

COVID-19 infections and vaccinations in older adults: Managing infections and reinfections

Dr. Dawn Bowdish, PhD

Firestone Institute for Respiratory
Health

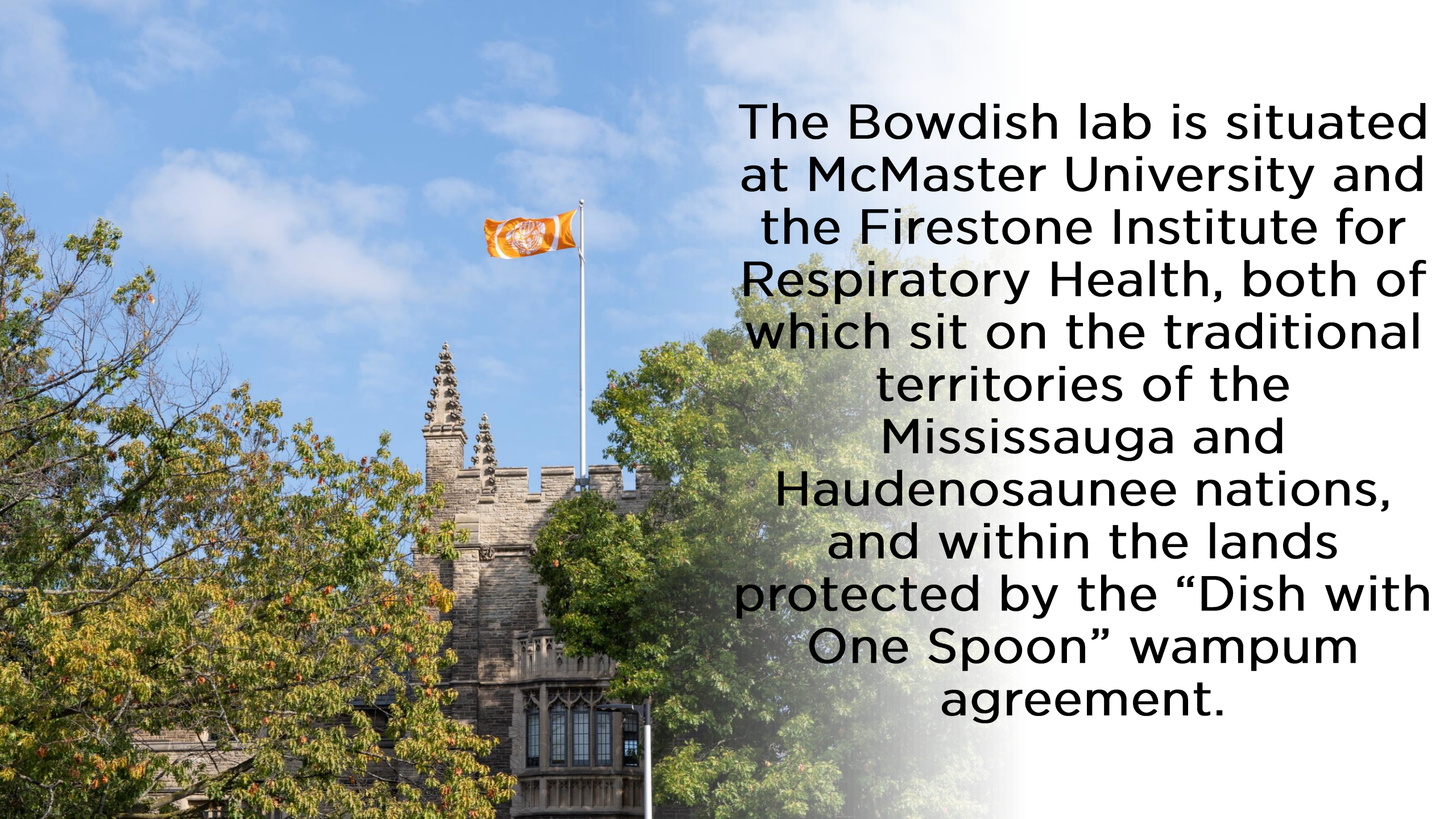
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www.bowdish.ca

Bluesky/Insta: @MsMacrophage

Inspired by research in the Bowdish lab.
Artist: Alysa Palazzo @alysa_palazzo_draws



The Bowdish lab is situated at McMaster University and the Firestone Institute for Respiratory Health, both of which sit on the traditional territories of the Mississauga and Haudenosaunee nations, and within the lands protected by the “Dish with One Spoon” wampum agreement.

There are known knowns; there are things we know that we know.

There are known unknowns; that is to say, there are things that we now know we don't know.

But there are also unknown unknowns – there are things we do not know we don't know.

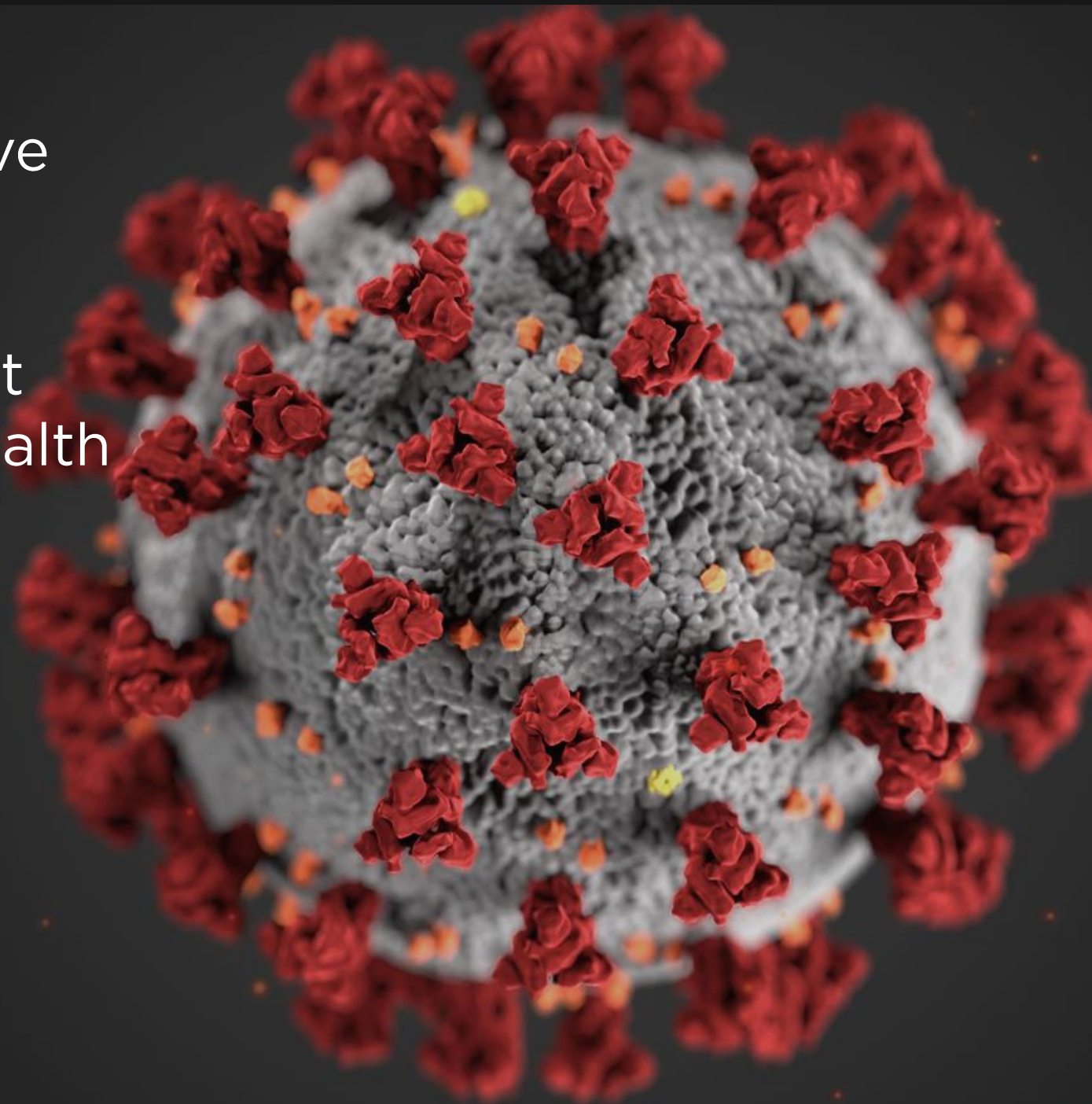
-Donald Rumsfeld





Knowns:

- COVID-19 infections can have serious long-term health consequences
- Vaccination protects against infections and long-term health consequences



Knowns:

- COVID-19 infections can have serious long-term health consequences
- Vaccination protects against infections and long-term health consequences

Unknowns:

- Do Omicron variants cause the same long-term health consequences?
- How much does vaccination protect against long-term health issues?
- When will we get back to normal?

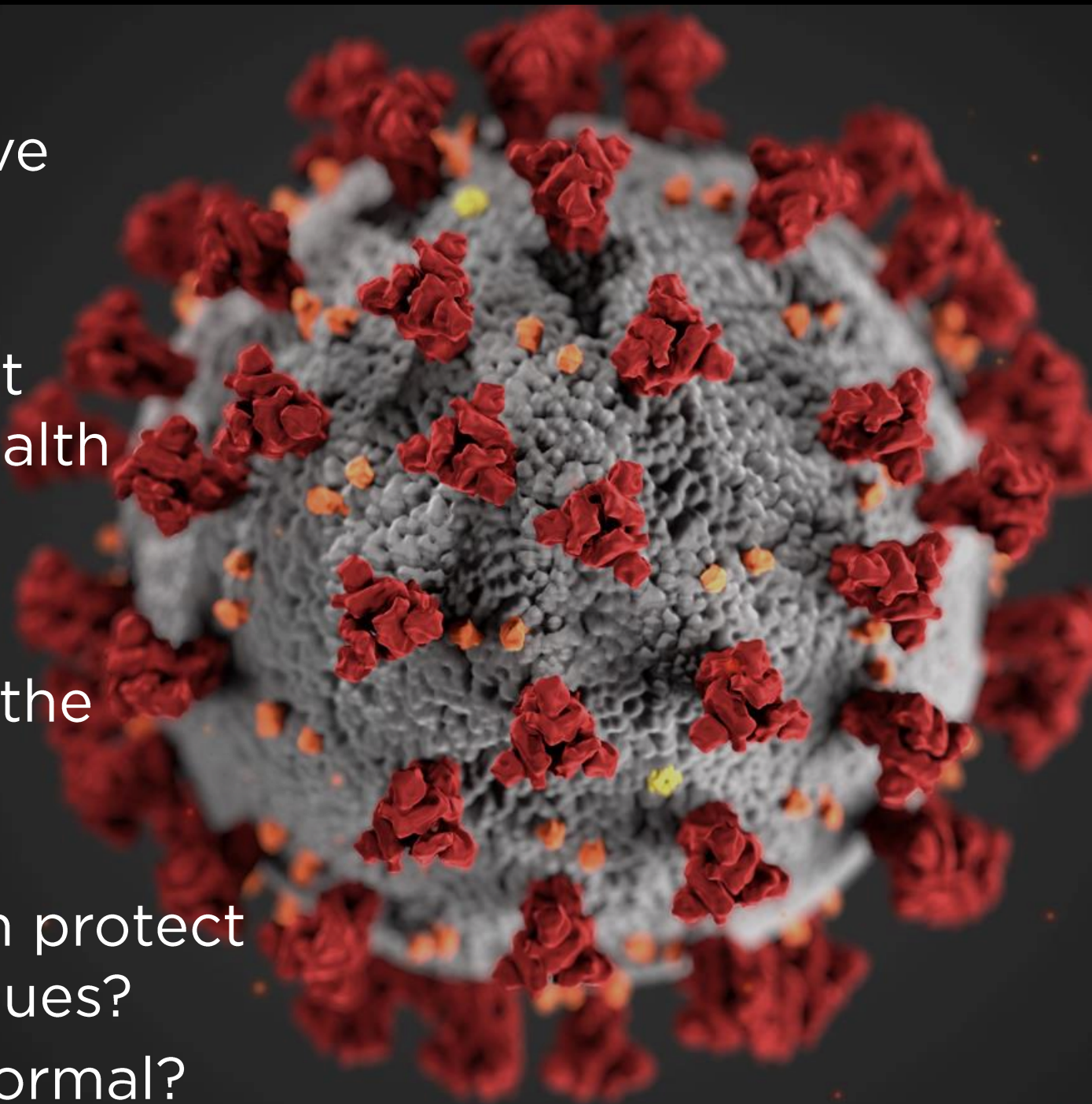
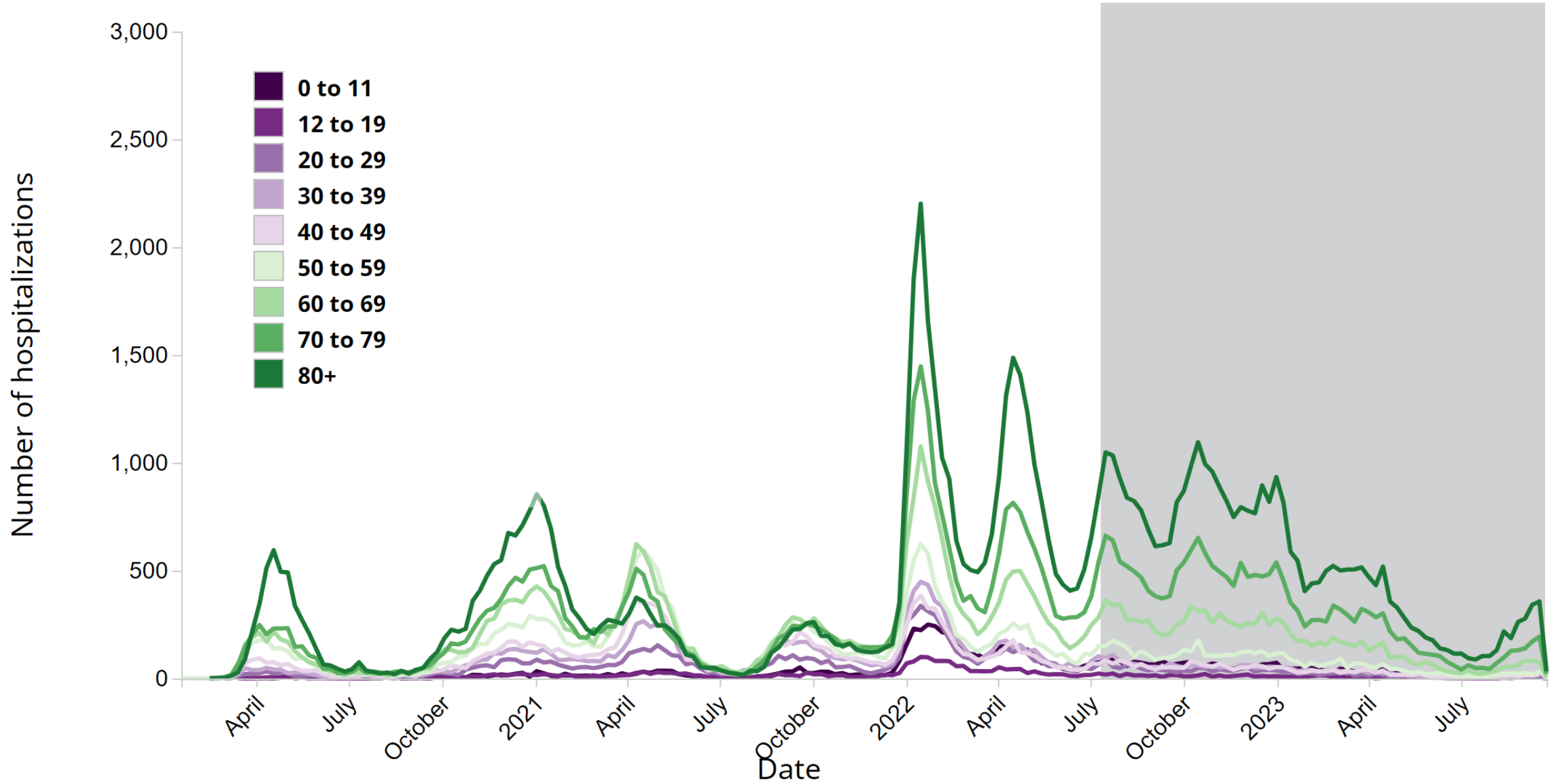
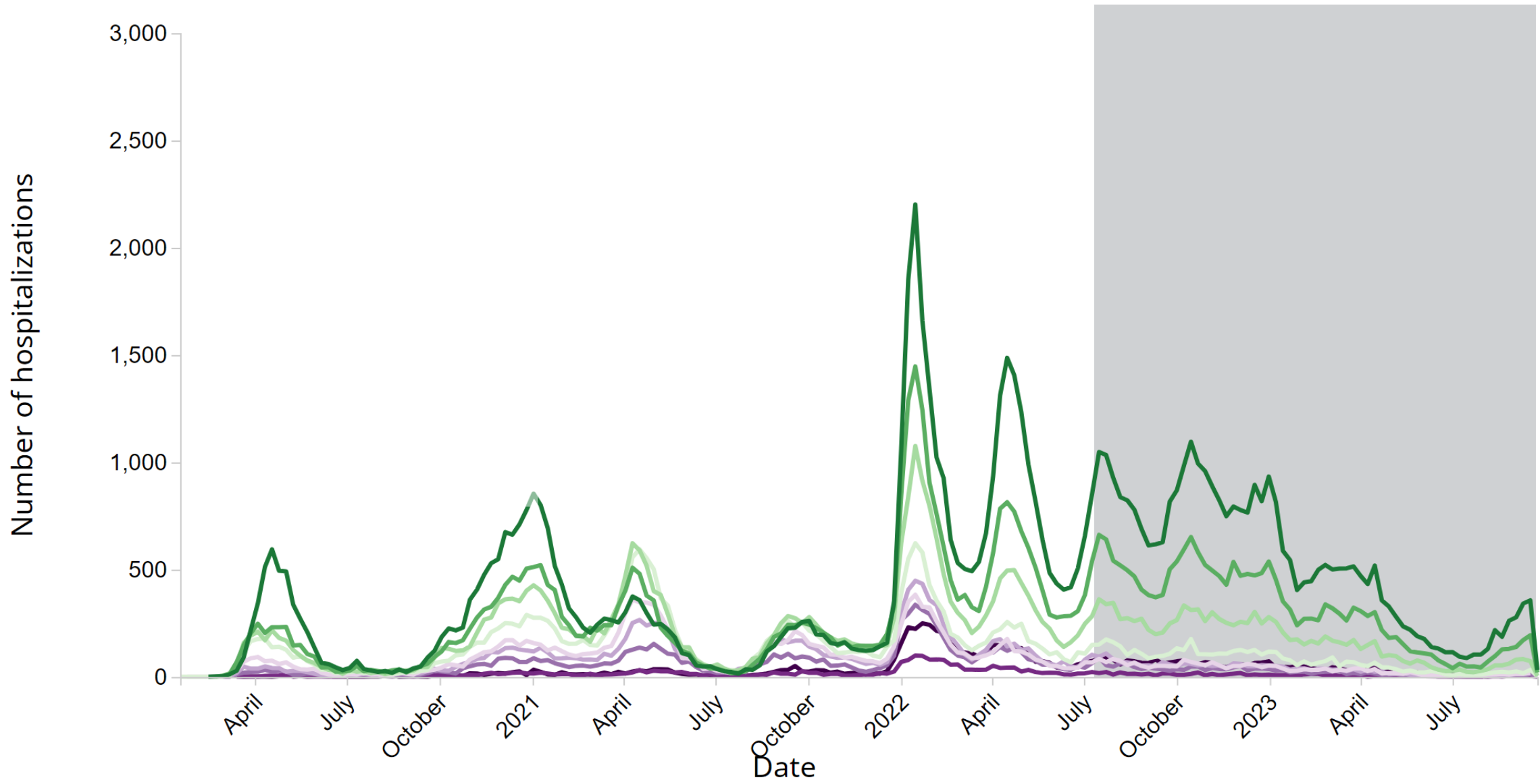
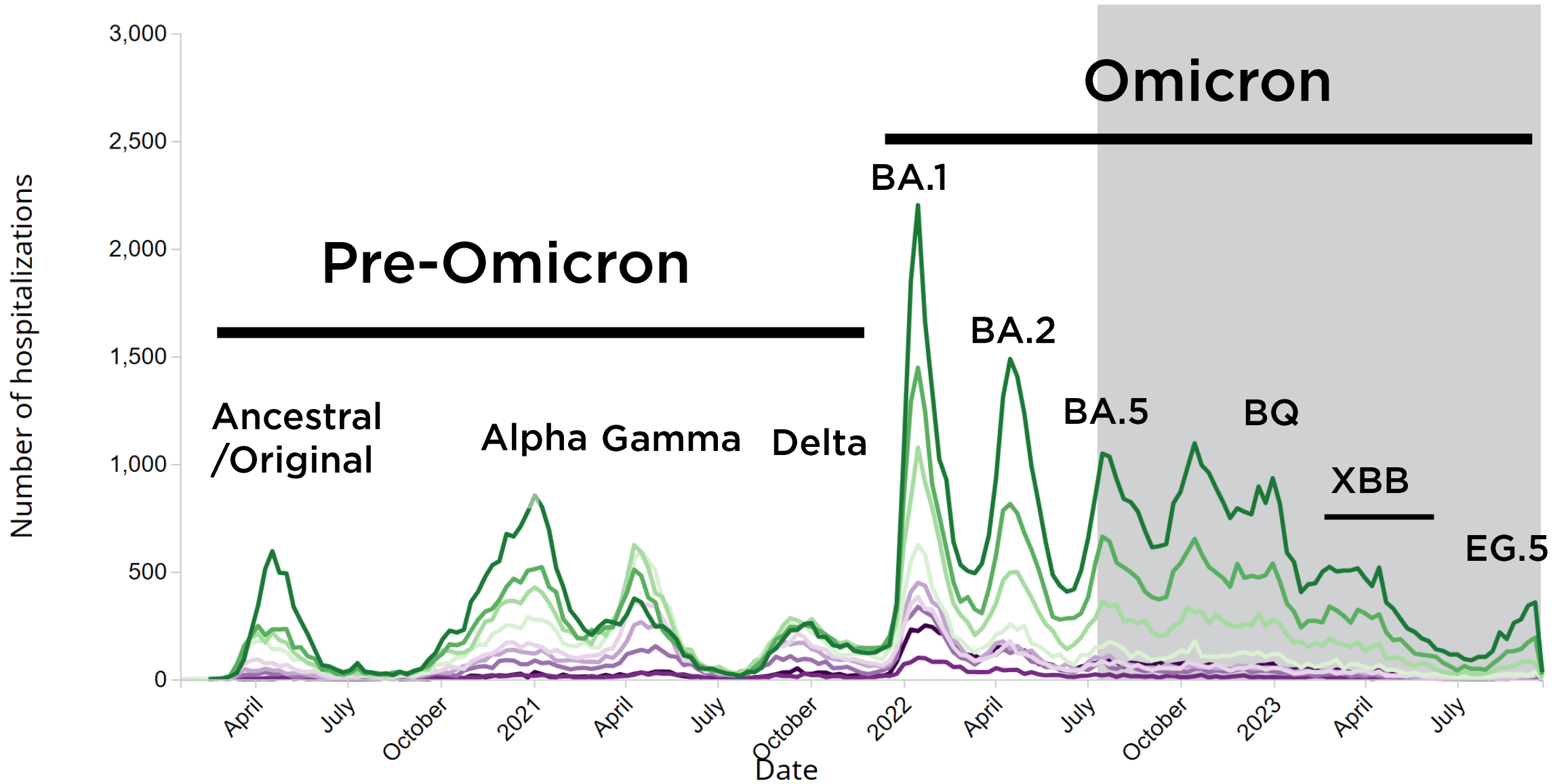


