**PROBAST**

Study:

Detecting and monitoring the symptoms of Parkinson's disease using smartphones: A pilot study

Step 2: Type of prediction study

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

**Diagnostic**

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

Development only

**What is the model of interest?**

Random forest

**What is the outcome of interest?**

PD diagnosis and PD severity estimation

Step 3: Assess risk of bias

**Domain 1: Participants**

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

Individuals with PD diagnosed clinically by a movement disorder specialist and control participants were recruited from an academic movement disorder clinic.

**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 mentioned

**Domain 2: Predictors**

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

Data from smartphone software: voice, posture, gait, finger tapping, reaction

**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**

Predictors are assessed the same way for everyone, independent and applicable.

**Domain 3: Outcome**

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

PD vs healthy controls & UPDSRS score estimation

The specialists also conducted a remote assessment of the modified UPDRS8 (that excluded assessments of rigidity and balance) via web-based video conferencing once per week for four weeks at approximately the same time each week.

**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**

Gold standard test was taken for PD severity assessment

**Domain 4: Analysis**

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

Twenty participants (10 individuals with PD and 10 controls) enrolled and completed the study. The 20 participants performed an average of 2.7 tests per day (68.9% adherence) for the study’s duration (average of 34.4 days).

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

Random forest

**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)**

10-fold cross-validation

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

SEN, SPE, MAE

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

None

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

Not mentioned

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

N

**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?**

PY

**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?**

Y

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

Y

**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**

Small amount of outcomes. Not described how missing data were handled.

**Overall Risk of bias**