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References

- [1] Boord JB, J Hosp Med. 2009; 4(1): 35–44
- [2] Umpierrez GE, J Clin Endocrinol Metab. 2002; 87(3): 978–82.
- [3] Clement S, Diabetes Care. 2004; 27(2): 553–91.
- [4] Umpierrez GE, J Clin Endocrinol Metab. 2012; 97(1): 16–38

Project



Comparison of two algorithms for basal bolus insulin therapy

in hospitalised patients with diabetes mellitus type 2

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Background

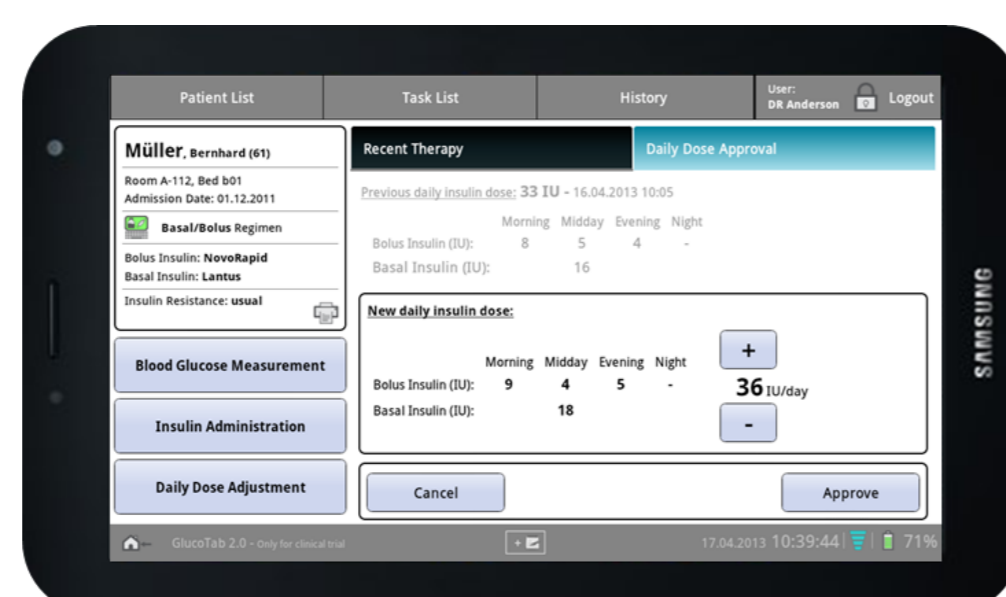
- Hyperglycemia is a common occurrence in hospitalized patients^[1]
- Hyperglycemia is a strong predictor of adverse clinical outcome in a range of diseases and can lead to a prolonged hospital stay^[2,3]
- For the majority of hospitalized patients premeal glucose values < 140 mg/dl and random glucose values < 180 mg/dl are recommended^[4]

GlucoTab system

Glucose management system with a workflow-integrated algorithm for basal-bolus insulin therapy (REACTION algorithm based on modified RABBIT 2 Algorithm, Umpierrez, Diabetes Care 2007)

