EHR Browser: A Web Tool to Explore OMOP-CDM Health Records by Concept Hierarchy, Mappings, and Temporal Trends

Veronica Lorenzini, Javier Gracia-Tabuenca, Nicola Cerioli, FinnGen, Mary Pat Reeve
Broad Institute, Tampere University, Helsinki University, FinnGen, Broad Institute

Background

Understanding the structure and use of clinical concepts within an OMOP-CDM database is essential for cohort definition, data quality assessments, and identifying mapping inconsistencies. Current OHDSI tools such as ATLAS and Athena support concept hierarchy visualization, record/person counts, and mappings, but these features are spread across different interfaces and often lack combined filtering or flexible comparison options. We present the EHR Browser, a web application that unifies concept hierarchy, record/person counts, standard/non-standard mappings, and temporal prevalence/incidence trends in a single interactive interface. This tool supports stratification by age and sex, offering a comprehensive and exploratory view of data utilization across clinical vocabularies.

Methods

The EHR Browser allows users to query any conceptId via search or direct URL. The tool displays the hierarchical tree of descendants or the set of mapped concepts. Each node includes total and descendant record/person counts. Temporal plots visualize these counts over time, optionally filtered by gender and age range. Users can toggle between total counts, prevalence (person count / total persons in observation), or incidence (first occurrence / at-risk population). The architecture comprises a server-client design. The server, implemented in R using the Plumber framework, interfaces with any OMOP-CDM instance using SqlRender and DatabaseConnector to support OHDSI-compatible SQL dialects. [1] Server-side unit tests are executed against FinnGen's custom Eunomia dataset using GitHub Actions. The client is a React-based application using D3.js for interactive visualization. [2] A Docker image is provided for seamless deployment of the tool. [3] To use it with any OMOP-CDM database, users must first generate a pre-calculated summary table using the ROMOPAPI R package. After this one-time setup, only a simple configuration file needs to be updated to point to the database. This minimal setup allows for quick and flexible integration with any OMOP instance.

Results

To demonstrate the capabilities of the EHR Browser, we used the tool on the FinnGen OMOP-CDM Data Freeze 13, querying the concept *Rheumatoid arthritis* (SNOMED, conceptId: 80809). Figure 1 shows the hierarchy view for the selected standard concept. The central node represents *Rheumatoid arthritis*, with direct parent and child concepts organized vertically. Each node in the tree is visually annotated with its associated record count and descendant record count. On the right, a line chart displays the temporal distribution of record counts for each concept node, stratified by year. Interactive filters above the chart allow users to restrict the data shown by gender and age range—in this case, only female patients aged 30 to 80 years are included. The plot updates dynamically based on filter selections, and the legend allows users to toggle individual lines for clarity. Figure 2 presents the mapping view of the same concept, showing all non-standard concepts that map to the *Rheumatoid arthritis* standard concept.

Each mapping node displays its own person count, and a temporal chart plots the number of persons over time for each code. Hovering over a node highlights the corresponding line in the chart and reveals detailed metadata, including the source vocabulary and code type. In this use case, we observed a noticeable drop in person counts between 1987 and 1995. Examining the contributing codes revealed that several ICD-8 concepts were mapped before 1987, and ICD-10 concepts after 1995. The absence of ICD-9 mappings in the tree led us to identify a gap in ICD-9-FI mapping coverage, highlighting how the EHR Browser can aid in detecting vocabulary inconsistencies and potential ETL issues.

