

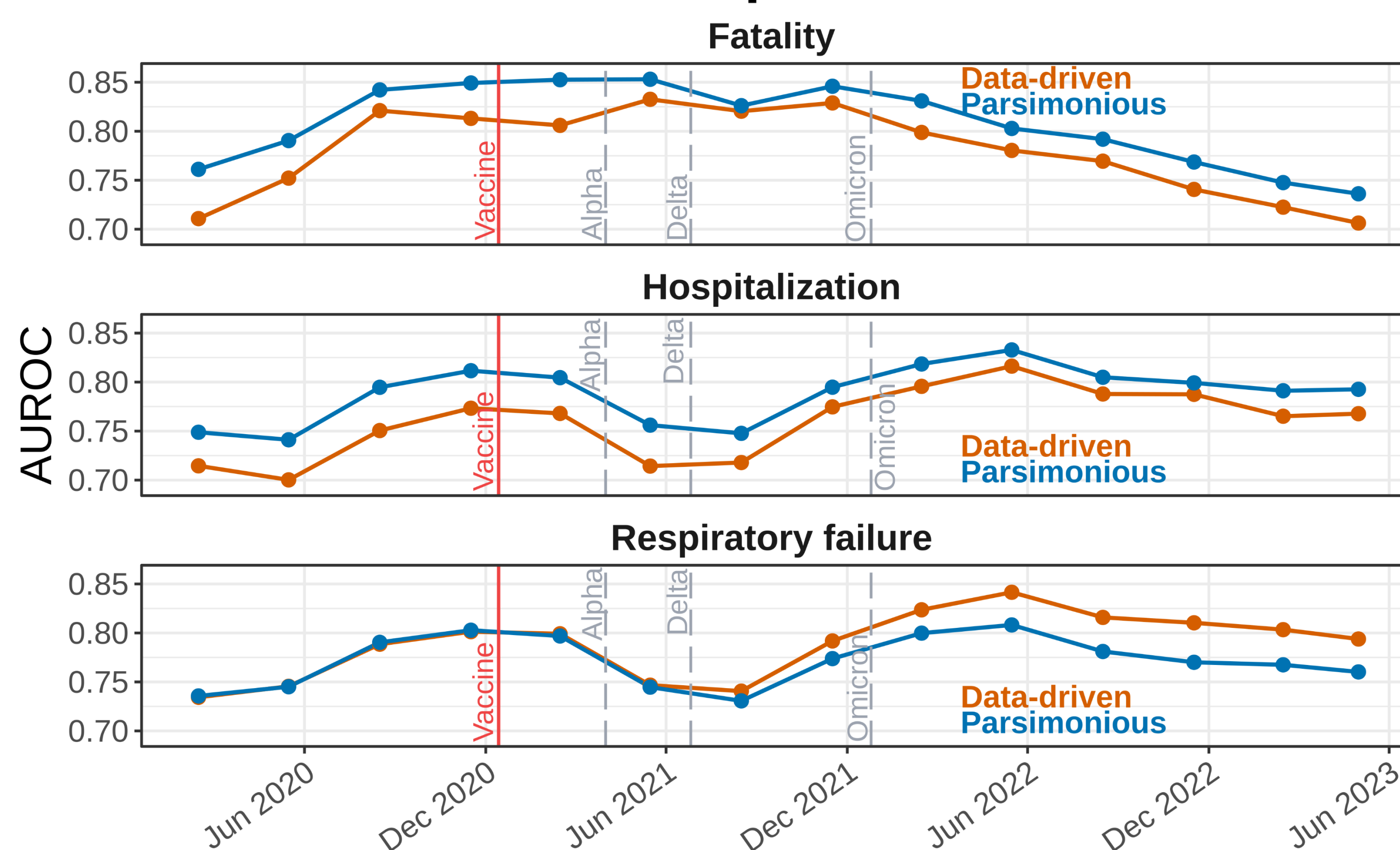
Influenza-proxy Seek-COVER models remained useful through three years of COVID-19.

PandemicPrediction: three-year temporal validation of Seek-COVER models during the COVID-19 pandemic

Background: Seek-COVER used influenza as a proxy when SARS-CoV-2 data were scarce. We examined whether those fixed parsimonious and data-driven models still performed adequately as COVID-19 care, vaccination, and dominant variants changed from January 2020 to June 2023.

Discrimination peaked around Alpha/Delta and declined by early 2023 across outcomes.

