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 2/line 37-38	section 'Title'/paragraph 1
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 41-66	section '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 3-4/line 84-123	section 'Introduction' /paragraph 2-4
	3b	D;V	Specify the objectives, including whether the study describes the development or validation of the model or both.	page 4/line 124-130	section '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, ifapplicable.	page 4/line 133-146	section 'Materials and 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.	The data used for model	The data used for model
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 4/line 133-140	section 'Materials and methods' /paragraph 1
	5b	D;V	Describe eligibility criteria for participants.	page 4/line 133-140	section 'Materials and
	5c	D;V	Give details of treatments received, if relevant.	not relevant	not relevant
Outcome	6a	D;V	Clearly define the outcome that is predicted by the prediction model, including how and when assessed.	page 4-5/line 162-167	section 'Materials and methods' /paragraph 3
	6b	D;V	Report any actions to blind assessment of the outcome to be predicted.	page 5/line 170-176	section 'Materials and
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 5/line 170-176	section 'Materials and methods' /paragraph 4
	7b	D;V	Report any actions to blind assessment of predictors for the outcome and other predictors.	page 5/line 170-176	section 'Materials and
Sample size	8	D;V	Explain how the study size was arrived at.	the study size is	the study size is

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.	samples with missing data were deleted in the study.	samples with missing data were deleted in the study.
Statistical analysis methods	10a	D	Describe how predictors were handled in the analyses.	page 4-5/line 141-146, 149	section 'Materials and
	10b	D	Specify type of model, all model-building procedures (including any predictor selection), and method for internal validation.	page 4-5/line 156-167	Due to the small sample size, no internal validation
	10c	V	For validation, describe how the predictions were calculated.	page 4/line 160-164	section 'Materials and
	10d	D;V	Specify all measures used to assess model performance and, if relevant, to compare multiple models.	page 5/line 170-176	section 'Materials and
	10e	V	Describe any model updating (e.g., recalibration) arising from the validation, if done.	not done	not done
Risk groups	11	D;V	Provide details on how risk groups were created, if done.	page 5/line 170-176	section 'Materials and
Development vs. validation	12	V	For validation, identify any differences from the development data in setting, eligibility criteria, outcome, and predictors.	Due to the small sample size and lack of other	Due to the small sample size and lack of other
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 4/line 133-140	section 'Materials and methods' /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 133-140	section 'Materials and methods' /paragraph 1
	13c	V	For validation, show a comparison with the development data of the distribution of important variables (demographics, predictors and outcome).	Due to the small sample size and lack of other	Due to the small sample size and lack of other
Model development	14a	D	Specify the number of participants and outcome events in each analysis.	page 4/line 133-140	all the involved
	14b	D	If done, report the unadjusted association between each candidate predictor and outcome.	page 5/line 202-205	section 'Results' /paragraph
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 210-213	section 'Results' /paragraph 2
	15b	D	Explain how to the use the prediction model.	page 6/line 210-213	section 'Results' /paragraph
Model performance	16	D;V	Report performance measures (with CIs) for the prediction model.	page 6/line 217-245	section 'Results' /paragraph 3-4
Model-updating	17	V	If done, report the results from any model updating (i.e., model specification, model performance).	not done	not done
Discussion					
Limitations	18	D;V	Discuss any limitations of the study (such as nonrepresentative sample, few events per predictor, missing data).	page 7-8/line 331-338	section 'Discussion'/paragraph 6

Interpretation	19a	V	For validation, discuss the results with reference to performance in the development data, and any other validation data.	page 7/line 260-264	section 'Discussion'/paragraph 1
	19b	D;V	Give an overall interpretation of the results, considering objectives, limitations, and results from similar studies, and other relevant evidence.	page 7/line 260-264, 271-276	section 'Discussion'/paragraph 1, 3
Implications	20	D;V	Discuss the potential clinical use of the model and implications for future research.	page 7/line 260-264	section '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.	page 9/line 347-351	section 'Supplementary Information' /paragraph 1
Funding	22	D;V	Give the source of funding and the role of the funders for the present study.	page 9/line 353-358	section '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.

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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.