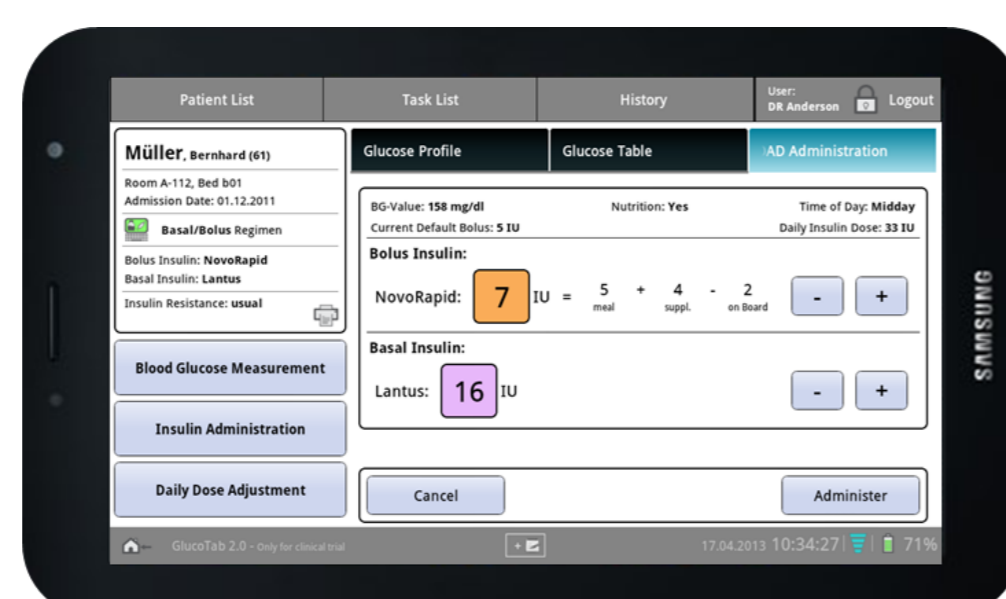
Initiation of insulin therapy

- Confirmed by physician
- In patients with pre-existing insulin therapy based on total daily dose (TDD)
- In insulin-naïve patients based on body weight, age, renal function
- ½ of TDD as basal insulin (glargine)
- ½ of TDD as bolus insulin (aspart) distributed over the day with meals
- Pre-meal glucose target 100–140 mg/dl (5.6–7.8 mmol/l)



Insulin dose adjustment

- TDD is adjusted once daily (confirmed by MD)
 - During ward rounds
 - Depending on glycemic control during the preceding 24 h
- Bolus insulin dose adjustment (confirmed by nurse)
 - 4 times daily (morning, noon, evening, bedtime)
 - Influencing factors:
 - Current blood glucose
 - Planned meal ingestion
 - Insulin sensitivity



Therapy profile and glycemic control

- Graphic overview of preceding insulin therapy, blood glucose values and meals



Aim

To compare two versions of the REACTION algorithm for glycemic management running on the GlucoTab system in hospitalised patients with type 2 diabetes (T2D) at the general ward.

Design

- Open, non-controlled feasibility study

Intervention

- 2 versions of the REACTION algorithm were used, each algorithm was tested in 15 patients
- **Initial algorithm**
TDD was divided into ½ basal insulin, ½ bolus insulin with meals
- **Refined algorithm**
bolus insulin dose was redistributed over the day; TDD and the 50:50 ratio remained unchanged

Inclusion criteria (main)

- T2D
- 18–90 years

Exclusion criteria (main)

- Impaired renal function (serum creatinine ≥ 3.0 mg/dl)
- Pregnancy
- Terminal illness

Patient characteristics

	Initial algorithm	Refined algorithm
	4 female	7 female
years	69 ± 10 years	73 ± 11
(mmol/mol)	76 ± 30	62 ± 18
BMI (kg/m ²)	29 ± 6	30 ± 7