Figure 3. Weekly of COVID-19 by age group in Canada as of September 23, 2023







Pre-Omicron

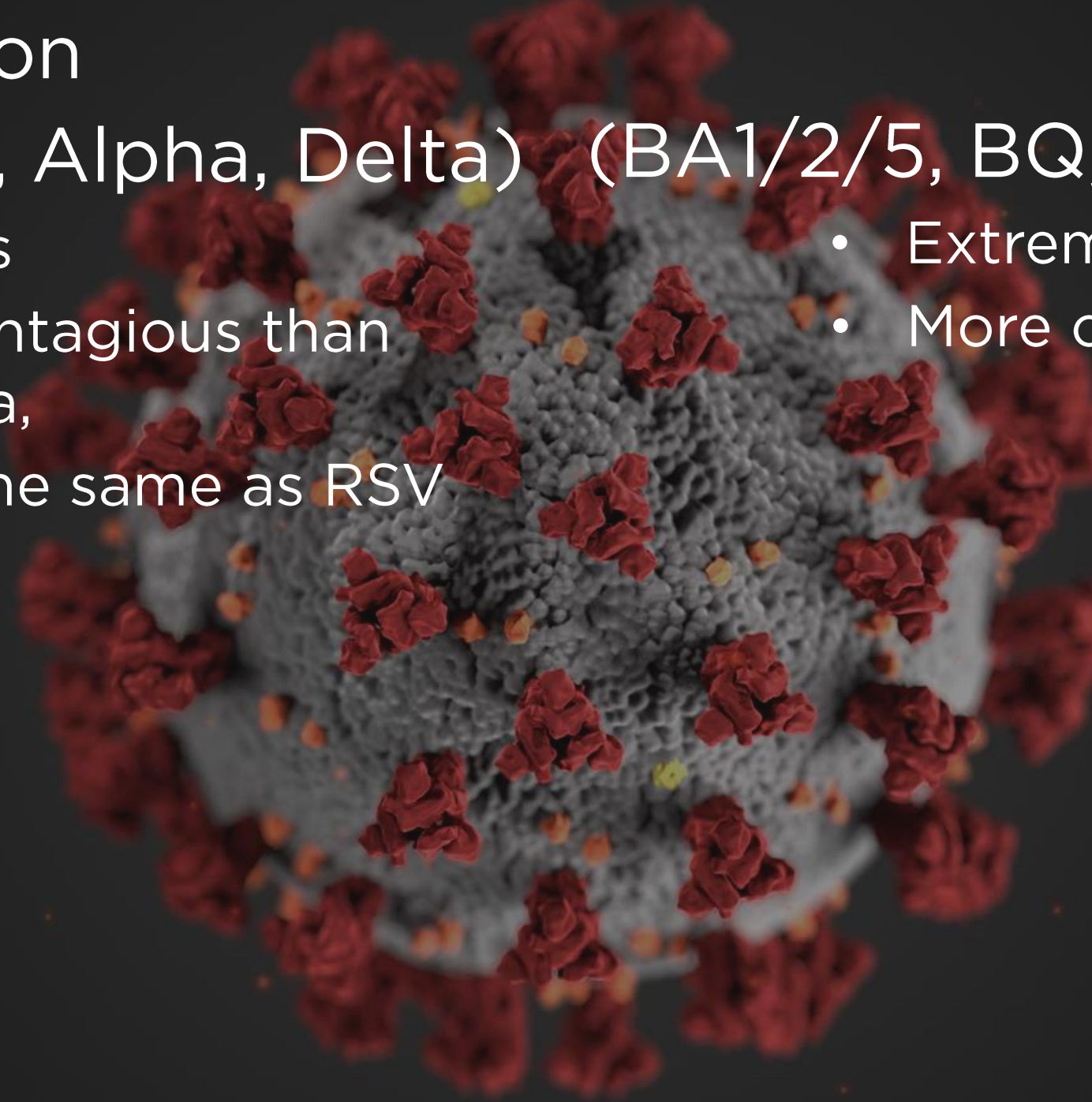
(Ancestral, Alpha, Delta)

- Contagious
 - More contagious than influenza,
 - About the same as RSV

(BA1/2/5, BQ, XBB, EG.5)

Omicron

- Extremely contagious
- More contagious than influenza, RSV



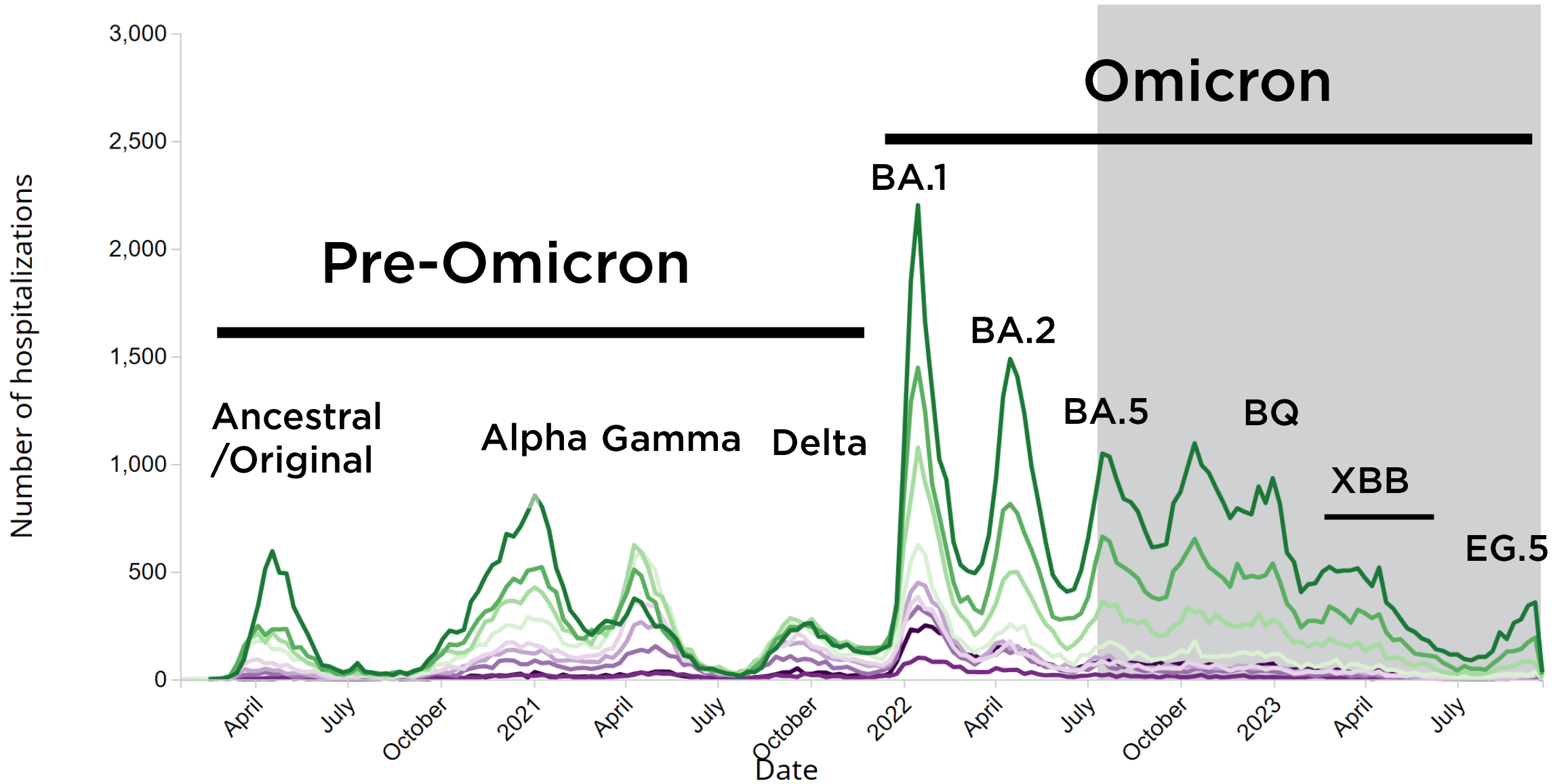
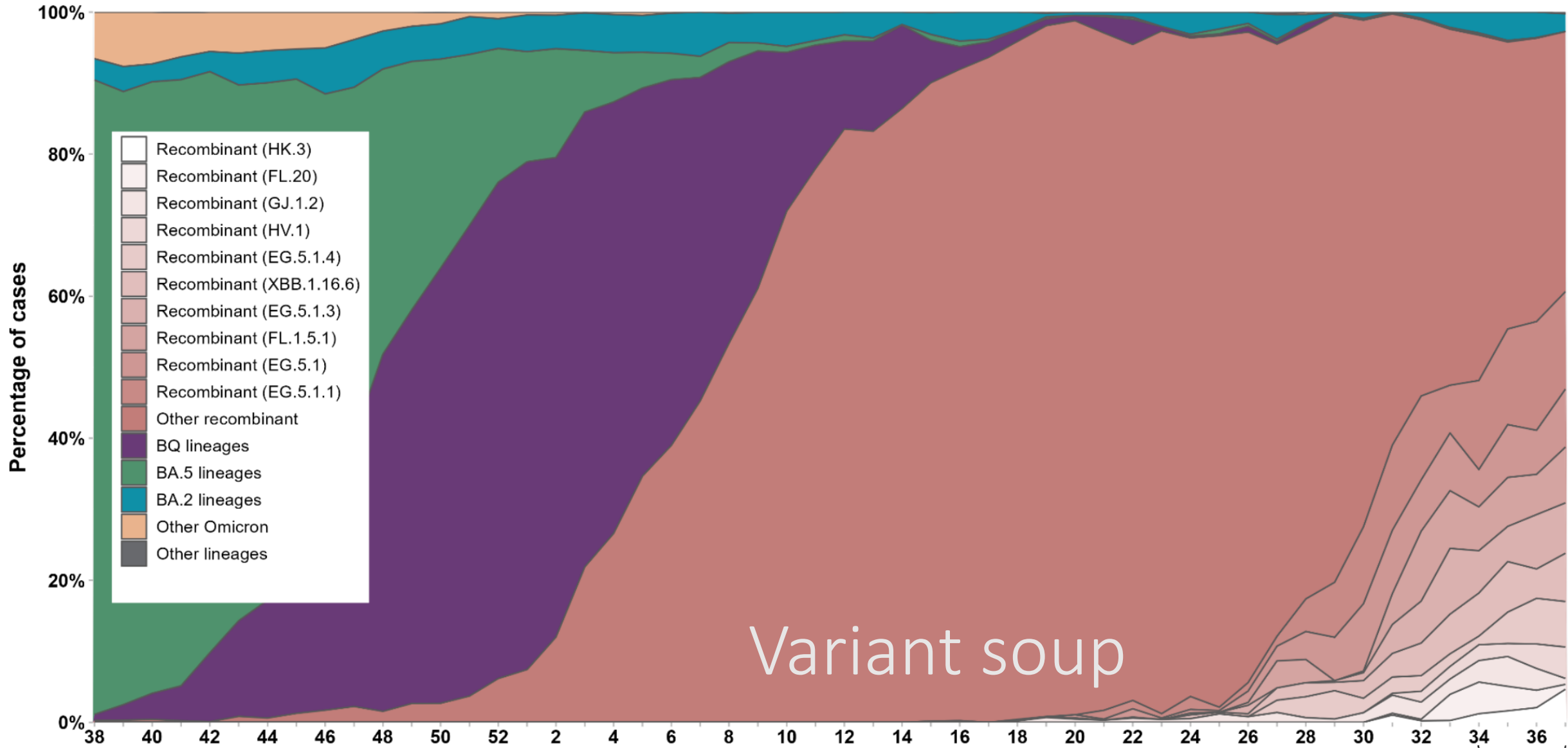


Figure 1. Percentage of COVID-19 cases by the most prevalent lineages and week, representative surveillance, Ontario, September 18, 2022 to September 16, 2023



Pre-Omicron

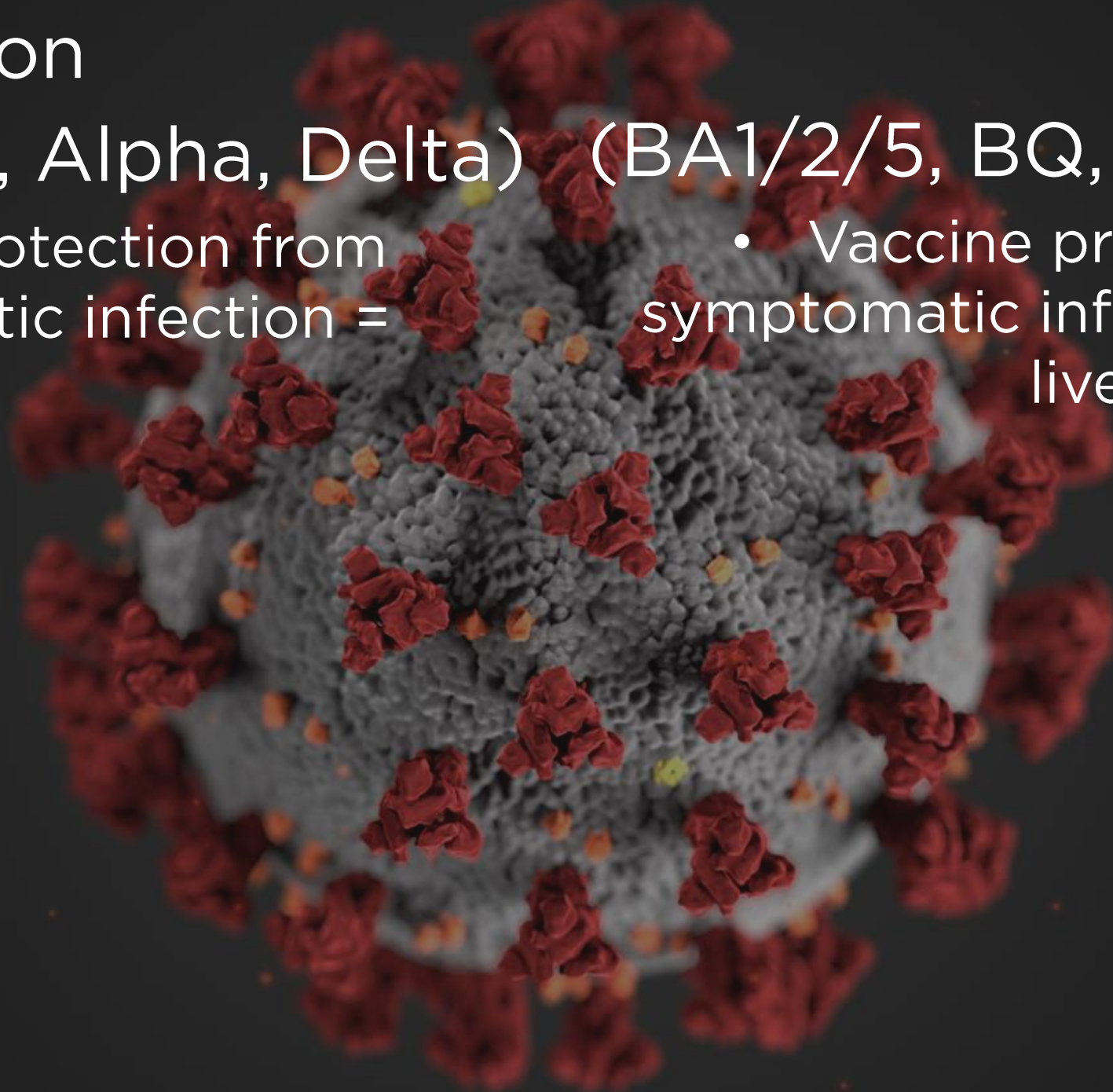
(Ancestral, Alpha, Delta)

- Vaccine protection from symptomatic infection = high

Omicron

(BA1/2/5, BQ, XBB, EG.5)

- Vaccine protections from symptomatic infection = short-lived (6 months?)



