

Challenging but feasible: Patient-level prediction in hand surgery

Patient-level prediction models for thumb-base osteoarthritis rehabilitation using real-world data

Background: Personalised rehabilitation for thumb-base osteoarthritis requires a better understanding of which patients benefit from specific treatments at particular stages. Patient-level prediction may support shared decision-making by estimating treatment satisfaction and the one-year risk of conversion to surgery.

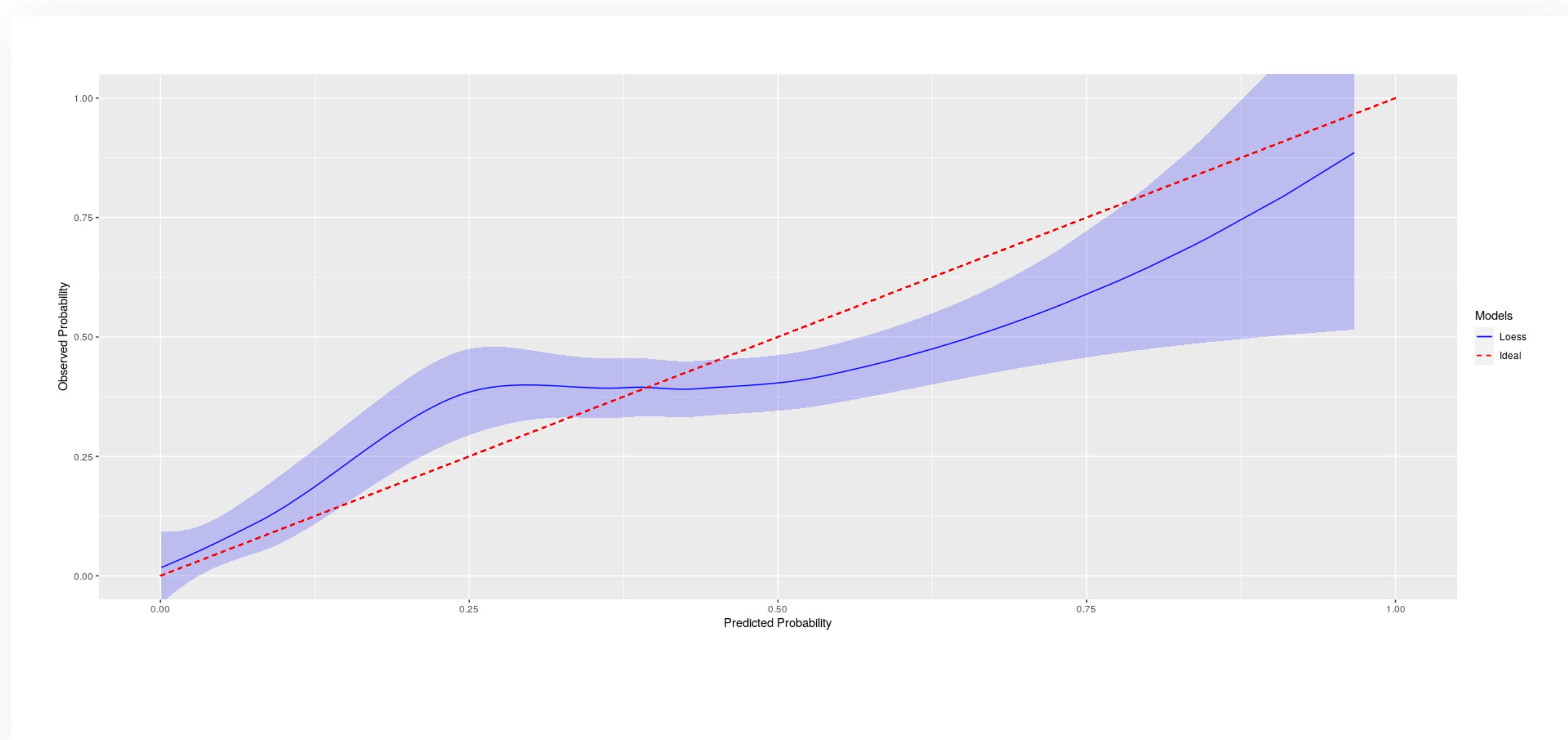


Figure 1. Calibration plot shows slight overestimation at low- and underestimation at high predicted probabilities

