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 3/Line 31-63.	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 6/Line 71-105.	Introduction/Paragraph 1-5.
	3b	D;V	Specify the objectives, including whether the study describes the development or validation of the model or both.	Page 7/Line 120-125.	Introduction/Paragraph 7.
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 8/Line 127-135.	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 8/Line 136-151.	Methods/Paragraph 2.
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 8/Line 140-152. Page13/Line263-264	Methods/Paragraph 2, and Section 3.9 DLM
	5b	D;V	Describe eligibility criteria for participants.	Page 8/Line 140-158.	Methods/Paragraph 2-3.
	5c	D;V	Give details of treatments received, if relevant.	N/A	Not relevant.
Outcome	6a	D;V	Clearly define the outcome that is predicted by the prediction model, including how and when assessed.	Page 9-10/Line 176-189	Methods/ Section 3.3 Pathological analysis.
	6b	D;V	Report any actions to blind assessment of the outcome to be predicted.	N/A	Not relevant.
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/Line 153-162	Methods/ Section 3.2 Clinical feature selection
	7b	D;V	Report any actions to blind assessment of predictors for the outcome and other predictors.	Page 9/Line 157-164	Methods/ Section 3.2
Sample size	8	D;V	Explain how the study size was arrived at.	Page 8/Line 128-151.	Methods/ Section 3.1, 3.2

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	After data exclusion, the included data were
Statistical analysis methods	10a	D	Describe how predictors were handled in the analyses.	Page 13/Line 269-281.	Methods/ Section 3.11
	10b	D	Specify type of model, all model-building procedures (including any predictor selection), and method for internal validation.	Page 11-13/Line 225-281.	Methods/ Section Deep learning to Section CML
	10c	V	For validation, describe how the predictions were calculated.	Page 13/Line 269-	Methods/ Section 3.11
	10d	D;V	Specify all measures used to assess model performance and, if relevant, to compare multiple models.	Evaluation metrics Section	Methods/ Section 3.11
	10e	V	Describe any model updating (e.g., recalibration) arising from the validation, if done.	N/A	Not need model updating
Risk groups	11	D;V	Provide details on how risk groups were created, if done.	N/A	No risk groups in the
Development vs. validation	12	V	For validation, identify any differences from the development data in setting, eligibility criteria, outcome, and predictors.	Page 12-13/Line 254-261	Methods/ Section 3.9 DLM Modeling and 3.10
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 14/ Line 283-296	Results/ Section 4.1Patient baseline characteristics in
	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, and Table S1	Table 1, and Table S1. and Section 4.1
	13c	V	For validation, show a comparison with the development data of the distribution of important variables (demographics, predictors and outcome).	Table 1, and Table S1	Table 1, and Table S1.
Model development	14a	D	Specify the number of participants and outcome events in each analysis.	Table1 and Figure 1.	Mainly in Table 1 and
	14b	D	If done, report the unadjusted association between each candidate predictor and outcome.	Figure 2.	Figure 2.
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).	Figure 3	Figure 3 and others
	15b	D	Explain how to the use the prediction model.	Page 12-13/Line 269-290.	Methods and Results/
Model performance	16	D;V	Report performance measures (with CIs) for the prediction model.	Table 2-4	Table 2-4
Model-updating	17	V	If done, report the results from any model updating (i.e., model specification, model performance).	N/A	Not need model-updating.
Discussion					
Limitations	18	D;V	Discuss any limitations of the study (such as nonrepresentative sample, few events per predictor, missing data).	Page 18/Line 405-420.	Discussion/ Paragraph 7.

Interpretation	19a	V	For validation, discuss the results with reference to performance in the development data, and any other validation data.	Page 16-17/Line 343-382.	Discussion/ Paragraph 2-4.
	19b	D;V	Give an overall interpretation of the results, considering objectives, limitations, and results from similar studies, and other relevant evidence.	Page 17/Line 369-404.	Discussion/ Paragraph 4-6.
Implications	20	D;V	Discuss the potential clinical use of the model and implications for future research.	Page 17-18/Line 370-406.	Discussion/ Paragraph 4-6.
Other information					
Supplementary information	21	D;V	Provide information about the availability of supplementary resources, such as study protocol, Web calculator, and data sets.	Supplementary Material	Supplementary Material
Funding	22	D;V	Give the source of funding and the role of the funders for the present study.	N/A	No 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.

Article Information: https://dx.doi.org/10.21037/gs-23-417
*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.