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 2-3	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 34-53, Page 3/Line 57-58	Abstract/Paragraph 2-3
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 61-67, Page 4/Line 68-84	Introduction/Paragraph 1-2
	3b	D;V	Specify the objectives, including whether the study describes the development or validation of the model or both.	Page 4/Line 85-91	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 4/Line 93-100	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.	Page 4/Line 93-100	Methods/Paragraph 1
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.	This is not the specific type of study.	This is not the specific type of study.
	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 4/Line 101-111, Page 5/Line 112-119	Methods/Paragraph 2-3
	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 4/Line 93-100	Methods/Paragraph 1

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.	This is not the specific type of study.	This is not the specific type of study.
Statistical analysis methods	10a	D	Describe how predictors were handled in the analyses.	Page 5/Line 138-143	Methods/Paragraph 7
	10b	D	Specify type of model, all model-building procedures (including any predictor selection), and method for internal validation.	Page 4/Line 101-111, Page 5/Line 112-122	Methods/Paragraph 2-4
	10c	V	For validation, describe how the predictions were calculated.	Page 4/Line 101-111, Page	Methods/Paragraph 2-4
	10d	D;V	Specify all measures used to assess model performance and, if relevant, to compare multiple models.	Page 4/Line 101-111, Page	Methods/Paragraph 2-
	10e	V	Describe any model updating (e.g., recalibration) arising from the validation, if done.	This is not the specific	This is not the specific
Risk groups	11	D;V	Provide details on how risk groups were created, if done.	This is not the specific	This is not the specific
Development vs. validation	12	V	For validation, identify any differences from the development data in setting, eligibility criteria, outcome, and predictors.	Page 4/Line 101-111, Page 5/Line 112-122	Methods/Paragraph 2-4
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 5/Line 145-155, Page 6/Line 156-162	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.	Page 4/Line 93-100	Methods/Paragraph 1
	13c	V	For validation, show a comparison with the development data of the distribution of important variables (demographics, predictors and outcome).	Page 4/Line 93-100	Methods/Paragraph 1
Model development	14a	D	Specify the number of participants and outcome events in each analysis.	Page 6/Line 163-197	Results/Paragraph 2-4
	14b	D	If done, report the unadjusted association between each candidate predictor and outcome.	Page 6/Line 163-197	Results/Paragraph 2-4
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 6/Line 189-197	Results/Paragraph 4
	15b	D	Explain how to the use the prediction model.	Page 6/Line 189-197	Results/Paragraph 4
Model performance	16	D;V	Report performance measures (with CIs) for the prediction model.	Page 6/Line 163-180	Results/Paragraph 2
Model-updating	17	V	If done, report the results from any model updating (i.e., model specification, model performance).	This is not the specific	This is not the specific
Discussion					
Limitations	18	D;V	Discuss any limitations of the study (such as nonrepresentative sample, few events per predictor, missing data).	Page 7/Line 231-243, Page 9/Line 299-307,	Results/Paragraph 1, Conclusion/Paragraph 1

Interpretation	19a	V	For validation, discuss the results with reference to performance in the development data, and any other validation data.	Page 8/Line 257-280	Results/Paragraph 3-4
	19b	D;V	Give an overall interpretation of the results, considering objectives, limitations, and results from similar studies, and other relevant evidence.	Page 8/Line 257-280	Results/Paragraph 3-4
Implications	20	D;V	Discuss the potential clinical use of the model and implications for future research.	Page 8/Line 257-280	Results/Paragraph 3-4
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 5/Line 123-137	Methods/Paragraph 5-6
Funding	22	D;V	Give the source of funding and the role of the funders for the present study.	Page 9/Line 309-311	Finding/paragrap 1

* 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.