

01 EXECUTIVE SUMMARY AND CONTEXT

EXECUTIVE SUMMARY

This is the April 22, 2021 overview of findings of modelling studies conducted and collated by the PHAC Modelling Group.

Current situational awareness

The effective reproduction number (R_t) for Canada on April 10, 2021, estimated using date of illness onset, was 1.17. There has been an increasing trend in R_t in most provinces since early February, and on April 10, R_t was >1 for all provinces.

The short-range statistical forecast for Canada up to April 15, 2021 is:

- 1,219,812 cumulative cases (range: 1,209,447 to 1,235,880)
- 24,061 cumulative deaths (range 23,943 to 24,185)

Overall, mean case incidence is projected to increase in Alberta, Manitoba and Ontario, and decrease in British Columbia, Quebec and Saskatchewan. Case incidence is projected to increase by 1.8% over the next week in Canada as a whole. The incidence of new deaths is projected to increase slightly in Canada.

The nowcast of the force of infection suggests that the epidemic is stable in Saskatchewan, Quebec and Nova Scotia. However, the force of infection is forecasted to continue to increase in British Columbia, Alberta, Manitoba, Ontario and New Brunswick.

The long-range dynamic modelling forecast (Simon Fraser University model) for Canada, suggests there may be ~15,000 reported cases per day in early May without further enhancements to control transmission. With recent enhancements to public health measures stringency in some provinces (British Columbia, Saskatchewan and Quebec) the epidemic is forecast to plateau, but with current controls in Alberta, Manitoba and Ontario the epidemic is forecast to continue to resurge.

The long-range dynamic modelling forecast (PHAC-McMaster University model) suggests that nationally, and in all major provinces, in order to control the epidemic, the effectiveness of the recent measures will need to lead to a reduction in transmission of at least 30%. With very recent changes in public health measures in some provinces it is difficult to forecast to what extent recently implemented measures may impact the epidemic.

Importation risk modelling for the week of April 11 to April 17, 2021, an estimated 5,566 people with COVID-19 came to Canada, primarily from India, the United States of America (USA) and Turkey. For the top 10 countries estimated to contribute infected travelers, the percentages of cases that may be variants of concern or interest (VOC/VOI) are 16% B.1.1.7 (UK variant), 8% B.1.617 (Indian variant), 2% B.1.427 and B.1.429 (Californian variants), 2% B.1.351 (South African variant), and each of the following at less than 1%: B.1.526 (Nigerian variant), and P.1 and P2 (Brazilian variants).

Assessment of the impact of interventions on the COVID-19 epidemic in Canada and other countries using the Oxford University stringency index:

- Canada's stringency index increased to 75 as of April 1, 2021, while the weekly rolling average of daily cases reached an all-time high of 8,730 on April 17, 2021.
- COVID-19 cases are increasing in many provinces. In some provinces where the stringency index has recently increased, cases may be starting to plateau. In other provinces where little or no change in the stringency index has occurred, cases continue to rise suggesting the stringency index in these regions is too low to control the epidemic.

Dynamic modelling

Preliminary assessment of the impact of detecting asymptomatic cases by population screening with rapid diagnostic tests (RDTs) explores the impact of asymptomatic population screening with rapid diagnostic tests in the presence of emerging variants of concern (VOC) and vaccination across Canada. In the simulations, increasing detection of asymptomatic cases to 50% or more by rapid testing allowed hospital capacity to remain below the maximum hospital threshold when restrictive closures were lifted. The results suggest a potentially important contribution of rapid diagnostic tests in reducing the burden of COVID-19 hospitalizations as restrictions are lifted, as well as mitigating the impact of immune-escape VOC (meaning vaccination offers low protection against infection or illness).

Agent-based model analysis: a framework to explore impacts of competing variants of concern (VOC), including immune escape VOC on the lifting of public health measures in Canada presents a modelling framework to study the effect of importation of immune-escape VOC that compete with VOC that were introduced earlier. In simulations, an introduced immune-escape VOC became the dominant circulating strain outcompeting other VOC and the original wild type strains in the absence of restrictive measures. The results suggest that as the introduction of immune-escape VOC increase, the likelihood of resurgence increases, supporting the importance of VOC surveillance, border measures to limit their introduction into Canada and ongoing public health capacity to control their spread within Canada.