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.	2/29-30	Title/1
Abstract	2	D;V	Provide a summary of objectives, study design, setting, participants, sample size, predictors, outcome, statistical analysis, results, and conclusions.	2-3/40-65	Abstract/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.	3-5/68-113	Introduction/1-4
	3b	D;V	Specify the objectives, including whether the study describes the development or validation of the model or both.	5/114-122	Introduction/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.	9-10/182-205	Experimental design/Data preparation
	4b	D;V	Specify the key study dates, including start of accrual; end of accrual; and, if applicable, end of follow-up.	N/A	N/A
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.	N/A	N/A
	5b	D;V	Describe eligibility criteria for participants.	N/A	N/A
	5c	D;V	Give details of treatments received, if relevant.	N/A	N/A
Outcome	6a	D;V	Clearly define the outcome that is predicted by the prediction model, including how and when assessed.	N/A	N/A
	6b	D;V	Report any actions to blind assessment of the outcome to be predicted.	N/A	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	N/A
	7b	D;V	Report any actions to blind assessment of predictors for the outcome and other predictors.	N/A	N/A
Sample size	8	D;V	Explain how the study size was arrived at.	9-10/182-193	Experimental design/Data

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	N/A
Statistical analysis methods	10a	D	Describe how predictors were handled in the analyses.	N/A	N/A
	10b	D	Specify type of model, all model-building procedures (including any predictor selection), and method for internal validation.	N/A	N/A
	10c	V	For validation, describe how the predictions were calculated.	13/241-258	Experimental design/Performance
	10d	D;V	Specify all measures used to assess model performance and, if relevant, to compare multiple models.	12-15/222-286	Experimental design/Performance
	10e	V	Describe any model updating (e.g., recalibration) arising from the validation, if done.	11/212-221	Experimental design/Model training and
Risk groups	11	D;V	Provide details on how risk groups were created, if done.	N/A; not carried out	N/A; not carried out
Development vs. validation	12	V	For validation, identify any differences from the development data in setting, eligibility criteria, outcome, and predictors.	A CatPhan phantom were used to test the model.	Experimental design/Data preparation/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.	N/A	N/A
	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.	N/A	N/A
	13c	V	For validation, show a comparison with the development data of the distribution of important variables (demographics, predictors and outcome).	N/A	N/A
Model development	14a	D	Specify the number of participants and outcome events in each analysis.	N/A	N/A
	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).	N/A	N/A
	15b	D	Explain how to the use the prediction model.	6-8/139-174	Methods/Sparse-view CBCT image acquisition
Model performance	16	D;V	Report performance measures (with CIs) for the prediction model.	16-25/287-355	Results/Phantom study; Patient study; Export scoring; Comparison Study
Model-updating	17	V	If done, report the results from any model updating (i.e., model specification, model performance).	N/A	N/A
Discussion					
Limitations	18	D;V	Discuss any limitations of the study (such as nonrepresentative sample, few events per predictor, missing data).	27/405-414	Discussion/8

Interpretation	19a	V	For validation, discuss the results with reference to performance in the development data, and any other validation data.	26-27/371-393	Discussion/3-5
	19b	D;V	Give an overall interpretation of the results, considering objectives, limitations, and results from similar studies, and other relevant evidence.	28/416-418	Conclusion/1
Implications	20	D;V	Discuss the potential clinical use of the model and implications for future research.	27/394-404	Discussion/6-7
Other information					
Supplementary information	21	D;V	Provide information about the availability of supplementary resources, such as study protocol, Web calculator, and data sets.	Code is not publicly available in this paper, and codes can only be acquired	Code is not publicly available in this paper, and codes can only be acquired
Funding	22	D;V	Give the source of funding and the role of the funders for the present study.	28/420	Acknowledgments/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.