Enabling CGM users with multi-horizon glucose predictive capabilities: The Accu-Chek® SmartGuide Predict App

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Accu-Chek® SmartGuide CGM Solution

ACCU·CHEK®

Accu-Chek SmartGuide Reader app

Accu-Chek SmartGuide Predict app

Accu-Chek SmartGuide sensor applicator

Accu-Chek SmartGuide sensor

Glucose prediction features

	Glucose Predict	Low Glucose Predict	Night Low Predict
Forecast	Encoder-Decoder NN	Gradient boosting	Gradient boosting
Input	● Time of day ● Bolus Insulin ● Recent and historic glucose ● Carbohydrates	● Recent glucose ● Carbohydrates	● Historic glucose excursions ● Past nighttime hypoglycaemia ● Bolus insulin ● Nighttime hypoglycaemia risk in the past
Output	Predicts the future glucose excursion up to 2 h	Low Glucose Risk Prediction within the next 30 min	Nighttime Hypoglycemia Risk Prediction
Visualisation	**Glucose curve**	**Push-Notification**	**Push-Notification**

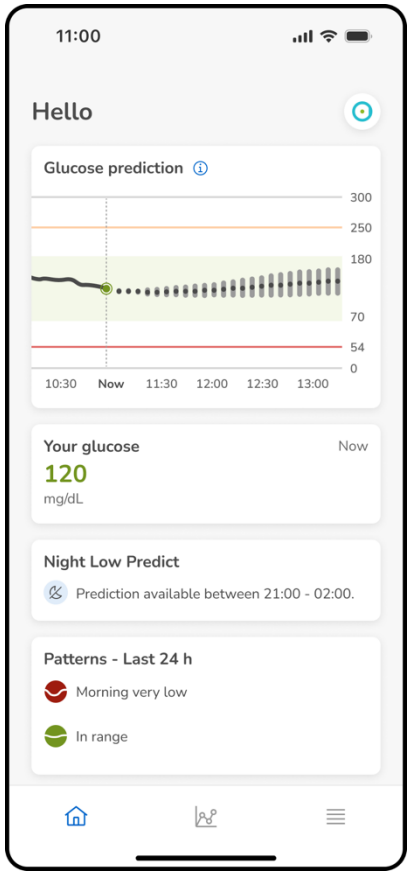
Validation datasets

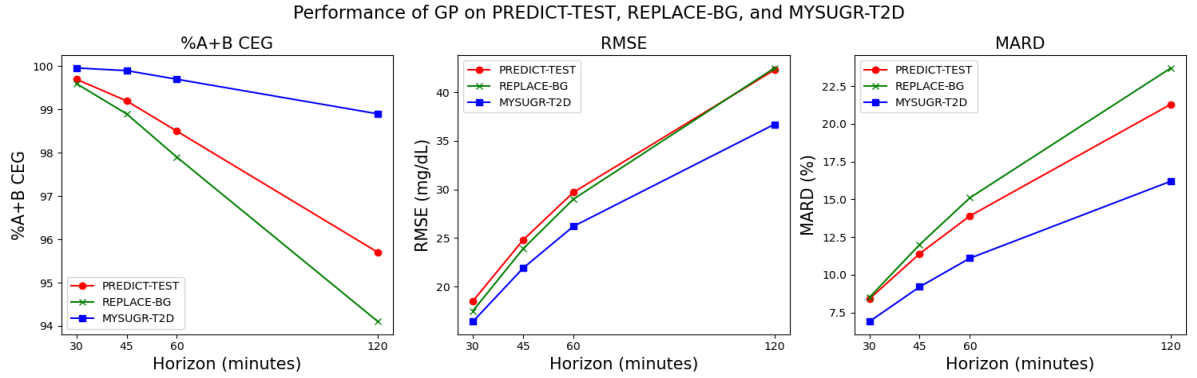
	Predict (Clinical Trial)	Replace-BG* (Clinical Trial)	MYSUGR (Real World Data)
No. Subjects	21	226	59
Subject Days	~800	~51,000	~12,000
Diabetes Type	Type 1	Type 1	Type 2
Therapy	**CGM+MDI**	**CGM + Pump**	**CGM+MDI**

Data characteristics of the three employed validation datasets.

*Aleppo G et al. REPLACE-BG: a randomized trial comparing continuous glucose monitoring with and without routine blood glucose monitoring in adults with well-controlled type 1 diabetes. Diabetes Care. 2017;40(4):538-545.

