



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. Abstract 2 D.V Provide a summary of objectives, study design, setting, participants, sample size, predictors outcome, statistical enables; results, and conclusions. Background and objectives and state of the study state of the study describes the development or validating the multivariable prediction model, including references to existing models. Bource of data 4 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, if applicable. Source of data 4 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, if applicable, and of follow-up. Participants 5 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, if applicable, and of follow-up. Specify key elements of the study setting (e.g., primary care, secondary care, general population) including number and location of centres. Participants 5 D.V Describe eligibility criteria for participants. Cutcome 6 D.V Give details of treatments received, if relevant. Cicard define the outcome that is predicted by the prediction model, including how and when assessed. Predictors 7 D.V Report any actions to blind assessment of the outcome to be predicted. Clearly define all predictors used in developing or validating the multivariable prediction model, including how and when they were measured. Report any actions to blind assessment of the outcome to be predicted. Clearly define all predictors used in developing or validating the multivariable prediction model, including how and when they were measured. Report any actions to blind assessment of predictors for the outcome the model of the prediction model interior	ction/Topic	Item		Checklist Item	Section
Abstract 2 D.V Provide a summary of objectives, study design, setting, participants, sample size, predictors, outcome, statistical analysis, results, and conclusions.		1	D;V		Title
Background and objectives Specify the very content of the study design or source of data (e.g., randomized trial, cohort, or registry very color of the model or them.	Abstract	2	D;V	Provide a summary of objectives, study design, setting, participants, sample size,	Abstract paras 1-3
Background and objectives 3 b 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 b D.V Specify the objectives, including whether the study describes the development or validation of the model or both. Methods Source of data 4 b 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, if applicable, end of follow-up. 5 b D.V Specify key elements of the study setting (e.g., primary care, secondary care, general population) including number and location of centres. 5 b D.V Give details of treatments received, if relevant. 5 c D.V Give details of treatments received, if relevant. Clearly define the outcome that is predicted by the prediction model, including how and when assessed. 6 b D.V Report any actions to blind assessment of the outcome to be predicted. 7 b D.V Report any actions to blind assessment of the outcome to be predicted. 7 b D.V Explain how the study size was arrived at. 8 D.V Explain how the study size was arrived at. 10 c D D D D D D D D D D D D D D D D D D	roduction			predictors, outcome, statistical analysis, results, and conclusions.	paras 1-3
Methods	Background	3a	D;V	for developing or validating the multivariable prediction model, including references to existing models.	Intro para 1-2
Source of data Source of data Source of data Source of data (e.g., randomized trial, cohort, or registry data), separately for the development and validation data sets, if applicable.	and objectives	3b	D;V		Intro para 3
Source of data Ab D.V Specify the key study dates, including start of accrual; end of accrual; and, if applicable, end of follow-up. Specify key elements of the study setting (e.g., primary care, secondary care, general population) including number and location of centres. Participants Sb D.V Describe eligibility criteria for participants.	ethods				
Ab D;V Specify the key study dates, including start of accrual; and, if applicable, end of follow-up.	Source of data	4a	D;V		Methods para 1-4, S1 Appendix
Participants Section	Source of data	4b	D;V		Methods para 1-4, S1 Appendix
Sb D;V Describe eligibility criteria for participants.		5a	D;V		Methods para 1-4, S1 Appendix
Outcome 6a D;V Clearly define the outcome that is predicted by the prediction model, including how and when assessed. 7a D;V Report any actions to blind assessment of the outcome to be predicted. 7a D;V Report any actions to blind assessment of the outcome to be predicted. 7b D;V Report any actions to blind assessment of predictors for the outcome and other predictors. 8 ample size 8 D;V Report any actions to blind assessment of predictors for the outcome and other predictors. 8 ample size 8 D;V Explain how the study size was arrived at. 9 D;V Describe how missing data were handled (e.g., complete-case analysis, single imputation, multiple imputation) with details of any imputation method. 10a D Describe how predictors were handled in the analyses. 10b D Specify type of model, all model-building procedures (including any predictor selection), and method for internal validation. 