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 1-2/Line 3-26	Abstract/Paragraph 1
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 3/Line 60-71	Introduction/Paragraph 2
	3b	D;V	Specify the objectives, including whether the study describes the development or validation of the model or both.	Page 2/Line 76-82	Introduction/Paragraph 3
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 2/Line 86-106	Methods/Paragraph 1
	4b	D;V	Specify the key study dates, including start of accrual; end of accrual; and, if applicable, end of follow-up.	This is not the specific	This is not the specific
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.	This is not the specific type of study.	This is not the specific type of study.
	5b	D;V	Describe eligibility criteria for participants.	This is not the specific	This is not the specific
	5c	D;V	Give details of treatments received, if relevant.	This is not the specific	This is not the specific
Outcome	6a	D;V	Clearly define the outcome that is predicted by the prediction model, including how and when assessed.	Page 6-7/Line 114-129	Methods/Paragraph 3
	6b	D;V	Report any actions to blind assessment of the outcome to be predicted.	This is not the specific	This is not the specific
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 9-10/Line 175-193	Methods/Paragraph 7
	7b	D;V	Report any actions to blind assessment of predictors for the outcome and other predictors.	This is not the specific	This is not the specific
Sample size	8	D;V	Explain how the study size was arrived at.	Page 6/Line 119-120	Methods/Paragraph 3

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.	Page 5/Line 86-88	Methods/Paragraph 1
Statistical analysis methods	10a	D	Describe how predictors were handled in the analyses.	Page 7-10/Line 130-193	Methods/Paragraph 4-7
	10b	D	Specify type of model, all model-building procedures (including any predictor selection), and method for internal validation.	Page 6-7/Line 114-129	Methods/Paragraph 3
	10c	V	For validation, describe how the predictions were calculated.	Page 7/Line 128-129	Methods/Paragraph 3
	10d	D;V	Specify all measures used to assess model performance and, if relevant, to compare multiple models.	Page 7/Line 126-128	Methods/Paragraph 3
	10e	V	Describe any model updating (e.g., recalibration) arising from the validation, if done.	N/A	N/A
Risk groups	11	D;V	Provide details on how risk groups were created, if done.	Page 6/Line 122-124	Methods/Paragraph 3
Development vs. validation	12	V	For validation, identify any differences from the development data in setting, eligibility criteria, outcome, and predictors.	Page 7/Line 126-129	Methods/Paragraph 3
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 10-11/Line 205-215	Results/Paragraph 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.	Table 1	Table 1
	13c	V	For validation, show a comparison with the development data of the distribution of important variables (demographics, predictors and outcome).	Page 11/Line 214-215	Results/Paragraph 1
Model development	14a	D	Specify the number of participants and outcome events in each analysis.	Page 11/Line 218-224	Results/Paragraph 2
	14b	D	If done, report the unadjusted association between each candidate predictor and outcome.	N/A	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).	Page 12 /Line 241-251	Results/Paragraph 2
	15b	D	Explain how to the use the prediction model.	Page 10-11/Line 205-215	Results/Paragraph 1
Model performance	16	D;V	Report performance measures (with CIs) for the prediction model.	Page 10-11/Line 218-251	Results/Paragraph 2
Model-updating	17	V	If done, report the results from any model updating (i.e., model specification, model performance).	Page 12 /Line 245-246	Results/Paragraph 2
Discussion					
Limitations	18	D;V	Discuss any limitations of the study (such as nonrepresentative sample, few events per predictor, missing data).	Page 20 /Line 399-410	Discussion/Paragraph 1

Interpretation	19a	V	For validation, discuss the results with reference to performance in the development data, and any other validation data.	Page 21 /Line 428-429	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.	Page 21 /Line 428-429	Discussion//Paragraph 2
Implications	20	D;V	Discuss the potential clinical use of the model and implications for future research.	Page 21 -24/Line 411-492	Discussion//Paragraph 2-4
Other information					
Supplementary information	21	D;V	Provide information about the availability of supplementary resources, such as study protocol, Web calculator, and data sets.	Page 27/Line 550-551	Appendix A. Supplementary data
Funding	22	D;V	Give the source of funding and the role of the funders for the present study.	Page 26/Line 547-549	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.