

Appendix

Projecting the impact of a two-dose COVID-19 vaccination campaign in Ontario, Canada

Thomas N. Vilches,¹ Kevin Zhang,² Robert Van Exan,³ Joanne M. Langley,⁴ Seyed M. Moghadas⁵

¹ Institute of Mathematics, Statistics and Scientific Computing, University of Campinas, Campinas SP, Brazil

² Faculty of Medicine, University of Toronto, Toronto, Ontario, M5S 1A8 Canada

³ Immunization & Policy Translation, Trent Lakes, Ontario, K0M 1A0, Canada

⁴ Canadian Center for Vaccinology, Dalhousie University, IWK Health Centre and Nova Scotia Health Authority, Halifax, Nova Scotia, B3K 6R8 Canada

⁵ Agent-Based Modelling Laboratory, York University, Toronto, Ontario, M3J 1P3 Canada

This appendix provides further details of model structure and parameterization, and estimates for the reduction of overall attack rate and disease outcomes with the accelerated vaccination campaign.

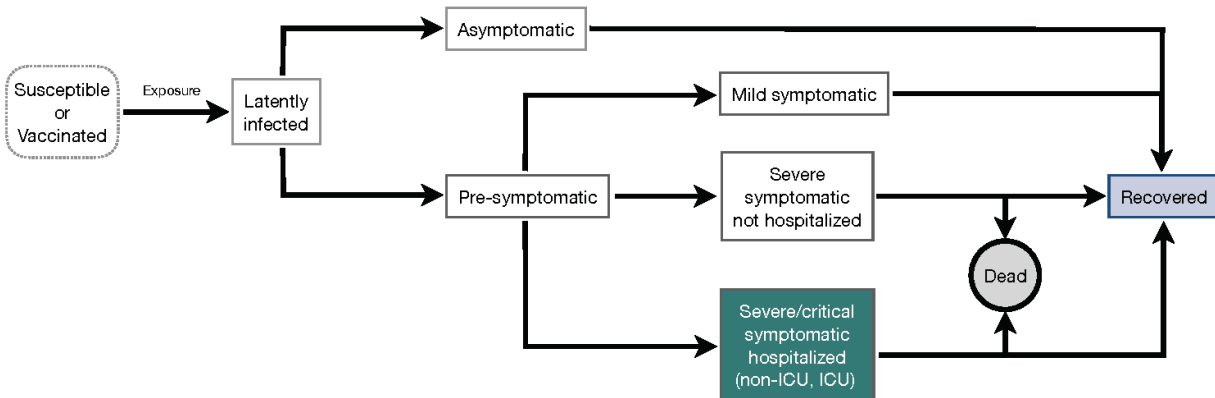


Figure A1. Schematic model diagram for infection and natural history of disease.

Table A1. Percentage of population in different age groups with and without comorbidities.

Condition	0-4	5-17	18-39	40-59	60-79	80+	All age groups
With comorbidity	5.0%	10%	18%	38%	60%	72%	32%
Without comorbidity	95%	90%	82%	62%	40%	18%	68%
Fraction of total population	4.8%	15%	29%	27%	20%	4.2%	100%

Table A2. Mixing patterns and the daily number of contacts derived from empirical observations. Daily numbers of contacts were sampled from negative binomial distributions for different scenarios.

Age group	Proportion of contacts between age groups					Daily number of contacts with stay-at-home order Mean (SD)	Daily number of contacts for self-isolated individual Mean (SD)
	0-4	5-19	20-49	50-65	65+		
0-4	0.2287	0.1839	0.4219	0.1116	0.0539	2.86 (2.14)	0.8 (2.14)
5-19	0.0276	0.5964	0.2878	0.0591	0.0291	4.70 (3.28)	1.32 (3.28)
20-49	0.0376	0.1454	0.6253	0.1423	0.0494	3.86 (2.95)	1.08 (2.95)
50-65	0.0242	0.1094	0.4867	0.2723	0.1074	3.15 (2.66)	0.88 (2.66)
65+	0.0207	0.1083	0.4071	0.2193	0.2446	2.24 (1.95)	0.63 (1.95)

Table A3. Vaccination coverage of different age groups and population segments with two doses of vaccines.

