Supplementary Table 1. Quantitative evaluation of paired intermediate quality T2WI in ablation study

Model	CycleGAN	SPADE	Pyramid	Transformer	PSNR	SSIM	LPIPS	FCS
CycleGAN	✓				28.6 ± 0.2	0.316 ± 0.040	0.329 ± 0.034	0.871 ± 0.029
S-CyGAN	✓	✓			28.9 ± 0.4	0.410 ± 0.047	0.246 ± 0.030	0.890 ± 0.028
PS-CyGAN	✓	✓	✓		29.1 ± 0.4	0.500 ± 0.054	0.213 ± 0.029	0.896 ± 0.030
ST-CyGAN	✓	✓		✓	29.1 ± 0.4	0.477 ± 0.048	0.213 ± 0.025	0.909 ± 0.024
PST-CyGAN	✓	✓	✓	✓	29.3 ± 0.5*	0.558 ± 0.116*	0.169 ± 0.056#	0.915 ± 0.028*

Note. * Higher is better; # Lower is better.

Supplementary Table 2. **Imaging parameters of T_2WI for prostate MRI in multicenter datasets**

Center	T_2WI	Vendor	Field strength	Voxel size (mm)	TE (s)	TR (s)
Center 1	Axial TSE*	Siemens Prisma	3T	0.35-0.38 × 0.35-0.38 × 2.0	110	3500
Center 1	Axial TSE	Siemens Verio, Skyra, Vida, and Prisma; Philips Ingenia; United imaging u770	3T	0.5-0.8 × 0.5-0.8 × 3.0-4.0	105-110	3500-7000
Center 2	Axial TSE	Siemens Skyra	3T	0.6-0.8 × 0.6-0.8 × 3.0-4.5	60/104	6540/7590
Center 3	Axial TSE	Philips Ingenia	3T	0.6-0.9 × 0.6-0.9 × 3.0-4.5	77/78/100	4542/4828/4898/4733/4972/ 6000
Center 7	Axial TSE	Siemens Skyra	3T	0.78 × 0.78 × 3.0-3.5	72/97	3900/4342/6118/6173/6489/6498/7500

Center 5	Axial TSE	Siemens Skyra, Verio	3T	0.59 × 0.59 × 3.0	62/64/74/97/104	4480/5000/5100/7500/8600
Center 4	Axial TSE	Philips Achieva TX	3T	0.86 × 0.86 × 3.0	76/80	2750/3000
Center 6	Axial TSE	Philips Achieva	3T	0.77 × 0.77 × 4.0	91	3000
PI-CAI	Axial TSE	N/A	3T	0.58 × 0.58 × 3.5	N/A	N/A

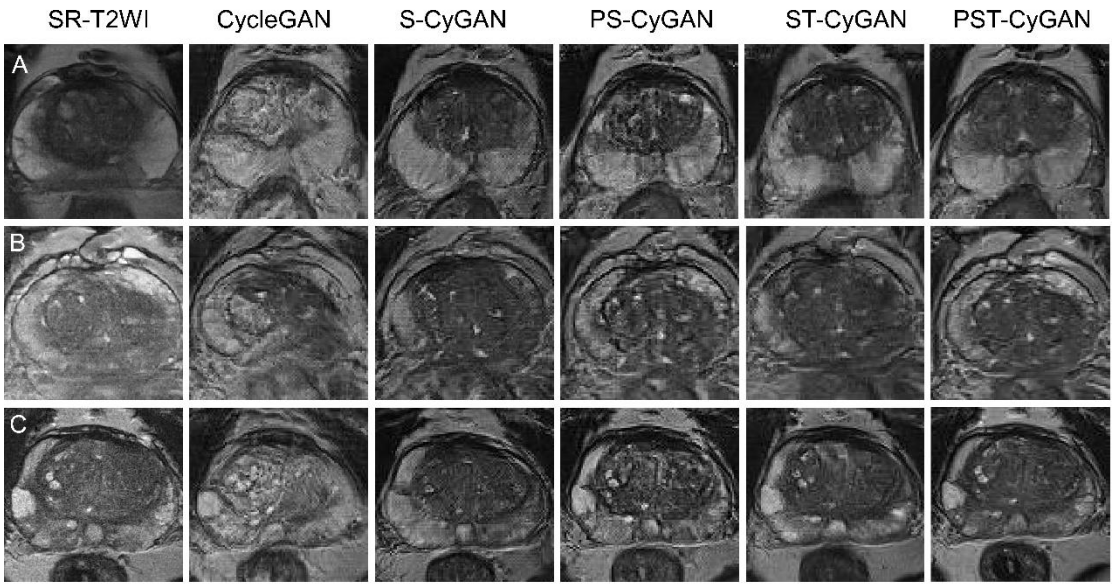
Abbreviation: *T_2WI*, T2-weighted imaging; *DWI*, diffusion-weighted imaging; *ADC*, Apparent diffusion coefficient; *SUH* 1st; *SUH* 2nd; *SKH*; *TZH*; *CSH*. TR = repetition time; TE = echo time.

