TRIPOD Checklist: Prediction Model Development

| Section/Topic | Item | Checklist Item | Page |
|---|---|---|---|
| **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 1-2 |
| Abstract | 2 | Provide a summary of objectives, study design, setting, participants, sample size, predictors, outcome, statistical analysis, results, and conclusions. | Page 1-2/Line 3-41 |
| **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 2-3/Line 42-60 |
| | 3b | Specify the objectives, including whether the study describes the development or validation of the model or both. | Page 3-4/Line 61-78 |
| **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 79-96 |
| | 4b | Specify the key study dates, including start of accrual; end of accrual; and, if applicable, end of follow-up. | Page 4/Line 79-96 |
| 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 79-96 |
| | 5b | Describe eligibility criteria for participants. | Page 4/Line 79-96 |
| | 5c | Give details of treatments received, if relevant. | NA |
| Outcome | 6a | Clearly define the outcome that is predicted by the prediction model, including how and when assessed. | Page 5-6/Line 97-122 |
| | 6b | Report any actions to blind assessment of the outcome to be predicted. | NA |
| Predictors | 7a | Clearly define all predictors used in developing or validating the multivariable prediction model, including how and when they were measured. | Page 5-6/Line 97-122 |
| | 7b | Report any actions to blind assessment of predictors for the outcome and other predictors. | NA |
| Sample size | 8 | Explain how the study size was arrived at. | Page 5-6/Line 97-122 |
| Missing data | 9 | Describe how missing data were handled (e.g., complete-case analysis, single imputation, multiple imputation) with details of any imputation method. | NA |
| Statistical analysis methods | 10a | Describe how predictors were handled in the analyses. | Page 4-6/Line 87-132 |
| | 10b | Specify type of model, all model-building procedures (including any predictor selection), and method for internal validation. | Page 4-6/Line 87-132 |
| | 10d | Specify all measures used to assess model performance and, if relevant, to compare multiple models. | Page 4-6/Line 87-132 |
| Risk groups | 11 | Provide details on how risk groups were created, if done. | Page 4-6/Line 87-132 |
| **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. | Page 6-7/Line |

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| | | | 134-147 |
| | 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 6-7/Line 134-147 |
| Model development | 14a | Specify the number of participants and outcome events in each analysis. | Page 6-7/Line 134-147 |
| | 14b | If done, report the unadjusted association between each candidate predictor and outcome. | Page 6-7/Line 134-147 |
| 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 7-8/Line 148-178 |
| | 15b | Explain how to the use the prediction model. | Page 7-8/Line 148-178 |
| Model performance | 16 | Report performance measures (with CIs) for the prediction model. | Page 8/Line 173-178 |
| **Discussion** | | | |
| Limitations | 18 | Discuss any limitations of the study (such as nonrepresentative sample, few events per predictor, missing data). | Page 11/Line 260-263 |
| Interpretation | 19b | Give an overall interpretation of the results, considering objectives, limitations, and results from similar studies, and other relevant evidence. | Page 09/Line 199-206 |
| Implications | 20 | Discuss the potential clinical use of the model and implications for future research. | Page 11/Line 254-260 |
| **Other information** | | | |
| Supplementary information | 21 | Provide information about the availability of supplementary resources, such as study protocol, Web calculator, and data sets. | Page 11-12/Line 264-267 |
| Funding | 22 | Give the source of funding and the role of the funders for the present study. | Page 12/Line 268-269 |

Article information: https://dx.doi.org/10.21037/tcr-22-366
*As the checklist was provided upon initial submission, the page numbers reported may be changed due to copyediting and may not be referable in the published version.