An OMOP-based tool for surveying and visualising concurrent drug exposure and renal function

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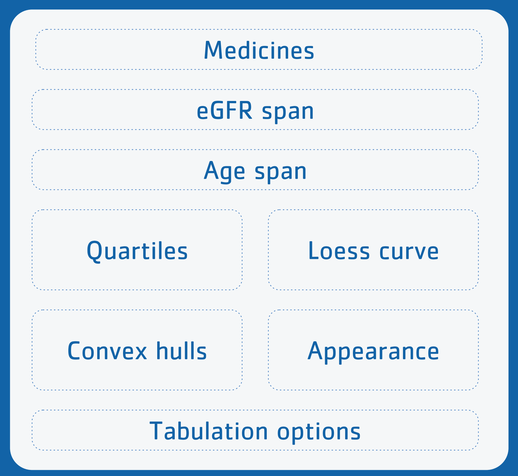
Background

Dosing algorithms guide treatment of patients with impaired renal function. Continuous monitoring of genuine drug use in real patients is key to surveying guideline adherence and discerning problematic patterns. Using pilot-study data from mostly surgical patients with colorectal cancer, mapped to the OMOP common data model (CDM), we sought to create a functional tool allowing users without technical expertise in programming or database management to query and survey real-life use of drugs requiring attention when used while renal function is impaired.

Fig. 1. Elements in the input panel

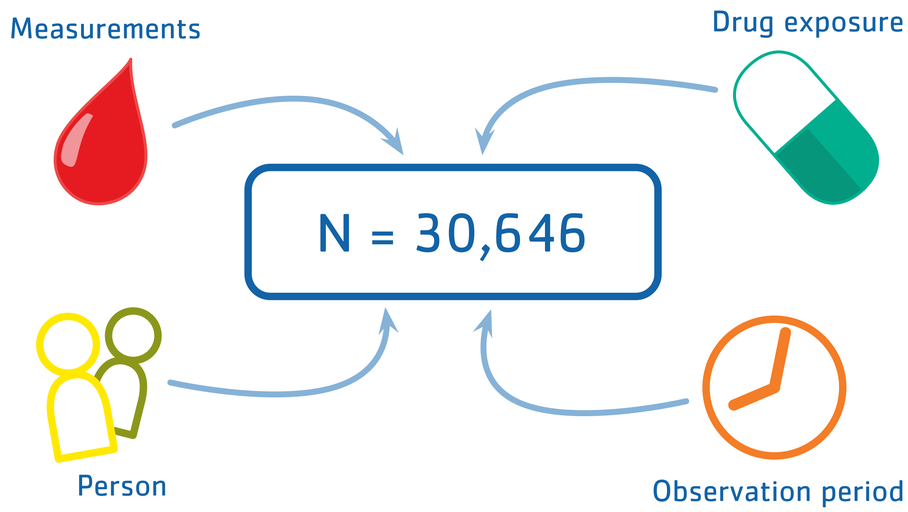


Methods and materials

We combined data from the person, measurement, drug exposure, concept and observation period tables for patients with at least one eGFR measurement of 60 ml/min or lower, from 2006 through 2016. We extracted data on total daily dose, eGFR, age, sex and number of medicines taken on that day for morphine, metformin, sotalol, lithium, digoxin, gabapentin and methotrexate. The tool uses Rstudio's Shiny web app framework, and draws scatter plots of daily doses vs. eGFR based on user inputs (figure 1).

Conclusion

Inappropriate dosing of the studied medicines did not seem a problem in this patient population. We found no substantial differences between females and males, nor between patients simultaneously using few and many medicines. The OMOP CDM simplifies addition of new data and facilitates further development in a collaborative manner.



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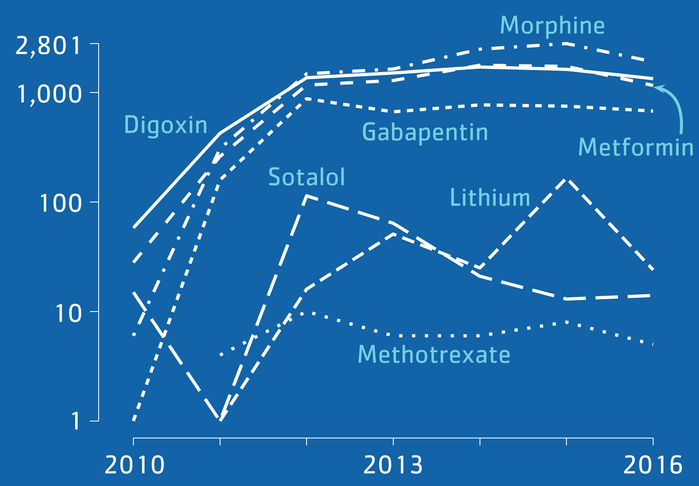
Results

The data set contained 30,646 data points (14,625 from females, 48%) from 2,291 patients (1,084 females, 47%). Figure 2 shows how morphine, metformin and digoxin dominate the data set. Missing data likely cause the steep segments between 2010 and 2012. Daily doses that were frequent for normal-level eGFR grew sparser with decreasing eGFR. We found no substantial exposure differences between females and males, and the number of concurrent medicines did not seem associated with higher daily doses at low eGFR.

Fig. 2. Number of data points per year



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