10c V For validation, describe how the predictions were calculated. 10d D;V Specify all measures used to assess model performance and, if relevant, to compare multiple models. 10e V Describe any model updating (e.g., recalibration) arising from the validation, if done. 11 D;V Provide details on how risk groups were created, if done. 12 V For validation, identify any differences from the development data in setting, eligibility criteria, outcome, and predictors. 13a D;V Windows and predictors, 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. 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. Describe the characteristics of the participants (basic demographics, clinical features, available predictors), including the number of participants with missing data for predictors and outcome. 13b D;V For validation, show a comparison with the development data of the distribution of important	Participants	5b	D;V	Describe eligibility criteria for participants.	Methods para 1-4, S1 Appendix, Table 1
Outcome 6a D;V Clearly define the outcome that is predicted by the prediction model, including how and when assessed. 7a D;V Report any actions to blind assessment of the outcome to be predicted. 7a D;V Report any actions to blind assessment of the outcome to be predicted. 7b D;V Report any actions to blind assessment of predictors for the outcome and other predictors. 8 ample size 8 D;V Report any actions to blind assessment of predictors for the outcome and other predictors. 8 ample size 8 D;V Explain how the study size was arrived at. 9 D;V Describe how missing data were handled (e.g., complete-case analysis, single imputation, multiple imputation) with details of any imputation method. 10a D Describe how predictors were handled in the analyses. 10b D Specify type of model, all model-building procedures (including any predictor selection), and method for internal validation. 10c V For validation, describe how the predictions were calculated. 10d D;V Specify all measures used to assess model performance and, if relevant, to compare multiple models. 10e V Describe any model updating (e.g., recalibration) arising from the validation, if done. 11 D;V Provide details on how risk groups were created, if done. 12 V For validation, identify any differences from the development data in setting, eligibility criteria, outcome, and predictors. 13a D;V Windows and predictors, 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. 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. Describe the characteristics of the participants (basic demographics, clinical features, available predictors), including the number of participants with missing data for predictors and outcome. 13b D;V For validation, show a comparison with the development data of the distribution of important		5c	D:V	Give details of treatments received, if relevant.	NA
Predictors Predictors Pred	Outcome	6a	D;V	Clearly define the outcome that is predicted by the prediction model, including how and	Methods para 5-9
Predictors Predictors Pred	Sucome	6b	D;V	Report any actions to blind assessment of the outcome to be predicted.	. NA
Sample size 8 D;V Explain how the study size was arrived at.	Predictors	7a	D;V	model, including how and when they were measured.	Methods para 5-9
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. 10a D Describe how predictors were handled in the analyses.	redictors	7b	D;V		NA
Statistical analysis methods 10a	Sample size	8	D;V	Explain how the study size was arrived at.	Methods para 5-9
Statistical analysis methods 10c V For validation, describe how the predictions were calculated. 10d D;V Specify all measures used to assess model performance and, if relevant, to compare multiple models. 10e V Describe any model updating (e.g., recalibration) arising from the validation, if done. Risk groups 11 D;V Provide details on how risk groups were created, if done. Persultation Participants Participants 13a D;V With and without the outcome and, if applicable, a summary of the follow-up time. A diagram may be helpful. Describe the characteristics of the participants (basic demographics, clinical features, available predictors), including the number of participants with missing data for predictors and outcome. Model development 14a D Specify the number of participants and outcome events in each analysis. Model development 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).	Missing data	9	D;V		NA
Statistical analysis methods 10c V For validation, describe how the predictions were calculated. 10d D;V Specify all measures used to assess model performance and, if relevant, to compare multiple models. 10e V Describe any model updating (e.g., recalibration) arising from the validation, if done. Risk groups 11 D;V Provide details on how risk groups were created, if done. Development vs. validation 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. Describe the characteristics of the participants (basic demographics, clinical features, available predictors and outcome. 13c V For validation, show a comparison with the development data of the distribution of important variables (demographics, predictors and outcome). Model development 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).		10a	D	Describe how predictors were handled in the analyses.	Methods para 5-9
