Automated Generation of Individual and Population Clinical Pathways with the OMOP Common Data Model

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INTRO

Clinical pathways : sequence of care events that patients experience during their encounters with health care facilities.

Complex issues make it difficult to represent these pathways. The high number of patients and the heterogeneity of variables increase the complexity and induce information overload.

Temporal event need to be aligned for population-based analysis.

METHODS

We developed a tool to automate the representation of clinical pathways, from an individual and population point of view (Fig. 1).

1) Data Extraction

Data extraction from the concepts of interest.

2) Steps gathering, formating and Simplification

Several simplifcation methods are used to reduce complexity such as concept abstraction, consecutive event merging, frequency consecutive merging,

3) Temporal Alignment

The key step is used to align the different pathways into an event through which all patient pass

4) Event filtering

Using two index lists: the chronological list (CH List) from the tips to the key step; the key step list (KS List) from the key step to the tips (Fig. 2).

5) Sequence building

Use of a target source logic for the creation of sequences.

Fig 1 : Building and simplifying the patient pathway based on the OMOP CDM

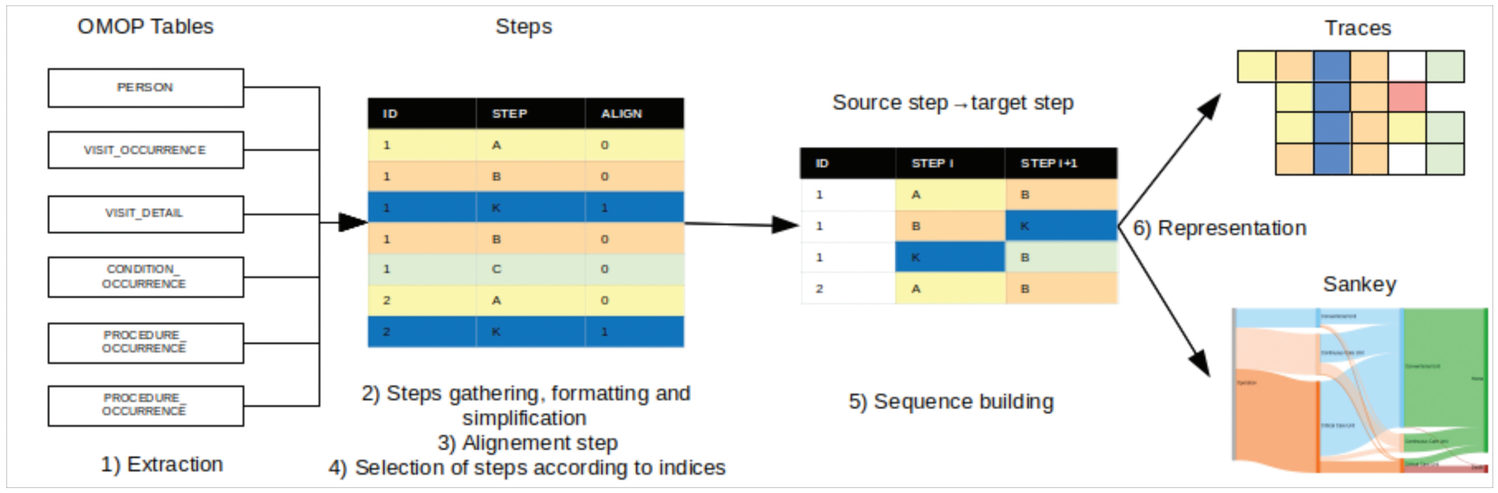


Fig 2 : Events filtering and temporal alignment

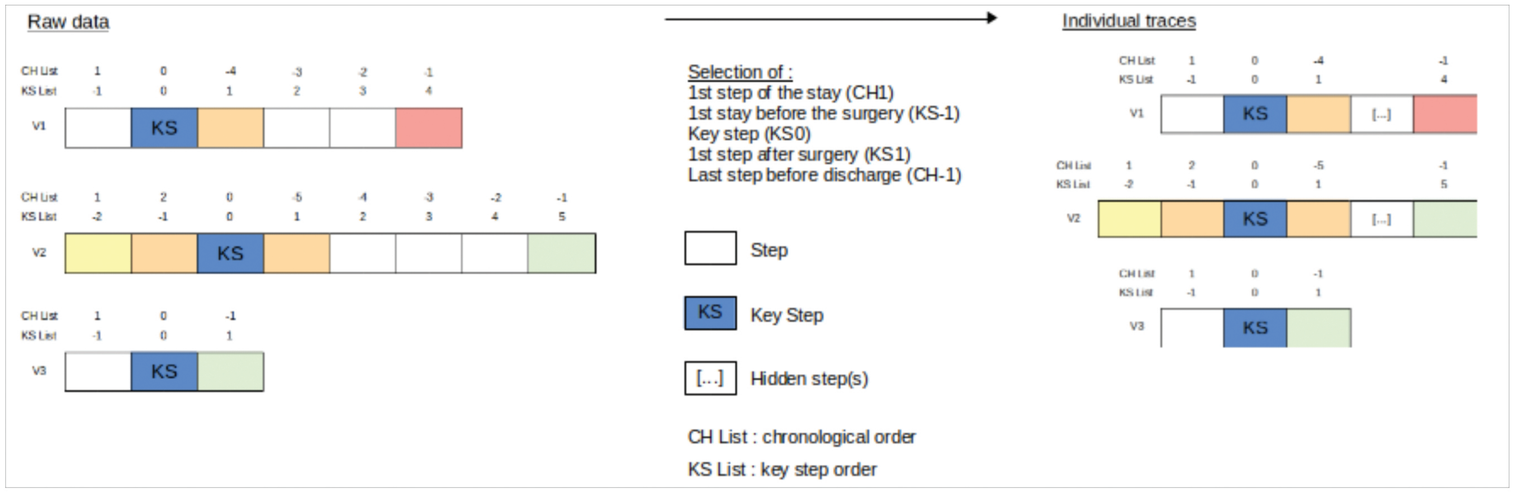
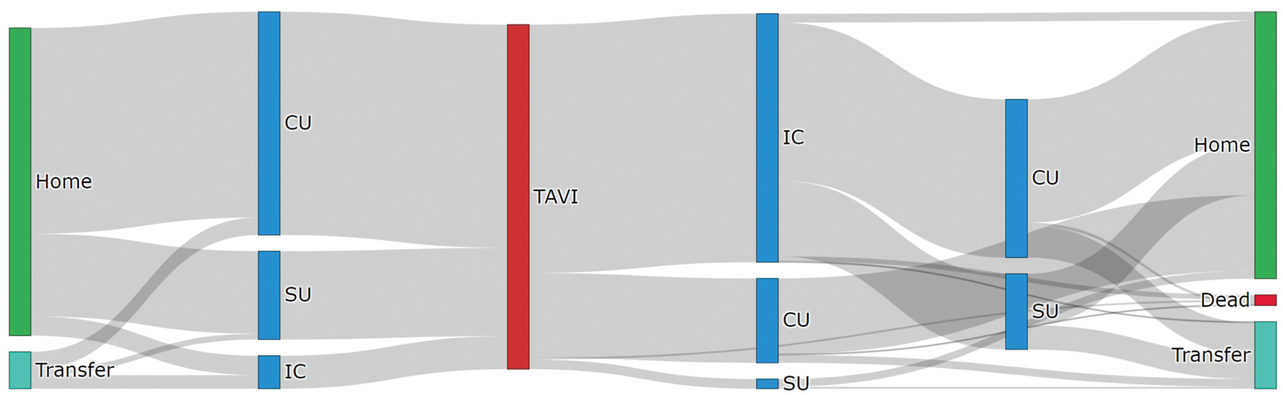


Fig 3 : Population pathway for transcatheter aortic valve implantation



EXPERIMENTATION

We tested our algorithm with three surgery procedures: the total hip replacement, the coronary bypass and the transcathe, based on the database of the Lille University Hopsital (France).

RESULTS

The tool was developed with R (version 4.0.3) and uses DatabaseConnector, SqlRender, d3js, plotly, tidyverse, and lubridate packages. Our R package for the generation of clinical pathways is available here.

The tool provided different ways of visualizing pathways depending on the question asked: the pathway before a surgery, the pathway of deceased patients or the complete pathway with different steps of interest. We included 90, 566, and 2101 patients, for total hip surgery, coronary bypass, transcatheter aortic valve implantation (Fig. 3), respectively.

The algorithm developed to align, filter and select events of interest has reduce the complexity of the visualization.

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