Pre-Omicron

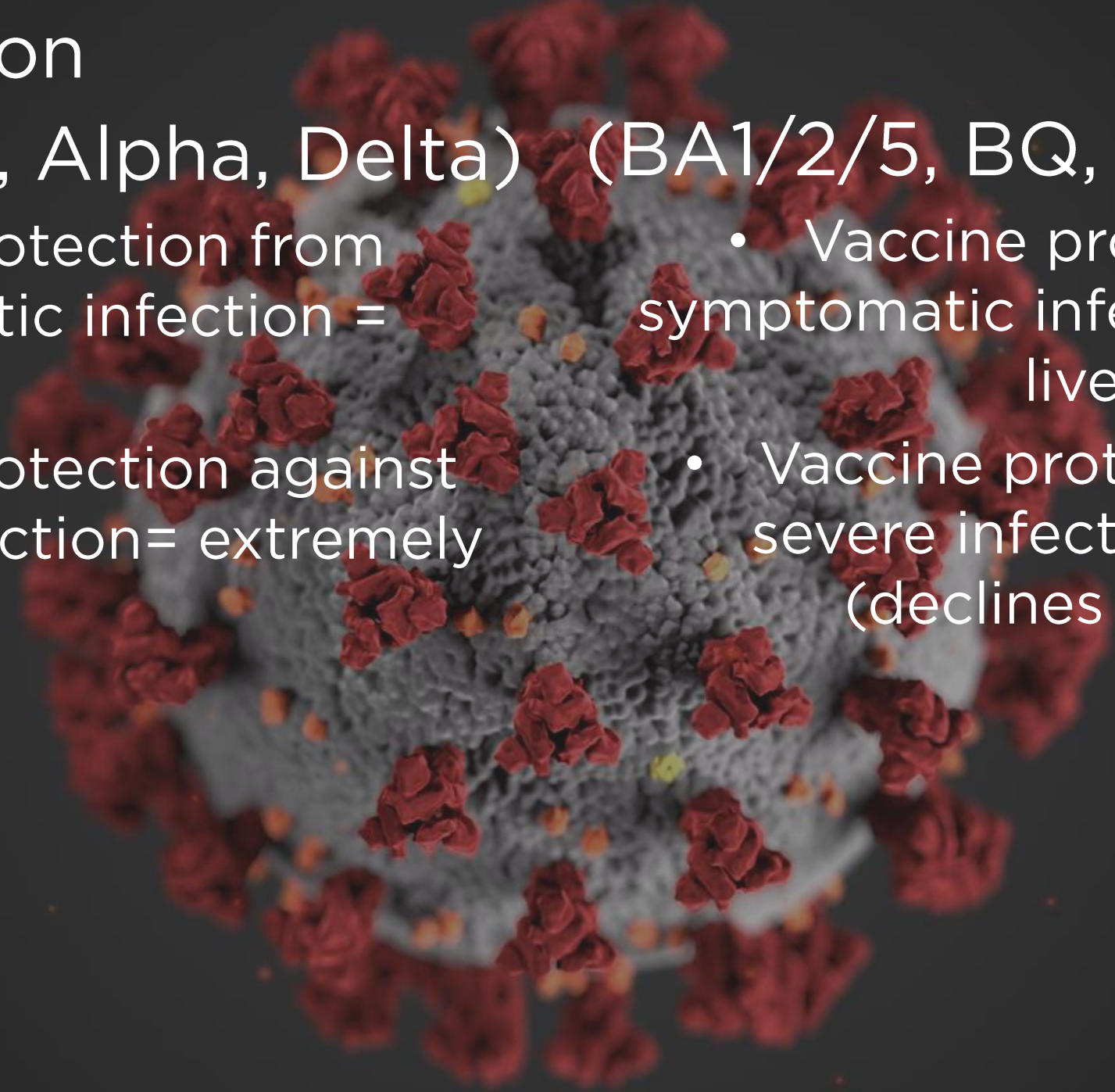
(Ancestral, Alpha, Delta)

- Vaccine protection from symptomatic infection = high
- Vaccine protection against severe infection = extremely high

Omicron

(BA1/2/5, BQ, XBB, EG.5)

- Vaccine protections from symptomatic infection = short-lived (6 months?)
- Vaccine protection against severe infection = very high (declines at 9+ months)



Pre-Omicron

(Ancestral, Alpha, Delta)

- Vaccine protection from symptomatic infection = high
- Vaccine protection against severe infection = extremely high
- Protection from previous infection (no vaccination) = months?

Omicron

(BA1/2/5, BQ, XBB, EG.5)

- Vaccine protections from symptomatic infection = short-lived (6 months?)
- Vaccine protection against severe infection = very high (declines at 9+ months)
- Protection from previous infection (no vaccination) = none to short-lived

Pre-Omicron

(Ancestral, Alpha, Delta)

- Vaccine protection from symptomatic infection = high
- Vaccine protection against severe infection = extremely high
- Protection from previous infection (no vaccination) = months?
- Protection from previous infection & vaccination (hybrid immunity) = >9 months?

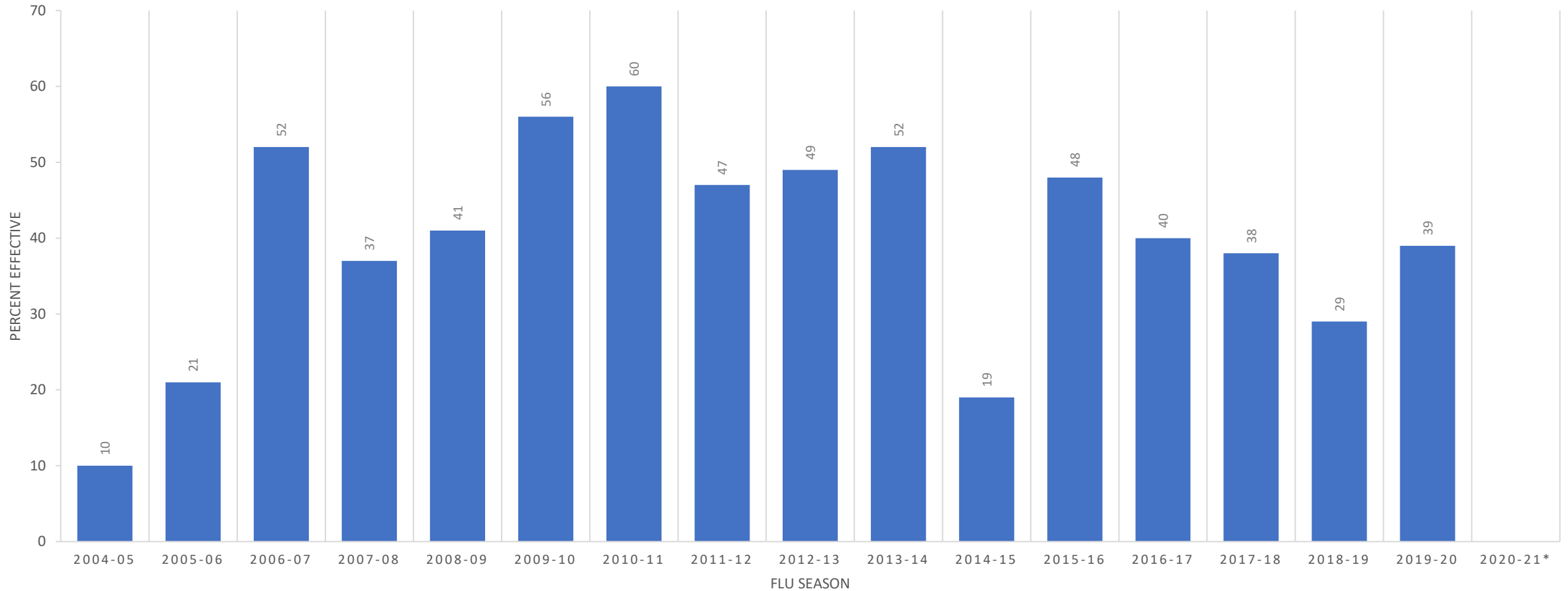
Omicron

(BA1/2/5, BQ, XBB, EG.5)

- Vaccine protections from symptomatic infection = short-lived (6 months?)
- Vaccine protection against severe infection = very high (declines at 9+ months)
- Protection from previous infection (no vaccination) = none to short-lived
- Protections from previous infection & vaccination (hybrid immunity) = ?

Effectiveness of Seasonal Flu Vaccines from the 2005 – 2021 Flu Seasons

SEASONAL FLU VACCINE EFFECTIVENESS

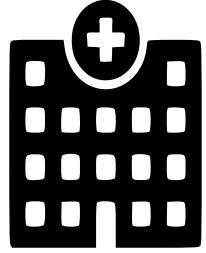


Vaccine. 2018 Feb 28; 36(10): 1272–1278.

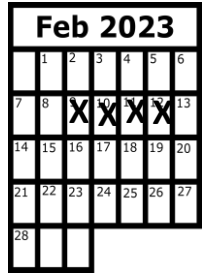
*2020-2021 flu vaccine effectiveness was not estimated due to low flu virus circulation during the 2020-2021 flu season.

Source: <https://www.cdc.gov/flu/professionals/vaccination/effectiveness-studies.htm>

If immunized against influenza...



...less likely to be hospitalized.



...shorter hospital stay.

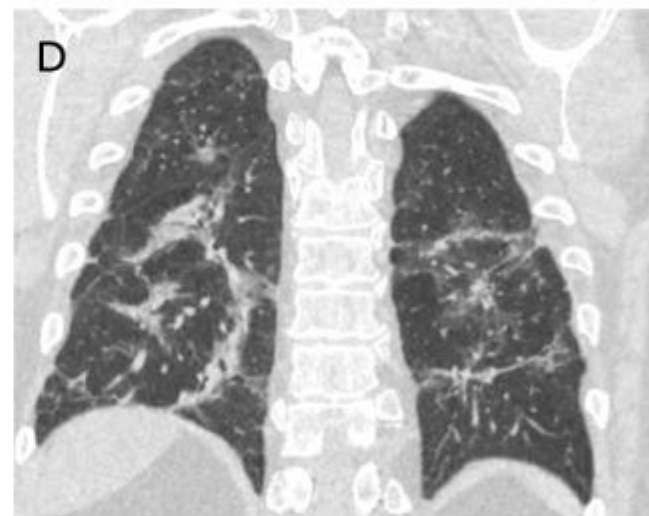
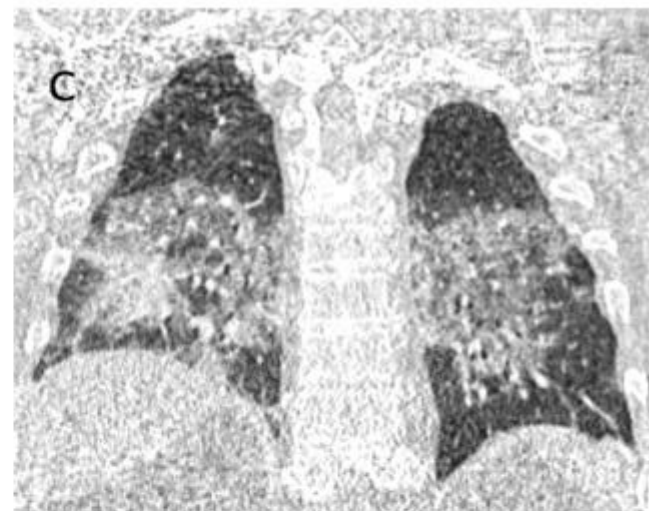
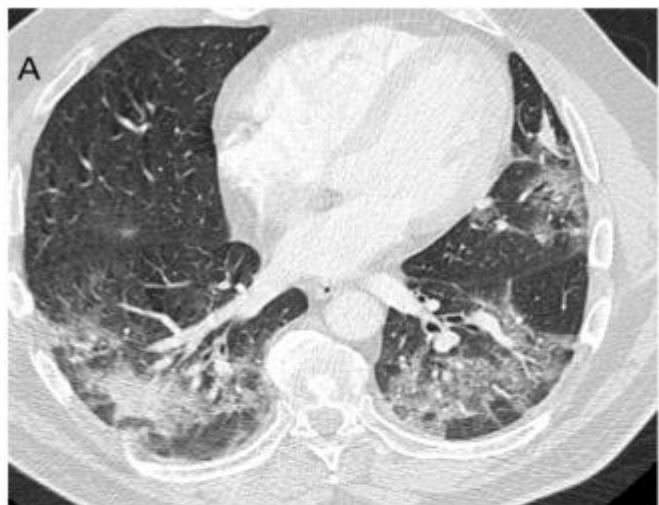


...fewer heart attacks/strokes.

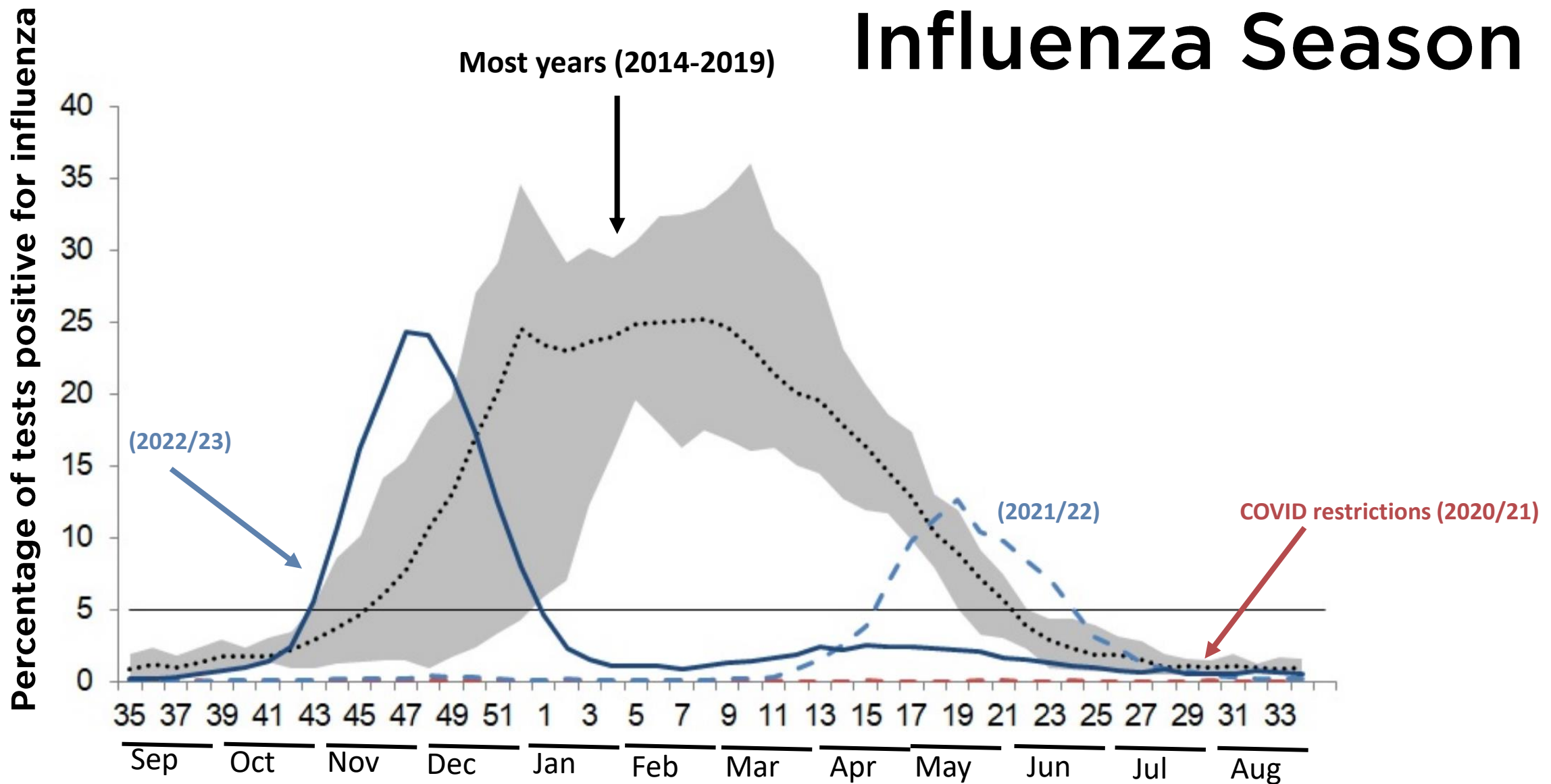


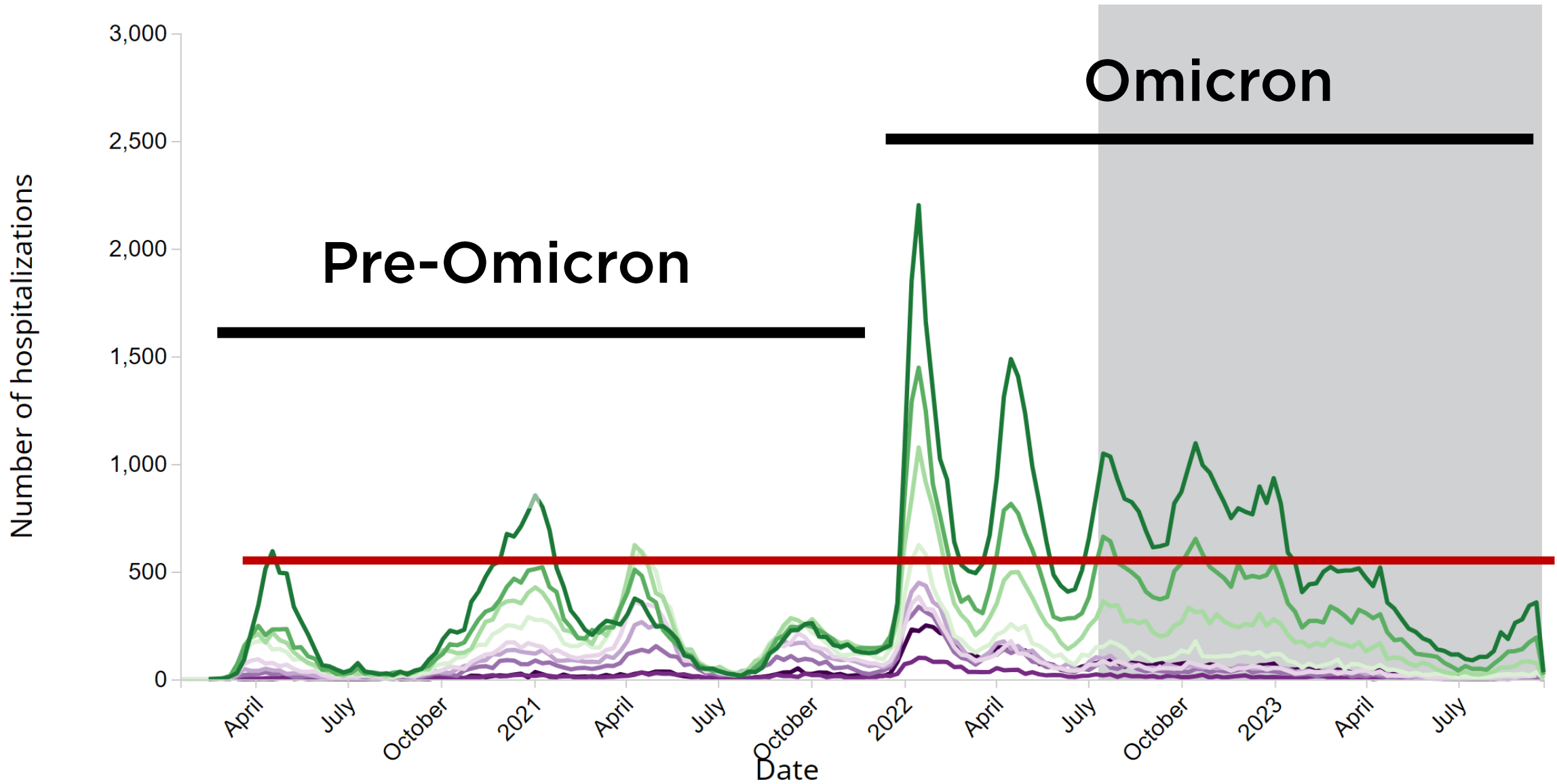
...less likely to develop 'catastrophic disability',
more likely to be able to live independently.