analysis methods 10c	Statistical	10b	D		Methods para 5-9
10d	analysis	10c	٧	For validation, describe how the predictions were calculated.	Methods para 5-9
Risk groups 11 D;V Provide details on how risk groups were created, if done. Development vs. validation 12 V For validation, identify any differences from the development data in setting, eligibility criteria, outcome, and predictors. Results Participants 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. Describe the characteristics of the participants (basic demographics, clinical features, available predictors), including the number of participants with missing data for predictors and outcome. For validation, show a comparison with the development data of the distribution of important variables (demographics, predictors and outcome). Model development D Specify the number of participants and outcome events in each analysis. If done, report the unadjusted association between each candidate predictor and outcome. 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).	methods	10d	D;V		Methods para 5-9
Development vs. validation Participants 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. Describe the characteristics of the participants (basic demographics, clinical features, available predictors), including the number of participants with missing data for predictors and outcome. Tac V For validation, show a comparison with the development data of the distribution of important variables (demographics, predictors and outcome). Model development Tab D Specify the number of participants and outcome events in each analysis. If done, report the unadjusted association between each candidate predictor and outcome. 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).		10e	V	Describe any model updating (e.g., recalibration) arising from the validation, if done.	Methods para 5-9
Participants Participants 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. Describe the characteristics of the participants (basic demographics, clinical features, available predictors), including the number of participants with missing data for predictors and outcome. To validation, show a comparison with the development data of the distribution of important variables (demographics, predictors and outcome). Model development The provided	Risk groups	11	D;V		NA
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Participants 13a			•	criteria, outcome, and predictors.	
13b D;V available predictors), including the number of participants with missing data for predictors and outcome. 13c V For validation, show a comparison with the development data of the distribution of important variables (demographics, predictors and outcome).	Suits	13a	D;V	with and without the outcome and, if applicable, a summary of the follow-up time. A diagram may be helpful.	NA
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Model development 14a D Specify the number of participants and outcome events in each analysis. 14b D If done, report the unadjusted association between each candidate predictor and outcome. 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). Model specification		13c	V	For validation, show a comparison with the development data of the distribution of	Table 1
development 14b D If done, report the unadjusted association between each candidate predictor and outcome. 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). Model specification	Model	14a	D		Results para 1-6
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). Model specification		14b	D		NA
specification		15a	D		Tables 2-3, S1 Appendix
		15b	D	Explain how to the use the prediction model.	Results para 2-5, Tables 2-3, S1 Table, S1 Appendix
Model performance 16 D;V Report performance measures (with CIs) for the prediction model.		16	D;V	Report performance measures (with CIs) for the prediction model.	Tables 2-3, Figs 2-4, Results para 2-6, S1 Appendix
Model-updating 17 V If done, report the results from any model updating (i.e., model specification, model performance).	Model-updating	17	V		Figs 1-4, Table 2



TRIPOD Checklist: Prediction Model Development and Validation

				Results para 2				
Discussion								
Limitations	18	D;V	Discuss any limitations of the study (such as nonrepresentative sample, few events per predictor, missing data).	Discussion para 7				
Interpretation	19a	V	For validation, discuss the results with reference to performance in the development data, and any other validation data.	Discussion para 2-5				
	19b	D;V	Give an overall interpretation of the results, considering objectives, limitations, results from similar studies, and other relevant evidence.	Discussion para 1 and 8				
Implications	20	D;V	Discuss the potential clinical use of the model and implications for future research.	Discussion para 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.	S1 Appendix				
Funding	22	D;V	Give the source of funding and the role of the funders for the present study.	SA				

^{*}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.