*, using a novel deep-accelerated TSE sequence for achieving high-resolution, high-SNR T_2WI as a dataset for training GAN model.

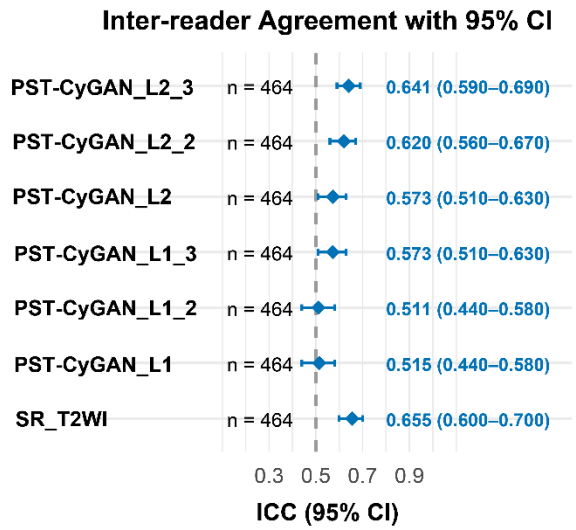
Supplementary Table 3. Standardized 10-Point PI-QUAL Scoring Rubric for Prostate MRI Image Quality Assessment

Score	Quality Tier	Spatial Resolution	SNR / Noise	Artifact Severity	Geometric Distortion	Diagnostic Confidence
10	**Excellent**	Perfect zonal delineation; all boundaries sharply defined	No noise; optimal tissue contrast throughout	Completely artifact-free	No distortion; perfect geometric fidelity	Highest confidence; ideal for all clinical uses
9	**Excellent**	Near-perfect sharpness; imperceptible softness only	Minimal noise; no diagnostic impact	Imperceptible artifacts only	Negligible deviation; anatomy fully accurate	Very high confidence; suitable for all applications
8	**Good**	Sharp with slight softness at periphery; zonal anatomy clear	Very mild noise; tissue differentiation unimpaired	Minimal artifacts; no diagnostic limitation	Very slight peripheral distortion; target evaluation intact	High confidence; fully suitable for routine reporting
7	**Good**	Mild blurring at interfaces; zonal anatomy well-preserved	Mild noise; tissue contrast maintained	Mild artifacts; slight impact on appearance only	Mild peripheral distortion; relevant anatomy intact	Good confidence; adequate for standard evaluation
6	**Adequate**	Moderate blurring at zonal boundaries; diagnosis feasible	Moderate noise; tissue differentiation maintained	Moderate artifacts; do not obscure primary regions	Moderate distortion; minor misrepresentation peripherally	Moderate-high confidence; acceptable for most scenarios
5	**Adequate**	Notable blurring; key anatomy identifiable with effort	Moderate noise; boundaries discernible but suboptimal	Noticeable artifacts; limited diagnostic impact	Notable distortion; target structures still identifiable	Moderate confidence; usable with awareness of limitations
4	**Poor**	Significant blurring; zonal anatomy degraded	Substantial noise; tissue contrast reduced	Significant artifacts; impairs portions of the gland	Significant distortion; interpretation affected	Low-moderate confidence; reassessment preferred
3	**Poor**	Severely degraded; anatomical boundaries largely indistinct	Extensive noise masking tissue signal	Extensive artifacts; diagnosis significantly impaired	Severe distortion; anatomical landmarks unreliable	Low confidence; repeat acquisition advised
2	**Non-diagnostic**	Near-complete loss of resolution; structures unrecognizable	Signal overwhelmed by noise	Overwhelming artifacts; evaluation nearly impossible	Extreme distortion; anatomy uninterpretable	Very low confidence; acquisition must be repeated
1	**Non-diagnostic**	Complete resolution loss; no anatomical detail discernible	No discernible signal; image unusable	Catastrophic artifacts; image entirely non-evaluable	Complete geometric failure; no recognizable anatomy	No diagnostic value; image acquisition failure