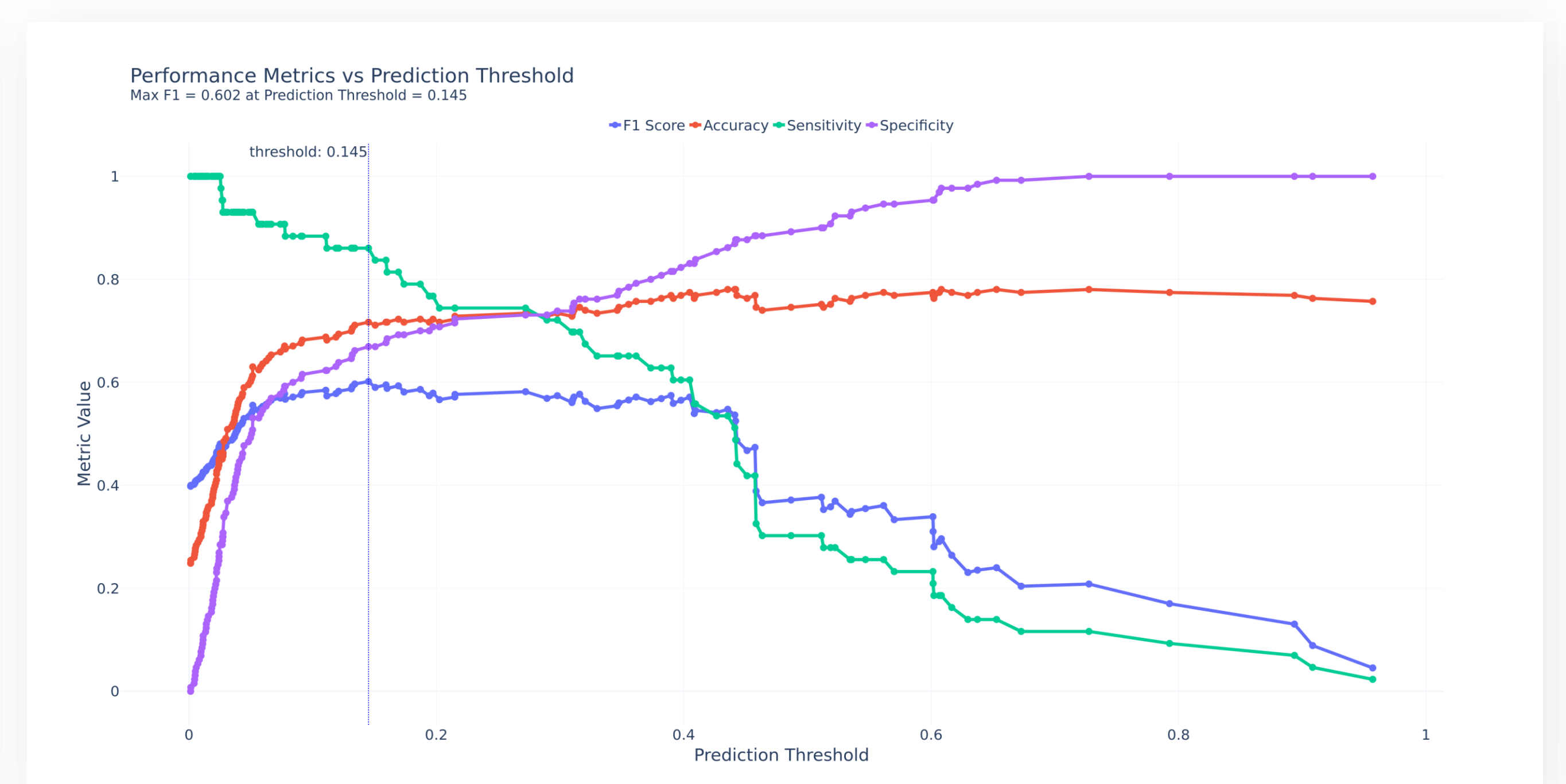


Figure 2. Performance metrics showing sensitivity, specificity, accuracy and F1 score