Influenza Season



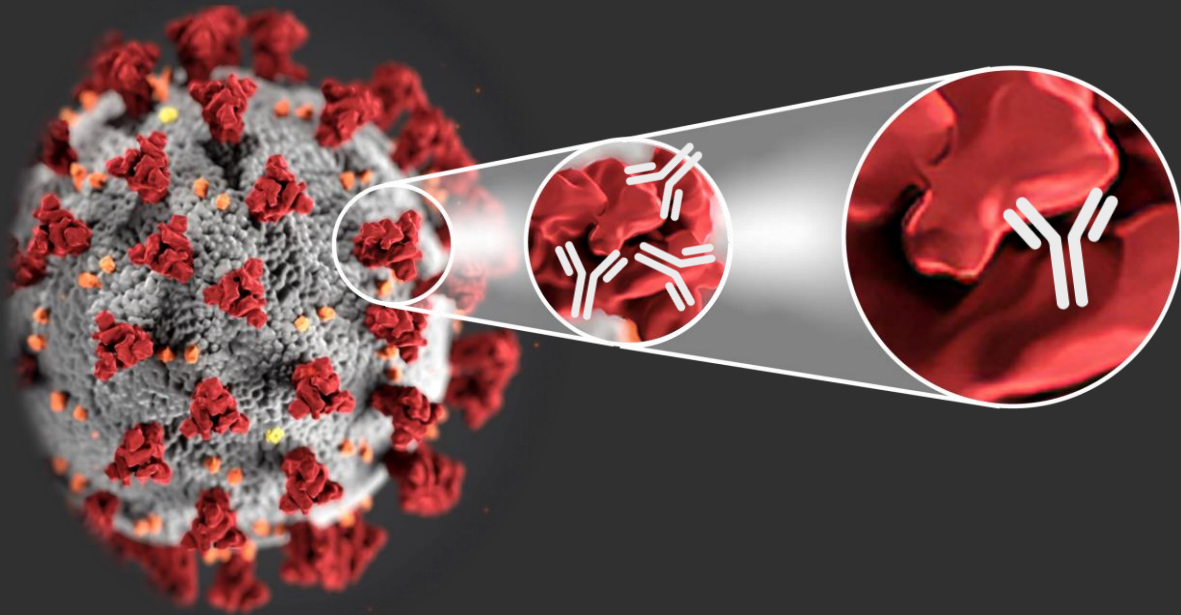


Unknown: Will we have another 'Omicron-like event'

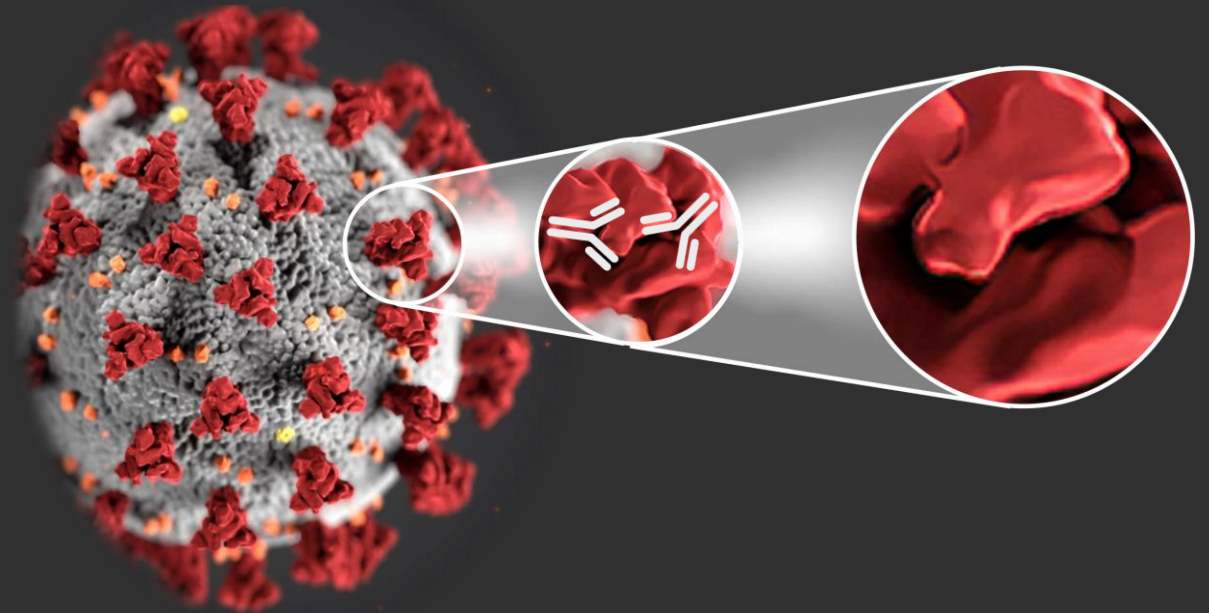


Immune evasiveness - explained

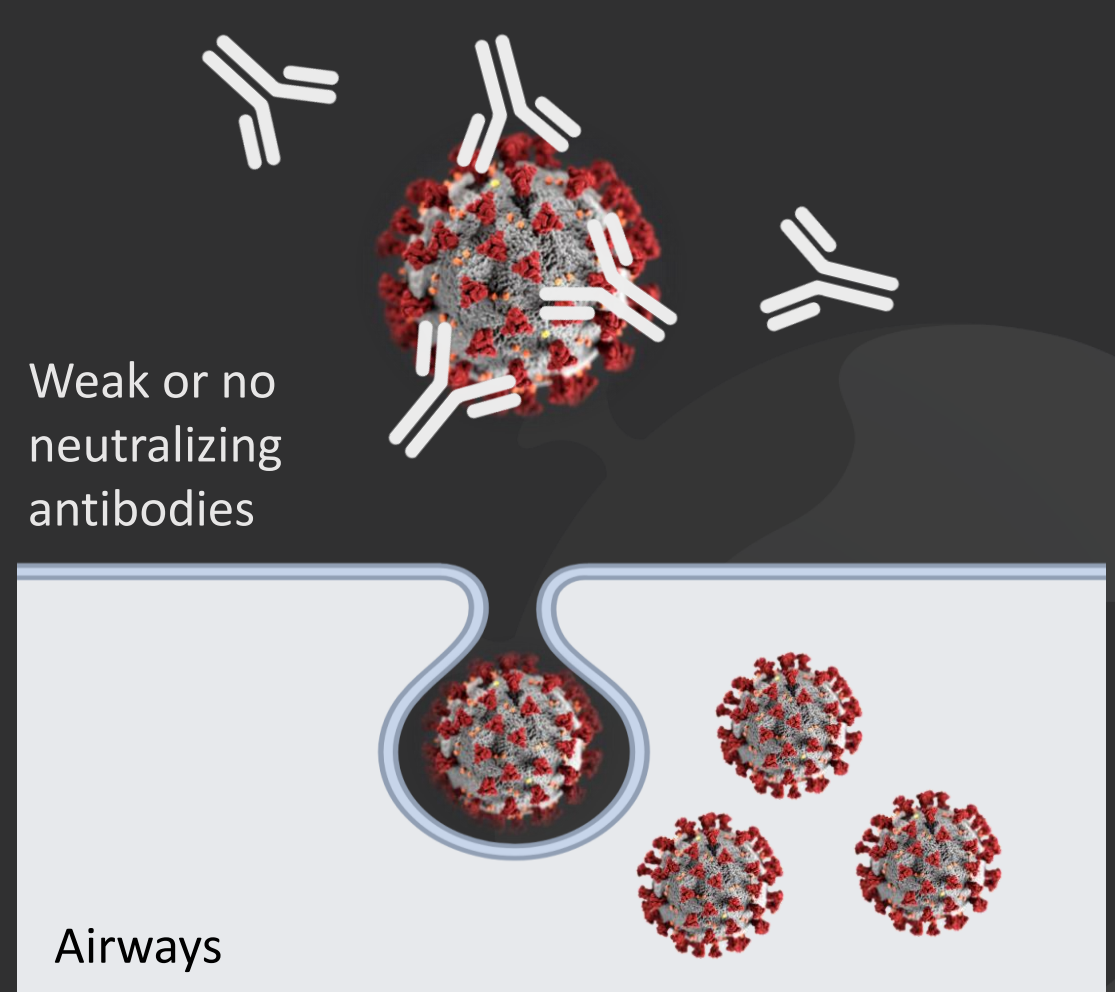
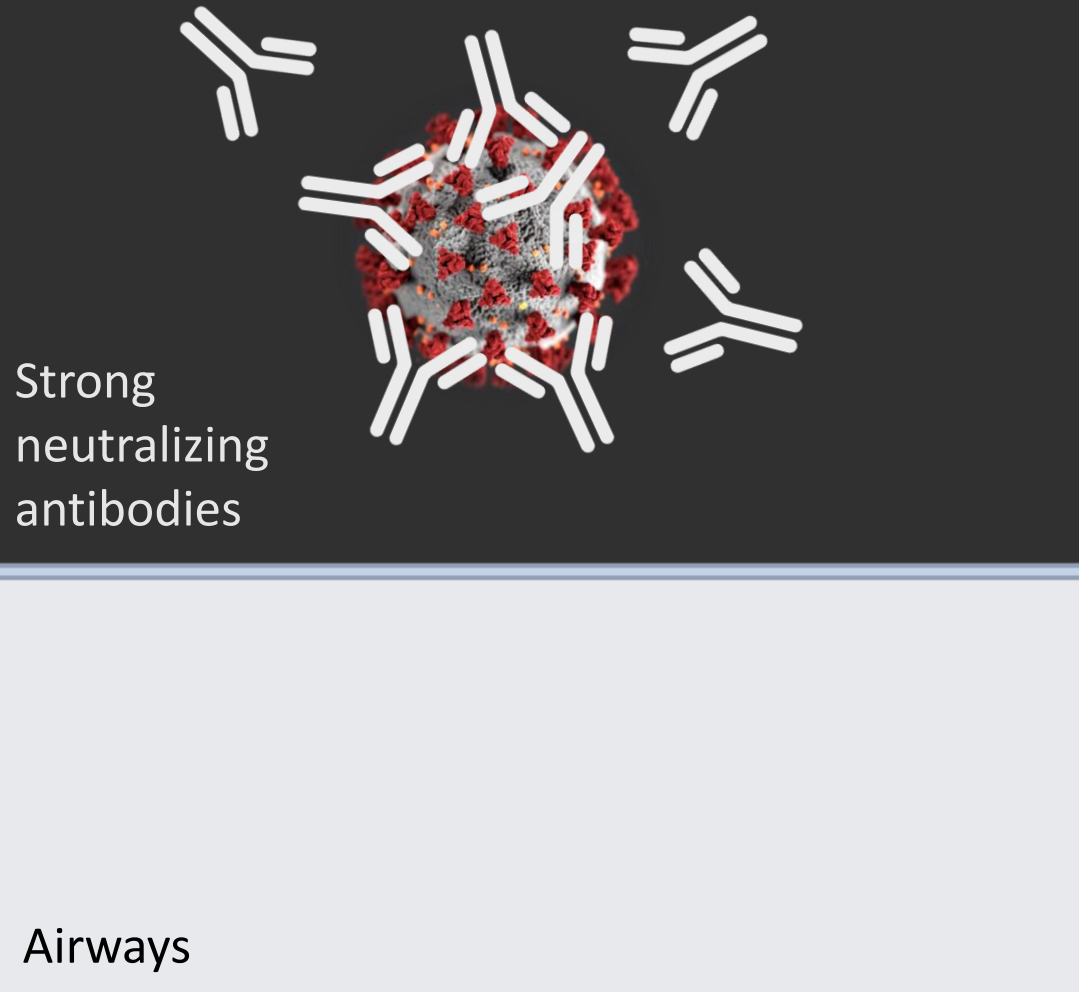
Original strain

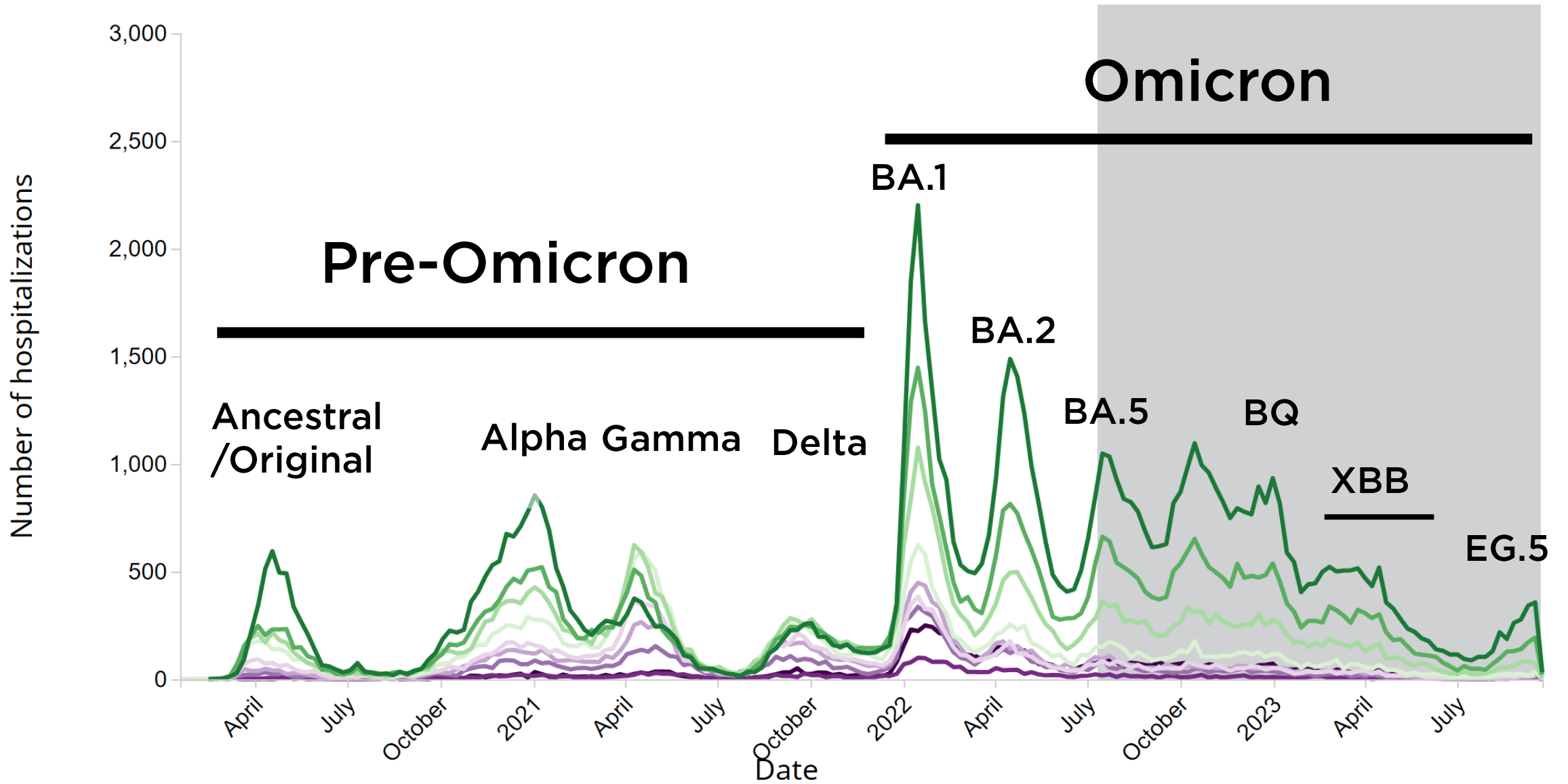


Omicron



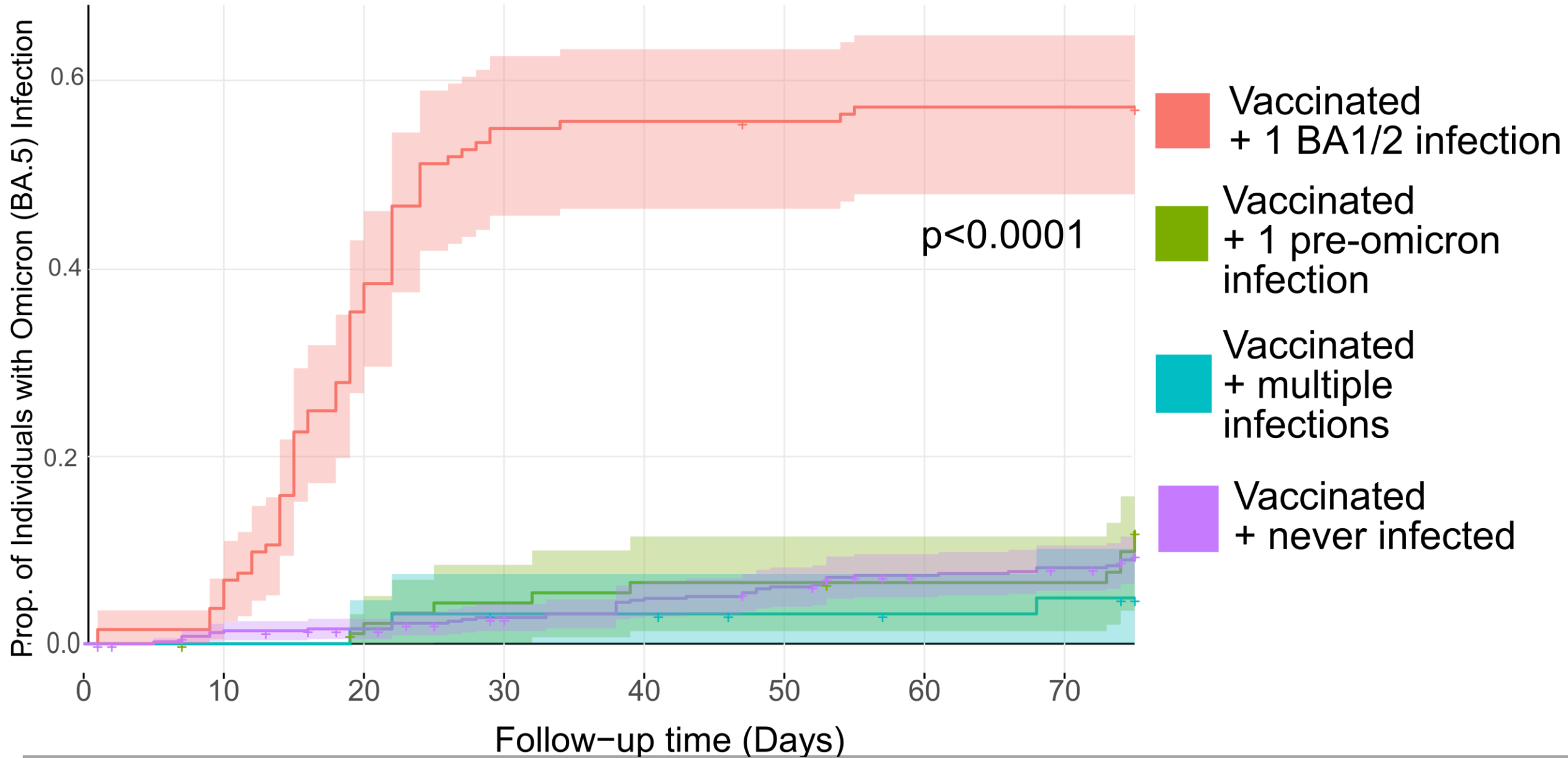
Immune evasiveness - explained





Known unknown: How do new variants evade
our immune systems?







May not apply to the general population.

Does not apply to most variants.

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

Interim guidance on the use of bivalent Omicron-containing COVID-19 vaccines for primary series

Published: June 9, 2023

PROTECTING AND EMPOWERING CANADIANS TO IMPROVE THEIR HEALTH

- Beginning in the fall of 2023 for those previously vaccinated against COVID-19, NACI recommends a dose of the XBB.1.5-containing formulation of COVID-19 vaccine if it has been at least 6 months from a from the previous COVID-19 vaccine dose or known SARS-CoV-2 infection (whichever is later).
- Immunization is particularly important for those at increased risk of COVID-19 infection or severe disease, for example:
 - Adults 65 years of age or older;
 - Residents of long-term care homes and other congregate living settings;
 - Individuals with underlying medical conditions that place them at higher risk of severe COVID-19;
 - Individuals who are pregnant;
 - Individuals in or from First Nations, Métis and Inuit communities
 - Members of racialized and other equity-deserving communities;
 - People who provide essential community services.

