

How can advanced analytics and innovative data visualizations improve the understanding of cancer healthcare pathways trajectories?

Background

Healthcare databases, especially claim databases, present large opportunities to study patient care pathways for specific disease.

Each patient's medical history is a timeline containing medical events (hospitalizations, consultations, drug delivery, etc.). Since each patient is unique, it is rare to find two patients with identical care sequences and representing every patient timeline is impractical with cohorts of thousands of patients.

It has been shown that user-friendly and comprehensive data visualizations have a strong impact on the interpretation of study results. One of the challenges is to provide such appropriate visuals to ensure that results are well understood by the medical community, as well as patients and their relatives.

Objectives

This work aims at exploring and providing methodological recommendations on the use of innovative data visualizations supporting analytic methods, including artificial intelligence, to address healthcare pathway questions.

Methods

We summarized in a decision tree the methodological steps that should be considered prior to choosing the most appropriate visualization. The decision tree splits are based on:

- the type of variables (categorical or continuous),
- the number of simultaneous variables,
- the information you want to keep (order of the events, time between the events)

Finally, analytic methods that could enhance each visualization are described.

For each of the visualizations, we gave examples of associated study questions applied on cancer patients at different steps of their healthcare pathways (before diagnosis or in the first year of treatment).

Conclusion

Our work resulted in a decision tree of methodologies that can be applied in order to analyze and visualize healthcare pathways depending on each clinical situation and study question in cancer. This could be applied to different types of cancer or even to other diseases.

References

1. Tredan O, et al. Innovative Approach for a Typology of Treatment Sequences in Early Stage HER2 Positive Breast Cancer Patients Treated With Trastuzumab in the French National Hospital Database. *Cancer Informatics*. 2022;21. doi:10.1177/11769351221135134

Abbreviations

TAK®: Time-sequence Analysis K-clustering

How to select an impactful data visualization? Follow the decision tree

