| Section                          | Item | Checklist description                                                                                                                                                                                                                                                                                                                                 | Reported on Page Number/Line Number | Reported on Section/Paragraph |
|---------------------------------|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|------------------------------|
| Title and abstract              | 1    | Identify the study as developing and/or validating a multivariable prediction model, the target population, and the outcome to be predicted.                                                                                                                                                                                                                         | Page1/Line3-4                       | Title/Paragraph1             |
| Abstract                        | 2    | Provide a summary of objectives, study design, setting, participants, sample size, predictors, outcome, statistical analysis, results, and conclusions.                                                                                                                                                                                                                                                                       | Page1-2/Line23-47                  | Abstract/Paragraph1-4       |
| Introduction                    | 3a   | Explain the medical context (including whether diagnostic or prognostic) and rationale for developing or validating the multivariable prediction model, including references to existing models.                                                                                                                                                                                         | Page2-3/Line50-67                  | Introduction/Paragraph1-2   |
|                                 | 3b   | Specify the objectives, including whether the study describes the development or validation of the model or both.                                                                                                                                                                                                                                                                                                        | Page2-3/Line62-67                  | Introduction/Paragraph2     |
| Methods                         | 4a   | 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.                                                                                                                                                                                                 | Page3/Line70-78                    | Methods/Paragraph1           |
|                                 | 4b   | Specify the key study dates, including start of accrual; end of accrual; and, if applicable, end of follow-up.                                                                                                                                                                                                                                                                                                           | Page3/Line70-78                    | Methods/Paragraph1           |
| Participants                    | 5a   | Specify key elements of the study setting (e.g., primary care, secondary care, general population) including number and location of centres.                                                                                                                                                                                                                                                                            | Page3/Line70-78                    | Methods/Paragraph1           |
|                                 | 5b   | Describe eligibility criteria for participants.                                                                                                                                                                                                                                                                                                                                                                       | Page3/Line70-78                    | Methods/Paragraph1           |
|                                 | 5c   | Give details of treatments received, if relevant.                                                                                                                                                                                                                                                                                                                                                                   | N/A                                | N/A                          |
| Outcome                         | 6a   | Clearly define the outcome that is predicted by the prediction model, including how and when assessed.                                                                                                                                                                                                                                                                                                                | Page4/Line100-113                  | Methods/Paragraph5-6         |
|                                 | 6b   | Report any actions to blind assessment of the outcome to be predicted.                                                                                                                                                                                                                                                                                                                                              | Page4/Line100-113                  | Methods/Paragraph5-6         |
| Predictors                      | 7a   | Clearly define all predictors used in developing or validating the multivariable prediction model, including how and when they were measured.                                                                                                                                                                                                                                                                         | Page3-4/Line80-98                  | Methods/Paragraph2-4         |
|                                 | 7b   | Report any actions to blind assessment of predictors for the outcome and other predictors.                                                                                                                                                                                                                                                                                                                          | Page3-4/Line80-98                  | Methods/Paragraph2-4         |
| Sample size                     | 8    | Explain how the study size was arrived at.                                                                                                                                                                                                                                                                                                                                                                           | Page3/Line70-78                    | Methods/Paragraph1           |
| Section | Page | Methodology | Results | Discussion | Other Information |
|---------|------|-------------|---------|------------|------------------|
| Missing data | 9 | 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 | Describe how predictors were handled in the analyses. | Page 4/Line 115-117 Methods/Paragraph 7 | | |
| | 10b | Specify type of model, all model-building procedures (including any predictor selection), and method for internal validation. | Page 4/Line 115-117 Methods/Paragraph 7 | | |
| | 10d | Specify all measures used to assess model performance and, if relevant, to compare multiple models. | Page 4/Line 115-117 Methods/Paragraph 7 | | |
| Risk groups | 11 | Provide details on how risk groups were created, if done. | Page 4/Line 115-117 Methods/Paragraph 7 | | |
| Results | | | | | |
| Participants | 13a | 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 4-5/Line 120-128 Results/Paragraph 1 | | |
| | 13b | Describe the characteristics of the participants (basic demographics, clinical features, available predictors), including the number of participants with missing data for predictors and outcome. | Page 4-5/Line 120-128 Results/Paragraph 1 | | |
| Model development | 14a | Specify the number of participants and outcome events in each analysis. | Page 5-6/Line 130-165 Results/Paragraph 2-6 | | |
| | 14b | If done, report the unadjusted association between each candidate predictor and outcome. | Page 5-6/Line 130-165 Results/Paragraph 2-6 | | |
| Model specification | 15a | 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). | Page 5-6/Line 130-165 Results/Paragraph 2-6 | | |
| | 15b | Explain how to use the prediction model. | Page 5-6/Line 130-165 Results/Paragraph 2-6 | | |
| Model performance | 16 | Report performance measures (with CIs) for the prediction model. | Page 5-6/Line 130-165 Results/Paragraph 2-6 | | |
| Discussion | | | | | |
| Limitations | 18 | Discuss any limitations of the study (such as nonrepresentative sample, few events per predictor, missing data). | Page 6-7/Line 181-205 Discussion/Paragraph 2 | | |
| Interpretation | 19b | Give an overall interpretation of the results, considering objectives, limitations, and results from similar studies, and other relevant evidence. | Page 6-7/Line 169-205 Discussion/Paragraph 1-2 | | |
| Implications | 20 | Discuss the potential clinical use of the model and implications for future research. | Page 7-8/Line 207-227 Discussion/Paragraph 3-4 | | |
| Other information | | | | | |
| Supplementary information | 21 | Provide information about the availability of supplementary resources, such as study protocol, Web calculator, and data sets. | N/A | N/A | |
| Funding | 22 | Give the source of funding and the role of the funders for the present study. | Page 8/Line 231-232 Acknowledgments/Paragraph | | |
Article information: https://dx.doi.org/10.21037/atm-22-1851

*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.