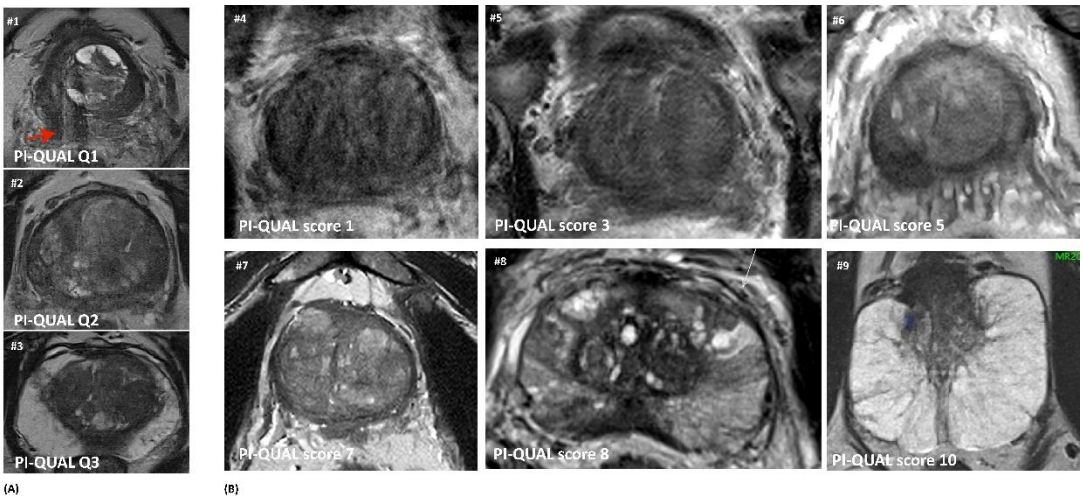
Abbreviations: PI-QUAL = Prostate Imaging Quality; SNR = signal-to-noise ratio. Each score is defined across five core PI-QUAL domains. Higher scores indicate superior image quality.



Supplementary Figure 1. Comparison of image reconstruction from four different models in three participants in the test datasets. (A) A 54-year-old male, the patient exhibits transitional zone hyperplasia, with decreased signal intensity in the lesion on reconstructed T2-weighted (T2W) images from CycleGAN, S-CyGAN, PS-CyGAN,PST-CyGAN and ST-CyGAN. While the reconstructions from CycleGAN, S-CyGAN, PST-CyGAN and ST-CyGAN display noticeable artifacts, PST-CyGAN-generated images remain artifact-free, demonstrating superior reconstruction quality. (B) A 78-year-old male, low-signal areas are evident in the prostate. Reconstructed images from CycleGAN, ST-CyGAN and PS-CyGAN contain artifacts, whereas those from S-CyGAN and PST-CyGAN provide clear visualization of the lesion with well-defined tumor boundaries and no artifacts. (C) A 65-year-old male, lesions are present in both the transitional and peripheral zones of the prostate. The reconstructed images from S-CycleGAN and PST-CyGAN distinctly depict the lesions, offering improved diagnostic clarity.



Supplementary Figure 2. Overall inter-reader agreement of PI-QUAL score for SR-T2WI and Synthetic HR-T2WI at 464 datasets by 5 independent readers. Each horizontal bar represents the inter-reader reliability (ICC) with its 95 % confidence interval (CI).



