

International Journal of Population Data Science

Journal Website: www.ijpds.org



Using machine learning to gain insights into chronic disease multimorbidity: trends and patterns in British Columbia, Canada

Jennifer Ferris^{1,2}, Alexandra Choi³, Brandon Wagar⁴, Jonathan Simkin¹, Ryan Woods¹, Ognjenka Djurdjev⁵, Hind Sbihi¹, Kari Harder⁶, and Kate Smolina¹

¹BC Centre for Disease Control, Provincial Health Services Authority

²Gerontology Research Centre, Simon Fraser University

³Vancouver Coastal Health Authority

⁴Health Sector Information, Analysis and Reporting (HSIAR), BC Ministry of Health

⁵Provincial Health Services Authority

⁶Northern Health Authority

Objective

The goal of this project is to explore novel ways to assess chronic disease multimorbidity (co-occurrence of two or more conditions) trends and patterns in the population of British Columbia (BC), Canada.

Approach

This study included linked data from the BC population (5M individuals) from 2001/02 to 2019/20. We analysed 25 chronic conditions, including 7 primary cancer subtypes. We report multimorbidity (MM) incidence, prevalence, and most common disease combinations. Further we explore temporal MM disease patterns using directed network analyses and extracted data-driven disease clusters with an unsupervised machine learning algorithm.

Results

The age-standardized incidence of MM stayed relatively stable over the study period for males and decreased for females, while prevalence increased to approximately 1 in 4 individuals in BC in 2019/20 (from 19% to 27% of females, from 15% to 22% of males). Disease networks and clusters varied significantly by sex and age group, this presentation will highlight select disease network and cluster findings and discuss their implications for chronic disease surveillance.

Conclusions

The prevalence of multimorbidity continues to rise in BC. Using advanced analytics to understand disease co-occurrence patterns provides new insights above and beyond traditional epidemiological metrics to support health system planning and prevention efforts.

Implications

Chronic disease surveillance and research have historically operated with a single disease focus, which is not patient-centered and does not adequately account for the reality of multimorbidity for many people. This project is laying the foundation for enhanced chronic disease surveillance and monitoring in BC.

