

Section/Topic	Item	Development / evaluation ¹	Checklist item	Reported on page
TITLE				
<i>Title</i>	1	D;E	Identify the study as developing or evaluating the performance of a multivariable prediction model, the target population, and the outcome to be predicted	Title
ABSTRACT				
<i>Abstract</i>	2	D;E	See TRIPOD+AI for Abstracts checklist	
INTRODUCTION				
<i>Background</i>	3a	D;E	Explain the healthcare context (including whether diagnostic or prognostic) and rationale for developing or evaluating the prediction model, including references to existing models	Lines 101-114
	3b	D;E	Describe the target population and the intended purpose of the prediction model in the context of the care pathway, including its intended users (e.g., healthcare professionals, patients, public)	Lines 115-120
	3c	D;E	Describe any known health inequalities between sociodemographic groups	N/A
<i>Objectives</i>	4	D;E	Specify the study objectives, including whether the study describes the development or validation of a prediction model (or both)	Lines 115-120
METHODS				
<i>Data</i>	5a	D;E	Describe the sources of data separately for the development and evaluation datasets (e.g., randomised trial, cohort, routine care or registry data), the rationale for using these data, and representativeness of the data	Lines 124-141
	5b	D;E	Specify the dates of the collected participant data, including start and end of participant accrual; and, if applicable, end of follow-up	Lines 131 and 139
<i>Participants</i>	6a	D;E	Specify key elements of the study setting (e.g., primary care, secondary care, general population) including the number and location of centres	Lines 129; Lines 138
	6b	D;E	Describe the eligibility criteria for study participants	Lines 142-149
	6c	D;E	Give details of any treatments received, and how they were handled during model development or evaluation, if relevant	N/A
<i>Data preparation</i>	7	D;E	Describe any data pre-processing and quality checking, including whether this was similar across relevant sociodemographic groups	Line 186-192
<i>Outcome</i>	8a	D;E	Clearly define the outcome that is being predicted and the time horizon, including how and when assessed, the rationale for choosing this outcome, and whether the method of outcome assessment is consistent across sociodemographic groups	Lines 158-170
	8b	D;E	If outcome assessment requires subjective interpretation, describe the qualifications and demographic characteristics of the outcome assessors	N/A
	8c	D;E	Report any actions to blind assessment of the outcome to be predicted	N/A
<i>Predictors</i>	9a	D	Describe the choice of initial predictors (e.g., literature, previous models, all available predictors) and any pre-selection of predictors before model building	Lines 171-184
	9b	D;E	Clearly define all predictors, including how and when they were measured (and any actions to blind assessment of predictors for the outcome and other predictors)	Lines 171-184
	9c	D;E	If predictor measurement requires subjective interpretation, describe the qualifications and demographic characteristics of the predictor assessors	N/A
<i>Sample size</i>	10	D;E	Explain how the study size was arrived at (separately for development and evaluation), and justify that the study size was sufficient to answer the research question. Include details of any sample size calculation	Lines 150-157
<i>Missing data</i>	11	D;E	Describe how missing data were handled. Provide reasons for omitting any data	Lines 188-191
<i>Analytical methods</i>	12a	D	Describe how the data were used (e.g., for development and evaluation of model performance) in the analysis, including whether the data were partitioned, considering any sample size requirements	Lines 200; 220-225
	12b	D	Depending on the type of model, describe how predictors were handled in the analyses (functional form, rescaling, transformation, or any standardisation).	Lines 200-203
	12c	D	Specify the type of model, rationale ² , all model-building steps, including any hyperparameter tuning, and method for internal validation	Lines 194-211
	12d	D;E	Describe if and how any heterogeneity in estimates of model parameter values and model performance was handled and quantified across clusters (e.g., hospitals, countries). See TRIPOD-Cluster for additional considerations ³	N/A
	12e	D;E	Specify all measures and plots used (and their rationale) to evaluate model performance (e.g., discrimination, calibration, clinical utility) and, if relevant, to compare multiple models	Line 214-219
	12f	E	Describe any model updating (e.g., recalibration) arising from the model evaluation, either overall or for particular sociodemographic groups or settings	N/A
	12g	E	For model evaluation, describe how the model predictions were calculated (e.g., formula, code, object, application programming interface)	Line 222-223
<i>Class imbalance</i>	13	D;E	If class imbalance methods were used, state why and how this was done, and any subsequent methods to recalibrate the model or the model predictions	N/A
<i>Fairness</i>	14	D;E	Describe any approaches that were used to address model fairness and their rationale	Lines 226-228
<i>Model output</i>	15	D	Specify the output of the prediction model (e.g., probabilities, classification). Provide details and rationale for any classification and how the thresholds were identified	Lines 195-199

¹ D=items relevant only to the development of a prediction model; E=items relating solely to the evaluation of a prediction model; D;E=items applicable to both the development and evaluation of a prediction model

² Separately for all model building approaches.

