

## TRIPOD Checklist: Prediction Model Development

| Section                   | Item | Checklist description  | Reported on Page Number/Line Number | Reported on Section/Paragraph |
|---------------------------|------|--|-------------------------------------|-------------------------------|
| <b>Title and abstract</b> |      |  |                                     |                               |
| 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 3-4                     | Title                         |
| Abstract                  | 2    | Provide a summary of objectives, study design, setting, participants, sample size, predictors, outcome, statistical analysis, results, and conclusions.  | Page 1-2/Line 43-72                 | Abstract/Paragraph 1          |
| <b>Introduction</b>       |      |  |                                     |                               |
| Background and objectives | 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 98-109                  | Introduction/Paragraph 2      |
|                           | 3b   | Specify the objectives, including whether the study describes the development or validation of the model or both.  | Page 4/Line 98-109                  | Introduction/Paragraph 2      |
| <b>Methods</b>            |      |  |                                     |                               |
| Source of data            | 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 4/Line 113-116                 | Methods/Paragraph 1           |
|                           | 4b   | Specify the key study dates, including start of accrual; end of accrual; and, if applicable, end of follow-up.   | Page 4/Line 117                     | Methods/Paragraph 1           |
| Participants              | 5a   | Specify key elements of the study setting (e.g., primary care, secondary care, general population) including number and location of centres.   | Page 4/Line 114-115                 | Methods/Paragraph 1           |
|                           | 5b   | Describe eligibility criteria for participants.  | Page 5/Line 124-127                 | Methods/Paragraph 3           |
|                           | 5c   | Give details of treatments received, if relevant.  | Page 5/Line 136-141                 | Methods/Paragraph 4           |
| Outcome                   | 6a   | Clearly define the outcome that is predicted by the prediction model, including how and when assessed.   | Page 5/Line 142-149                 | Methods/Paragraph 5           |
|                           | 6b   | Report any actions to blind assessment of the outcome to be predicted.   | Page 5-6/Line 153-165               | Methods/Paragraph 6           |
| Predictors                | 7a   | Clearly define all predictors used in developing or validating the multivariable prediction model, including how and when they were measured.  | Page 6/Line 169-178                 | Methods/Paragraph 7           |
|                           | 7b   | Report any actions to blind assessment of predictors for the outcome and other predictors.   | Page 6/Line 169-178                 | Methods/Paragraph 7           |
| Sample size               | 8    | Explain how the study size was arrived at.   | Page 7/Line 188-203                 | Methods/Paragraph 8           |

|                              |     |   |                         |                           |
|------------------------------|-----|---|-------------------------|---------------------------|
| Missing data                 | 9   | Describe how missing data were handled (e.g., complete-case analysis, single imputation, multiple imputation) with details of any imputation method.  | Page 7/Line 188-203     | Methods/Paragraph 8       |
| Statistical analysis methods | 10a | Describe how predictors were handled in the analyses.   | Page 7/Line 188-203     | Methods/Paragraph 8       |
|                              | 10b | Specify type of model, all model-building procedures (including any predictor selection), and method for internal validation.   | Page 7/Line 188-203     | Methods/Paragraph 8       |
|                              | 10d | Specify all measures used to assess model performance and, if relevant, to compare multiple models.   | Page 7/Line 188-203     | Methods/Paragraph 8       |
| Risk groups                  | 11  | Provide details on how risk groups were created, if done.   | Page 7/Line 188-203     | Methods/Paragraph 8       |
| <b>Results</b>               |     |   |                         |                           |
| 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. | Page 7/Line 210-213     | Results/Paragraph 1       |
|                              | 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.    | Page 8/Line 230-239     | Results/Paragraph 3       |
| Model development            | 14a | Specify the number of participants and outcome events in each analysis.   | Page 7/Line 210-213     | Results/Paragraph 1       |
|                              | 14b | If done, report the unadjusted association between each candidate predictor and outcome.  | Page 7-8/Line 243-251   | Results/Paragraph 3       |
| 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).                           | Page 9/Line 253-263     | Results/Paragraph 4-5     |
|                              | 15b | Explain how to use the prediction model.  | Page 9/Line 253-263     | Results/Paragraph 4-5     |
| Model performance            | 16  | Report performance measures (with CIs) for the prediction model.  | Page 9/Line 265-271     | Results/Paragraph 6       |
| <b>Discussion</b>            |     |   |                         |                           |
| Limitations                  | 18  | Discuss any limitations of the study (such as nonrepresentative sample, few events per predictor, missing data).  | Page 11/Line 319-329    | Discussion/Paragraph 6    |
| Interpretation               | 19b | Give an overall interpretation of the results, considering objectives, limitations, and results from similar studies, and other relevant evidence.  | Page 10-11/Line 280-318 | Discussion/Paragraph 2-5  |
| Implications                 | 20  | Discuss the potential clinical use of the model and implications for future research.   | Page 11/Line 333-338    | Discussion/Paragraph 7    |
| <b>Other information</b>     |     |   |                         |                           |
| Supplementary information    | 21  | Provide information about the availability of supplementary resources, such as study protocol, Web calculator, and data sets.   | Page 25-35/Line 544-637 | supplementary information |
| Funding                      | 22  | Give the source of funding and the role of the funders for the present study.   | Page 12/Line 343-344    | Funding                   |

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\*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.