| Section | Item | Checklist description                                                                                                                                                                                                 | Reported on Page Number/Line Number | Reported on Section/Paragraph |
|---------|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|------------------------------|
| Title   | 1    | Identify the study as developing and/or validating a multivariable prediction model, the target population, and the outcome to be predicted.                                                                       | Page 1/line 2-3                     | Title/Paragraph 1            |
| Abstract | 2    | Provide a summary of objectives, study design, setting, participants, sample size, predictors, outcome, statistical analysis, results, and conclusions.                                                       | Page 2, Line 39-82                 | Abstract/Paragraph 1-4       |
| Introduction | 3a | Explain the medical context (including whether diagnostic or prognostic) and rationale for developing or validating the multivariable prediction model, including references to existing models.  | Page 4/line 90-107                 | Introduction/Paragraph 1-3   |
|         | 3b | Specify the objectives, including whether the study describes the development or validation of the model or both.                                                                                                 | Page 4/line 108-112                | Introduction/Paragraph 4     |
| Methods | 4a  | Describe the study design or source of data (e.g., randomized trial, cohort, or registry data), separately for the development and validation data sets, if applicable.                                                   | Page 6/line 115-129                | Materials&Methods/Paragraph 1-3 |
|         | 4b  | Specify the key study dates, including start of accrual; end of accrual; and, if applicable, end of follow-up.                                                                                                       | Page 7/line 182-187                | Materials&Methods/Paragraph 5 |
| Participants | 5a | Specify key elements of the study setting (e.g., primary care, secondary care, general population) including number and location of centres.                                                            | Page 6/line 115-129                | Materials&Methods/Paragraph 1-3 |
|         | 5b  | Describe eligibility criteria for participants.                                                                                                                                                                       | Page 6/line 116-128                | Materials&Methods/Paragraph 1-3 |
|         | 5c  | Give details of treatments received, if relevant.                                                                                                                                                                    | Page 6/line 146-154                | Materials&Methods/Paragraph 3 |
| Outcome | 6a  | Clearly define the outcome that is predicted by the prediction model, including how and when assessed.                                                                                                               | Page 6-7/line 156-173              | Materials&Methods/Paragraph 4 |
|         | 6b  | Report any actions to blind assessment of the outcome to be predicted.                                                                                                                                             | Page 6-7/line 156-173              | Materials&Methods/Paragraph 4 |
| Predictors | 7a | Clearly define all predictors used in developing or validating the multivariable prediction model, including how and when they were measured.                                                                 | Page 7-8/line 156-180              | Materials&Methods/Paragraph 4-5 |
|         | 7b  | Report any actions to blind assessment of predictors for the outcome and other predictors.                                                                                                                          | Page 7-8/line 156-180              | Materials&Methods/Paragraph 4-5 |
| Sample size | 8  | Explain how the study size was arrived at.                                                                                                                                                                           | Page 6/line 115-117                | Materials&Methods/Paragraph 1 |
| Section | Step | Description | Page/Line |
|---------|------|-------------|-----------|
| Missing data | 9 | Describe how missing data were handled (e.g., complete-case analysis, single imputation, multiple imputation) with details of any imputation method. | 6/115-117 |
| Statistical analysis methods | 10a | Describe how predictors were handled in the analyses. | 8-9/181-187 |
| | 10b | Specify type of model, all model-building procedures (including any predictor selection), and method for internal validation. | 8-9/181-187 |
| | 10d | Specify all measures used to assess model performance and, if relevant, to compare multiple models. | 8-9/181-187 |
| Risk groups | 11 | Provide details on how risk groups were created, if done. | 8-9/181-187 |
| Results | Participants | 13a | Describe the flow of participants through the study, including the number of participants with and without the outcome and, if applicable, a summary of the follow-up time. A diagram may be helpful. | 9/190-204 |
| | | 13b | Describe the characteristics of the participants (basic demographics, clinical features, available predictors), including the number of participants with missing data for predictors and outcome. | 9/190-204 |
| Model development | 14a | Specify the number of participants and outcome events in each analysis. | 9-10/206-215 |
| | 14b | If done, report the unadjusted association between each candidate predictor and outcome. | 9-10/206-215 |
| Model specification | 15a | Present the full prediction model to allow predictions for individuals (i.e., all regression coefficients, and model intercept or baseline survival at a given time point). | 10-11/217-242 |
| | 15b | Explain how to use the prediction model. | 10-11/217-242 |
| Model performance | 16 | Report performance measures (with CIs) for the prediction model. | 11-12/245-267 |
| Discussion | Limitations | 18 | Discuss any limitations of the study (such as nonrepresentative sample, few events per predictor, missing data). | 14/315-318 |
| Interpretation | 19b | Give an overall interpretation of the results, considering objectives, limitations, and results from similar studies, and other relevant evidence. | 12-14/270-314 |
| Implications | 20 | Discuss the potential clinical use of the model and implications for future research. | 14/320-325 |
| Other information | Supplementary information | 21 | Provide information about the availability of supplementary resources, such as study protocol, Web calculator, and data sets. | 14/328-330 |
| Funding | 22 | Give the source of funding and the role of the funders for the present study. | 15/332-334 |
Article information: https://dx.doi.org/10.21037/jtd-22-481
*As the checklist was provided upon initial submission, the page number/line number reported may be changed due to copyediting and may not be referable in the published version. In this case, the section/paragraph may be used as an alternative reference.