	Age group			Individuals with comorbidities	Individuals without comorbidities	Healthcare workers
	18-19	20-64	65+			
Vaccine coverage	37%	47%	70%	56%	34%	90%

Table A4. Estimated vaccine efficacies with associated timelines.

Vaccine efficacy	Weeks after the first dose		Weeks after the second dose	
	1-2	3	1	>1
Pfizer-BioNTech	1-2	3	1	>1
Infection	None	46% (40% - 51%)	60% (53% - 66%)	92% (88% - 95%)
Symptomatic disease	None	57% (50% - 63%)	66% (57% - 73%)	94% (87% - 98%)
Severe disease	None	62% (39% - 80%)	80% (59% - 94%)	92% (75% - 100%)
Moderna	1-2	3-4	1-2	>2
Infection	None	61% (31% - 79%)	61% (31% - 79%)	93.5% (85.2% - 97.2%)
Symptomatic disease	None	92.1% (68.8% - 99.1%)	92.1% (68.8% - 99.1%)	94.1% (89.3% - 96.8%)
Severe disease	None	92.1% (68.8% - 99.1%)	92.1% (68.8% - 99.1%)	100%

Table A5. Risk of death due to COVID-19.

Hospitalized cases	Age groups						
	0-19	20-44	45-54	55-64	65-74	75-84	85-100
Non-ICU	0.1%	0.15%	0.65%	1.0%	2.0%	7.35%	38.0%
ICU	0.2%	0.22%	0.8%	2.2%	4.0%	8.0%	40.0%

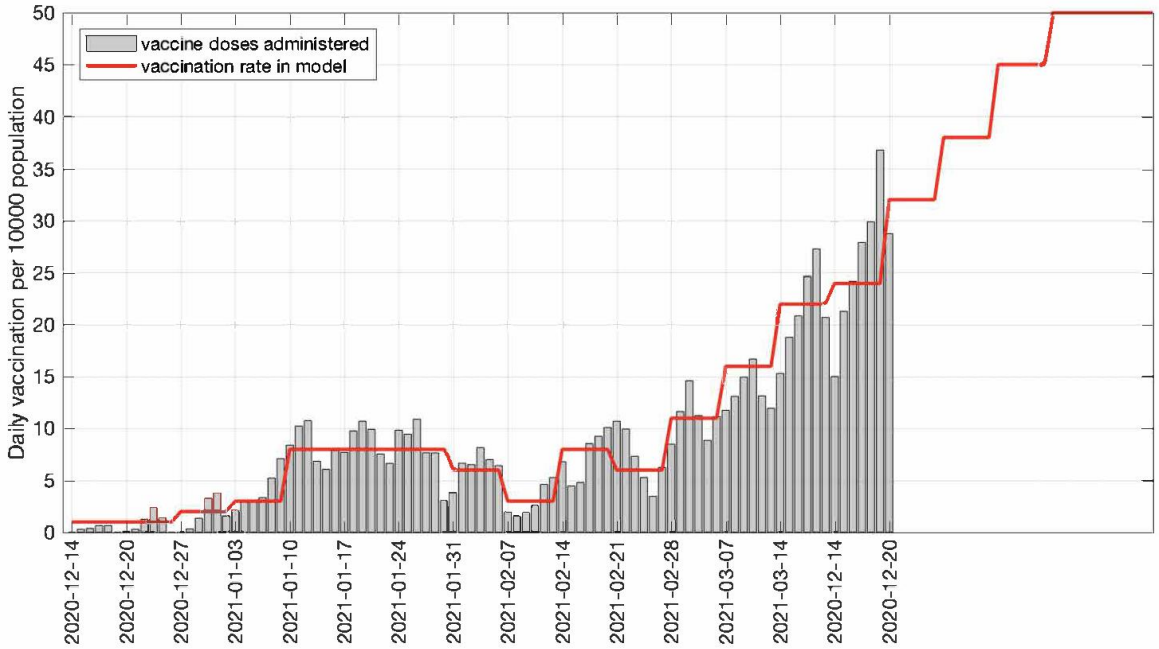


Figure A2. Daily vaccination rate.