USE OF MOBILE-BASED TECHNOLOGIES TO IMPROVE DIABETES SELF MANAGEMENT AND POSTPRANDIAL GLUCOSE CONTROL

Toschi, E MD, Henn, O BA, Edwards, S MPH, Atakov Castillo A, BA
Joslin Diabetes Center

Aim:

The goal of this study was to assess if flash glucose monitoring (FreeStyle Libre, Abbott) together with real-time contextual prompts from a smartphone app and web-based nutrition education can improve eating behavior in T1D patients.

Background:

1. Investigator-initiated project including:
   Pilot evaluation of a web-based nutrition education program* to guide patients with postprandial pattern analysis and glucose optimization.
2. Pilot evaluation of a new system ("Sugar Sleuth"**) that uses a smartphone app and web-based software to gather and analyze continuous glucose data and contextual information to identify factors causing glycemic variability.

Methods:

CGM-naïve T1D subjects with an A1c 7.0-9.0% used a FreeStyle Libre system that communicated with the "Sugar Sleuth" app for 14 weeks. Subjects were instructed to periodically "scan" the sensor to see their glucose readings. Following a glycemic excursion, the app prompted them to enter the suspected cause, including food and insulin information. Participants completed an online nutrition education module focused on the impact of food on postprandial glucose control. At baseline and the conclusion of the study, 24-hour dietary recalls were performed using the Nutrition Data System for Research program from the University of Minnesota.

* Investigators collaborated with education software company (dbaza, inc.).
** Investigators collaborated with Abbott Diabetes Care

Baseline Characteristics	Mean±SEM
Age (years)	55 ± 2.5
Diabetes Duration (years)	32 ± 3
Gender (F/M)	16/14
BMI (kg/m^2)	25.4 ± 0.5
Weight (kg)	75 ± 2.4
A1c (%)	8.0 ± 0.1

Results:

A total of 30 T1D subjects participated in the study. Baseline characteristics: mean A1c 8.0±0.1%, mean age 54±3, 52% female, mean duration of diabetes 32±3 years. Participants used either multiple daily injections (57%) or insulin pumps (43%). Over the 14 weeks A1c improved by 0.5±0.5% (P<0.0001). Changes in insulin doses did not account for this improvement, therefore further investigation is underway to identify meaningful changes in disease management behavior.

	Baseline (average±SEM)	14 weeks	P
A1c (%)	8 ± 0.1	7.5 ± 0.09	0.0001
Weight (kg)	75.2 ± 2.4	75.1 ± 2.4	ns
Calories (kcal)	211 6± 147	1970 ± 210	ns
Fat (g)	100.5 ± 10.5	91.5 ± 10.5	ns
Carbohydrate (g)	235 ± 20.6	191.6 ± 25.7	0.05
Protein (g)	94.4 ± 6.5	94.8 ± 10	ns
Glycemic Index	58 ± 1.4	57±1.2	ns
Glycemic Load	118 ± 12.6	103 ± 16	ns
Total Daily Dose (units)	40 ± 3.0	40 ± 2.9	ns

Case Study: Reducing Glycemic Load of Breakfast

Baseline
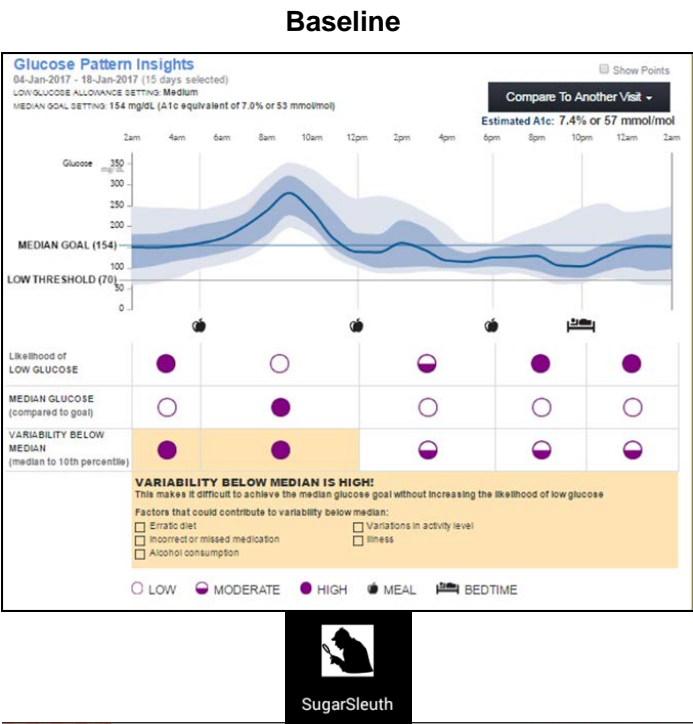
SugarSleuth

The Sugar Sleuth system identified consistent spike in blood glucose after breakfast of corn flakes, milk and orange juice. After completing the nutrition education module, breakfast was changed to toast with eggs.

Study End
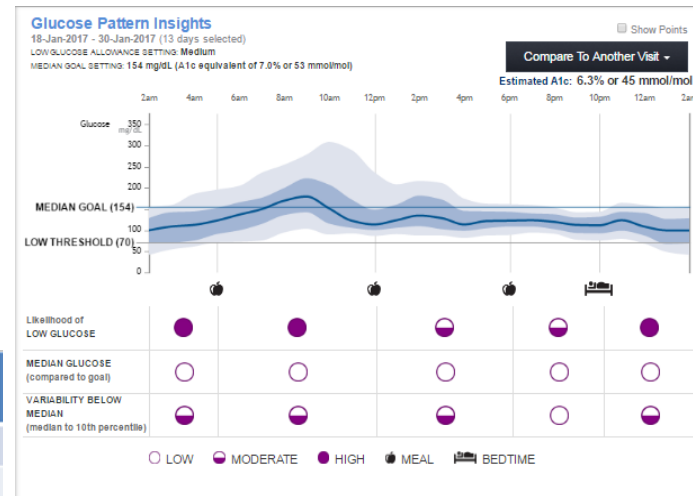
Conclusions:

This is the first time to our knowledge that a clinical intervention that incorporates contextual feedback on continuous post prandial glucose fluctuations promoted changes in self-management behavior and improved glucose control.