Use of Gocap to evaluate appropriateness of bolus insulin dosing to achieve target glucose levels in patients on basal bolus regimen

Toschi E, MD, Carl S, Greenberg J, BS, Greaves T, BS, Atakov-Castillo A, BA,
Slyne C, BA, Munshi M, MD

Joslin Diabetes Center

Aim

In patients on basal bolus regimen using multiple daily injections (MDI), the timing and amount of bolus doses is not known. Clinicians are required to make changes in insulin prescription based only on blood glucose (BG) data.

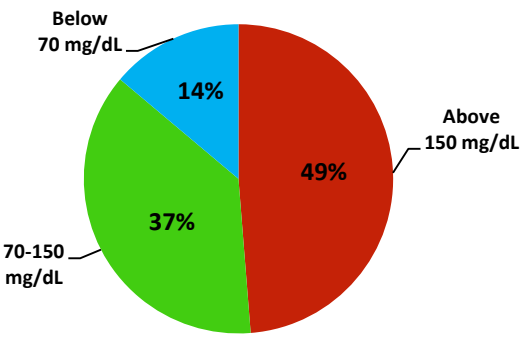
Methods

We used insulin pen caps (Gocap), that record insulin injection data via Bluetooth, to evaluate the impact of bolus insulin dosing on 3-hour post-injection BG levels in two groups of patients: younger (18-35 years) and older (>65 years).

Results

Patient Characteristics (n=58)	Younger cohort (n=35)	Older cohort (n=23)
Age (yrs)	28.6 ± 3.8	73.7 ± 7.6
Gender (% Female)	46	52
Duration of DM (yrs)	14 ± 9	30 ± 14
Type 1 (%)	100	61
A1c (%)	8.0 ± 1.4	8.4 ± 1.2
Total medications/day	3.9 ± 1.5	11.4 ± 4.4

Three-hour post-meal glycemic results

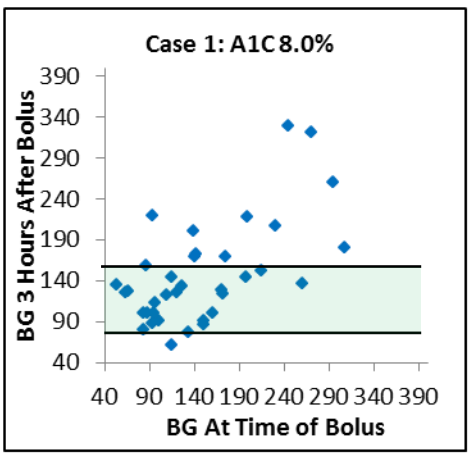


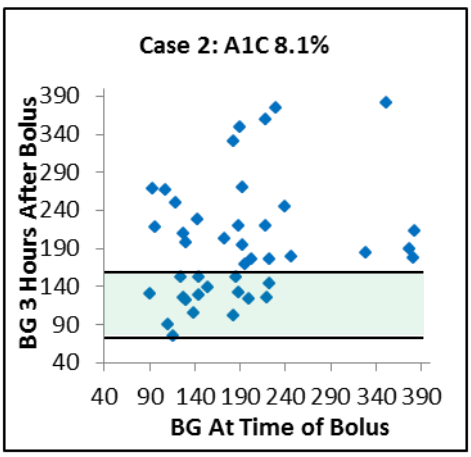
Older adult Pre-bolus BG vs. 3-hr post-bolus BG
N=23; T1D=14

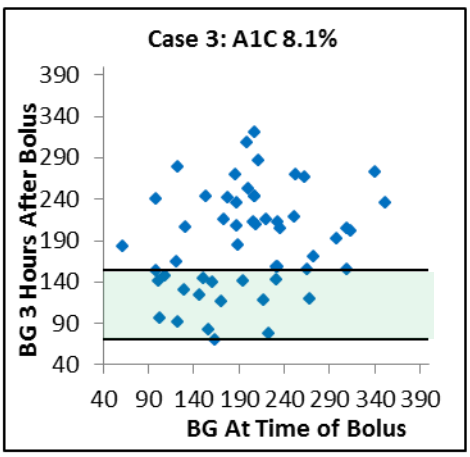
	End BG <50	End BG 50-70	End BG 70-150	End BG >150
Start BG <70	63 (71.6%)	4 (4.5%)	10 (11.4%)	11 (12.5%)
Start BG 70-180	20 (9.3%)	11 (5.1%)	86 (39.8%)	99 (45.8%)
Start BG >180	34 (6.4%)	12 (2.3%)	118 (22.3%)	366 (69%)

