

### Introduction:

Long-term care (LTC), assisted living (AL) and retirement homes (RH) have been the epicenter of the COVID-19 pandemic in Canada. (March 2020 – June 2020):

- 80% of deaths are from LTC homes<sup>1</sup>.
- 5 times greater case fatality rate than the general public<sup>2</sup>.
- 38% of all Ontario health care worker cases have been LTC workers<sup>3</sup>.
- Congregate care residents may respond to the COVID-19 vaccine differently.

This prospective study aims to understand individual immune risk for the purpose of developing recommendations that can *prevent* outbreaks, including designing the best vaccination strategies for our most vulnerable citizens.

### Objectives:

- 1) Understand what facility-wide features contribute to COVID-19 outbreaks.
- 2) Discover how immune or other factors (e.g. frailty, medications, previous infection history, etc.) contribute to susceptibility or resistance to infection.
- 3) Examine correlates of protection for COVID-19 infection.
- 4) Conduct immune surveillance for COVID-19 infections.

### Methods:

#### Recruitment:

- Residents were recruited from 25 LTC, RH and AL homes from across Ontario (Fig. 1).
- N = 1171 residents, 66% female, age = ~84 (+/- 9.9).

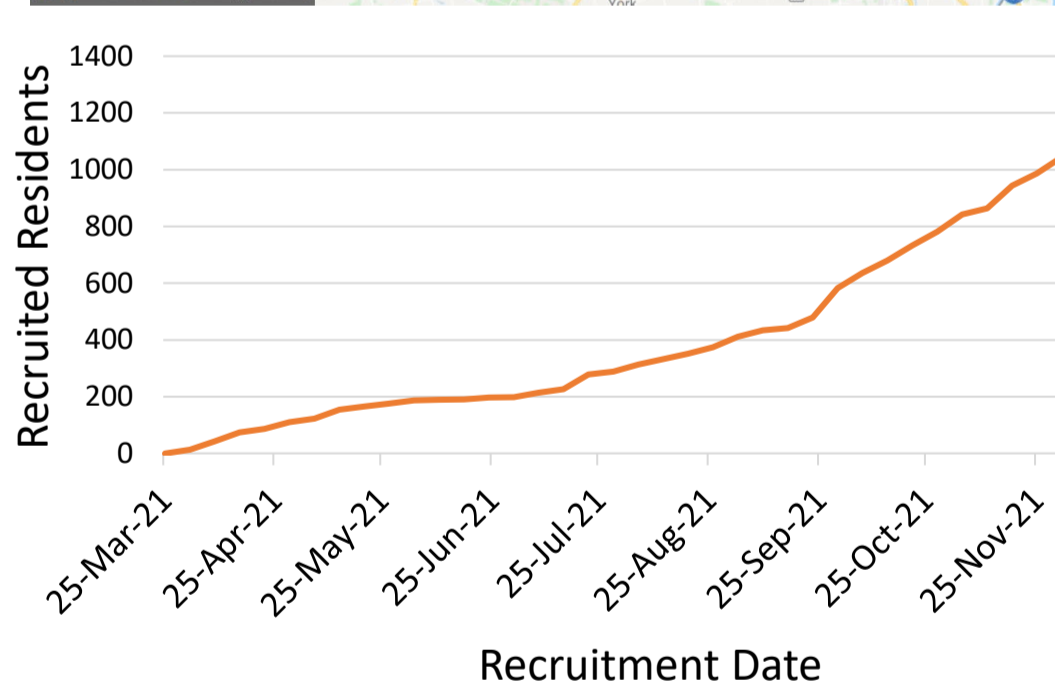
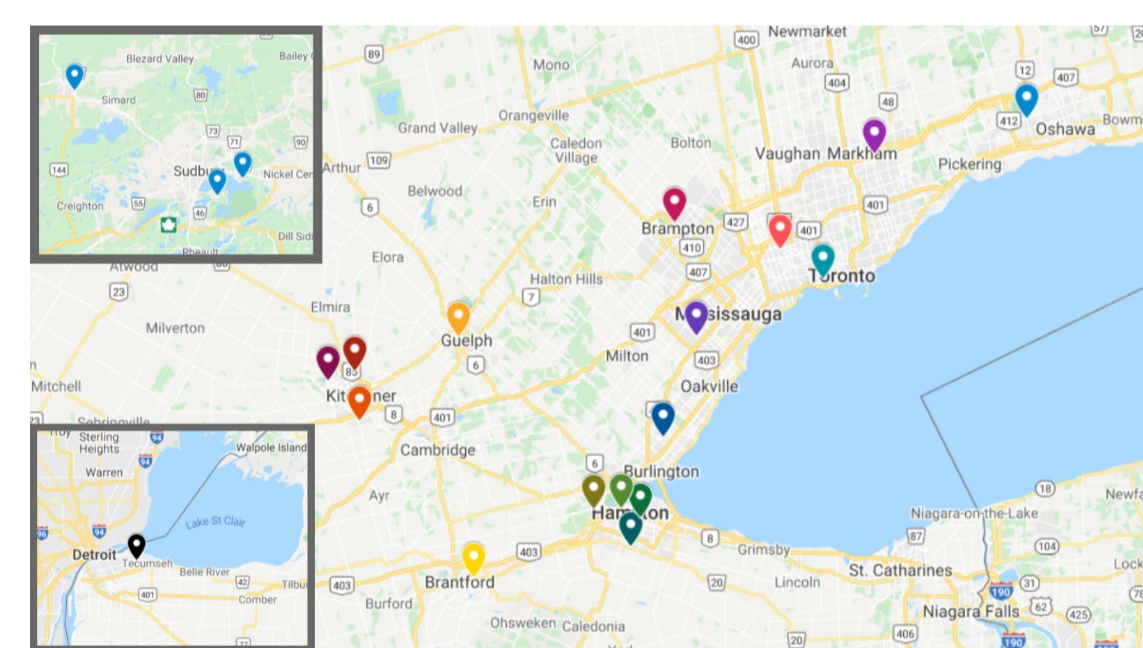