Results

Glycemic management

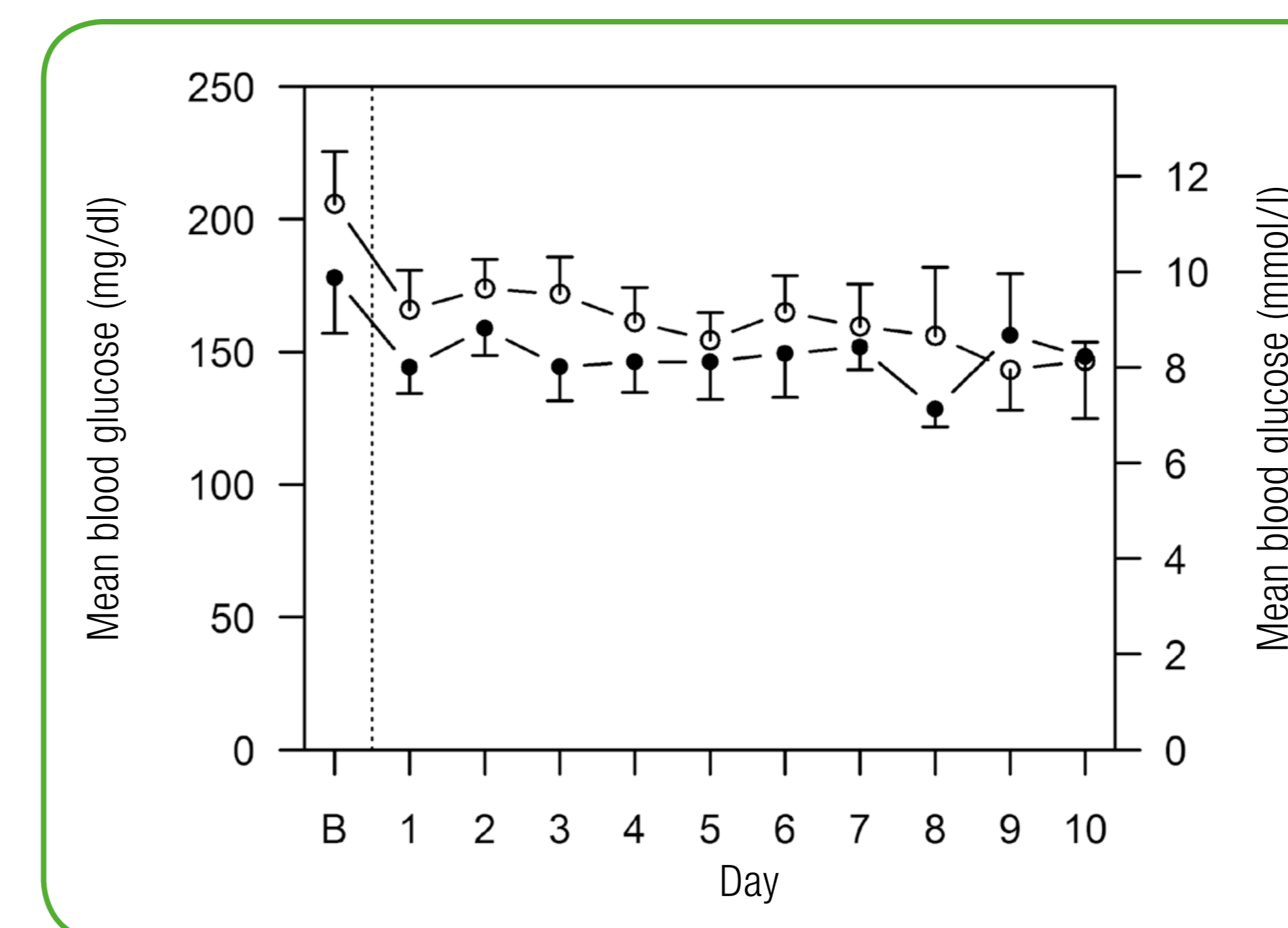
	Initial algorithm	Refined algorithm	
mean BG	mg/dl	163 ± 34	148 ± 25
BG < 70 mg/dl	%	1.3	1.5
BG < 40 mg/dl	%	0	0
mean TDD	U	47 ± 28	47 ± 27
mean basal dose	U	20 ± 13	22 ± 12
mean bolus dose	U	27 ± 16	25 ± 15

