Quantifying polypharmacy in elderly people: a comparison between source and mapped data in the UK Clinical Practice Research Datalink GOLD

Leena Elhussein, Ed Burn, Antonella Delmestri, Victoria Y Strauss, Daniel Prieto-Alhambra

Background

The use of multiple medications concurrently or cumulatively, i.e. polypharmacy, is increasing in the developed world as the population ages [(1)]. Polypharmacy is associated with several adverse events and health outcomes[(2)].

Clinical Practice Research Datalink (CPRD) GOLD, a UK primary care database, has been recently mapped to the OMOP-CDM, an established common data model for the transformation of the data to have the same structure and vocabularies. The use of mapped data in observational health studies has many advantages: these include, allowing for reproducible data flow, encouraging international collaborations, and producing robust, reliable and generalisable health research output[(3)].

In the case of identifying a cohort with polypharmacy in CPRD GOLD, certain challenges exist when using the mapped instance. One of these challenges is the method used to identify drugs intake/use, i.e. on the prescription/product level vs. the ingredient level, which could lead to different populations identified. Another obstacle is the unavailability of data linkages (e.g., hospital data) as source data that is yet to be mapped to the common data model.

In this study, we aimed to:

1- Test the feasibility of identifying a polypharmacy cohort in elderly population using the OMOP-CDM mapped version of CPRD GOLD data comparing it to the polypharmacy cohort identified using the source data.

2- Compare the cohort characterisation between the two cohorts.

Methods

All participants aged >65 on 01/01/2010, registered for >=1 year were identified from CPRD GOLD, for both, source and mapped data. For the source data, we only included those with linkage to Hospital Episode Statistics and Office for National Statistics. Polypharmacy was defined based on the number of CPRD product codes (prodcode) recorded in the source data and based on active ingredients in the mapped data in 2009. Polypharmacy cohorts were defined - using a data-driven approach - as the people belonging to the top quintile in terms of number of drugs/ingredients. Cohort validity - with source data as the true classification - was examined

using cohort evaluation metrics: sensitivity, specificity, positive predictive value (PPV) and negative predicted values (NPV). After identifying polypharmacy cohorts in source and mapped data, baseline characteristics (e.g., age, sex and Charlson morbidity score) were compared between them. Additionally, one-year (prior to start date) point-prevalence of the use of bisphosphonates as one example of preventative therapies use was summarised.

Results

Cut-off for the top quintile was ≥ 15 ingredients in the mapped data and ≥ 10 drugs in the source data. After matching the identified population in both instances, cohort validity metrics were as follow: sensitivity was 69.0%, specificity was 95.8%, PPV was 84.2% and NPV was 90.6%.

Out of 1,009,042 eligible patients in the mapped data, 214,394 patients belonged to the polypharmacy cohort. Mean age was 78.2 (SD 7.8) with 80,870 (37.7 %) males in that cohort. Mean Charlson morbidity score was 2.3 (1.9).

In the source data, there were 475,371 eligible patients, of which, 116,076 belonged to the polypharmacy cohort. Mean age was 78.2 (7.4) with 45,578 (39.3%) of that cohort being males. Mean Charlson morbidity score was 1.9 (1.8).

One-year point-prevalence of bisphosphonates use was 18.1% (95% CI 17.9% to 18.3 %) in the mapped data and 17.6% (17.4% to 17.9%) in the source data.

Conclusion

The validity of polypharmacy cohort identified in the mapped data when compared to the source data is high in all metrics but slightly lower for sensitivity. One possible explanation is the higher cut-off of top quintile in the mapped data. The difference in cut-off values could be attributed to the methods in which polypharmacy was calculated in each instance. The resulting cohorts had similar demographic characteristics and prevalence of bisphosphonates use. We have proved the clinical validity of identifying a polypharmacy cohort in the OMOP-CDM data. More research is needed to test the generalisability of using a cut-off of 15 ingredients to define polypharmacy in other OMOP-CDM data sources.

References/Citations

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