<https://www.canada.ca/en/public-health/services/publications/healthy-living/canadian-immunization-guide-part-4-active-vaccines/page-26-covid-19-vaccine.html>

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

Interim guidance on the use of bivalent Omicron-
containing COVID-19 vaccines for primary series

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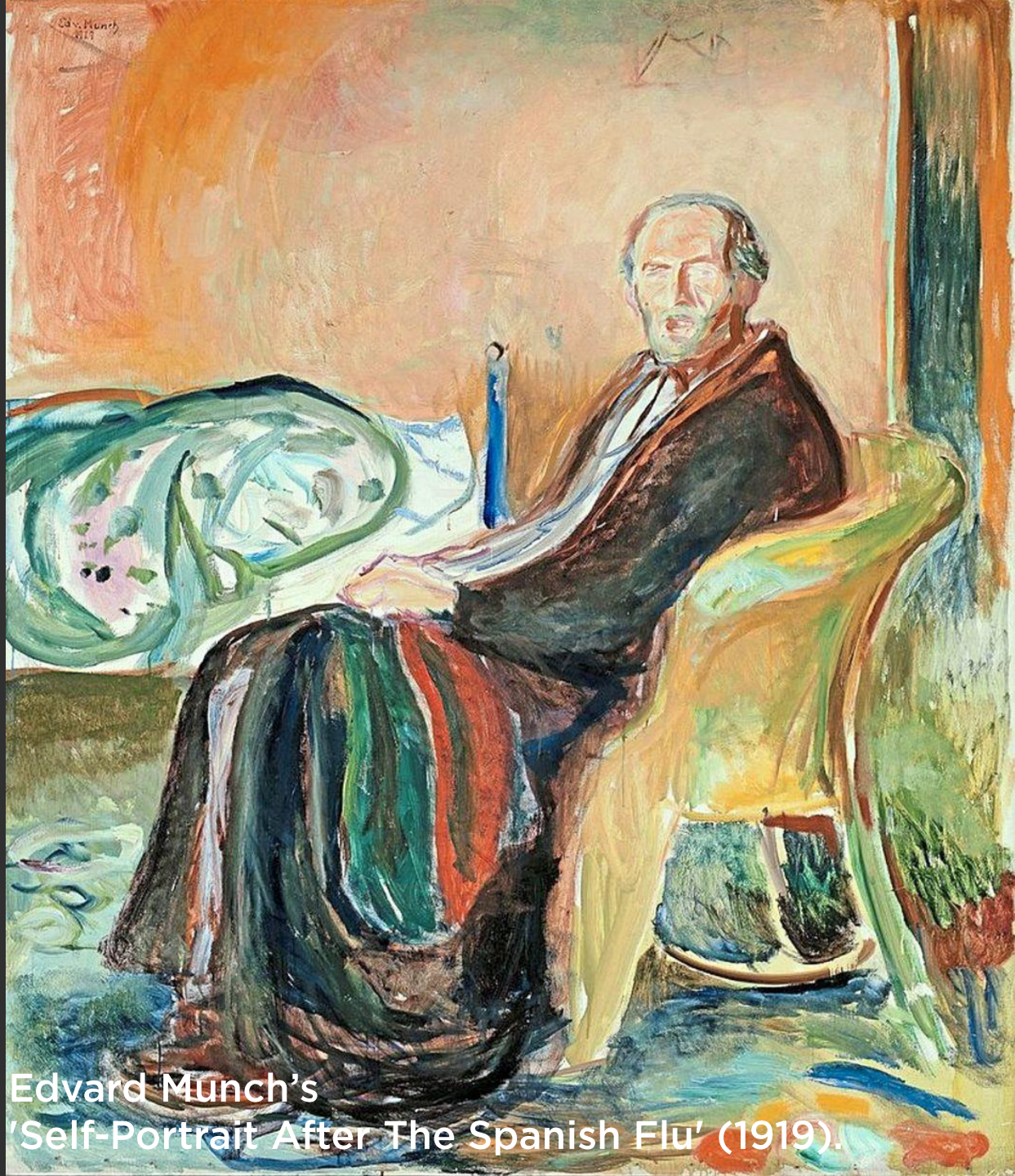
- For individuals 6 months of age and older, COVID-19 vaccines may be given concurrently with (i.e., same day), or at any time before or after, non-COVID-19 vaccines.
- Regardless of vaccination status, individuals should continue to follow recommended public health measures for prevention and control of SARS-CoV-2 infection and transmission.

PROTECTING AND EMPOWERING CANADIANS TO IMPROVE THEIR HEALTH

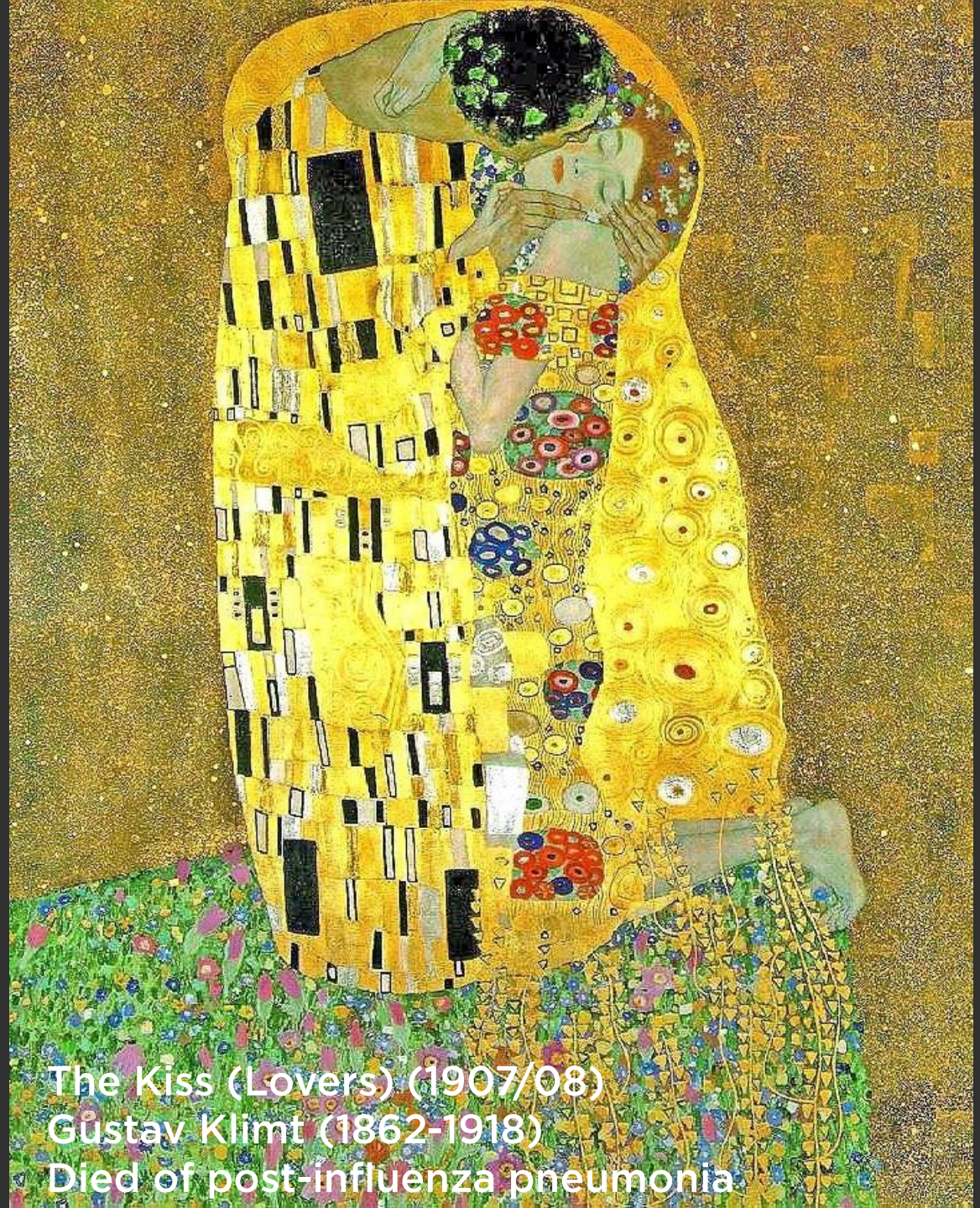
Known: Serious infections are bad for you



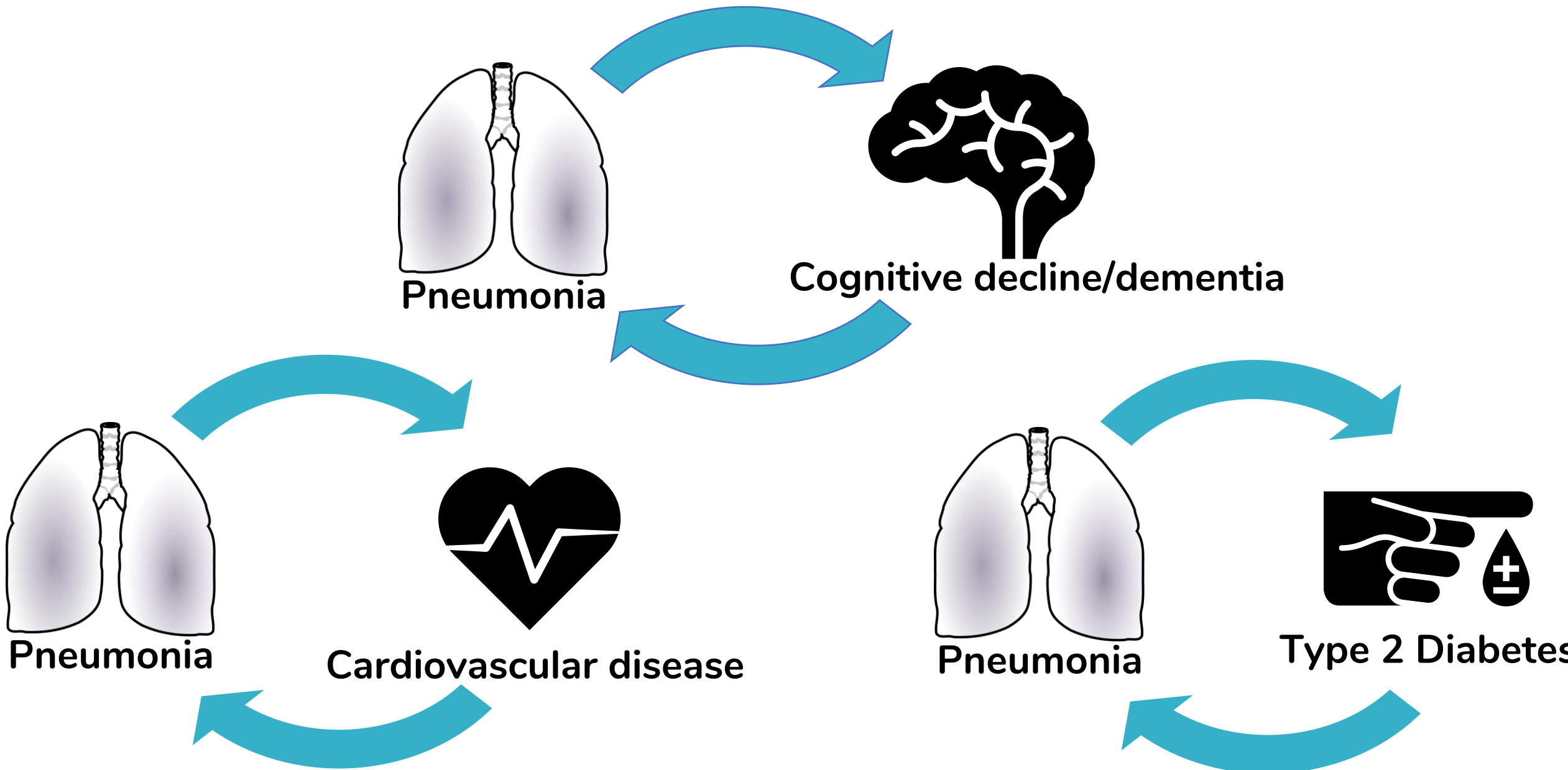
The Firestone Institute
for Respiratory Health

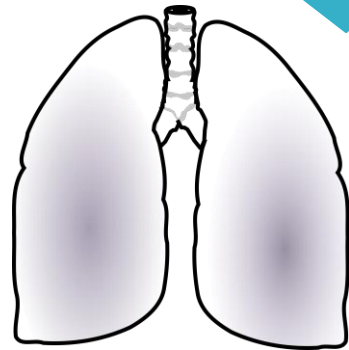


Edvard Munch's
'Self-Portrait After The Spanish Flu' (1919).

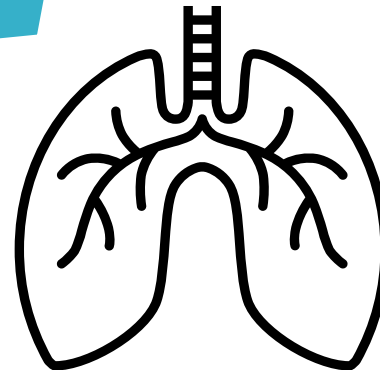


The Kiss (Lovers) (1907/08)
Gustav Klimt (1862-1918)
Died of post-influenza pneumonia

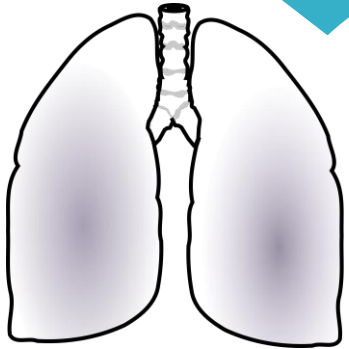




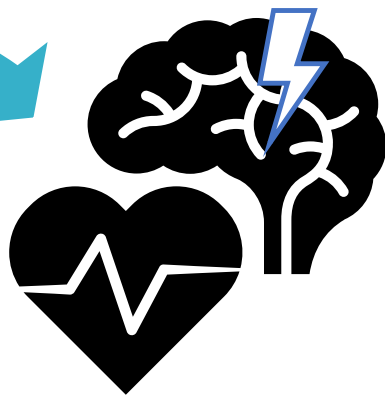
COVID-19



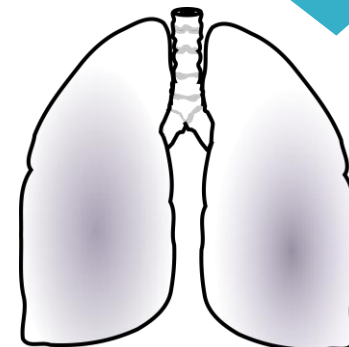
Decreased lung function



COVID-19



Cardiovascular events

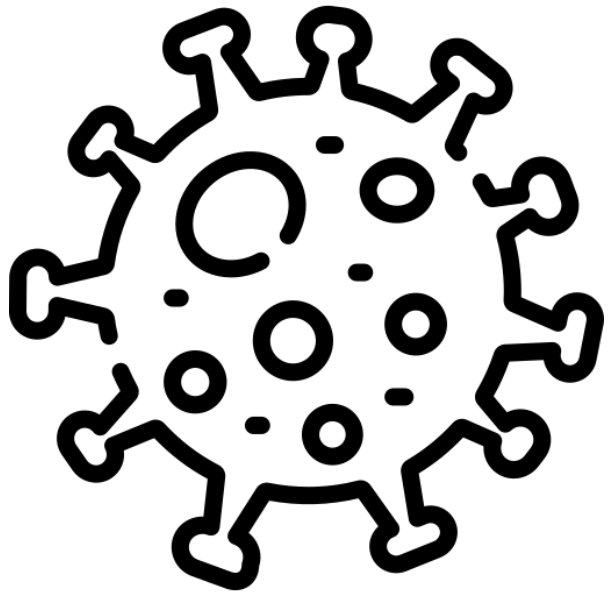


COVID-19

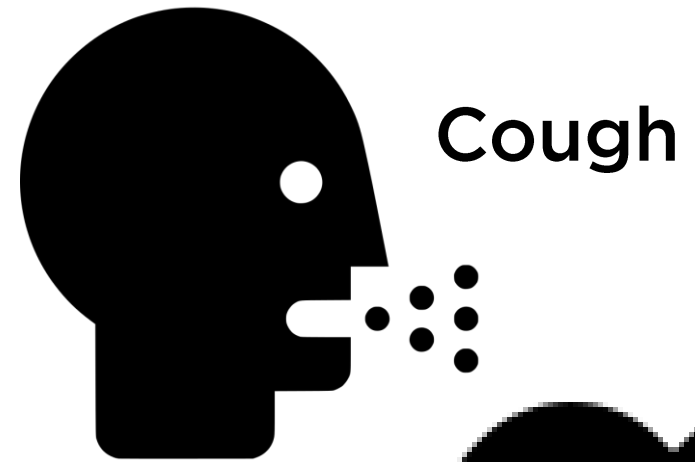


Frailty/Disability





Weeks-Months



Cough

Weakness



Hair loss



Chest pain



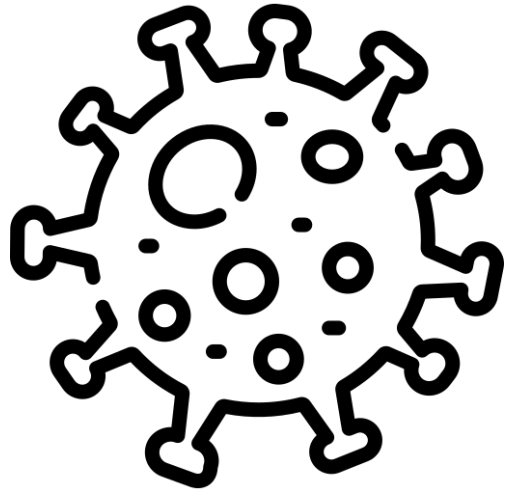


Data from the pre-Omicron era.

Lack of testing makes it very difficult to find associations in the Omicron era.

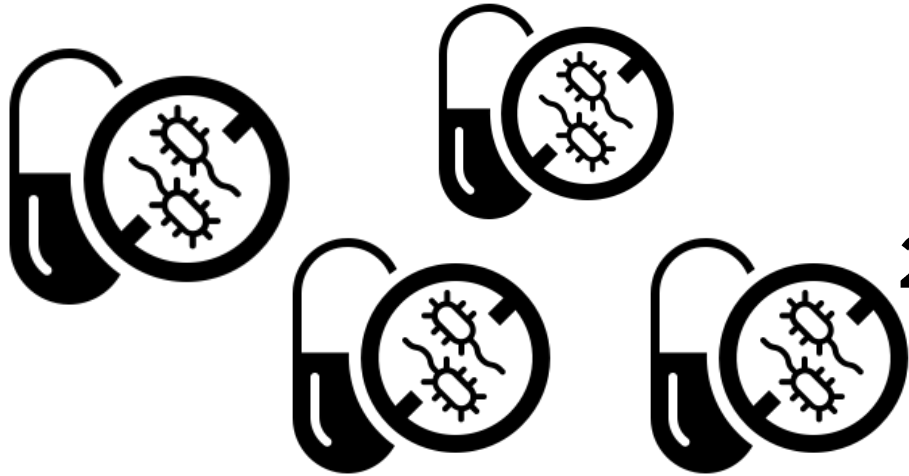
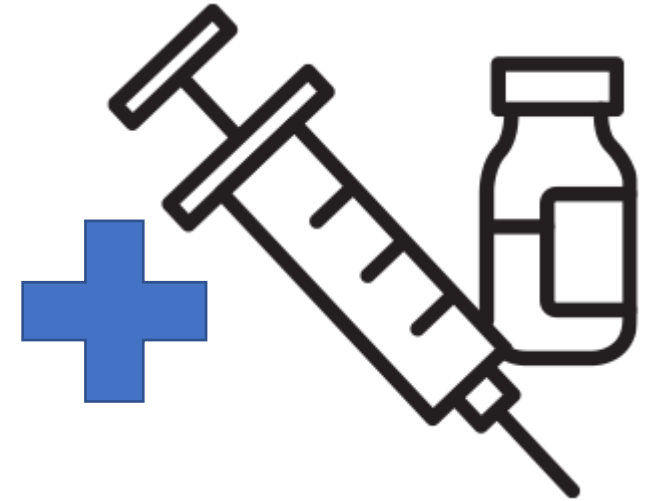
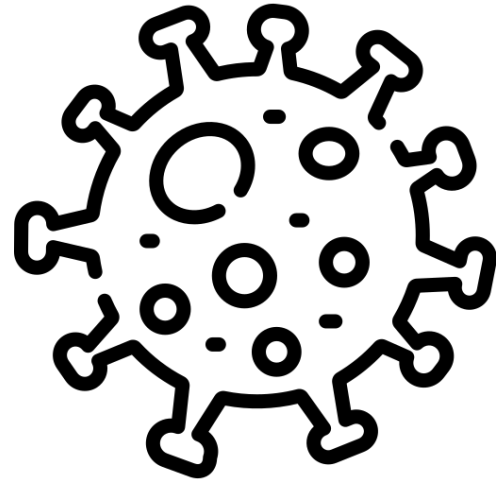
Data from other jurisdictions implies the frequency of people living with Post-COVID symptoms is stable/decreasing.

COVID-19



vs.

