

Determinants and persistence of medication adherence and its influence on health outcomes based on national health databases

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Background

Adherence to medications is crucial for achieving better health and clinical outcomes, which in turn reduces hospitalization and annual healthcare costs^{1,2,3,4}. There have been numerous studies on the determinants of medication adherence, however, the results are often conflicting, as the studies cover small populations and limited choice of medications^{5,6,7}. The population-based prescription databases linked with medical records allow larger scale studies into medication adherence and its determinants. Here we utilize a linked dataset of digital prescriptions and healthcare claims in OMOP CDM, to explore the patterns of medication adherence and systematically characterize its determinants across a wide variety of chronic medications.

Methods

The dataset utilized here, described 149 354 10% of Estonian population between 2012-2019 in OMOP CDM⁸. Out of these 64 837 had at least two continuous prescriptions of the same drug and thus had at least one adherence measurement. We concentrated 157 medications, identified independently to be chronic by two pharmacists among the 300 most common ingredients in the database.

For estimating medication adherence from prescription data, it is critical to have correct prescription durations on the record. We have systematically reviewed the prescription patterns for all medications used for chronic conditions and imputed the missing values based on the combination of existing prescription patterns in the data, clinical information and expert judgement.

For characterizing adherence, we calculated the Continuous multiple interval measure of Medication Acquisition (CMA) measure version 5. We calculated these values yearly for each and chronic medication combination. We have wrapped code from AdhereR R package⁹ to work on OMOP formatted databases for doing this calculation at scale on OMOP formatted databases.

To characterize the determinants of adherence we fitted a linear model to predict the adherence measure based on the patient demographics, medication, diagnosis, hospitalization and comorbidities information.

Results

The average CMA was 0.75 ± 0.21 . Traditionally, 0.8 is considered the threshold for good medication adherence, thus on average the adherence could be better. However, the adherence patterns vary considerably across medication. The CMA per ingredient ranged from 0.422 (albuterol, 95% CI 0.413...0.432) to 0.922 (warfarin, 95% CI 0.917...0.926).

In the linear mixed model, the fixed effects of demographics, comorbidities, diagnoses hospitalisation, ingredient and length of consecutive prescription described 11.6% percent of the variation. The ingredient had the largest effect with length of continuous prescription also describing significant amount of variance. While the proportion of variation explained was negligible for other effects, like demographics

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