Evaluating the Impact of Glucommander on Improvement in Time-in-Range (TIR) in Type 2 Diabetes using Continuous Glucose Monitoring

ATLANTA DIABETES ASSOCIATES

Bruce W. Bode and John G. Clarke

116-LB – 2020 ADA

STUDY DESIGN

PURPOSE

An IRB-approved proof-of-concept single-center prospective study to evaluate the safety and efficacy of utilizing Glucommander outpatient insulin dosing software to assist providers in titrating MDI basal bolus insulin doses, using glucose data from Abbott Freestyle Libre 14-day glucose monitoring system.

SETTING

Single Center: Atlanta Diabetes Associates

HARDWARE

Abbot Freestyle Libre 14-day Glucose Monitoring System and cell phone for using Abbott LibreLink app

SOFTWARE

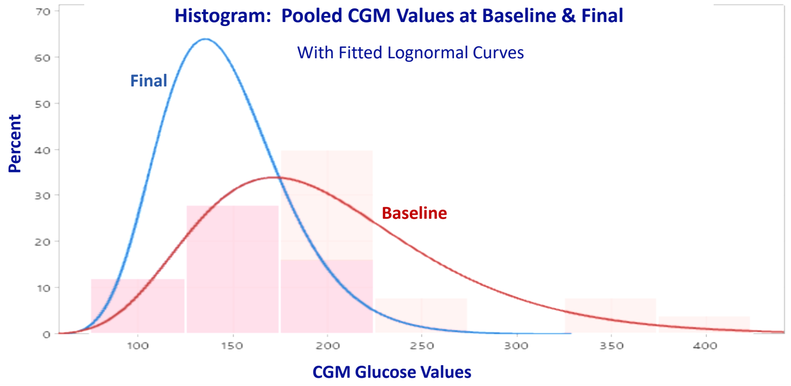
Glytec Glucommander Outpatient insulin dosing software (Cloud)
Abbott Freestyle LibreLink client-facing app & LibreView provider-facing portal (Cloud)

DATA

Prospective data from 25 adult participants
Enrollment Criteria: Age=(18 to 80); Type 2 Diabetes; A1C > 8.0%. Must have an iPhone or Android phone capable of running the LibreLink app.
Exclusion Criteria: eGFR<30; hemoglobinopathy; steroid use; pregnancy

DEMOGRAPHICS

N(Female)	10	Mean(Weight (kg))	101
N(Male)	15	Mean(Height (cm))	175
N(Caucasian)	13	Mean(BMI)	32.9
N(African American)	12	Mean(Age)	54
N(Other ethnicity)	0	Mean(Years Diagnosed Type 2)	9.2
		Mean(A1C at Start)	11.4



METHODS

- Visit 1: Training by a nurse educator about MDI basal-bolus insulin administration, meal planning, and the use of a glucose sensor. Collection of Baseline data (Week 1) begins.
- Visit 2: Downloaded Baseline (Week 1) data. Start of Glucommander program. Week 2 begins.
- Visit 3 through 6: The participants' CGM data from each newly completed week were used by the software to provide new insulin dose titrations, and the next week was started.
- Visit 7: Collected Final sensor data from the 4th adjustment (Week 6).

ANALYSIS

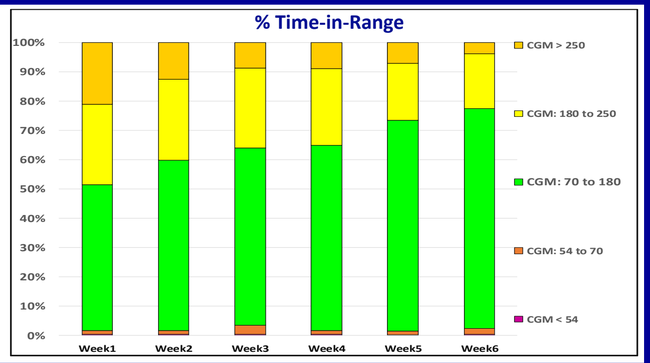
Statistical comparisons were conducted between the pooled baseline data vs. pooled final data.

The mean of the participants' mean glucose values was also compared between baseline & final.

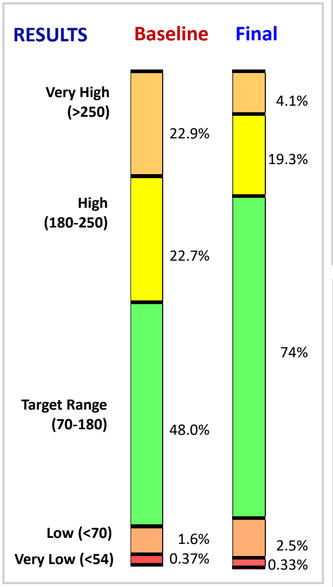
Specifications are in the references.[1-4]