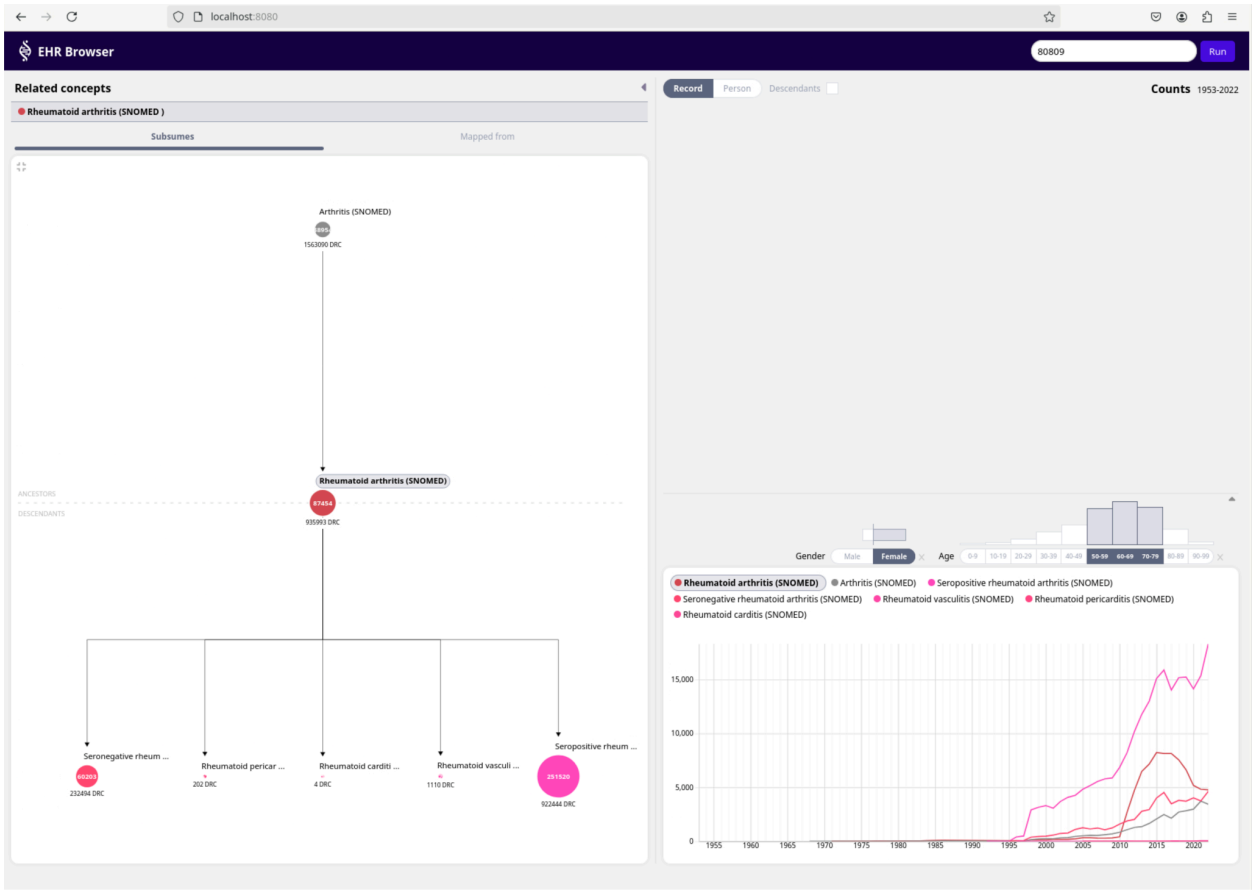

Figure 1. Rheumatoid Arthritis hierarchy view. Record counts for females aged 30-80.

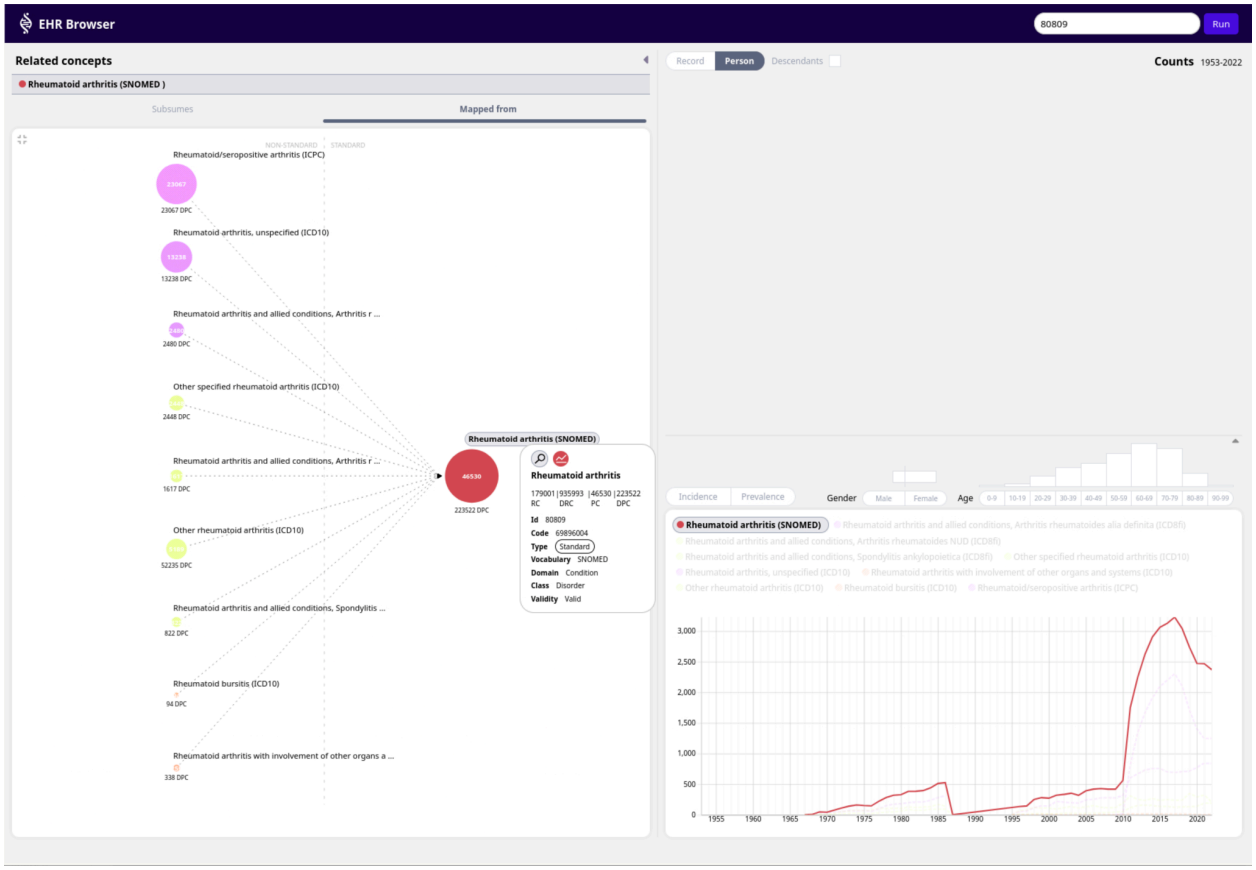

Figure 2. Rheumatoid Arthritis mappings view. Person counts, no filters.

Conclusion

The EHR Browser streamlines the exploration of OMOP-CDM concepts by consolidating hierarchical relationships, mappings, and temporal data trends into a single, filterable interface. It supports use cases such as cohort definition, data quality audits, vocabulary gap detection, and mapping validation. We envision this tool becoming a valuable companion to existing OHDSI tools, enabling more intuitive and thorough data exploration for researchers and data custodians alike. It is worth mentioning that the tool is in active development and the feature here described may vary by symposium.

References

1. https://github.com/FINNGEN/ROMOPAPI
2. https://github.com/Nicolibus/EHR_browser
3. https://hub.docker.com/repository/docker/javiergrata/romopapi/general