COVID-19 + recent vaccine



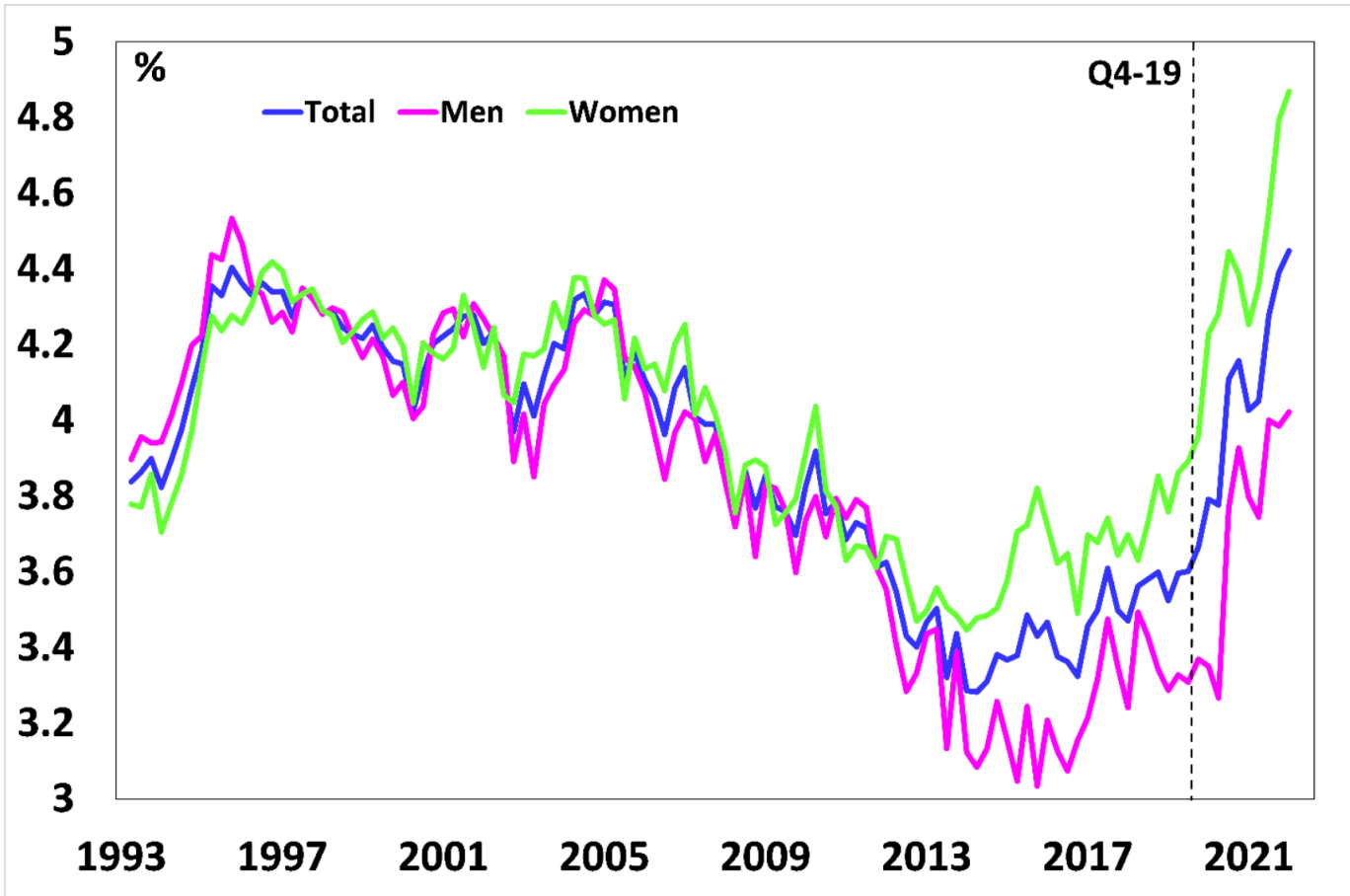
2-4x increase in antibiotic prescriptions!



The Firestone Institute
for Respiratory Health

MacFadden, D., et al. Coronavirus Disease 2019 Vaccination Is Associated With Reduced Outpatient Antibiotic Prescribing in Older Adults With Confirmed Severe Acute Respiratory Syndrome Coronavirus 2: A Population-Wide Cohort Study, *Clinical Infectious Diseases*, Volume 77, Issue 3, 1 August 2023, Pages 362–370.

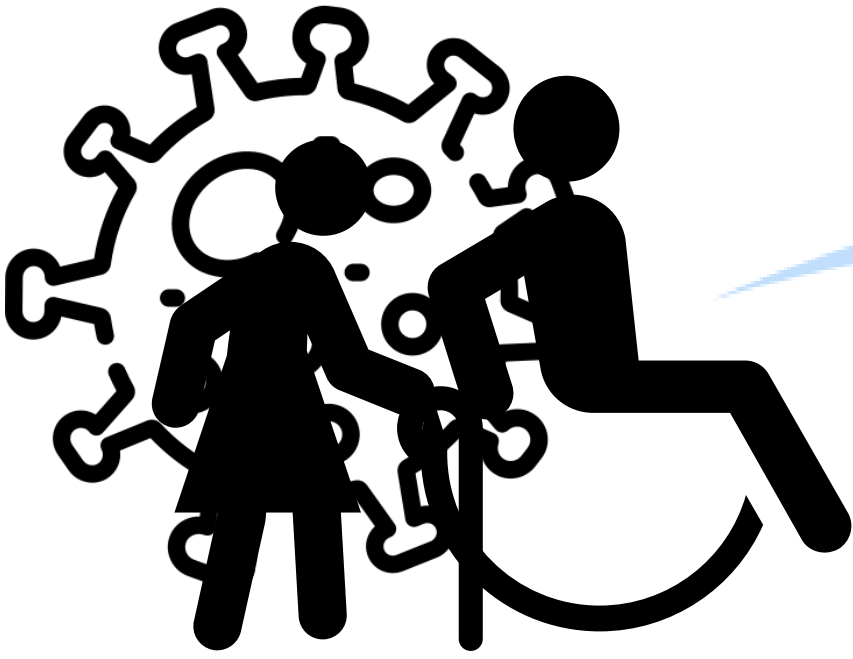
Figure 6. UK – Per cent of Adult Population Aged 16-64 Who Are Outside the Workforce and Do Not Want a Job Because of Long-term Sickness



“The share of the 16-64 population who are outside the workforce and do not want a job because of long-term sickness is a record high, with an especially sharp rise among women.”



**Michael Saunders,
Bank of England**



COVID-19 induced
health issues

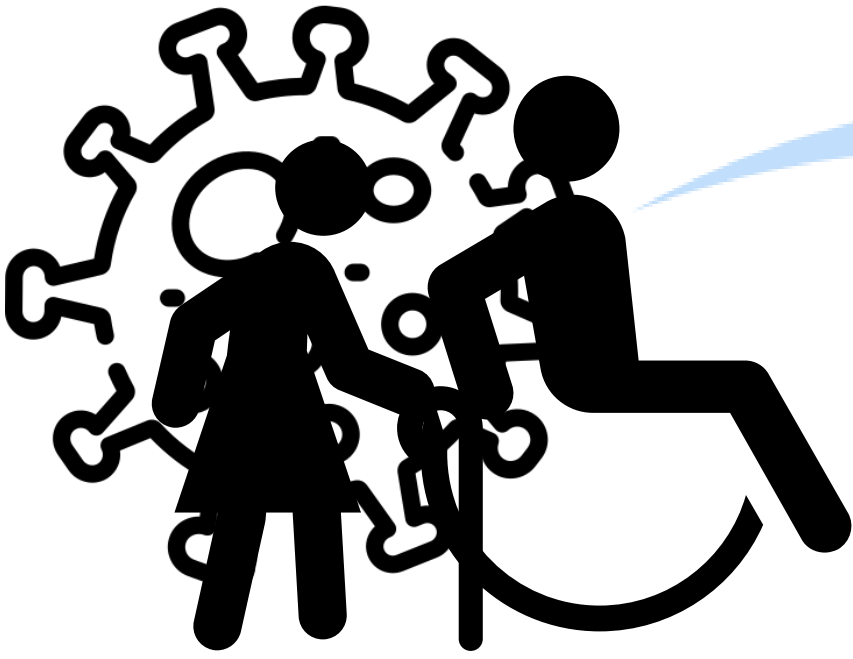
Caregivers



Early (& unwanted)
retirement

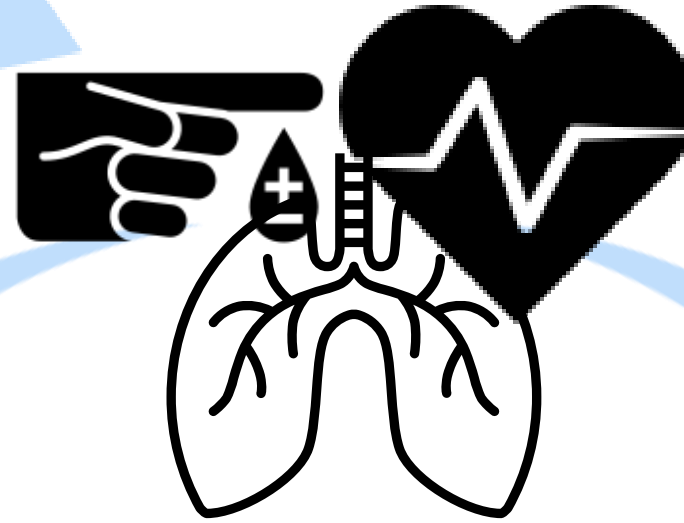


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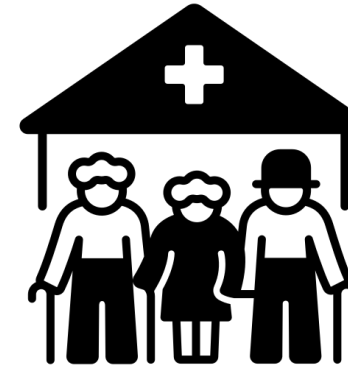


COVID-19 induced health issues

Increased Complexity



Increased Health care needs



Increased LTC needs



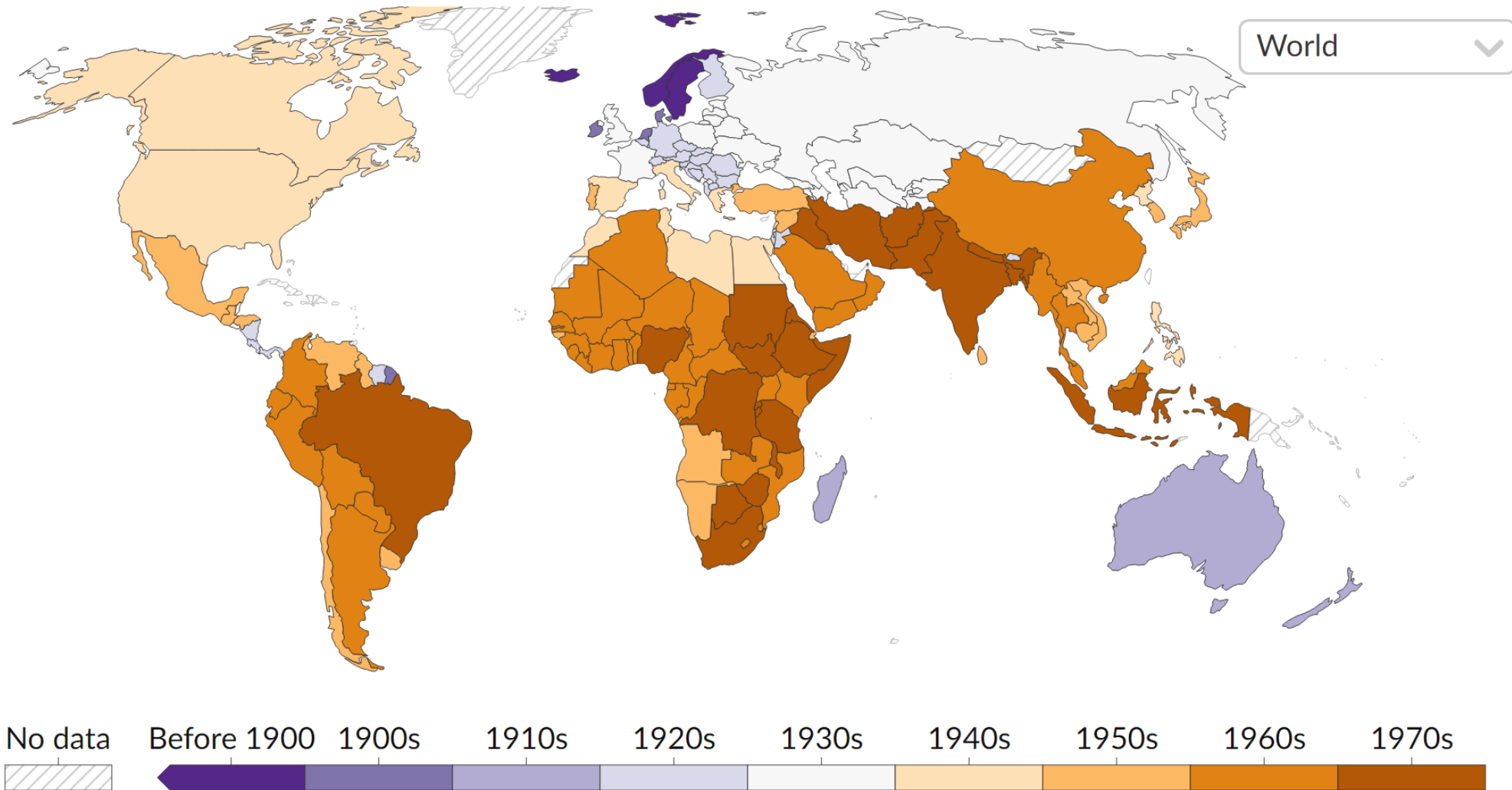
Known: COVID-19 is here to stay



The Firestone Institute
for Respiratory Health

Smallpox: path to eradication

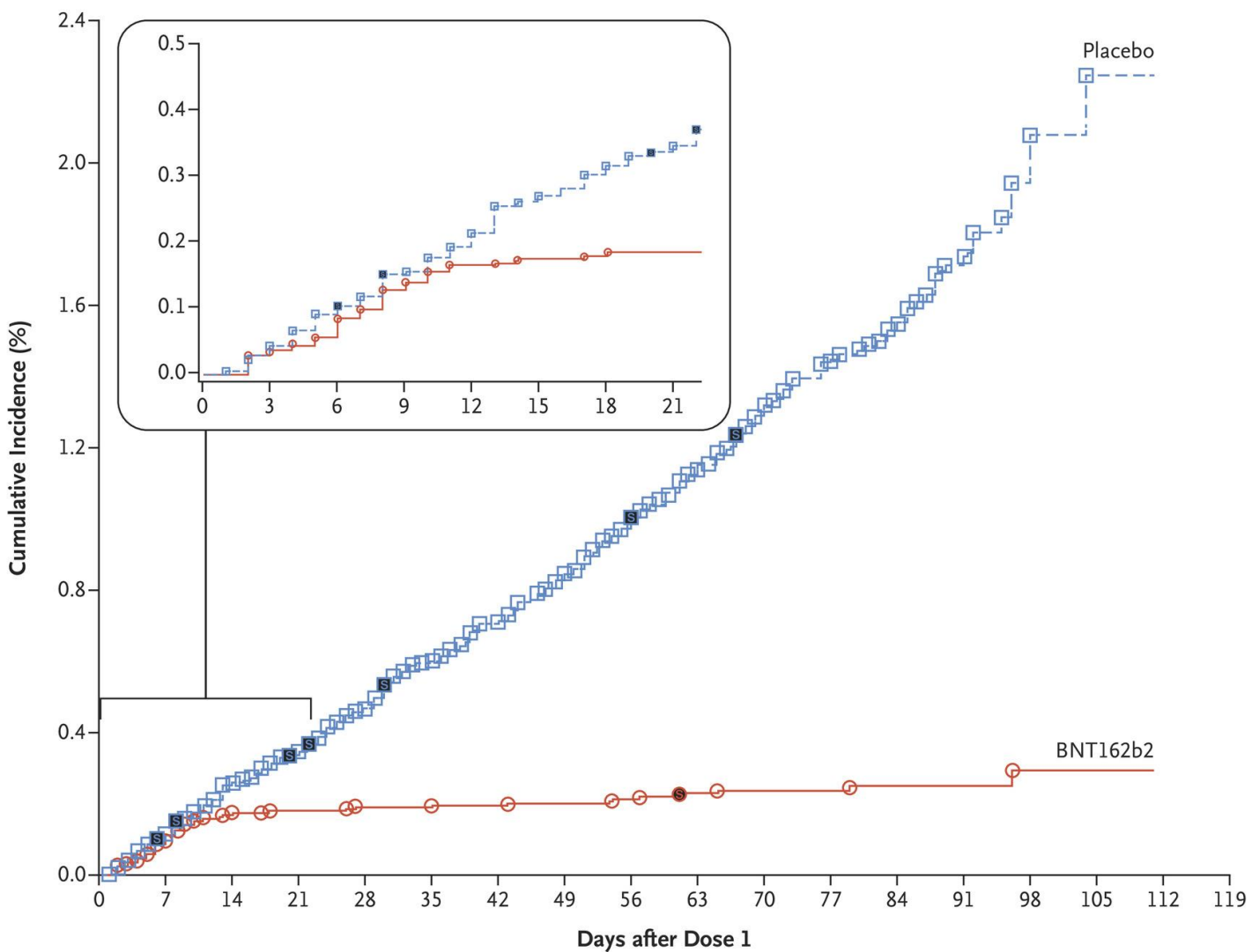
The decade in which smallpox was eliminated by country. Smallpox was globally eradicated in 1977.



Source: Fenner et al. (1988)

OurWorldInData.org/eradication-of-diseases/ • CC BY

<https://ourworldindata.org/grapher/decade-in-which-smallpox-ceased-to-be-endemic-by-country>



🌀 Almost 100% protection!

Efficacy End-Point Subgroup	BNT162b2, 30 μ g (N=21,669)		Placebo (N=21,686)		VE (95% CI) percent
	No. of participants	Surveillance time person-yr (no. at risk)	No. of participants	Surveillance time person-yr (no. at risk)	
Covid-19 occurrence					
After dose 1	50	4.015 (21,314)	275	3.982 (21,258)	82.0 (75.6–86.9)
After dose 1 to before dose 2	39		82		52.4 (29.5–68.4)
Dose 2 to 7 days after dose 2	2		21		90.5 (61.0–98.9)
≥ 7 Days after dose 2	9		172		94.8 (89.8–97.6)

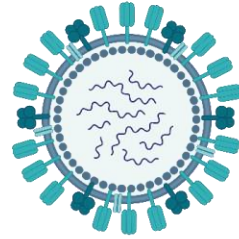
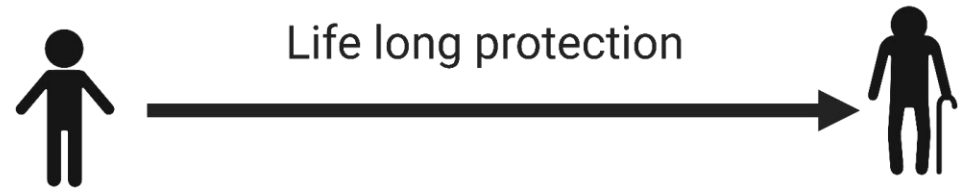
Polack FP, et al. Safety and Efficacy of the BNT162b2 mRNA Covid-19 Vaccine. N Engl J Med. 2020 Dec 31;383(27):2603-2615. doi: 10.1056/NEJMoa2034577.

The 4 flavours of vaccine responses

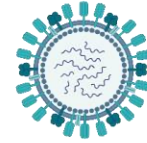
The good, the good enough, and the useless



Measles



Influenza

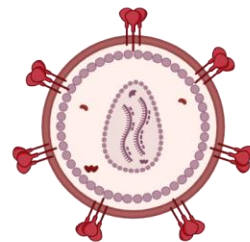


Virus mutates - new vaccines needed



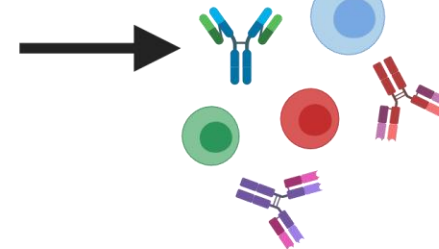
Tetanus toxin

Booster shots required



HIV

Immune responses generated



Unable to clear infection



Reasons for optimism?





