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 2, line 4 to page3, line 16	Abstract
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 4, line 2 to page 5, line 22	Paragraph 1-5 of introduction
	3b	D;V	Specify the objectives, including whether the study describes the development or validation of the model or both.	Page 6, line 1-11	Paragraph 6 of introduction
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, ifapplicable.	Page 6, line 18 to page 7, line 20	Paragraph 1-5 of Materials and methods 2.1
	4b	D;V	Specify the key study dates, including start of accrual; end of accrual; and, if applicable, end of follow-up.	Page 6, line 18-21	Paragraph 1 of Materials
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 6, line 13-21	Paragraph 1 of materials and methods; paragraph 1
	5b	D;V	Describe eligibility criteria for participants.	Page 6, line 22 to page 7,	Paragraph 2-3 of Materials
	5c	D;V	Give details of treatments received, if relevant.	N/A, no treatment	N/A, no treatment
Outcome	6a	D;V	Clearly define the outcome that is predicted by the prediction model, including how and when assessed.	Page 8, line 6-15	Materials and methods 2.3.1
	6b	D;V	Report any actions to blind assessment of the outcome to be predicted.	N/A, no need to blind	N/A, no need to blind
Predictors	7a	D;V	Clearly define all predictors used in developing or validating the multivariable prediction model, including how and when they were measured.	Page 7, line 22 to page 9, line 10	Materials and methods 2.2; materials and methods
	7b	D;V	Report any actions to blind assessment of predictors for the outcome and other predictors.	N/A, no need to blind	N/A, no need to blind
Sample size	8	D;V	Explain how the study size was arrived at.	Page 7, line 12-15	Paragraph 4 of Materials

Missing data	9	D;V	Describe how missing data were handled (e.g., complete-case analysis, single imputation, multiple imputation) with details of any imputation method.	N/A, not an individual prognosis or diagnosis	N/A, not an individual prognosis or diagnosis
Statistical analysis methods	10a	D	Describe how predictors were handled in the analyses.	Page 10, line 22 to page	Materials and methods 2.4
	10b	D	Specify type of model, all model-building procedures (including any predictor selection), and method for internal validation.	Page 10, line 12-20	Materials and methods 2.3.4
	10c	V	For validation, describe how the predictions were calculated.	Page 11, line 5-7	Materials and methods 2.4
	10d	D;V	Specify all measures used to assess model performance and, if relevant, to compare multiple models.	Page 11, line 3-4	Materials and methods 2.4
	10e	V	Describe any model updating (e.g., recalibration) arising from the validation, if done.	N/A, no model updating	N/A, no model updating
Risk groups	11	D;V	Provide details on how risk groups were created, if done.	N/A, no risk group	N/A, no risk group
Development vs. validation	12	V	For validation, identify any differences from the development data in setting, eligibility criteria, outcome, and predictors.	Page 7, line 16-20	Paragraph 5 of Materials and methods 2.1
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.	Page 6, line 18-21;	Paragraph 1 of Materials and methods 2.1
	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.	Page 7, line 12-15	Paragraph 4 of Materials and methods 2.1
	13c	V	For validation, show a comparison with the development data of the distribution of important variables (demographics, predictors and outcome).	Page 7, line 16-20; Table 1	Paragraph 5 of Materials and methods 2.1
Model development	14a	D	Specify the number of participants and outcome events in each analysis.	Page 7, line 12-15	Paragraph 4 of Materials
	14b	D	If done, report the unadjusted association between each candidate predictor and outcome.	N/A, not included	N/A, not included
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 included	N/A, not included
	15b	D	Explain how to the use the prediction model.	Page 8, line 17 to page 9,	Materials and methods
Model performance	16	D;V	Report performance measures (with CIs) for the prediction model.	Page 15, line 5-18; Table 3; Table 4	Paragraph 2 of Results 3.1; paragraph 1 of Results
Model-updating	17	V	If done, report the results from any model updating (i.e., model specification, model performance).	N/A, no model updating	N/A, no model updating
Discussion					
Limitations	18	D;V	Discuss any limitations of the study (such as nonrepresentative sample, few events per predictor, missing data).	Page 17, line 19 to page 18, line 7	Discussion 4.4

Interpretation	19a	V	For validation, discuss the results with reference to performance in the development data, and any other validation data.	Page 14 line 19 to page 17 line 4	Discussion 4.1 and 4.2
	19b	D;V	Give an overall interpretation of the results, considering objectives, limitations, and results from similar studies, and other relevant evidence.	Page 13 line 3 to page 14 line 8	Paragraph 1 of Discussion
Implications	20	D;V	Discuss the potential clinical use of the model and implications for future research.	Page 14 line 9-17	Paragraph 2 of Discussion
Other information					
Supplementary information	21	D;V	Provide information about the availability of supplementary resources, such as study protocol, Web calculator, and data sets.	N/A,The dataset has not been authorized for public release	N/A,The dataset has not been authorized for public release
Funding	22	D;V	Give the source of funding and the role of the funders for the present study.	Page 20, line 4-6	Funding

* 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.

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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.