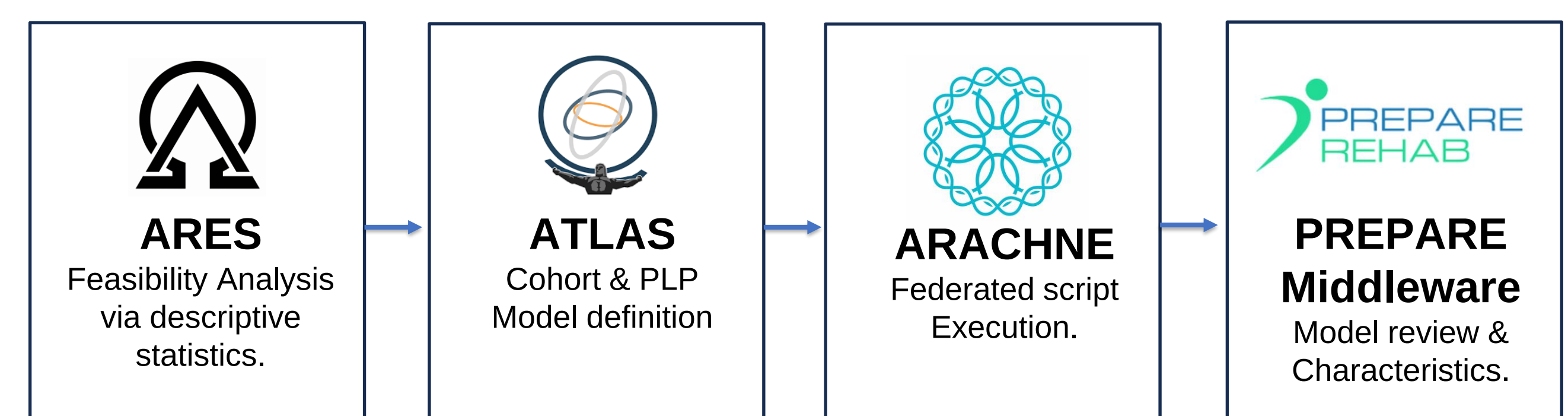
Methods

We included routinely collected data from patients treated in 25 Dutch hand clinics between October 21st, 2021, and April 7th, 2023, who provided informed consent. Patients were asked to complete multiple patient-reported outcome measures (PROMs) throughout their care pathway.



- 1) Amongst patients diagnosed with CMC1 Osteoarthritis who undergo conservative treatment, which patients will convert to surgery within 1 or 2 years?
- 2) Amongst patients diagnosed with CMC1 Osteoarthritis who undergo conservative treatment, which patients will feel satisfied with their treatment results after 1 year?

(Target cohort, outcome cohort, time at risk)



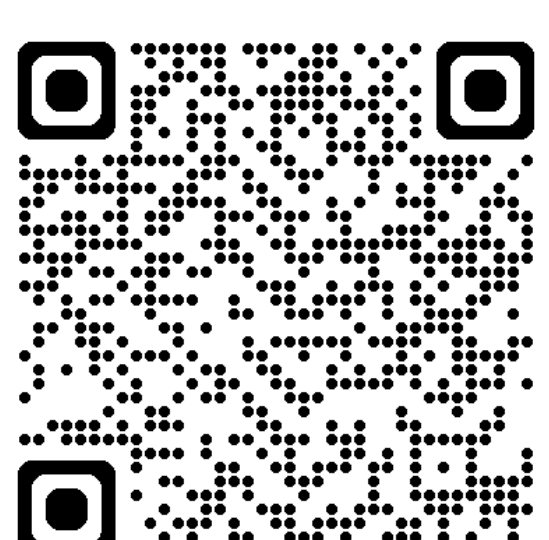
Discussion: We developed a model to predict the risk of conversion to surgery within 1 and 2 years (AUROC 0.80). A major limitation was the inability to specify **laterality** in ATLAS, which is essential in fields such as hand surgery. For predicting **satisfaction with the results of conservative treatment**, we were unable to define appropriate target and outcome cohorts in ATLAS. Here, using PROM data required linking individual questions to their questionnaires, but the necessary table (i.e., *fact_relationship*) is not yet available in ATLAS; therefore, development of custom cohorts for this prediction problem is ongoing.

Krijn Polder^{1,2}, Lisa Hoogendam^{1,2}, Margarita Grammatikopoulou³, Vasilis Alepopoulos³, Giorgos Giannios³, Spiros Nikolopoulos³, Ruud Selles^{1,2}, and the PREPARE Project Group

¹ Department of Rehabilitation Medicine, Erasmus Medical Centre, Rotterdam, The Netherlands

² Department of Plastic, Reconstructive, and Hand Surgery, Erasmus Medical Centre, Rotterdam, The Netherlands

³ Information Technologies Institute, Centre for Research and Technology Hellas (CERTH-ITI), Thessaloniki, Greece



PREPARE is funded by the European Union. UK participants are supported by UKRI grant number 10086219 (Trilateral Research). Grant Agreement 101080288 PREPARE HORIZON-HLTH-2022-TOOL-12-01. Views and opinions expressed are those of the author(s) only and do not necessarily reflect those of the European Union or European Health and Digital Executive Agency (HADEA). Neither the European Union nor the granting authority can be held responsible for them. Grant Agreement 101080288 PREPARE HORIZON-HLTH-2022-TOOL-12-01



CERTH
CENTRE FOR
RESEARCH & TECHNOLOGY
HELLAS