Figure 1: Location of participating LTC, RH, and AL homes (top) and recruitment over time from study start until Dec 2021 (bottom).

#### Data collection:

- Health records and bio samples (see below) were collected from participants approximately 3 weeks and every 3 months following vaccination (see protocol).

#### DEMOGRAPHIC AND HEALTH DATA

**What:** Obtain information about age, sex, covid infections, medical conditions, medications, etc.

**Why:** Understand which medical conditions and medications impact COVID-19 infection and protection.

**Frequency:** Throughout

#### BLOOD DRAW SAMPLES

**What:** 20 ml of blood will be drawn (3 small tubes) from each resident by a trained phlebotomist.

**Why:** Measures the level and quality of antibodies made in response to the COVID-19 vaccine and/or infection. This also predicts how well a resident will be protected in the future from COVID-19.

**Frequency:** 4 times

#### SALIVA SAMPLES

**What:** 1ml of saliva will be collected by spitting into a tube.

**Why:** Detect COVID-19 antibodies in the upper respiratory system.

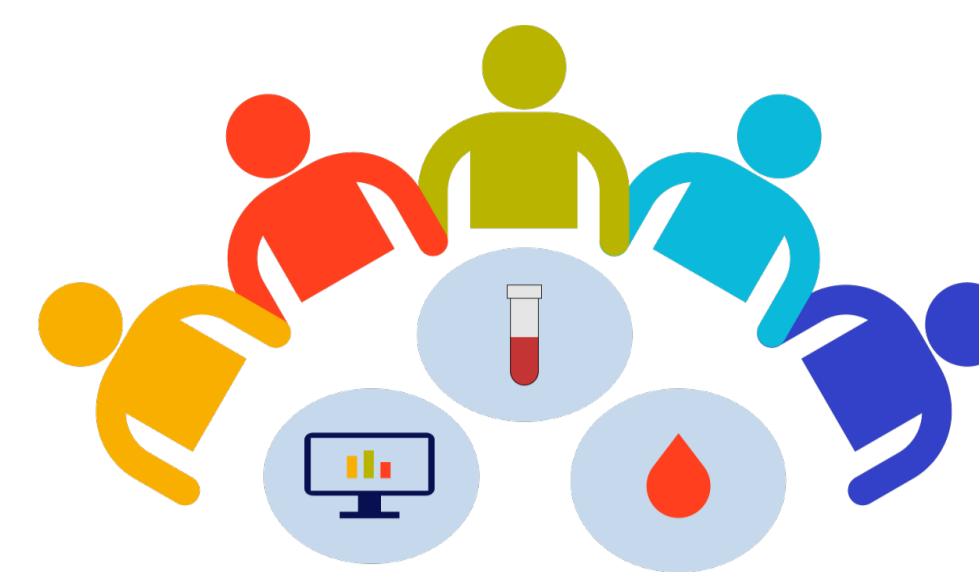
**Frequency:** 2 times

#### DRY BLOOD SPOT SAMPLES

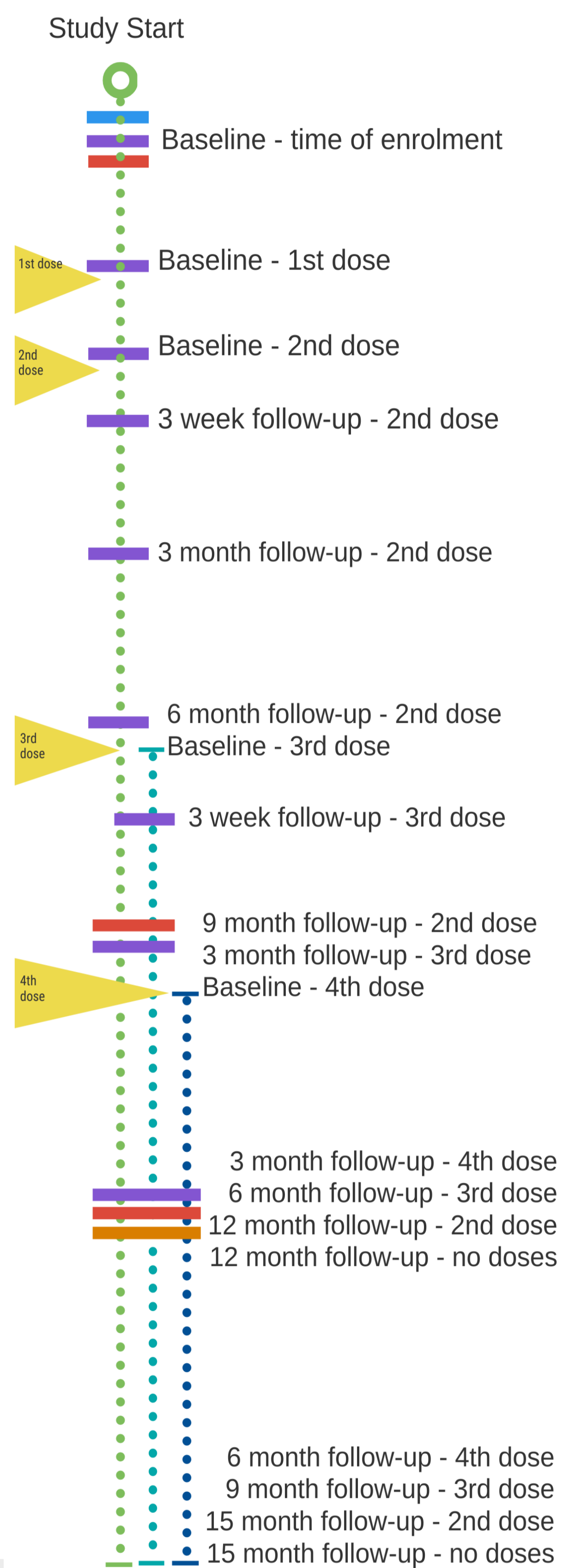
**What:** A drop of blood from resident's fingers will be collected by a trained phlebotomist.