Glucose Predict Results

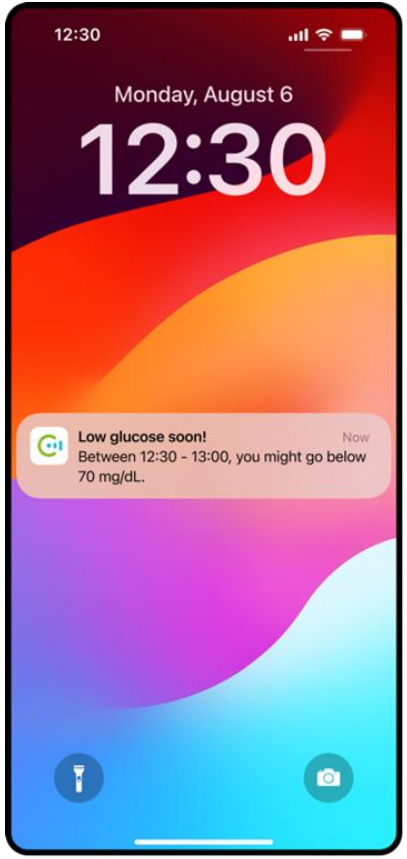




	ForeCasting Horizon [min]	% in Zones A&B of CEG	RMSE** [mg/dL]	MARD*** [%]
Pooled* dataset	30	99.8	17.5	7.9
	45	99.3	23.5	10.9
	60	98.7	28.3	13.3
	120	96.3	40.4	20.3

* Herrero-Vinas P et al. Enhancing the capabilities of continuous glucose monitoring with a predictive app, in press JDST.
** root mean square error
*** mean absolute relative difference

Low Glucose Predict Results

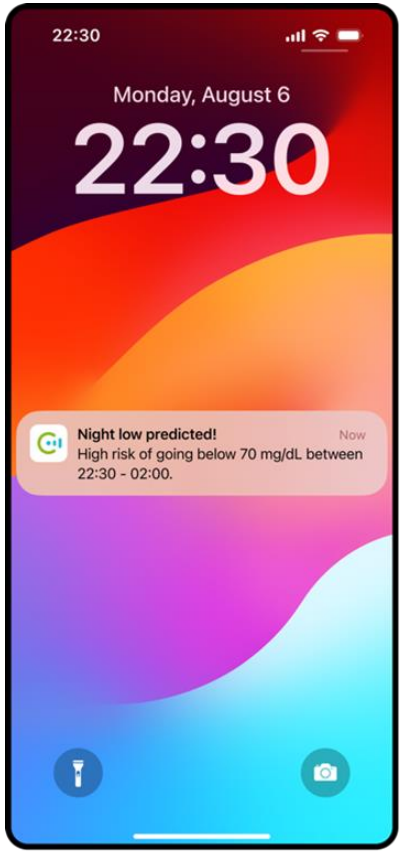


Dataset*	Accuracy [%]	Sensitivity [%]	Specificity [%]	Lead Time [minutes]
PREDICT-TEST	98.6	95.3	98.6	16.2
REPLACE-BG	98.6	95.3	98.7	16.4
MYSUGR-T2D	99.3	95.3	99.3	15.4
POOLED	98.9	95.2	98.9	16.2

- Very similar prediction performance across all three datasets
- On average the low glucose notification is given ~16 minutes before the event occurs

* Herrero-Vinas P et al. Enhancing the capabilities of continuous glucose monitoring with a predictive app, in press JDST.

Night Low Predict Results



Dataset*	Accuracy [%]	Sensitivity [%]	Specificity [%]	AURoC**
PREDICT-TEST	85.9	67.2	90.3	0.882
REPLACE-BG	77.0	50.7	85.0	0.772
MYSUGR-T2D	93.8	32.1	97.0	0.851
POOLED	86.5	55.3	91.6	0.859

- Slightly lower prediction performance for the Replace BG dataset
- On average for about half of the nights with a potential hypoglycemic event a notification will be pushed to the user

* Herrero-Vinas P et al. Enhancing the capabilities of continuous glucose monitoring with a predictive app, in press JDST.
** area under the receiver operation characteristic

Summary

- The machine learning models powering the three predictive features within the Accu-Chek® SmartGuide Predict app underwent extensive testing using various clinical and real-world datasets, including data from individuals with type 1 and type 2 diabetes on multiple daily injection (MDI) or pump therapy.

- The results from such evaluation provide reassurance that the demonstrated performance should translate into valuable real-world usage of the app, benefiting people with diabetes in their daily management.

Doing now what patients need next

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