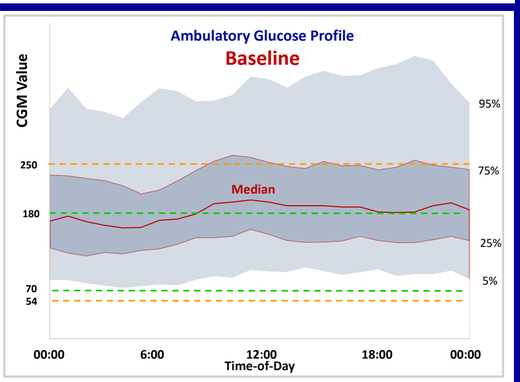
RESULTS	Baseline	P-value	Final	Spec
Time(CGM>250)	22.9%	P<0.00001	4.1%	<5%
Time(180<CGM<=250)	27.2%	P<0.00001	19.3%	<25%
Time(70<=CGM<=180)	48.0%	P<0.00001	73.8%	>70%
Time(54<=CGM<70)	1.6%	P<0.007	2.5%	<4%
Time(CGM<54)	0.37%	P>0.265	0.33%	<1%
CV	42.9%		35.8%	<36%
Mean(Pooled CGM)	196	P<0.00001	146	
Mean(25 Volunteers' Mean CGM)	202	P<0.0002	146	
Standard Deviation(CGM)	84	P<0.00001	52	
%(Time Sensor Active)	82%	For overall study		
Mean(Basal Insulin, u)	34.1		37.6	
Mean(Total Daily Meal Insulin Boluses, u)	33.5		40.1	
Mean(TDD, u)	67.5		77.7	
Mean(CGM Means, Caucasian)	199.9	P>0.4 &	154.1	
Mean(CGM Means, African-American)	203.6	Power<0.2	137.8	

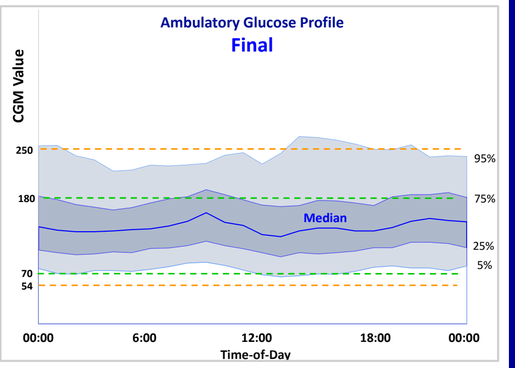
The % of time in the Target Range (70 to 180) grew steadily over the course of treatment.



AMBULATORY GLUCOSE PROFILE
Baseline & Final







CONCLUSIONS

Glucommander software and CGM data were used to calculate safe and effective dose adjustments, to optimize the efficacy of injected basal bolus insulin. Time in range improved from 48.0% to 73.8% while staying well within AGP-acceptable norms for avoiding hypoglycemia. An RN, CDCES accomplished these results with four consecutive weekly titrations, each requiring only a visual review of the data and a touch of a button, without intervention from the ordering licensed provider.

This approach delivers significantly improved outcomes for patients on basal bolus insulin with multiple daily injections, while optimizing the use of clinical resources. The combination of Glucommander software and CGM data can continually optimize insulin doses and improve outcomes while relieving the burden on patients and providers.

REFERENCES

1. Section 6. Glycemic Targets: Standards of Medical Care in Diabetesd2020; Diabetes Care 2020;43(Suppl. 1):S66–S76 .
2. Battelino T, Danne T, Bergenstal R, Amiel S, Beck R, Biester T, Bosi E, Buckingham B, Cefalu W, Close K, Cobelli C, Dassau E, DeVries H, Donaghue K, Dovc K, Doyle F, Garg S, Grunberger G, Heller S, Heinemann L, Hirsch I, Hovorka R, Jia W, Kordonouri O, Kovatchev B, Kowalski A, Laffel L, Levine B, Mayorov A, Mathieu C, Murphy H,Nimri R, Nørgaard K, Parkin C, Renard E, Rodbard D, Saboo B, Schatz D, Stoner K, Urakami T, Weinzimer S, and Phillip M; Clinical Targets for Continuous Glucose Monitoring Data Interpretation: Recommendations from the International Consensus on Time in Range; Diabetes Care 2019;42:1593–1603 .
3. Beck R, Bergenstal R, Riddlesworth T, Kollman C, Li Z, Brown A, and Close K; Validation of Time in Range as an Outcome Measure for Diabetes Clinical Trials; Diabetes Care 2019;42:400-405.
4. Bergenstal R, Ahmann A, Timothy Bailey T, Bissen J, Buckingham B, Deeb L, Dolin R, Garg S, Goland R, Hirsch I, Klonoff D, Kruger D, Matfin G, Mazze R, Olson B, Parkin C, Peters A, Powers M, Rodriguez H, Southerland P, Strock E, Tamborlane W, and Wesley D; Recommendations for Standardizing Glucose Reporting and Analysis to Optimize Clinical Decision Making in Diabetes: The Ambulatory Glucose Profile; Journal of Diabetes Science and Technology Vol 7, Issue 2, March 2013.