**PROBAST**

Study:

Non-linear dynamic modeling of glucose in type 1 diabetes with kernel adaptive filters.

Step 2: Type of prediction study

**Is the study a diagnostic or a prognostic study?**

Prognostic

**Is the study a development only, development and validation or validation only study?**

Development only

**What is the model of interest?**

Kernel adaptive filters

**What is the outcome of interest?**

Glucose forecasting. Hypo- and hyperglycemia prediction.

Step 3: Assess risk of bias

**Domain 1: Participants**

**Describe the sources of data and criteria for participant selection**

Fifteen Type 1 diabetic patients, following multiple-dose insulin therapy, were monitored from 5 to 22 days (average 12.5±4.6) in free-living conditions. The study was approved by the Ethics Committees of the participating clinical centers and all subjects provided written informed consent before enrollment.

**1.1 Were appropriate data sources used, e.g. cohort, RCT or nested case-control study data?**

Y

**1.2 Were all inclusions and exclusions of participants appropriate?**

Y

**Risk of bias introduced by selection of participants:**

**Low**

**Rationale of bias rating**

No further eligibility criteria given

**Domain 2: Predictors**

**List and describe predictors included in the final model, e.g. definition and timing of assessment**

Patients wore the Guardian Real-Time continuous glucose monitoring (CGM) system (Medtronic Minimed Inc.) which reports an average subcutaneous glucose value every 5 min. In addition, they were equipped with the SenseWear Armband (BodyMedia Inc.) physical activity monitor which collects physiological data at 32 Hz from the following sensors: (i) a 3-axis accelerometer, (ii) a galvanic skin response sensor, (iii) a sensitive electronic thermometer, and (iv) a heat flux sensor.

Unclear whether activity data were used.

**2.1 Were predictors defined and assessed in a similar way for all participants?**

Y

**2.2 Were predictor assessments made without knowledge of outcome data?**

Y

**2.3 Are all predictors available at the time the model intended to be used?**

Y

**Risk of bias introduced by predictors or their assessment**

Low

**Rationale of bias rating**

Independent and easily applicable predictors. Similar assessment for all patients.

**Domain 3: Outcome**

**Describe the outcome, how it was defined and determined, and the time interval between predictor assessment and outcome determination:**

Hypoglycemia and hyperglycemia prediction at different PHs

**3.1 Was the outcome determined appropriately?**

Y

**3.2 Was a pre-specified or standard outcome definition used?**

Y

**3.3 Were predictors excluded from the outcome definition?**

Y

**3.4 Was the outcome defined and determined in a similar way for all participants?**

Y

**3.5 Was the outcome determined without knowledge of predictor information?**

Y

**3.6 Was the time interval between predictor assessment and outcome determination appropriate?**

Y

**Risk of bias introduced by the outcome or its determination**

Low

**Rationale of bias rating**

Glucose forecasting. Only past and present glucose values used.

**Domain 4: Analysis**

**Describe number of participants, number of candidate predictors, outcome events and events per candidate predictor**

15 patients. Unclear how many outcomes

**Describe how the model was developed, predictor selection and risk group definition**

Kernel adaptive filters

**Describe whether and how the model was validated, either internally (cross validation, random split sample) or externally (e.g. temporal validation, geographical validation, different setting, different type of participants)**

Unclear

**Describe the performance measures of the model, e.g. calibration, discrimination, classification, net benefit, and whether they were adjusted for optimism**

Sensitivity, specificity

**Describe any participants who were excluded from the analysis**

None / not described

**Describe missing data on predictors and outcomes as well as methods used for missing data**

Not described

**4.1 Were there a reasonable number of participants with the outcome?**

U

**4.2 Were continuous and categorical predictors handled appropriately?**

Y

**4.3 Were all enrolled participants included in the analysis?**

Y

**4.4 Were participants with missing data handled appropriately?**

U

**4.5 Was selection of predictors based on univariable analysis avoided?**

Y

**4.6 Were complexities in the data (e.g. censoring, competing risks, sampling of controls)**

**accounted for appropriately?**

Y

**4.7 Were relevant model performance measures evaluated appropriately?**

PN

**4.8 Were model overfitting and optimism in model performance accounted for?**

U

**4.9 Do predictors and their assigned weights in the final model correspond to the results**

**from multivariable analysis?**

U

**Risk of bias introduced by the analysis**

High

**Rationale of bias rating**

Overall analysis part is only shortly described. Validation approach unclear but likely simple validation. Unclear how many outcomes and how missing data were handled. Reporting of results only with sensitivity and specificity.

**Overall Risk of bias**

High