**Why:** Detects COVID-19 antibodies in the blood.

**Frequency:** 4-10 times

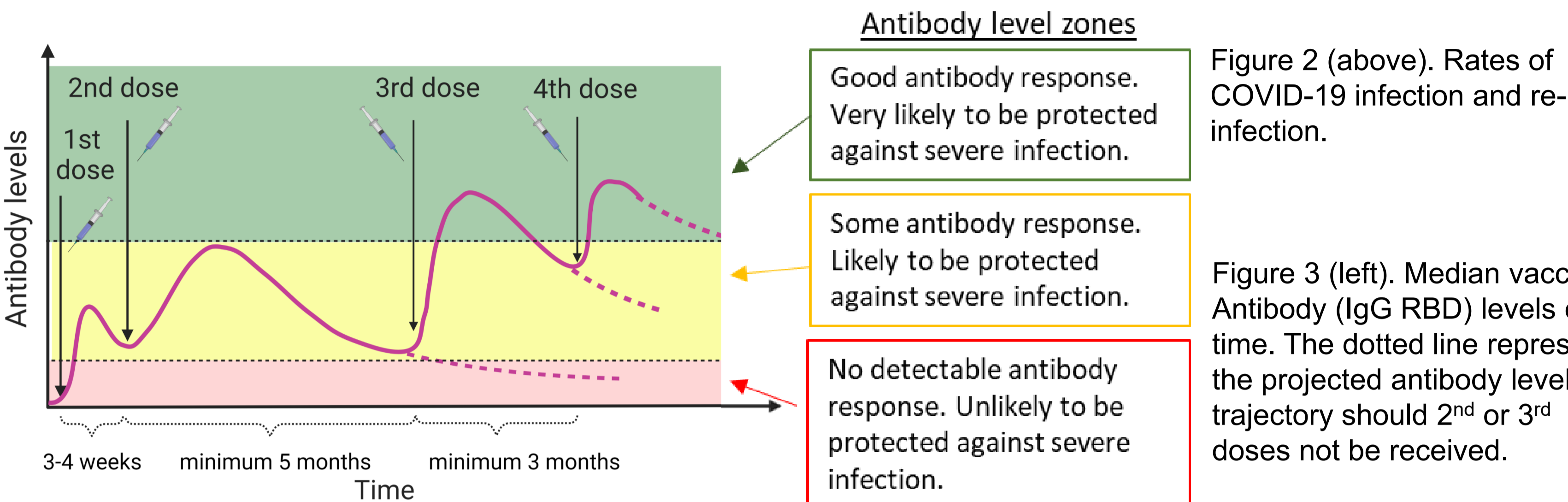
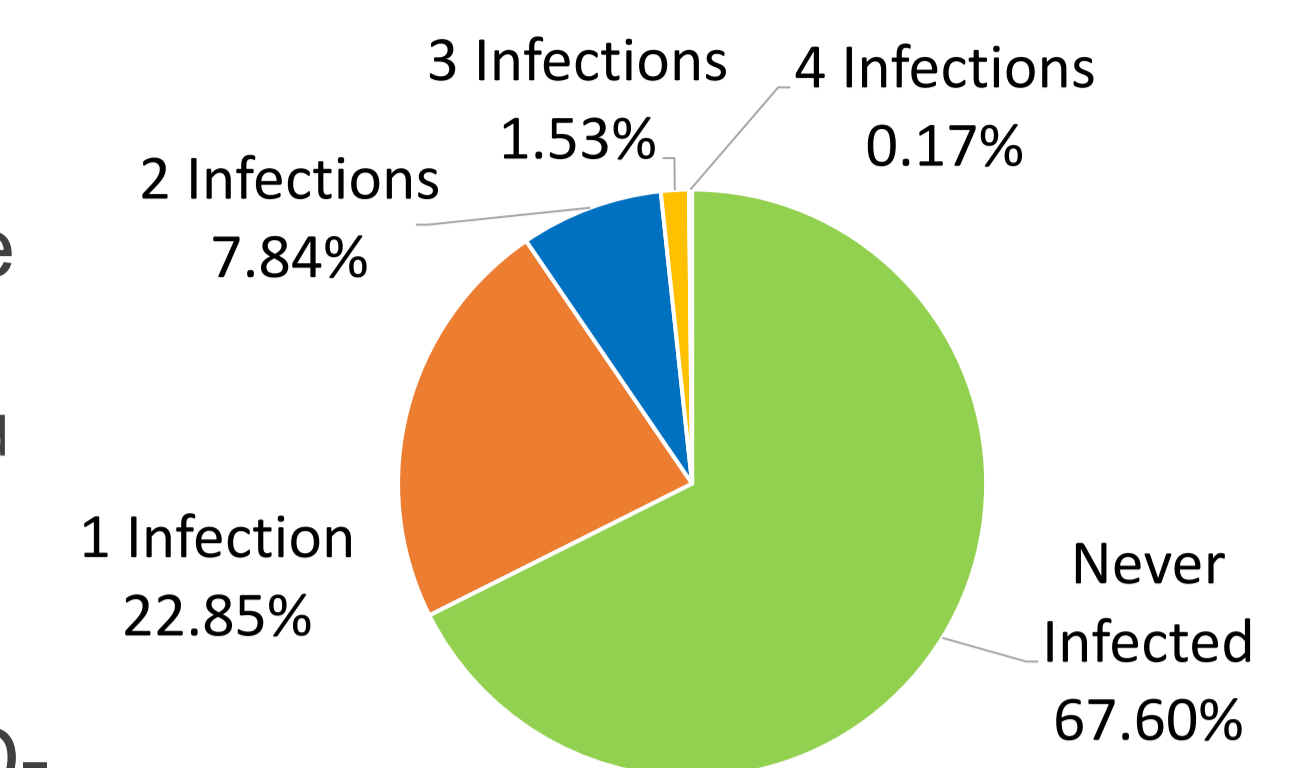


