Incorporating real-world data and mathematical modelling to estimate the undiagnosed Chronic hepatitis B population

Julien Smith-Roberge[1] PhD, William W. L. Wong[1] PhD

[1]School of Pharmacy, University of Waterloo, Kitchener, ON, Canada

UNIVERSITY OF WATERLOO
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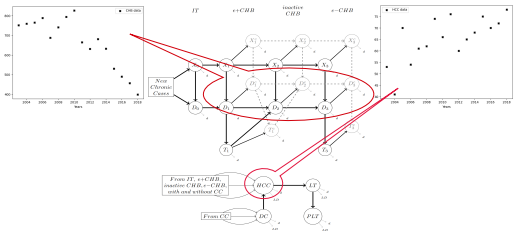
Background

- Chronic hepatitis B (CHB) remains a significant public health concern globally, particularly in the Asia-Pacific region, where most infections are asymptomatic.
- Understanding geographic and demographic trends in CHB prevalence and undiagnosed cases is crucial for developing equitable healthcare strategies and resource allocation to eliminate the disease.
- **Our aim is to estimate the chronic hepatitis B (CHB) prevalence and undiagnosed proportion in Canada's largest province, Ontario, using a back-calculation modeling approach informed by population-level health administrative data**

Figure 1. Back-calculation framework



Methods

- We conducted population-based retrospective analyses of health administrative data for Ontario from 2003 to 2018 to generate the annual incidence of patients with newly diagnosed hepatocellular carcinoma (HCC), decompensated cirrhosis (DC) and CHB as well as patients treated for HBV for three birth cohorts: individuals born before 1945, born between 1945 and 1965, and born after 1965.
- We developed a back-calculation framework (**Figure 1**) to estimate the historical prevalence of CHB for each cohort. We used a Bayesian Markov Chain Monte Carlo (MCMC) algorithm to back-calculate the historical CHB prevalence and the undiagnosed proportion through a calibration process.
- The algorithm constructs the probability distribution of the historical CHB prevalence and the undiagnosed proportion by comparing the model-generated predictions of the annual number of CHB health events against observed health administrative data such as the diagnosed HCC and diagnosed DC incidences generated in the retrospective analysis

Results

- Our results indicated a decreasing trend in the undiagnosed CHB proportion and CHB prevalence over time for all cohorts in the provinces (**Figures 2 and 3**) .
- The mean prevalence estimates for Ontario across all birth cohorts in 2020 were 0.35% (95%CI: 0.33%-0.36%) **(Figure 2)**.
- The undiagnosed proportion estimates for Ontario across all birth cohorts were 27% (95%CI: 25%-30%) in 2020 **(Figure 3)**

Figure 2. Estimated Prevalence

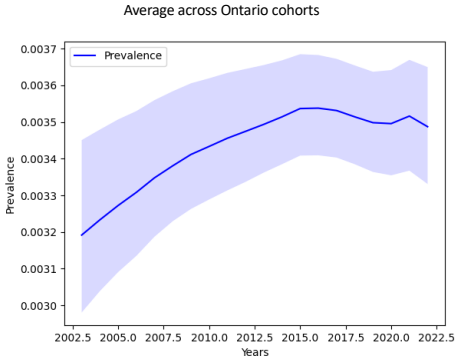
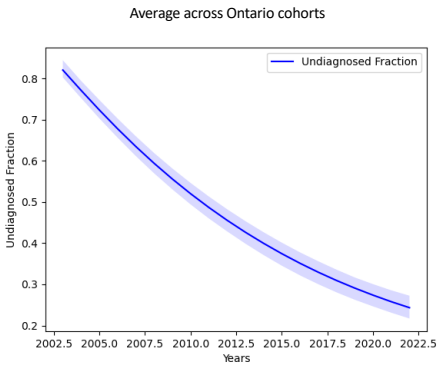


Figure 3. Estimated Undiagnosed



Discussion

- This is the first study to estimate CHB prevalence and undiagnosed proportion in Canada using provincial health administrative data.
- **A significant number of CHB-infected individuals still remain undiagnosed.**
- Additional efforts needed to increase the number of people screened and treated
- Our findings can provide evidence to guide decision-making on HBV screening strategies to reach undiagnosed individuals and help meeting the elimination target.

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