Young adult Pre-bolus BG vs. 3-hr post-bolus BG
N=35; T1D=35

End BG <50	End BG 50-70	End BG 70-150	End BG >150
61 (52.6%)	9 (7.8%)	29 (25%)	17 (14.7%)
26 (4.2%)	35 (5.6%)	342 (55.1%)	218 (35.1%)
70 (5.4%)	52 (4%)	485 (37.6%)	684 (53%)

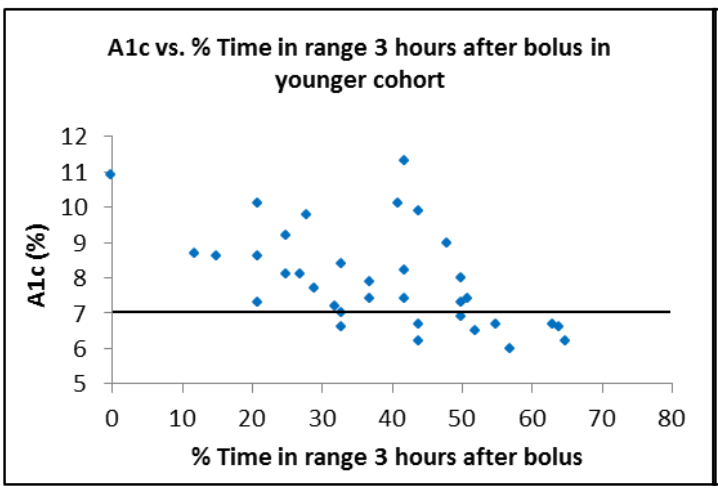


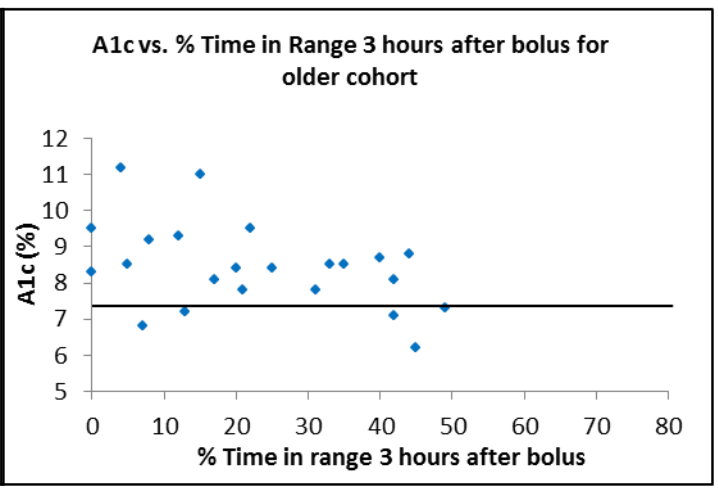




Blood glucose level at time of bolus versus 3 hour post-bolus collected over 30 days in three subjects with similar A1c.

- Time-in-range after 3 hours can vary despite similar A1c.
- Case 1 is 50% in-range after 3 hours, case 2 is 27% in-range after 3 hours, and case 3 is 25% in-range after 3 hours.





A1c versus time in range in older and younger cohorts do not correlate.

- Young cohort with goal A1c of 7 had 20-60% of time-in-range at 3 hours after bolus.
- Elderly cohort with goal A1c of 7.5 had 0-50% of time-in-range at 3 hours after bolus.

Conclusions

Time not in-range at 3 hours after bolus is common in both young and elderly.
Bluetooth pen cap technology is able to identify this issue, which patient report may not identify.
This data from Gocap may help clinicians to educate patients, and adjust bolus insulin dosing and/or insulin-carbohydrate ratio to improve glycemic control in patients on MDI.

This research was funded by Sanofi® with support from Common Sensing® and DEXCOM Inc®