**Maria M. Martignoni, Amy Hurford**
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**Methods**

*Estimating the proportion of days with mild restrictions*

When an elimination approach to COVID-19 is applied, severe restrictions are implemented to bring the number of cases back to zero whenever a community outbreak occurs, and restrictions are released afterwards. We are interested in broadly estimating the expected percentage of days when mild restrictions are implemented for different viral variants.

We know that the Alpha variant is 1.5 more transmissible than the original variant [1], that the Delta variant is 1.6 more than Alpha [2] and that the Omicron variant is 3.3 more times transmissible than Delta [3]. The Alpha variant arrived in Canada at the end of December 2020 [4]. Newfoundland and Labrador experienced a community outbreak of Alpha variant in February 2021, and no successive outbreak till the end of April 2021 [4]. Therefore, we use 120 days as an estimate for the expected time between community outbreaks ($T_d$) due to the Alpha variant. Respective estimates for other variants are provided in Table 1.

Additionally, we assume that an elimination strategy is enacted when 50 cases are already present in the community, and we calculate the time needed to reduce the number of cases from 50 to 1 ($T_l$) by assuming exponential decay in the number of cases. We find that

$$50 \; e^{(R_0\gamma - \gamma)T_l} \longleftrightarrow T_l = \frac{\ln(1/50)}{R_0\gamma - \gamma} \; .$$

We assume that the net reproduction number with severe restrictions implemented is $R_0 = 0.1$ for the original strain, and calculate the corresponding reproductive number for different variants of concern taking into account their increased transmissibility [1,2,3]. We assume a recovery rate of 1/7 days$^{-1}$.
Finally, we calculate the expected percentage of days for when mild restrictions can be implemented, given an elimination strategy, as

$$\% \text{ of days with mild lockdown} = \frac{T_d - T_l}{T_d} \times 100 \; .$$

Estimates are provided in Table 1 and Fig. 2.

*Estimating disease severity*

Using the estimates of hospitalization rates for different viral variants in vaccinated and unvaccinated individuals [5], and Newfoundland and Labrador vaccination rates [6], we estimate the average number of hospitalizations per 1000 infections in Newfoundland and Labrador when variants were established in the province [7]. Estimates are provided in Table 1.

|  | Original | Alpha | Delta | Omicron |
|---|---|---|---|---|
| Date of establishment in NL [6] | March 14, 2020 | Feb 12, 2021 | Apr 28, 2021 | Dec 15, 2021 |
| Percent of NL population vaccinated with one dose when the variant was established [5] | — | 0.93% | 26.46% | 6.41% |
| Percent of NL population vaccinated with two doses when the variant was established [5] | — | 0.78% | 1.86% | 85.33% |
| Average probability of hospitalization for unvaccinated individuals [4] | 2.3% | 3.84% | 5.50% | 1.82% |
| Average probability of hospitalization for individuals vaccinated with one dose [4] | — | 1.79% | 2.14% | 1.27% |
| Average probability of hospitalization for individuals vaccinated with two doses [4] | — | — | 1.73% | 1.01% |
| Average hospitalizations per 1000 cases, given NL vaccination rates when the variant was established | 23 | 38 | 45 | 11 |
| Estimated time between community outbreaks ($T_d$) | 180 days | 120 days | 75 days | 23 days |
| Estimated duration of a severe lockdown to bring the number of cases from 50 to 1 ($T_l$). | 30 days | 32 days | 36 days | 132 days |
| If elimination is implemented, estimated % of days of severe lockdown. | 83.1% | 73.2% | 52.0% | 0% |

[1] Leung, K., Shum, M. H., Leung, G. M., Lam, T. T., & Wu, J. T. (2021). Early transmissibility assessment of the N501Y mutant strains of SARS-CoV-2 in the United Kingdom, October to November 2020. *Eurosurveillance*, *26*(1), 2002106.

[2] Zahradník, J., Marciano, S., Shemesh, M., Zoler, E., Harari, D., Chiaravalli, J., ... & Schreiber, G. (2021). SARS-CoV-2 variant prediction and antiviral drug design are enabled by RBD in vitro evolution. *Nature microbiology*, *6*(9), 1188-1198.

[3] Nishiura, H., Ito, K., Anzai, A., Kobayashi, T., Piantham, C., & Rodríguez-Morales, A. J. (2022). Relative reproduction number of SARS-CoV-2 Omicron (B. 1.1. 529) compared with Delta variant in South Africa. *Journal of clinical medicine*, *11*(1), 30.

[4] COVID-19 daily epidemiology update, https://health-infobase.canada.ca/covid-19/epidemiological-summary-covid-19-cases.html, accessed March 7, 2022.

[5] Paredes, M. I., Lunn, S. M., Famulare, M., Frisbie, L. A., Painter, I., Burstein, R., ... & Oltean, H. N. (2021). Associations between SARS-CoV-2 variants and risk of COVID-19 hospitalization among confirmed cases in Washington State: a retrospective cohort study. *Medrxiv*.

[6] COVID-19 Vaccination in Canada, https://health-infobase.canada.ca/covid-19/vaccination-coverage/, accessed March 7, 2022.

[7] Updates on COVID-19 Variants of Concern (VOC), https://nccid.ca/covid-19-variants/, accessed March 7, 2022.

The Omicron variant features both high viral transmissibility and low disease severity, particularly in vaccinated individuals, what makes disease mitigation, rather than elimination, a better approach.