## TRIPOD Checklist: Prediction Model Development

| Section                          | Item | Checklist description                                                                                                                                                                                                 | Reported on Page Number/Line Number | Reported on Section/Paragraph |
|----------------------------------|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|-----------------------------|
| **Title and abstract**           |      |                                                                                                                                                                                                                       |                                     |                             |
| **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 1-3                    | title                       |
| **Abstract**                     | 2    | Provide a summary of objectives, study design, setting, participants, sample size, predictors, outcome, statistical analysis, results, and conclusions.                                                                 | Page 2, Line 31-53                  | Abstract                    |
| **Introduction**                 |      |                                                                                                                                                                                                                       |                                     |                             |
| **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 3-5, Line 84-129               | Introduction, Paragraph 1-3 |
| **3b**                           |      | Specify the objectives, including whether the study describes the development or validation of the model or both.                                                                                                      | Page 3-5, Line 84-129               | Introduction, Paragraph 1-3 |
| **Methods**                      |      |                                                                                                                                                                                                                       |                                     |                             |
| **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 104-116                | 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 104-116                | 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 104-116                | Methods, Paragraph 1        |
| **5b**                           |      | Describe eligibility criteria for participants.                                                                                                                                                                       | Page 4, Line 104-116                | Methods, Paragraph 1        |
| **5c**                           |      | Give details of treatments received, if relevant.                                                                                                                                                                     | Page 4, Line 104-116                | Methods, Paragraph 1        |
| **Outcome**                      | 6a   | Clearly define the outcome that is predicted by the prediction model, including how and when assessed.                                                                                                              | Page 5, Line 84-129                 | Methods, Paragraph 2-3      |
| **6b**                           |      | Report any actions to blind assessment of the outcome to be predicted.                                                                                                                                             | Page 3-5, Line 84-129               | Methods, Paragraph 2-3      |
| **Predictors**                   | 7a   | Clearly define all predictors used in developing or validating the multivariable prediction model, including how and when they were measured.                                                                     | Page 3-5, Line 118-143              | Methods, Paragraph 2-3      |
| **7b**                           |      | Report any actions to blind assessment of predictors for the outcome and other predictors.                                                                                                                           | Page 3-5, Line 84-129               | Methods, Paragraph 2-3      |
| **Sample size**                  | 8    | Explain how the study size was arrived at.                                                                                                                                                                            | Page 4, Line 104-116                | Methods, Paragraph 1        |
| Section | ID | Description | Page, Line | Notes |
|---------|----|-------------|------------|-------|
| Missing data | 9 | Describe how missing data were handled (e.g., complete-case analysis, single imputation, multiple imputation) with details of any imputation method. | 4, 104-116 | Methods, Paragraph 1 |
| Statistical analysis methods | 10a | Describe how predictors were handled in the analyses. | 5, 118-135 | Methods, Paragraph 2 |
| | 10b | Specify type of model, all model-building procedures (including any predictor selection), and method for internal validation. | 5, 118-143 | Methods, Paragraph 2-3 |
| | 10d | Specify all measures used to assess model performance and, if relevant, to compare multiple models. | 5, 118-143 | Methods, Paragraph 2-3 |
| Risk groups | 11 | Provide details on how risk groups were created, if done. | 5, 118-135 | Methods, Paragraph 2 |
| 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. | 6, 163-169 | 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. | 6, 163-169 | Results, Paragraph 1 |
| Model development | 14a | Specify the number of participants and outcome events in each analysis. | 6-10, 171-275 | Results, Paragraph 2-7 |
| | 14b | If done, report the unadjusted association between each candidate predictor and outcome. | 6-10, 171-275 | Results, Paragraph 2-7 |
| 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). | 6-10, 171-275 | Results, Paragraph 2-7 |
| | 15b | Explain how to use the prediction model. | 10, 266-275 | Results, Paragraph 7 |
| Model performance | 16 | Report performance measures (with CIs) for the prediction model. | 10, 266-275 | Results, Paragraph 7 |
| Discussion | Limitations | 18 | Discuss any limitations of the study (such as nonrepresentative sample, few events per predictor, missing data). | 13, 360-365 | Discussion, Paragraph 4 |
| Interpretation | 19b | Give an overall interpretation of the results, considering objectives, limitations, and results from similar studies, and other relevant evidence. | 11-13, 302-365 | Discussion, Paragraph 1-4 |
| Implications | 20 | Discuss the potential clinical use of the model and implications for future research. | 12-13, 346-359 | Discussion, Paragraph 3 |
| Other information | Supplementary information | 21 | Provide information about the availability of supplementary resources, such as study protocol, Web calculator, and data sets. | N/A, all information was showed in the manuscript. | N/A, all information was showed in the manuscript. |
| Funding | 22 | Give the source of funding and the role of the funders for the present study. | 13, 375-377 | 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.