TRIPOD Checklist: Prediction Model Development and Validation

Section	Item		Checklist description	Reported on Page Number/Line Number	Reported on Section/Paragraph
Title and abstract					
Title	1	D;V	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	Title
Abstract	2	D;V	Provide a summary of objectives, study design, setting, participants, sample size, predictors, outcome, statistical analysis, results, and conclusions.	Page 3-4，Line 26-57	Abstract, Paragraph 1-4
Introduction					
Background and objectives	3a	D;V	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 5-7, Line 62-96	Introduction，Paragraph 1-4
	3b	D;V	Specify the objectives, including whether the study describes the development or validation of the model or both.	Page 7, Line 97-98	Introduction，Paragraph 5
Methods					
Source of data	4a	D;V	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 9, Line 149	Feature selection method and model construction
	4b	D;V	Specify the key study dates, including start of accrual; end of accrual; and, if applicable, end of follow-up.	Page 7, Line 104-105	Patients，Paragraph 2
Participants	5a	D;V	Specify key elements of the study setting (e.g., primary care, secondary care, general population) including number and location of centres.	Page 7, Line 101,104,111	Patients，Paragraph 2
	5b	D;V	Describe eligibility criteria for participants.	Page 7, Line 105-112	Patients，Paragraph 2
	5c	D;V	Give details of treatments received, if relevant.	Page 7, Line 104	Patients，Paragraph 2
Outcome	6a	D;V	Clearly define the outcome that is predicted by the prediction model, including how and when assessed.	N/A，Not covered in this article	N/A
	6b	D;V	Report any actions to blind assessment of the outcome to be predicted.	N/A，Not covered in this article	N/A
Predictors	7a	D;V	Clearly define all predictors used in developing or validating the multivariable prediction model, including how and when they were measured.	N/A，Not covered in this article	N/A
	7b	D;V	Report any actions to blind assessment of predictors for the outcome and other predictors.	N/A，Not covered in this article	N/A

Sample size	8	D;V	Explain how the study size was arrived at.	N/A，Not covered in this article	N/A

			Describe how missing data were handled (e.g., complete-case analysis, single imputation, multiple imputation) with details of any imputation method.	Page9, Line149-154	Feature selection method and model construction
Missing data	9	D;V			
Statistical analysis methods	10a	D	Describe how predictors were handled in the analyses.	Page9, Line 154-161	Feature selection method and model construction
	10b	D	Specify type of model, all model-building procedures (including any predictor selection), and method for internal validation.	Page9, Line 161-165	Feature selection method and model construction
	10c	V	For validation, describe how the predictions were calculated.	Page9, Line 161-163	Feature selection method and model construction
	10d	D;V	Specify all measures used to assess model performance and, if relevant, to compare multiple models.	N/A, Not covered in this article	N/A
	10e	V	Describe any model updating (e.g., recalibration) arising from the validation, if done.	N/A, Not covered in this article	N/A
Risk groups	11	D;V	Provide details on how risk groups were created, if done.	N/A, Not covered in this article	N/A
Development vs. validation	12	V	For validation, identify any differences from the development data in setting, eligibility criteria, outcome, and predictors.	N/A, Not covered in this article	N/A
Results					
Participants	13a	D;V	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.	Page7, Line 104-112	Figure 1
	13b	D;V	Describe the characteristics of the participants (basic demographics, clinical features, available predictors), including the number of participants with missing data for predictors and outcome.	Page10, Line 178-188	Results, Paragraph 1
	13c	V	For validation, show a comparison with the development data of the distribution of important variables (demographics, predictors and outcome).	N/A, Not covered in this article	N/A
Model development	14a	D	Specify the number of participants and outcome events in each analysis.	N/A, Not covered in this article	N/A
	14b	D	If done, report the unadjusted association between each candidate predictor and outcome.	N/A, Not covered in this article	N/A
Model specification	15a	D	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).	N/A, Not covered in this article	N/A
	15b	D	Explain how to the use the prediction model.	N/A, Not covered in this article	N/A

Model performance	16	D;V	Report performance measures (with CIs) for the prediction model.	Page10, Line201-209	Results，Paragraph 3
Model-updating	17	V	If done, report the results from any model updating (i.e., model specification, model performance).	Page10, Line 201-209	Results，Paragraph 3
Discussion					
Limitations	18	D;V	Discuss any limitations of the study (such as nonrepresentative sample, few events per predictor, missing data).	Page14-15, Line 292-304	Discussion, Paragraph 4

Interpretation	19a	V	For validation, discuss the results with reference to performance in the development data, and any other validation data.	Page12-13, Line 225-271	Discussion, Paragraph 2
	19b	D;V	Give an overall interpretation of the results, considering objectives, limitations, and results from similar studies, and other relevant evidence.	Page12-15, Line 225-304	Discussion, Paragraph 2-4
Implications	20	D;V	Discuss the potential clinical use of the model and implications for future research.	Page15, Line306-309	Conclusion
Other information					
Supplementary information	21	D;V	Provide information about the availability of supplementary resources, such as study protocol, Web calculator, and data sets.	Page21，Line 448-450	Supplement
Funding	22	D;V	Give the source of funding and the role of the funders for the present study.	Page15，Line313-315	Acknowledgments

* Items relevant only to the development of a prediction model are denoted by D, items relating solely to a validation of a prediction model are denoted by V, and items relating to both are denoted D;V. We recommend using the TRIPOD Checklist in conjunction with the TRIPOD Explanation and Elaboration document.