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Retrospective Analysis of Impact on SMBG and Glycemic Control of Mobile Health (mHealth)-Application for Diabetes Management

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BACKGROUND

Using mHealth tools for diabetes self-management may have a beneficial impact on the quality of metabolic control. Based on meta analysis of impact on glycaemic control of digital tracking and remote coaching has been indicated to be around -0.38% [95%CI -0.40 to -0.37]) in adult population[1]. However, relevant and sufficient real-world data that would convincingly demonstrate the usefulness of mHealth tools in a clinical care or less controlled setting is lacking, as many mHealth projects have never gone beyond pilot stage. The exploratory data presented here will be utilized to generate future research hypotheses to further test the clinical utility of mySugr and to improve the mySugr Logbook and diabetes management tools.

OBJECTIVE

To investigate the potential impact of the mySugr Logbook app usage on parameters of blood glucose (BG) control. mySugr Logbook (registered class I medical device application) was developed to make logging of metabolic control data appealing and useful in day-to-day life, and is one of the market leading apps with over 800,000 registered users (September 2016).

METHODS

A randomly selected sample of 2,104 highly engaged users (logging ≥5 days/week for ≥6 months) were included (T1D, aged 34.5±16.13 years, 45.77% female). The group was not filtered for blood glucose control at baseline. No further inclusion criteria regarding mean BG results or eA1c was applied for inclusion in the sample, which may have led to an underestimation of the magnitude of changes in metabolic control.

The change of BG results (mean, standard deviation (SD), coefficient of variability (CV)) within the group was analyzed at baseline (t_0), month 1 (t_1), and month 2-6 (t_2), using R. Baseline data is based on an intercept of regression model of all data from t_1, which is more stable than data from day/s 1/1-3.

RESULTS

Baseline BG results (t_0) were 162.10±59.25 mg/dl, representing a rather well controlled group with an estimated A1c of 7.3%. At t_1 the mean BG had dropped to 156.41±55.67 mg/dl and further to 155.33±52.96 mg/dl at t_2 – with a stable reduction in mean of 4.1%, SD of 11% and CV of 6,8% ($P<10^{-10}$).

Based on the reduction of mean blood glucose between t_0-t_2, this would correspond to a reduction of eA1c of approximately 0.3% in an already well controlled population (from 7.3% to 7.0%) using conventional conversion method[2].

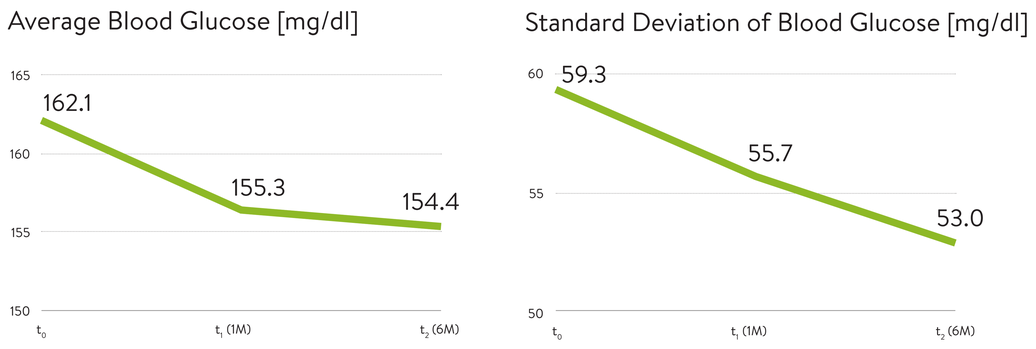

Figure 1. Effect on glycemic control, as mean blood glucose and standard deviation at baseline, t_1 (1 month) and t_2 (6 month) in mg/dl.

In a secondary analysis the within population shifts between eA1c-categories (based on blood glucose average) was investigated. The respective analysis showed a consistent shift of patients from eA1c categories indicating poor BG control, to eA1c categories indicating improved BG control (lower eA1c) at t_2.

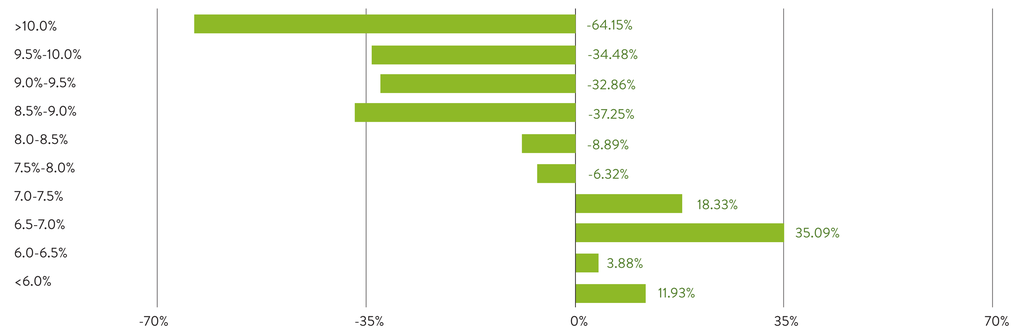

Figure 2. Shift in size of eA1c-segments, based on mean BG calculation at t_0 and t_2, converted using conventional method.[2]

CONCLUSION

The reduction of parameters indicative of BG variability, SD and CV, demonstrate that logging alone with the mySugr Logbook app may have positively impacted the quality of BG control. These findings highlight the necessity for a prospective, controlled clinical study, which would take a closer look at an extended set of BG control parameters, e.g. also including 'time spent in range' analyses. We hypothesize that the addition of upcoming features to mySugr (Coaching, Bolus Calculator and more) will result in further improvements of self monitoring behavior and glycemic control for highly engaged users.

References

1) Forisch M, Grohmann-Izay B. Use of Digital Tracking Devices in the Management of Diabetes Mellitus: A Systemic Review and Meta-analysis [abstract]. Diabetes. 2015; 64 (suppl 1).
2) „A1C And eAG". American Diabetes Association. N.p., 2016. Web. 27 Oct. 2016.

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