Supplementary Figure 3. Presentative image cases showing the 3-point PI-QUAL score for HR-T2WI selection and 10-point PI-QUAL score for image quality evaluation. The 3-point PI-QUAL (Q1, Q2, Q3) assessment was performed in deep-accelerated HR-T_2WI only, whereas Q1 indicates the image with significant artifact (#1, red arrow) or low SNR, and Q3 presents the image with excellent spatial resolution, tissue contrast and high SNR (#3), and Q2 is the case between Q1 and Q3 **(A)**. The 10-point PI-QUAL assessment is performed in test data only for the evaluation of the quality of GAN-generated images. Similar to 3-point PI-QUAL score, PI-QUAL score 10 indicates the best image quality, vice versa, PI-QUAL score 1 indicates lowest image quality **(B)**.

CONSORT 2010 Checklist

Transformer-Enhanced Generative Adversarial Networks for Improving MR Image Quality in Prostate Imaging

npj Precision Oncology | ClinicalTrials.gov: NCT06636747

Important Note to Reviewers

This CONSORT checklist is submitted in response to an editorial technical check requirement. The present study is primarily a retrospective, multicenter observational study (n=2,682 patients from 8 centers). The ClinicalTrials.gov registration (NCT06636747) pertains to a prospective single-arm feasibility cohort (n=11) in which consecutive participants underwent additional high-resolution T2WI alongside standard-of-care MRI at Center 1 (NUH). This prospective component is not a randomised controlled trial. Items not applicable to this study design are marked "N/A" with explanation. Yellow-highlighted cells indicate N/A items.

Section/Topic	Item No	Checklist Item	Reported on Page No.
TITLE AND ABSTRACT			
Title and abstract	**1a**	Identification as a randomised trial in the title. [Note: The manuscript title does not identify this as an RCT. The prospective component (n=11) is a single-arm observational feasibility cohort registered on ClinicalTrials.gov (NCT06636747), not a randomised trial. CONSORT checklist is submitted in response to editorial request due to trial registration.]	**Title page**
	1b	Structured summary of trial design, methods, results, and conclusions.	**Abstract (Title page)**
INTRODUCTION			
Background and objectives	**2a**	Scientific background and explanation of rationale.	**Introduction (pp. 2–4)**
	2b	Specific objectives or hypotheses. [Objective: to develop and validate PST-CyGAN for standardising prostate T2WI quality across multicenter datasets, and to prospectively test generalisability across varying voxel sizes.]	**Introduction (p. 4)**
METHODS			
Trial design	**3a**	Description of trial design including allocation ratio. [The prospective component is a single-arm, non-randomised, observational feasibility cohort. Eleven consecutive patients at Center 1 (NUH) were prospectively enrolled to undergo HR-T2WI in addition to standard-of-care MRI. No comparator arm or allocation ratio applies.]	**Methods – Study design (p. 6)**
	3b	Important changes to methods after trial commencement, with reasons.	N/A
Participants	**4a**	Eligibility criteria for participants. [Inclusion: male patients ≥50 years with clinical suspicion of prostate cancer (elevated PSA or abnormal DRE) who had undergone prostate MRI. Exclusion: prior prostatectomy or radiotherapy; missing or incomplete imaging data.]	**Methods – Study design (p. 6)**
	4b	Settings and locations where the data were collected. [Prospective cohort: Center 1 (First Affiliated Hospital of Soochow University), 3.0T MRI scanner. Retrospective data: 7 tertiary centers + PI-CAI public dataset, collected January 2017–May 2025.]	**Methods – Study design (p. 6)**