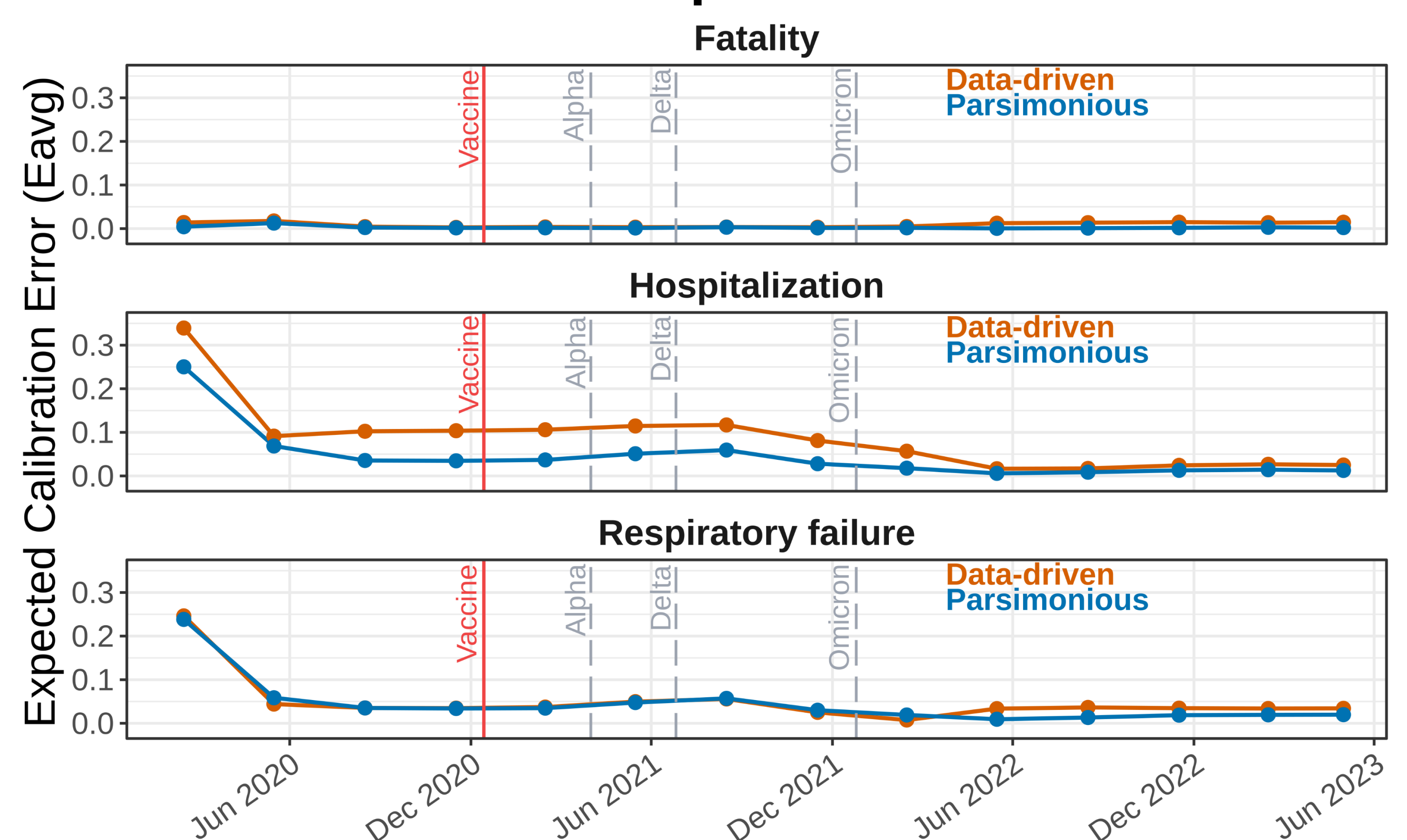
Discrimination performance



Red line: vaccine availability
Grey lines: dominant variant shifts (>50% cases)

Calibration was stable for fatality, but early 2020 error was large for hospitalization and respiratory failure.

Calibration performance



Influenza-proxy models transported surprisingly well despite major distribution shifts during the pandemic.

Study Design

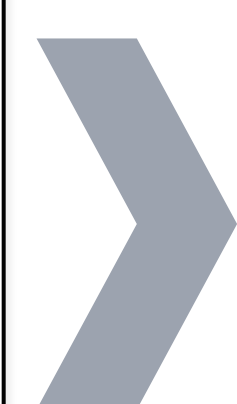
1. Fixed Seek-COVER models

Parsimonious and data-driven Seek-COVER models for fatality, hospitalization, and respiratory failure.



2. Quarterly COVID-19 cohorts

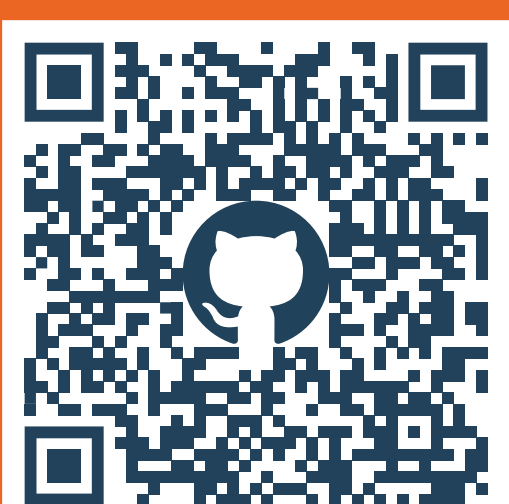
Optum Clinformatics patients with COVID-19, split into 14 non-overlapping 3-month cohorts from Jan 2020 to Jun 2023.



3. Validation outputs

Apply models without retraining. AUROC measures discrimination; Eavg measures calibration in the figures above.

Limitation: This is a single-database temporal validation in Optum Clinformatics. Future work should compare influenza-proxy models with SARS-CoV-2-trained models and determine when enough COVID-19 data existed to retrain.



Egill A. Fridgeirsson¹, Ross D. Williams¹, Jenna Reps^{1,2}

e.fridgeirsson@erasmusmc.nl

1: Medical Informatics, Erasmus University Medical Center. 2: JnJ, Raritan, New Jersey

