**Modelling the population distribution of patient- reported outcomes using electronic health records: a UK study**

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**Background**

Patient Reported Outcome Measures (PROM) col- lected in surveys allow understanding of the health at the population-level. We aimed to test the feasibility of estimating health status as measured by PROMs through ecological prediction models which use local linked survey and primary care electronic health records (EHR) and applying the models to national EHR. **Methods**

3,710 musculoskeletal consulters registered in 11 general practiced in North Staffordshire, UK and consented the linkage of their survey PROM (high impact pain, (HICP)) with EHR were in- cluded in this study. HICP was modelled by EHR predictors cover- ing demographic, lifestyle risk factors, musculoskeletal diagnostic/ problems, analgesic prescriptions, comorbidities, and deprivation. Final set of predictors were selected through backward elimination (p>0.1). Individual-level prediction models (binary logistic regres- sion) were fitted and evaluated in terms of model fit statistics (AIC, BIC, R-square), discrimination (C-statistics) and calibration-slope with internal validation. The final model was cross-mapped to a na- tional UK primary EHR database (Clinical Practice Research Database) to obtain national population estimates of high impact pain.

**Results**

The C-statistics and calibration-slope of the final model was 0.77 (95% confidence interval: 0.70-0.79) and 1.00 (0.92-1.08), re- spectively. The estimated HICP was 51.2% overall among 49,788 UK musculoskeletal consulters and matched hypothesised variation by gender, age, deprivation and geographical regions.

**Conclusions**

Estimation of population-level health status as mea- sured by PROM using EHR appears feasible and has potential application in assessing health inequalities. Further independent ex- ternal validation studies are warranted.

**Key messages**

Primary care EHR data could be modelled to predict population-level PROMs.