Adherence to GlucoTab system

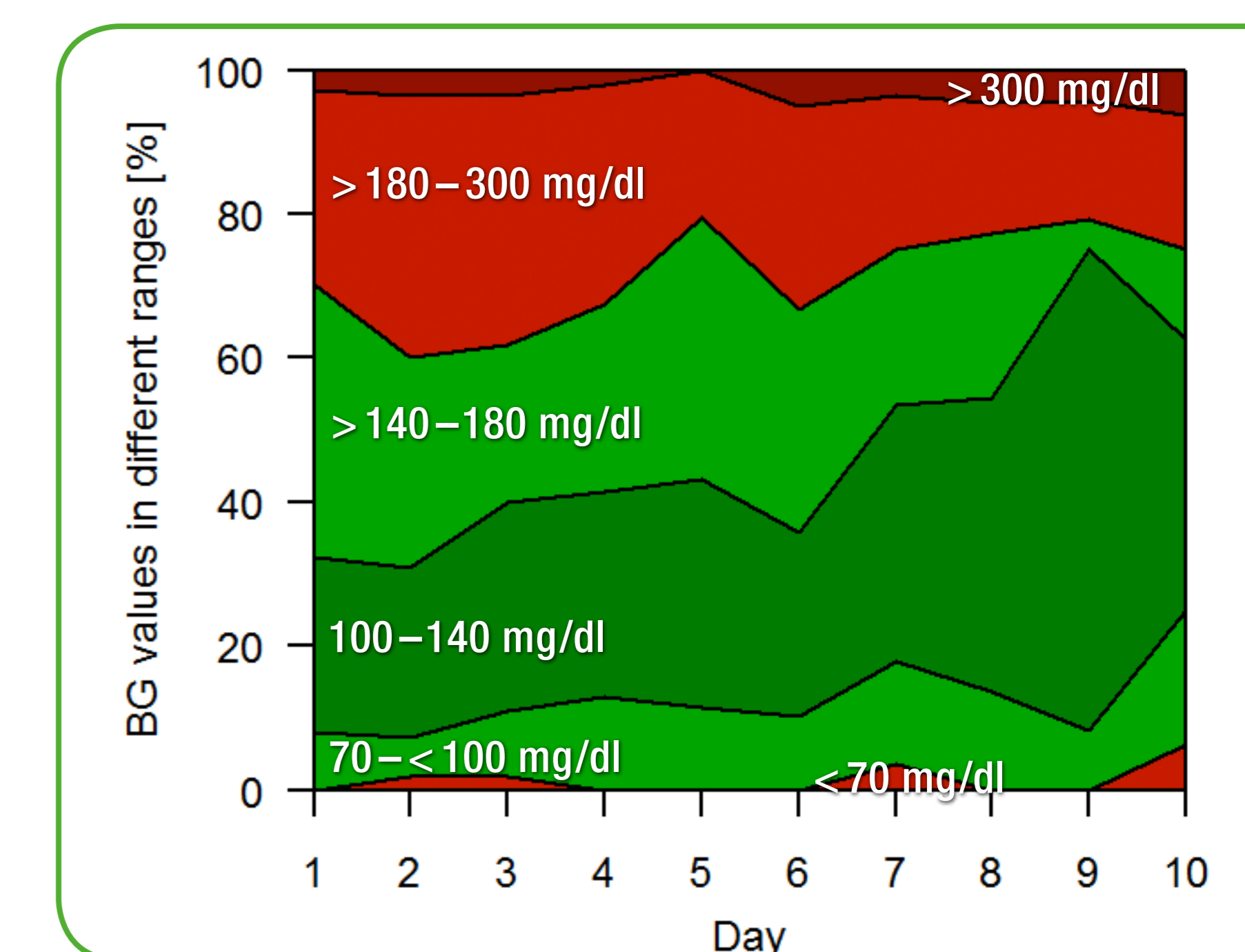
	Initial algorithm	Refined algorithm	
adherence to TDD suggestion	%	98.3	99.1
adherence to basal insulin suggestion	%	98.1	94.4
adherence to bolus insulin suggestion	%	95.2	96.4