Section/Topic	Item No	Checklist Item	Reported on Page No.
Interventions	**5**	The interventions for each group with sufficient details to allow replication. [Single-arm study. Intervention: DL-accelerated HR-T2WI acquisition (0.35×0.35×2.0 mm) at Center 1 using Siemens Prisma 3T scanner, followed by PST-CyGAN model processing. Comparator: standard-resolution T2WI (SR-T2WI) from the same patients and from retrospective multicenter datasets. PST-CyGAN code: https://github.com/LuckLT/PST-CyGAN.git]	**Methods – MRI & Model (pp. 7–10)**
Outcomes	**6a**	Pre-specified primary and secondary outcome measures, including how and when assessed. [Primary: PI-QUAL score change (upgrade/downgrade) between SR-T2WI and PST-CyGAN-generated synthetic HR-T2WI, assessed by 5 independent blinded radiologists using a 10-point expanded PI-QUAL scale. Secondary: quantitative image quality metrics (PSNR, SSIM, LPIPS, FCS); inter-reader agreement (Cronbach's alpha); Bland-Altman analysis of PI-QUAL differences; prospective PI-QUAL improvement across three voxel sizes.]	**Methods – Image quality assessment (pp. 10–11)**
	6b	Any changes to trial outcomes after the trial commenced, with reasons.	N/A
Sample size	**7a**	How sample size was determined. [The prospective cohort (n=11) was designed as a feasibility validation of generalisability across predefined voxel sizes (1.5×1.5×3.3 mm, 0.7×0.7×3.3 mm, 0.4×0.4×2.0 mm). No formal sample size calculation was performed; the cohort size was based on a pragmatic consecutive enrolment design consistent with feasibility study standards.]	**Methods – Study design (p. 6)**
	7b	Explanation of any interim analyses and stopping guidelines.	N/A
RANDOMISATION			
Sequence generation	**8a**	Method used to generate the random allocation sequence.	**N/A (Non-randomised observational feasibility cohort)**
	8b	Type of randomisation; details of any restriction.	N/A
Allocation concealment mechanism	**9**	Mechanism used to implement the random allocation sequence.	N/A
Implementation	**10**	Who generated the random allocation sequence, who enrolled participants, and who assigned participants to interventions.	N/A
Blinding	**11a**	If done, who was blinded after assignment to interventions and how. [Image quality evaluation was performed by 5 radiologists blinded to whether images were SR-T2WI originals or PST-CyGAN-generated synthetic HR-T2WI. Readers were also blinded to each other's scores.]	**Methods – Image quality assessment (p. 10)**
	11b	If relevant, description of the similarity of interventions. [SR-T2WI and synthetic HR-T2WI images were displayed in the same DICOM format and window settings to ensure comparable viewing conditions.]	**Methods – Image quality assessment (p. 10)**
Statistical methods	**12a**	Statistical methods used to compare groups for primary and secondary outcomes. [Paired Wilcoxon signed-rank test for PI-QUAL upgrades/downgrades; Bland-Altman analysis for	**Methods – Statistical analysis (p. 12)**