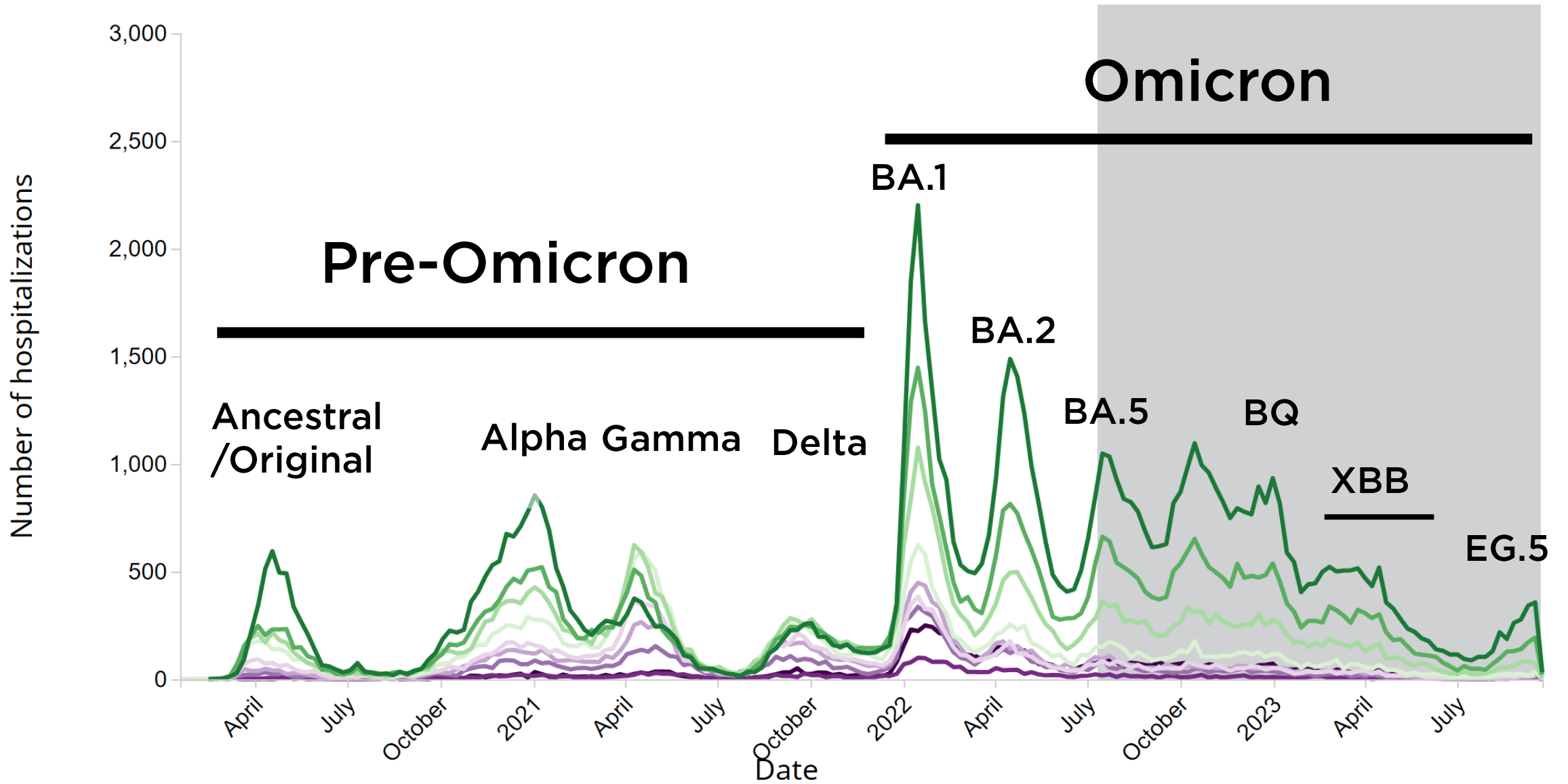
Humoral Responses

- Susceptibility to infection
- Transmission



Cellular Responses

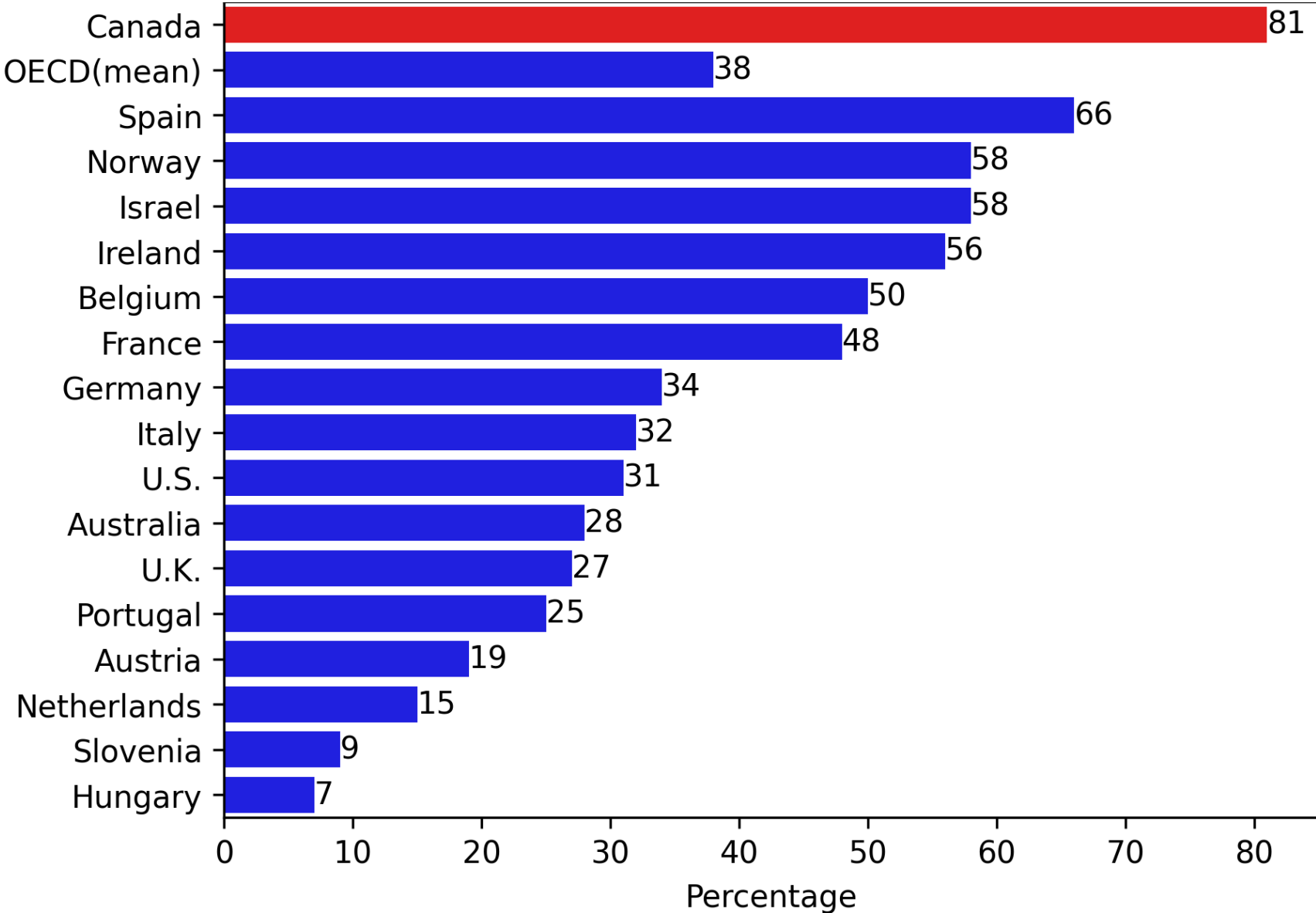
- Severe infection, Hospitalization & Death





Known: Ageism kills.



COVID-19 Deaths in Long-Term-Care

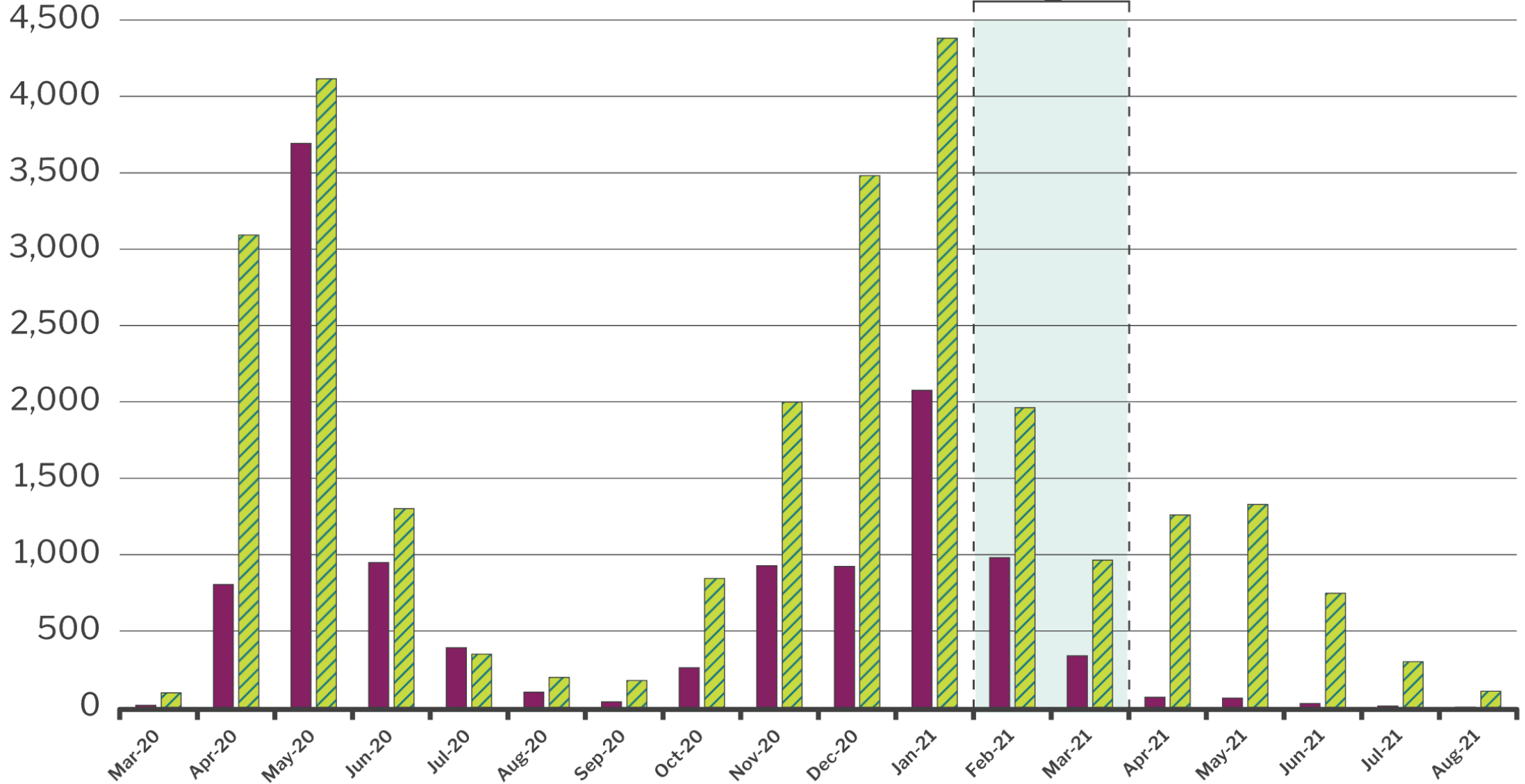


 LTC resident COVID-19 deaths
 COVID-19 community deaths



95% of first-dose vaccinations were administered to LTC residents between January 15 and March 31

Monthly COVID-19 deaths



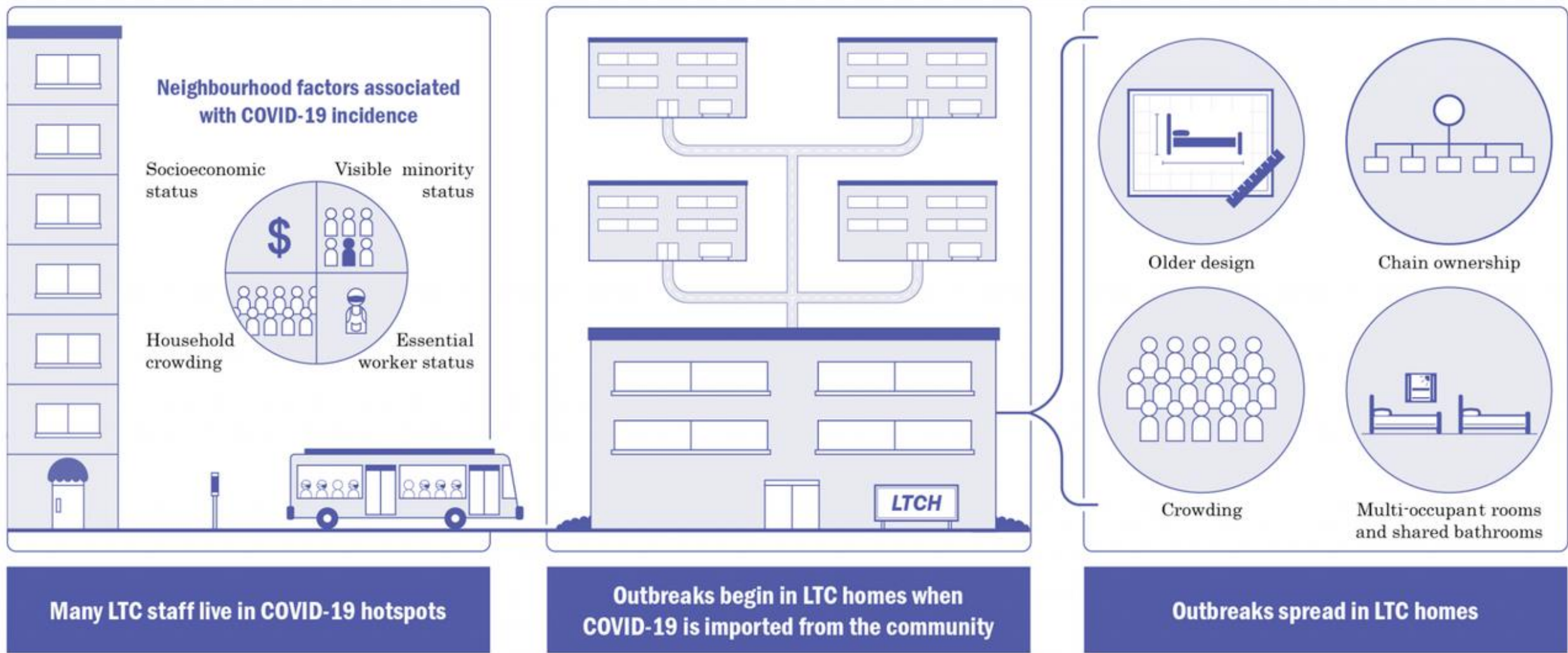


Reshan Rex Shalom Village
 Allegra Ferrara Amica Unionville
 Dana Chausic St. Joseph's Villa Dundas
 Josie Lopes St. Joseph's Lifecare Centre Brantford
 Rebecka Seilis St. Joseph's Healthcare Centre Guelph

Mattea Duvnjak
 Melissa Mackinnon
 Mithila Vidwans
 Shari Farrugia
 Sherline Dorcelus

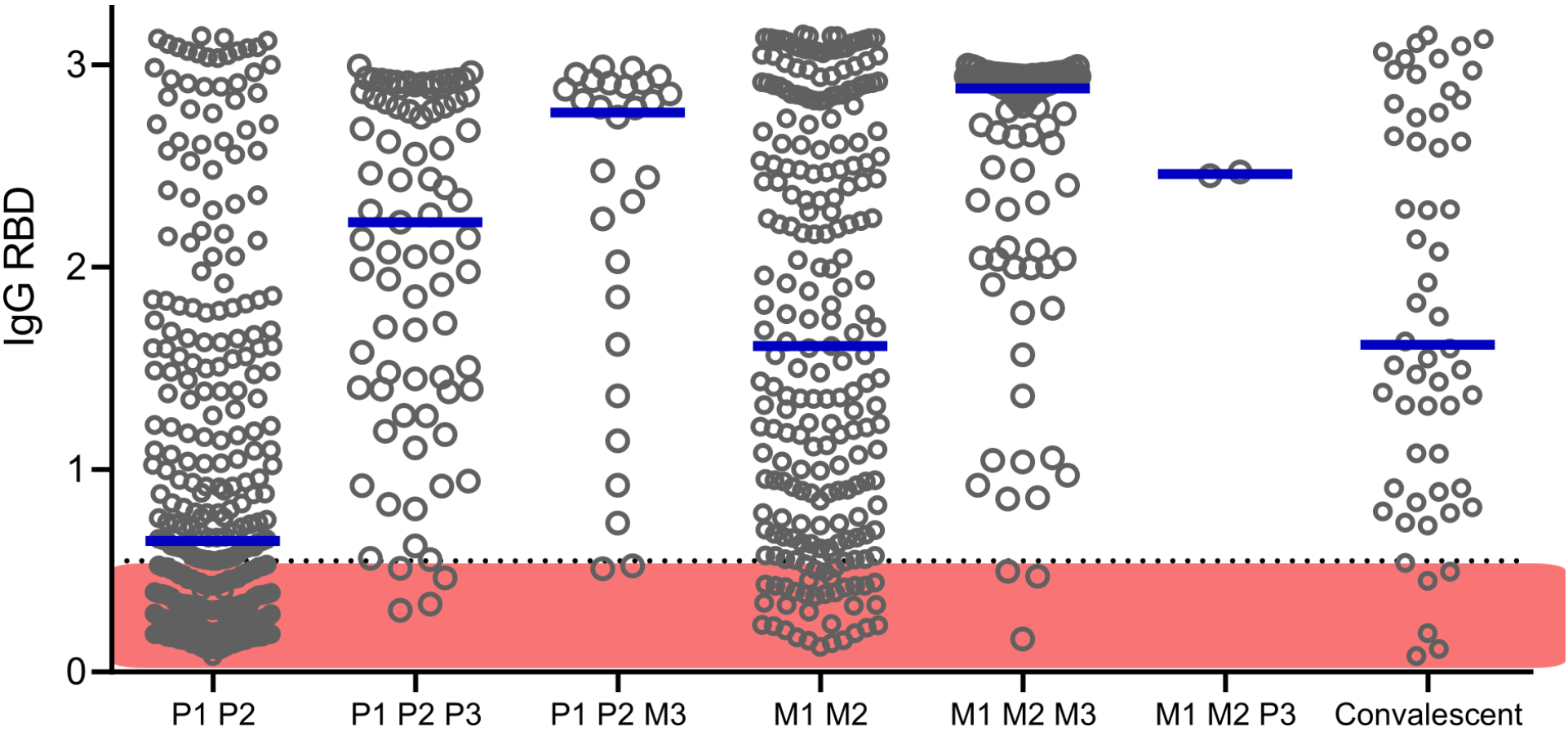
Fairview Nursing Home
 The Village of Wentworth Heights
 The Village of Erin Meadows
 The Village of Humber Heights
 The Village of Sandalwood Park
 The Village of Taunton Mills

Deanna Levac Schlegel Villages
 Lora Bruyn-Martin Schlegel Villages
 Heather Livingstone Hamilton Continuing-Care
 The Village of Tansley Woods
 Julie Garneau Pinehaven Nursing Home
 The Village of University Gates
 The Village of Winston Park



Costa, Andrew P., et al. "Risk factors for outbreaks of SARS-CoV-2 at retirement homes in Ontario, Canada: a population-level cohort study." CMAJ. 193.25 (2021): E969-E977.