Glycemic control

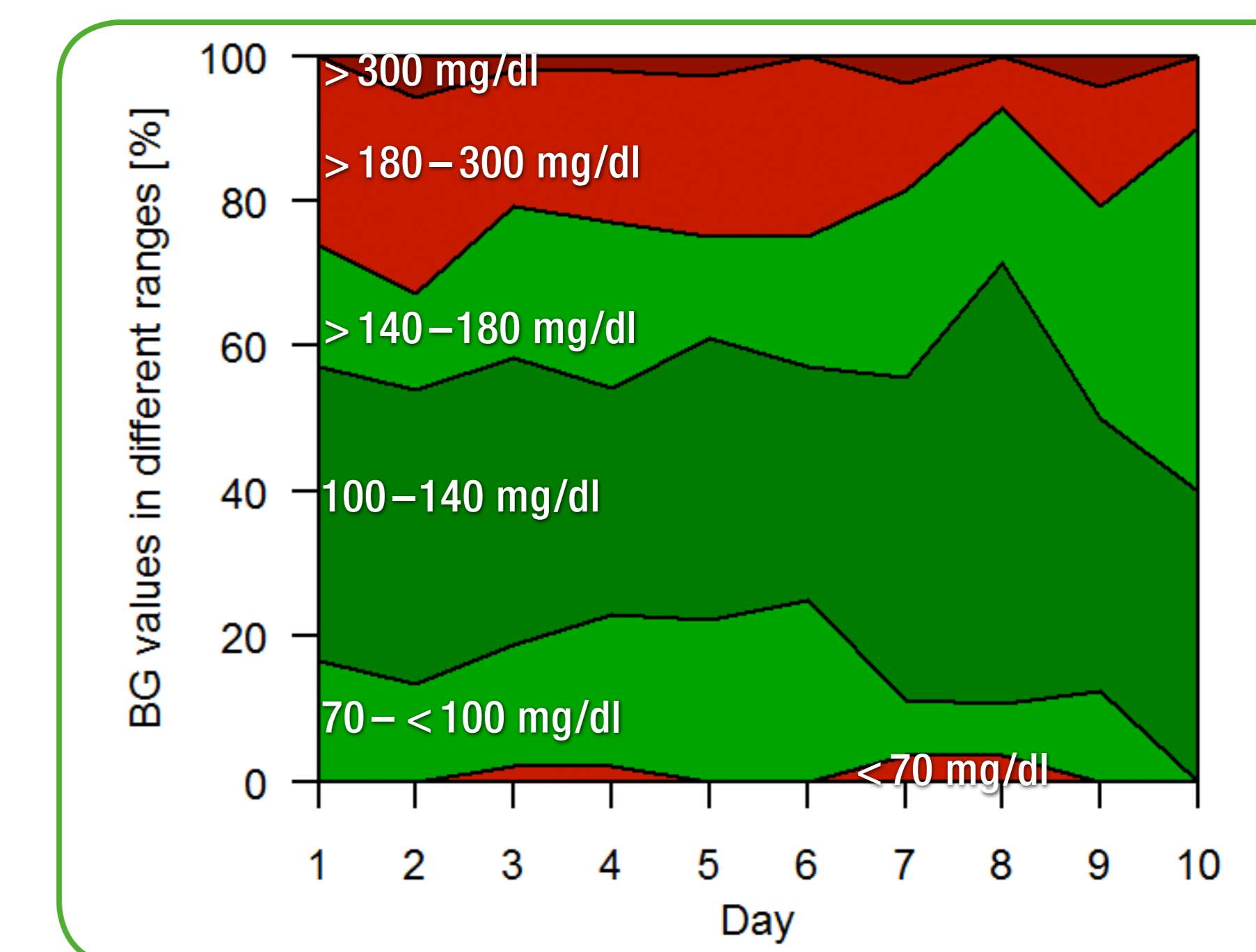
- Mean blood glucose over the first ten study days for the initial (open circles) and refined algorithm (closed circles)



Blood glucose values in different target ranges for the initial algorithm and



the refined algorithm



Conclusions

- The refined version of the REACTION algorithm could improve glycemic control without increased risk of hypoglycemia
- Adherence to insulin dosing advices generated by both algorithms was high
- Insulin doses were comparable for the two versions of the algorithm
- The REACTION algorithm has the potential to improve glycemic management in the hospital setting