Association and Center of Disease Control for patients with diabetes. However due to our small sample size, p-values for hsCRP were not statistically significant. Nevertheless, we observed a correlation between hsCRP and other metabolic parameters such as LDL-cholesterol, TIR over 70% and ALT, but hsCRP were not correlated with HbA1c improvement. These reductions found in correlation confirm the inflammation reduction process that participants had in a very short period of time. Important meta-analysis about behavioral support with studies published between 2003 and 2016 described the Diabetes Prevention Program (DPP) based lifestyle intervention delivery via eHealth communication and its magnitude on weight loss showed the efficacy of interventions on weight loss can be greater when a provider is both involved in person and remotely. At GluCare, the application of both remote and in-person coaching permits the care team to suggest any corrective actions required based on the information received or trends observed (sleep hygiene, activity, food logging, glucose readings, compliance criteria, etcetera). The engagement level was near daily per month (24.05 messages per month per participants). The food logging feature allowed the care team to also overlay CGM or BGM data received with dietary choices via the GluCare portal and drive further patient engagement and education about glycemic variability and compliance. Whilst an average of 9.22 meals per participant per month was recorded, the trend seen was an uptake of this feature early into the program with more meals logged, and a tapering off in the number of meals later on as feedback was received.

Acknowledgement

None

Conflicts of Interest

The following authors declared the following potential conflicts of interest: The following authors are full-time employees/interns at GluCare: Milena Caccelli, Yousef Said, The following authors have affiliations with organizations with direct or indirect financial interest in the subject matter discussed in the manuscript: Ali Hashemi, Ihsan AlMarzooqi.

References

1. Al Awadi F, Hassanein M, Hussain HY, Mohammed H, Ibrahim G, et al. (2020) Prevalence of Diabetes and Associated Health Risk Factors among Adults in Dubai, United Arab Emirates: Results from Dubai Household Survey 2019. J Diabetes Endocrinol 26:164-173.
2. Koprulu F, Bader R, Hassan N, Abduelkarem AR, Mahmood D, et al. (2014) Evaluation of Adherence to Diabetic Treatment in the Northern Region of the United Arab Emirates. Trop J Pharm Res13:989.
3. Quinn CC, Clough SS, Minor JM, Lender D, Okafor MC, et al. (2008) WellDocTM Mobile Diabetes Management Randomized Controlled Trial: Change in Clinical and Behavioral Outcomes and Patient and Physician Satisfaction. Diabetes Technol Ther 10:160-168.
4. Whaley CM, Bollyky JB, Lu W, Painter S, Schneider J, et al. (2019) Reduced medical spending associated with increased use of a remote diabetes management program and lower mean blood glucose values. J Med Econ 22:869-877.
5. Hirsch JD, Bounthavong M, Arjmand A, Ha DR, Cadiz CL, et al. (2017) Estimated Cost-Effectiveness, Cost Benefit, and Risk Reduction Associated with an Endocrinologist-Pharmacist Diabetes Intense Medical Management "Tune-Up" Clinic. J Manag Care Spec Pharm 23: 318-326.

Cite this article: Caccelli M, Said Y, Mojado J, Palsky C, Hashemi A, Almarzooqi I. Managing Diabetes in a Virtual and Physical Setting. J Diabetes Metab, 2022, 13(3): 925.