Section/Topic	Item No	Checklist Item	Reported on Page No.
		agreement between SR-T2WI and synthetic HR-T2WI; one-way ANOVA with Tukey post-hoc for quantitative metrics; Cronbach's alpha for inter-reader agreement. Two-sided P<0.05 considered significant. Software: MedCalc v15.2.]	
	12b	Methods for additional analyses, such as subgroup analyses. [Subgroup analyses performed for multi-model, multicenter, and multi-reader comparisons. McNemar test used for binary upgrade/downgrade comparisons between model variants.]	**Methods-Statistical analysis (p. 12)**
RESULTS			
Participant flow (diagram strongly recommended)	**13a**	For each group, numbers of participants who were enrolled, received intended treatment, and were analysed. [Total enrolled: 2,682 patients. Training: n=2,207 (including 941 HR-T2WI + 1,266 SR-T2WI); Internal test: n=272; External test: n=192; Prospective test: n=11. All enrolled participants were analysed. See Figure 5 (study flowchart).]	**Results-Figure 5 (p. 6)**
	13b	For each group, losses and exclusions after randomisation, with reasons. [Patients excluded due to prior prostatectomy/radiotherapy or incomplete imaging data; exact exclusion numbers reported in Figure 5. No post-enrolment losses in prospective cohort.]	**Results – Figure 5 (p. 6)**
Recruitment	**14a**	Dates defining the periods of recruitment and follow-up. [Data collection: January 2017–May 2025. Prospective HR-T2WI acquisition at Center 1 was ongoing during this period concurrent with NCT06636747 registration (registered 01 August 2023).]	**Methods – Study design (p. 6)**
	14b	Why the trial ended or was stopped.	**N/A (Feasibility study; all planned patients enrolled)**
Baseline data	**15**	Baseline demographic and clinical characteristics. [Patient demographics and imaging parameters across all centers summarised in Supplementary Table 2. Prospective cohort baseline: 11 consecutive men with clinical PCa suspicion at Center 1.]	**Supplementary Table 2**
Numbers analysed	**16**	Number of participants included in each analysis. [Retrospective test: 464 patients (272 internal + 192 external); Prospective test: 11 patients. All enrolled participants included in analysis. No imputation was performed.]	**Results (pp. 3–5)**
Outcomes and estimation	**17a**	For each primary and secondary outcome, results for each group and estimated effect size with precision. [Primary: PST-CyGAN upgraded PI-QUAL in 38% of cases (L2_3 mode), downgraded in 20%; vs. no quality control (11% upgrades, 69% downgrades; P<0.01). Prospective: PI-QUAL improved by 20.0–29.1% across three voxel sizes. Quantitative: PSNR 29.3±0.5, SSIM 0.558±0.116, LPIPS 0.169±0.056, FCS 0.915±0.028.]	**Results (pp. 3–5)**
	17b	For binary outcomes, absolute and relative effect sizes.	**N/A (Outcomes are ordinal/continuous)**
Ancillary analyses	**18**	Results of any other analyses performed, including subgroup analyses. [Subgroup analyses by initial image quality tier (low/intermediate/high PI-QUAL), by center, by reader, and by PST-CyGAN reconstruction mode (L1/L2, three loss weight variants). Results in Figures 2, 3 and Supplementary Table 1.]	**Results (pp. 4–5)**

Section/Topic	Item No	Checklist Item	Reported on Page No.
Harms	**19**	All important harms or unintended effects in each group. [No direct patient harms applicable (computational imaging study). Potential imaging harm assessed: PST-CyGAN was validated not to reduce visibility of clinically significant lesions; readers specifically examined suspicious regions during blinded scoring.]	**Methods & Discussion (pp. 10, 15)**
DISCUSSION			
Limitations	**20**	Trial limitations, including sources of potential bias and imprecision. [Limitations include: (1) absence of direct pathological correlation; (2) small prospective cohort (n=11); (3) expanded 10-point PI-QUAL scale not yet externally validated; (4) performance may vary with scanners outside the training distribution.]	**Discussion (pp. 15–16)**
Generalisability	**21**	Generalisability (external validity, applicability) of the trial findings. [External generalisability demonstrated via zero-shot evaluation on two entirely withheld centers (Centers 2 and 6) and prospective testing across three predefined voxel sizes from new patient cohort.]	**Discussion (pp. 15–16)**
Interpretation	**22**	Interpretation consistent with results, balancing benefits and harms, and considering other relevant evidence. [PST-CyGAN reliably generates standardised HR-T2WI from diverse acquisition protocols, reducing inter-site variability. Consistent with prior deep learning-based MRI enhancement literature. Future validation against pathological endpoints planned.]	**Discussion & Conclusion (pp. 15–16)**
OTHER INFORMATION			
Registration	**23**	Registration number and name of trial registry. [NCT06636747; ClinicalTrials.gov; registered 01 August 2023. IRB at Center 1: 2024-SR-586.]	**Abstract & Methods (pp. 1, 7)**
Protocol	**24**	Where the full trial protocol can be accessed, if available. [Full model code available at: https://github.com/LuckLT/PST-CyGAN.git. Full trial protocol available upon reasonable request to the corresponding authors.]	**Methods (p. 7)**
Funding	**25**	Sources of funding and other support, role of funders. [National Natural Science Foundation of China (Grant 82402227 to J.B.; Grant 82302308 to Y.H.); Research Grants Council of Hong Kong SAR (Grant T45-401/22-N to P.A.H.). Funders had no role in study design, data collection, analysis, interpretation, or manuscript preparation.]	**Acknowledgements (Title page)**

** We strongly recommend reading this statement in conjunction with the CONSORT 2010 Explanation and Elaboration for important clarifications on all the items. See www.consort-statement.org for CONSORT extensions and up-to-date references.*

