Personalizing Background Risk Estimates for Outcomes of Interest Associated with COVID-19 Vaccination

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INTRO:

- People across the globe are being given COVID vaccines.
- The FDA have listed some vaccine outcomes of interest to monitor.

METHODS

1. The OHDSI PatientLevelPrediction retrospective cohort design framework was implemented.
2. Seven databases were used.
3. Nine outcomes 1-year after index were predicted in 3 different target populations (random visit in 2017, 1st Jan 2017 and first influenza visit in 2017.
4. Three to four phenotypes were considered per outcome, resulting in >500 prediction tasks.
5. LASSO logistic regression models were fit for each <target population, outcome phenotype, database> triple using a 2 million target population sample with a 20%:80% test/train split with 3-fold cross validation.
6. Area under the receiver operating curve (AUC) and the calibration-in-the-large metrics were calculated.
7. External validation was assessed across databases, target populations and outcome phenotypes.

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Some outcomes were **highly predictive** in observational data. The model performances were generally **stable** across target populations and outcome phenotypes but **varied across databases**.

Results

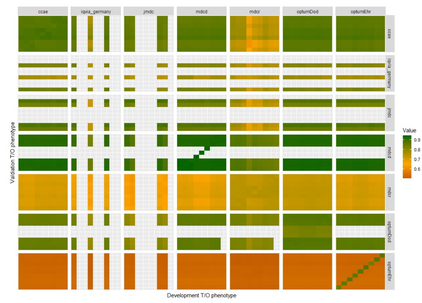
Can these outcomes of interest be predicted using observational data?

Some vaccine outcomes of interest can be predicted using observational data, whereas others were difficult to predict across databases and phenotypes.

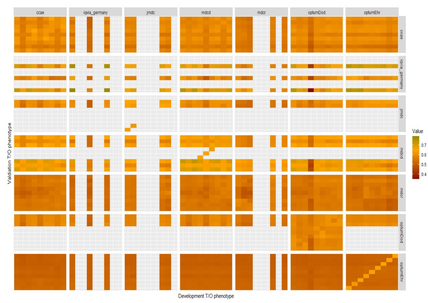
Are certain datasets better than others for developing these models?

Yes. The discriminative performance was often better when predicting the outcomes using MDCD whereas the performance was often worse when using MDCR.

Do these models generalize across databases, target populations and outcome phenotype definitions?



Acute MI models generalized across the investigated target populations and outcome phenotypes but transported poorly across some databases.



Similar trends were observed for Appendicitis. This indicates the database has the greatest impact on model performance stability.

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