³ TRIPOD-Cluster is a checklist of reporting recommendations for studies developing or validating models that explicitly account for clustering or explore heterogeneity in model performance (eg, at different hospitals or centres). Debray et al, BMJ 2023; 380: e071018 [DOI: 10.1136/bmj-2022-071018]

<i>Training versus evaluation</i>	16	D;E	Identify any differences between the development and evaluation data in healthcare setting, eligibility criteria, outcome, and predictors	Lines 181-184; 246-249
<i>Ethical approval</i>	17	D;E	Name the institutional research board or ethics committee that approved the study and describe the participant-informed consent or the ethics committee waiver of informed consent	Lines 230-231
OPEN SCIENCE				
<i>Funding</i>	18a	D;E	Give the source of funding and the role of the funders for the present study	Lines 399-407
<i>Conflicts of interest</i>	18b	D;E	Declare any conflicts of interest and financial disclosures for all authors	Lines 416-418
<i>Protocol</i>	18c	D;E	Indicate where the study protocol can be accessed or state that a protocol was not prepared	Lines 233-234
<i>Registration</i>	18d	D;E	Provide registration information for the study, including register name and registration number, or state that the study was not registered	Line 233-234
<i>Data sharing</i>	18e	D;E	Provide details of the availability of the study data	Lines 409-412
<i>Code sharing</i>	18f	D;E	Provide details of the availability of the analytical code ⁴	Lines 412-414
PATIENT & PUBLIC INVOLVEMENT				
<i>Patient & Public Involvement</i>	19	D;E	Provide details of any patient and public involvement during the design, conduct, reporting, interpretation, or dissemination of the study or state no involvement.	N/A
RESULTS				
<i>Participants</i>	20a	D;E	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.	Lines 237-239; Figure 1; ESM Figure 2
	20b	D;E	Report the characteristics overall and, where applicable, for each data source or setting, including the key dates, key predictors (including demographics), treatments received, sample size, number of outcome events, follow-up time, and amount of missing data. A table may be helpful. Report any differences across key demographic groups.	Lines 239-243; Table 1
	20c	E	For model evaluation, show a comparison with the development data of the distribution of important predictors (demographics, predictors, and outcome).	Lines 244-249; ESM Table 2
<i>Model development</i>	21	D;E	Specify the number of participants and outcome events in each analysis (e.g., for model development, hyperparameter tuning, model evaluation)	Lines 240-242; 246-247
<i>Model specification</i>	22	D	Provide details of the full prediction model (e.g., formula, code, object, application programming interface) to allow predictions in new individuals and to enable third-party evaluation and implementation, including any restrictions to access or re-use (e.g., freely available, proprietary) ⁵	ESM Table 1
<i>Model performance</i>	23a	D;E	Report model performance estimates with confidence intervals, including for any key subgroups (e.g., sociodemographic). Consider plots to aid presentation.	Lines 257-303
	23b	D;E	If examined, report results of any heterogeneity in model performance across clusters. See TRIPOD Cluster for additional details ³ .	N/A
<i>Model updating</i>	24	E	Report the results from any model updating, including the updated model and subsequent performance	N/A
DISCUSSION				
<i>Interpretation</i>	25	D;E	Give an overall interpretation of the main results, including issues of fairness in the context of the objectives and previous studies	Lines 336-374
<i>Limitations</i>	26	D;E	Discuss any limitations of the study (such as a non-representative sample, sample size, overfitting, missing data) and their effects on any biases, statistical uncertainty, and generalizability	Lines 363-388
<i>Usability of the model in the context of current care</i>	27a	D	Describe how poor quality or unavailable input data (e.g., predictor values) should be assessed and handled when implementing the prediction model	Lines 350-356
	27b	D	Specify whether users will be required to interact in the handling of the input data or use of the model, and what level of expertise is required of users	Lines 350-356
	27c	D;E	Discuss any next steps for future research, with a specific view to applicability and generalizability of the model	Lines 393-395

From: Collins GS, Moons KGM, Dhiman P, et al. *BMJ* 2024;385:e078378. doi:10.1136/bmj-2023-078378

⁴ This relates to the analysis code, for example, any data cleaning, feature engineering, model building, evaluation.

⁵ This relates to the code to implement the model to get estimates of risk for a new individual.