TRIPOD+AI

Version: 11-January-2024

Section/Topic	Item	Development / evaluation[1]	Checklist item	Reported on page
TITLE				
Title	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	1
ABSTRACT				
Abstract	2	D;E	See TRIPOD+AI for Abstracts checklist	5
INTRODUCTION				
Background	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	7-9
	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)	7-9
	3c	D;E	Describe any known health inequalities between sociodemographic groups	N/A
Objectives	4	D;E	Specify the study objectives, including whether the study describes the development or validation of a prediction model (or both)	9
METHODS				
Data	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	18-19
	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	19
Participants	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	18-19
	6b	D;E	Describe the eligibility criteria for study participants	18
	6c	D;E	Give details of any treatments received, and how they were handled during model development or evaluation, if relevant	N/A
Data preparation	7	D;E	Describe any data pre-processing and quality checking, including whether this was similar across relevant sociodemographic groups	21-22
Outcome	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	26-27
	8b	D;E	If outcome assessment requires subjective interpretation, describe the qualifications and demographic characteristics of the outcome assessors	22,27
	8c	D;E	Report any actions to blind assessment of the outcome to be predicted	27-28
Predictors	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	18
	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)	20,22
	9c	D;E	If predictor measurement requires subjective interpretation, describe the qualifications and demographic characteristics of the predictor assessors	N/A
Sample size	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	18-19
Missing data	11	D;E	Describe how missing data were handled. Provide reasons for omitting any data	18
Analytical methods	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	18-19
	12b	D	Depending on the type of model, describe how predictors were handled in the analyses (functional form, rescaling, transformation, or any standardisation).	21-23
	12c	D	Specify the type of model, rationale[2], all model-building steps, including any hyperparameter tuning, and method for internal validation	23-26
	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]	26-28
	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	26-28
	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)	20,24
Class imbalance	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
Fairness	14	D;E	Describe any approaches that were used to address model fairness and their rationale	18-19
Model output	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	25-26

[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]

Training versus evaluation	16	D;E	Identify any differences between the development and evaluation data in healthcare setting, eligibility criteria, outcome, and predictors	18-18
Ethical approval	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	19
OPEN SCIENCE				
Funding	18a	D;E	Give the source of funding and the role of the funders for the present study	5
Conflicts of interest	18b	D;E	Declare any conflicts of interest and financial disclosures for all authors	5
Protocol	18c	D;E	Indicate where the study protocol can be accessed or state that a protocol was not prepared	19
Registration	18d	D;E	Provide registration information for the study, including register name and registration number, or state that the study was not registered	5,19
Data sharing	18e	D;E	Provide details of the availability of the study data	5
Code sharing	18f	D;E	Provide details of the availability of the analytical code[4]	18
PATIENT & PUBLIC INVOLVEMENT				
Patient & Public Involvement	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				
Participants	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.	18-19,Fig5
	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.	18-19 table E2
	20c	E	For model evaluation, show a comparison with the development data of the distribution of important predictors (demographics, predictors, and outcome).	18-19
Model development	21	D;E	Specify the number of participants and outcome events in each analysis (e.g., for model development, hyperparameter tuning, model evaluation)	18-19,22,27
Model specification	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]	23-25
Model performance	23a	D;E	Report model performance estimates with confidence intervals, including for any key subgroups (e.g., sociodemographic). Consider plots to aid presentation.	10-12
	23b	D;E	If examined, report results of any heterogeneity in model performance across clusters. See TRIPOD Cluster for additional details[3].	10-12
Model updating	24	E	Report the results from any model updating, including the updated model and subsequent performance	N/A
DISCUSSION				
Interpretation	25	D;E	Give an overall interpretation of the main results, including issues of fairness in the context of the objectives and previous studies	13-117
Limitations	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	16-17
Usability of the model in the context of current care	27a	D	Describe how poor quality or unavailable input data (e.g., predictor values) should be assessed and handled when implementing the prediction model	15-16
	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	20
	27c	D;E	Discuss any next steps for future research, with a specific view to applicability and generalizability of the model	15-17

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.