#### Protocol:



### Results:

- The results show waning of immunity to levels where nearly half of the study population had no detectable antibodies 5 months following the second dose. A 3<sup>rd</sup> dose increased antibody levels, but waning returned by 3 months post 3<sup>rd</sup> dose.
- 33% of our residents have been infected with COVID-19 at least once.



### Impact:

- Recommendations for a 3<sup>rd</sup> and 4<sup>th</sup> dose nationally and provincially were supported by our data<sup>4,5</sup>.
  - ▶ NACI guidelines
  - ▶ OIAC guidelines

Public Health Ontario | Santé publique Ontario | OIAC CCOI Ontario Immunization Advisory Committee / Comité consultatif ontarien de l'immunisation

Recommendations: Fourth COVID-19 Vaccine Dose for Long-Term Care Home Residents and Older Adults in Other Congregate Settings

29 December 2021

An Advisory Committee Statement (ACS)  
National Advisory Committee on Immunization (NACI)

Initial guidance on a second booster dose of COVID-19 vaccines in Canada

Published: April 5, 2022

- Ontario was the first jurisdiction globally to offer 4<sup>th</sup> dose (Dec 29<sup>th</sup>, 2021), followed by Israel (Jan 2<sup>nd</sup>, 2022)<sup>6</sup>.
- Other provinces are offering 4<sup>th</sup> doses to residents of congregate care settings based on our recommendations and the success of the 4<sup>th</sup> dose in Ontario<sup>7</sup>.

### Future Directions:

The future of the pandemic is unknown. We plan to continue to study COVID-19 vaccine effectiveness, particularly as it relates to the 4<sup>th</sup> dose, and better understand the impact of hybrid immunity into the Fall of 2022.

#### Funding Agencies



#### Research Partners



#### Study Partners



#### Long-term Care Partners



#### References

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2 Fisman DN, et al. Risk Factors Associated With Mortality Among Residents With Coronavirus Disease 2019 (COVID-19) in Long-term Care Facilities in Ontario, Canada. JAMA Netw Open. 2020;3(7):e2015957. doi:10.1001/jamanetworkopen.2020.15957

3 <https://www.publichealthontario.ca/-/media/documents/ncov/epi/2020/07/covid-19-epi-health-care-workers-ontario.pdf?la=en&:text=There%20are%205%2C815%20confirmed%20cases,as%20of%20June%2022%2C%202020.&text=81.0%25%20are%20female%2C%2018.7%25%20are%20male.>

4 Breznik JA, Zhang A, Huynh A, Miller MS, Nazy I, Bowdish DME, Costa AP. Antibody Responses 3-5 Months Post-Vaccination with mRNA-1273 or BNT163b2 in Nursing Home Residents. J Am Med Dir Assoc. 2021 Dec;22(12):2512-2514. doi: 10.1016/j.jamda.2021.10.001. Epub 2021 Nov 1. PMID: 34736891; PMCID: PMC8558841.

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7 Grewal, R., Kitchen, S. A., Nguyen, L., Buchan, S. A., Wilson, S. E., Costa, A. P., & Kwong, J. C. (2022). Effectiveness of a fourth dose of COVID-19 vaccine among long-term care residents in Ontario, Canada: Test-negative design study. <https://doi.org/10.1101/2022.04.15.22273846>