Three doses better than two doses & Moderna (100 mcg) provides more robust response



The arrival of the Delta Variant



COVID IN
LONG-TERM CARE
STUDY



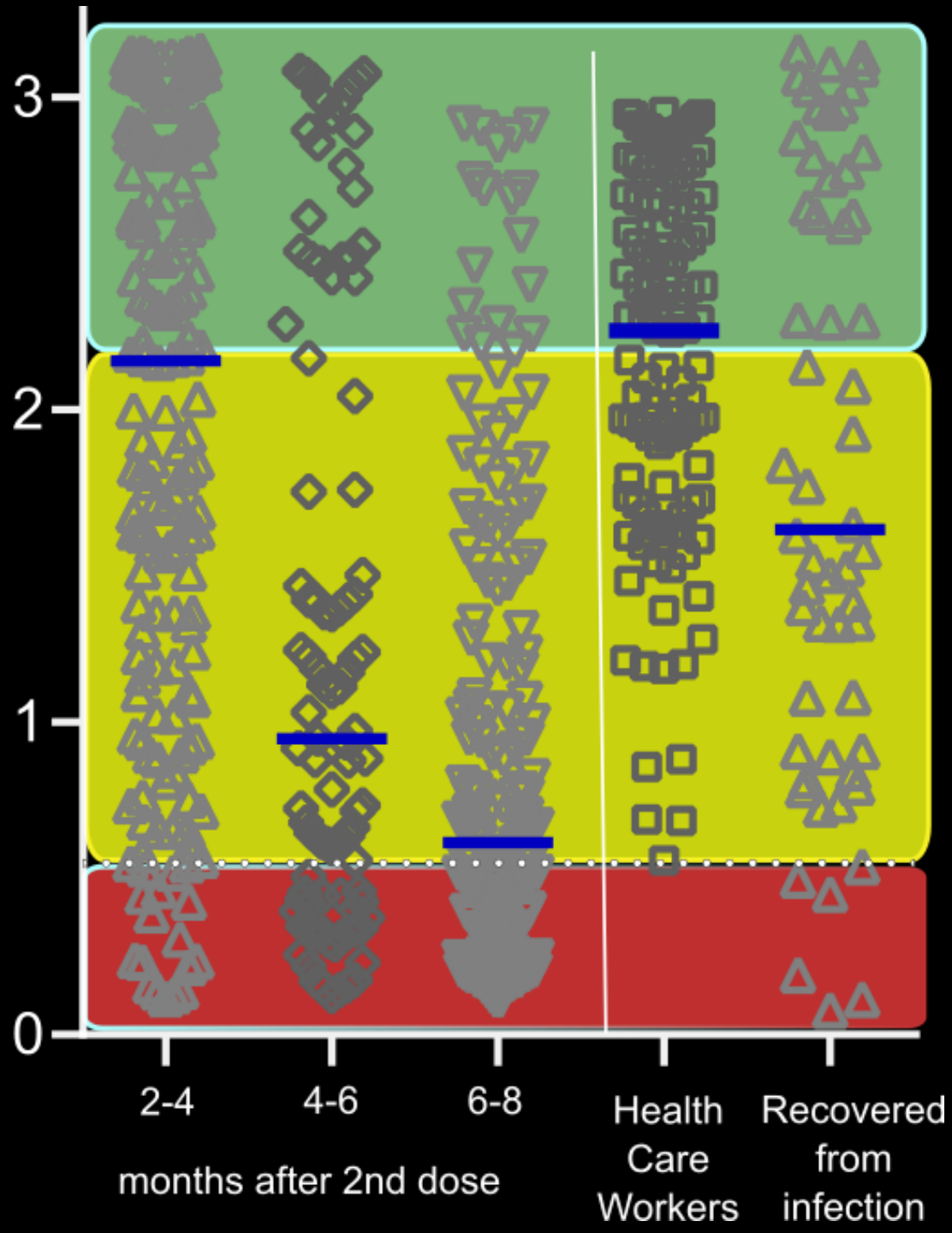
RIA RESEARCH
INSTITUTE
for AGING
Schlegel • UWaterloo • Conestoga



AMICA
SENIOR LIFESTYLES

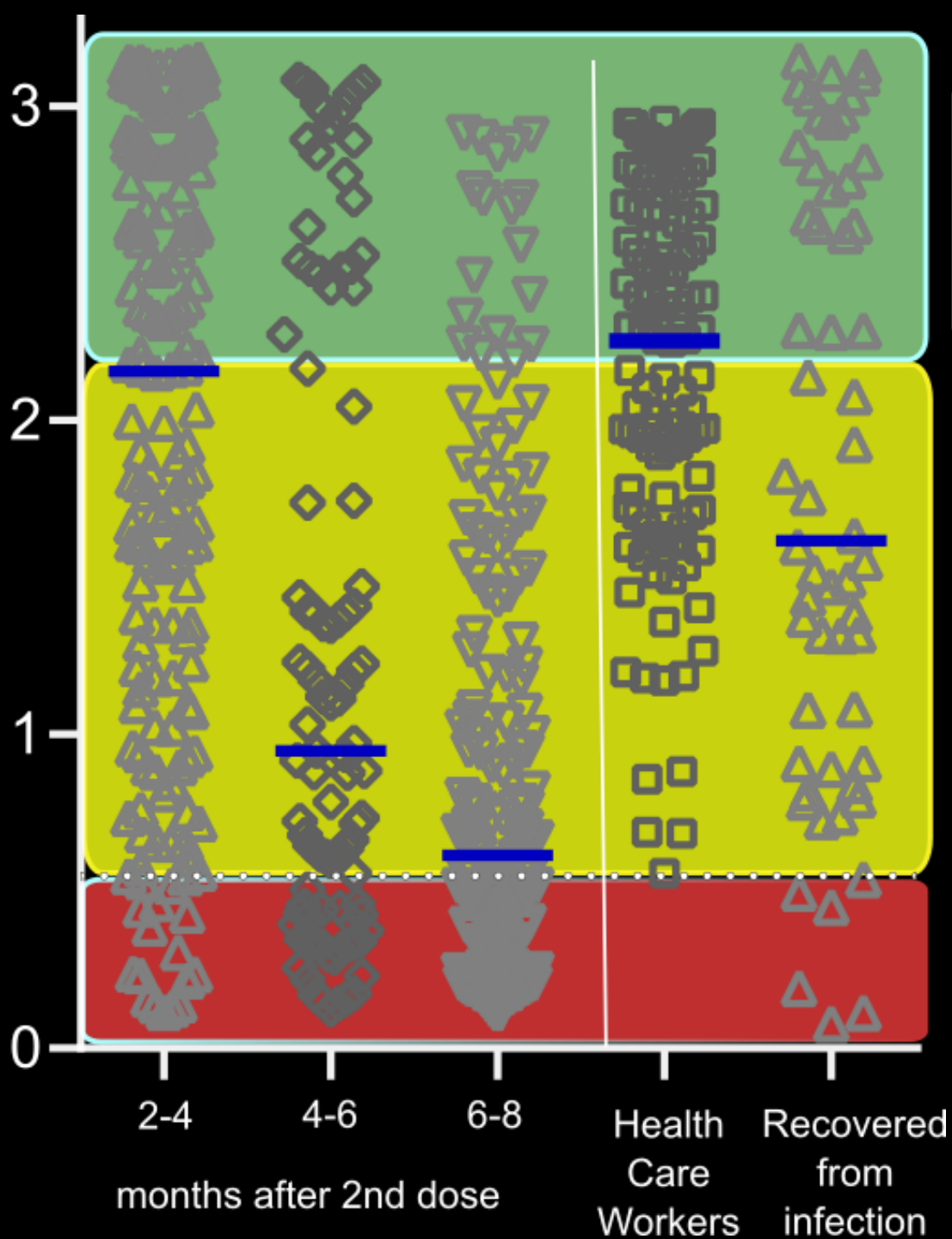


IgG RBD

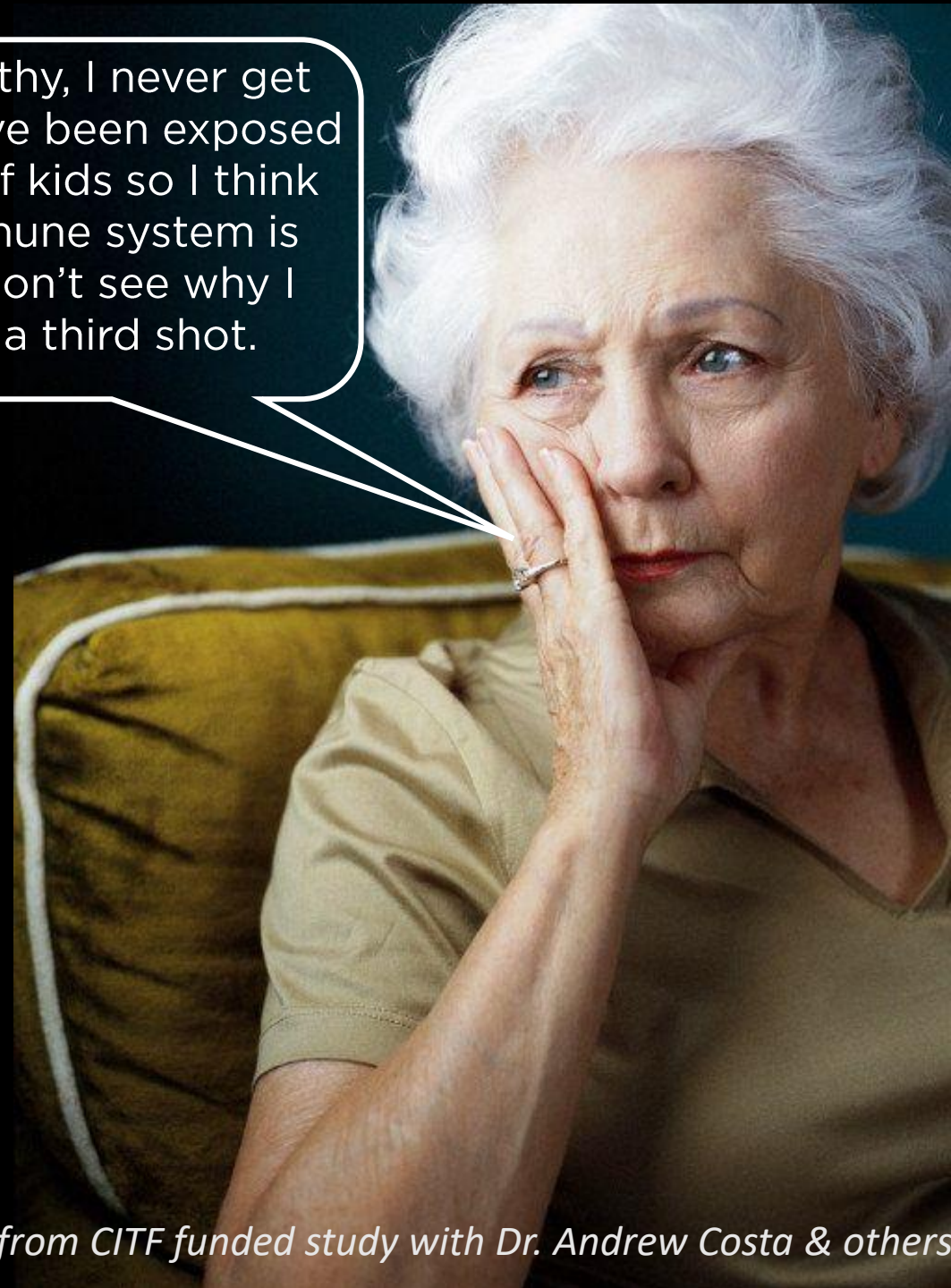


**Antibody assays done by Ishac Nazy & team*

IgG RBD



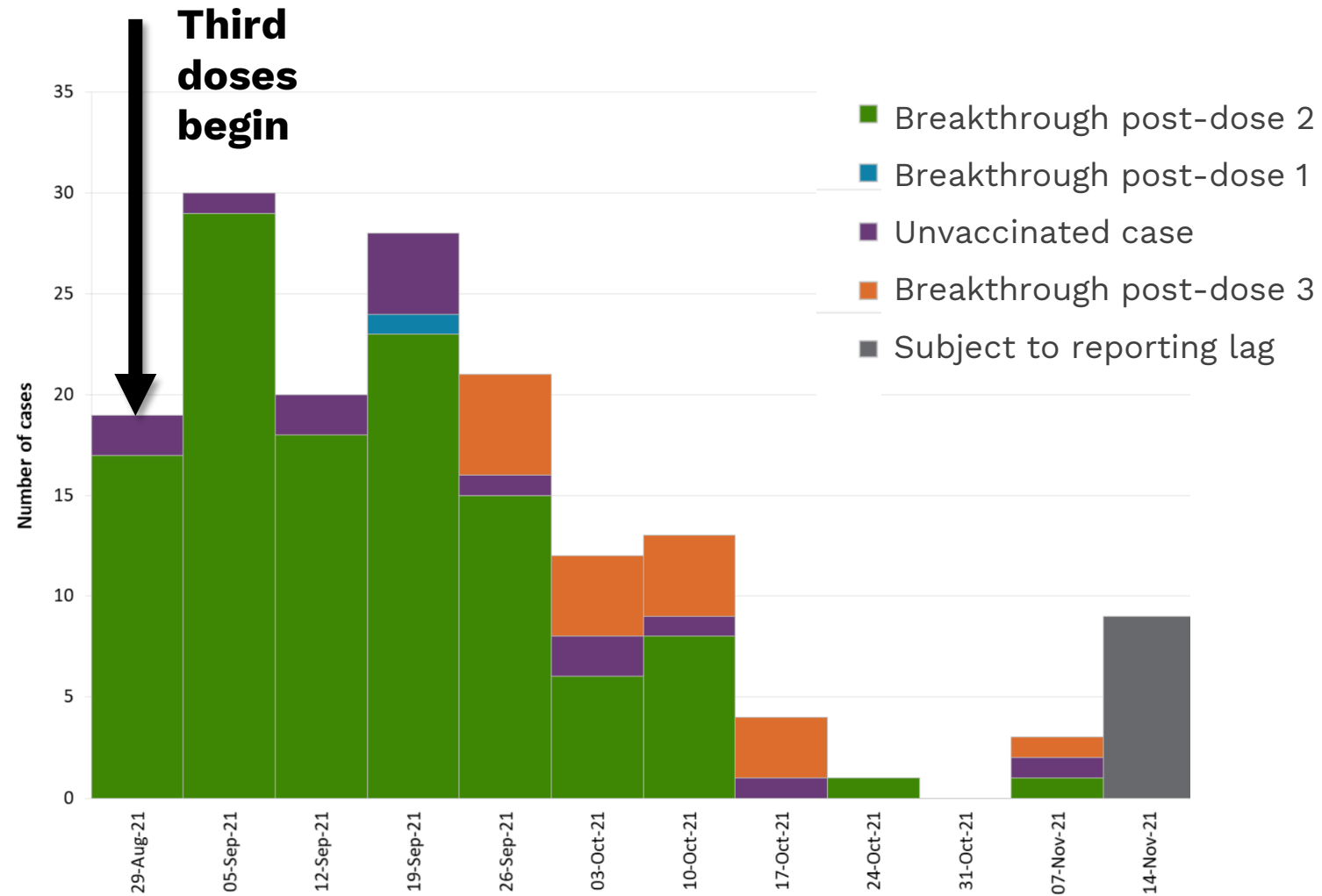
I'm healthy, I never get the flu, I've been exposed to lots of kids so I think my immune system is fine. I don't see why I need a third shot.





*data from CITF funded study with Dr. Andrew Costa & others

Third dose came just in time for long-term care

Figure 1: Number of COVID-19 long-term care home resident cases by vaccination status and reported week: Ontario, August 29, 2021 to November 20, 2021



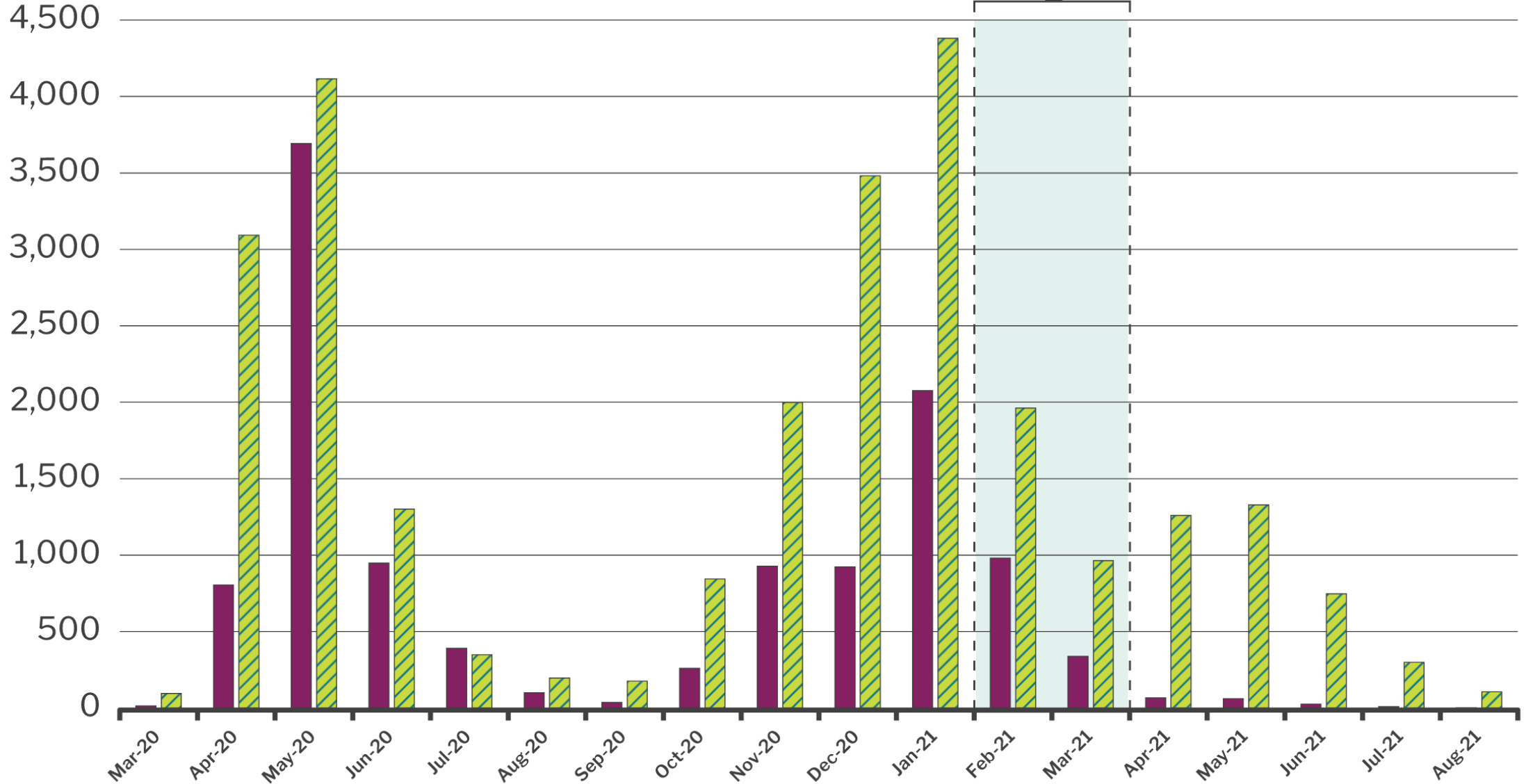
Source: Public Health Ontario data

 LTC resident COVID-19 deaths
 COVID-19 community deaths



95% of first-dose vaccinations were administered to LTC residents between January 15 and March 31

Monthly COVID-19 deaths



Take home messages:

- Don't rely on previous infection to protect you.
- The best time to get vaccinated is at the start of a wave
- Vaccination is one method of protection but not the only method
- We don't know the long-term health consequences of infection, nor how protective vaccination is yet



COVID IN
LONG-TERM CARE
STUDY

Participant Quotes



Ronnie from the Village of Tansley



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"It's informative to everybody as to what's happening with the virus, as everybody needs to know. Medical techniques will improve."

Gwyn from The Village at University Gates



"I was quite interested when you sent me the last results. Research is very necessary for us to make strides forward in medicine and knowledge is very important."

”

Karel from the Village of Winston Park



“

"I just try to help to know the long range effects of the vaccine."

Dorothy (Dot) from St. Joe's Villa Dundas



"Happy to be at your service!"

”

www.covidinltc.ca @covidinltc

Deanna Levac

Schlegel Villages

Lora Bruyn-Martin

Schlegel Villages

Heather Livingstone Hamilton Continuing Care

The Village of Tansley Woods

Julie Garneau

Pinehaven Nursing Home

The Village of University Gates

The Village of Winston Park

Fairview Nursing Home

Mattea Duvnjak

The Village of Wentworth Heights

Melissa Mackinnon

The Village of Erin Meadows

Mithila Vidwans

The Village of Humber Heights

Shari Farrugia

The Village of Sandalwood Park

Sherline Dorcelus

The Village of Taunton Mills

Dana Chausic

St. Joseph's Villa Dundas

Josie Lopes

St. Joseph's Lifecare Centre Brantford

Rebecka Seilis

St. Joseph's Healthcare Centre Guelph

Reshan Rex

Shalom Village

Allegra Ferrara

Amica Unionville



Participant Quotes



Jeff from The Village of Humber Heights



“

"I chose to participate in this study because I wanted to see how my immunity levels would change after my booster vaccine to ensure that I am the most protected in order to see my sister."

Dorothy (Dot) from St. Joe's Villa Dundas



”

"Happy to be at your service. Let's not only Spit on Covid let punch and kick it too."

Evelyn from Pinehaven and her family, Ross and Chris



"We should share whatever information we can to help them come up with answers," says Chris, which is why she and her parents are part of the important COVID-19 Immunity study led by McMaster University.

Margaret from The Village of Erin Meadows



"I wanted to do this research initiative because I like the prospect of helping people and contributing to science in a positive way."

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Participant Quotes



Ronnie from the Village of Tansley



“

"It's informative to everybody as to what's happening with the virus, as everybody needs to know. Medical techniques will improve."

Gwyn from The Village at University Gates



"I was quite interested when you sent me the last results. Research is very necessary for us to make strides forward in medicine and knowledge is very important."

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Karel from the Village of Winston Park



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"I just try to help to know the long range effects of the vaccine."

Gloria Resident at The Village of Tansley Woods



What inspired you to participate in the study?

"I wanted to help stop this dreadful virus that's going around and spreading. I feel honoured to be asked to join the study and anything I can to help is a plus."

