

Regional Council Update:

Epidemiology and modelling of COVID-19 for Peel region

Dr. Lawrence Loh, Interim Medical Officer of Health
Monali Varia, Manager, Infection Prevention & Surveillance
Region of Peel – Public Health
April 23, 2020

What we learned from China

About transmission

COVID-19 is a respiratory disease transmitted by droplets during close unprotected contact with a case.

Airborne spread has not been reported, however possible if aerosol-generating procedures are used in health care facilities.

About the virus and infection

Incubation period: ~5d (1-14d)

Period of communicability: during the symptomatic state (transmission possible, if pre-symptomatic. We don't know the full role of asymptomatic transmission.)

Reproductive number R_0 : 2-2.5

Sign and symptoms

Fever (88%)

Dry cough (68%)

Fatigue (38%)

Shortness of breath (19%)

Sore throat (14%)

Nasal congestion (5%)

Diarrhea (4%)

Clinical course

80% mild to moderate

14% severe

6% critical

Case fatality rate (0.7% outside Wuhan, 3.8% overall China)

Recovery time (mild): 2 weeks

Recovery (severe): 3-6 weeks

The tools of Public Health

There is current no standard treatment or vaccine for COVID-19. Treatment is supportive to alleviate symptoms.

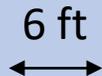
Public Health tools to reduce transmission are:



Border restrictions and enhanced screening



Aggressive case finding and contact management



Physical distancing (population-level)



Infection prevention and control (hand hygiene, respiratory etiquette, staying home when sick)

>2.3M cases

>163,000
deaths

185/195
countries affected



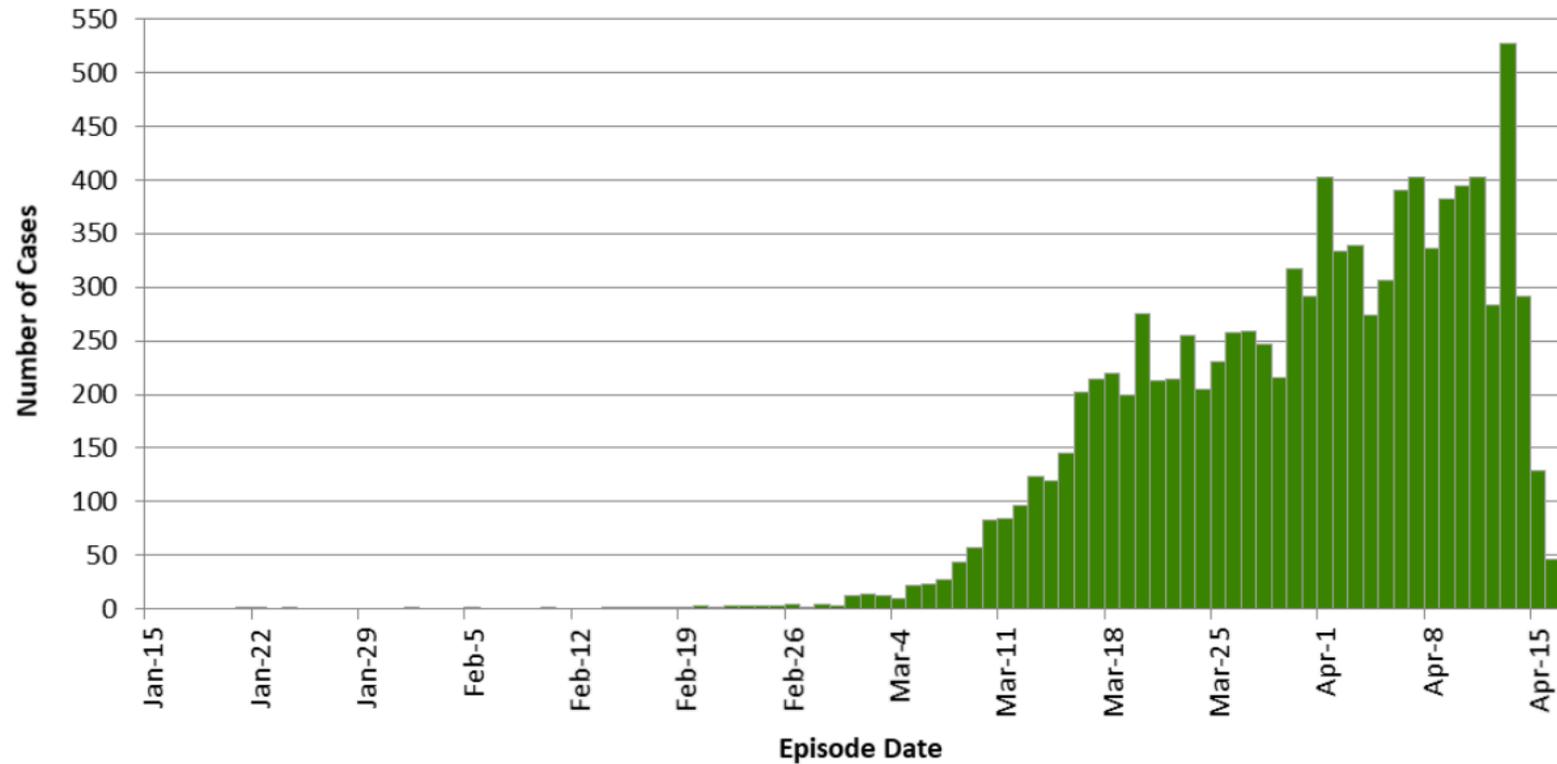
8.2-4

As of April 19, 2020.

Source: Coronavirus COVID-19 Global Cases by Johns Hopkins CSSE, <https://gisanddata.maps.arcgis.com/apps/opsdashboard/index.html#/bda7594740fd40299423467b48e9ecf6>

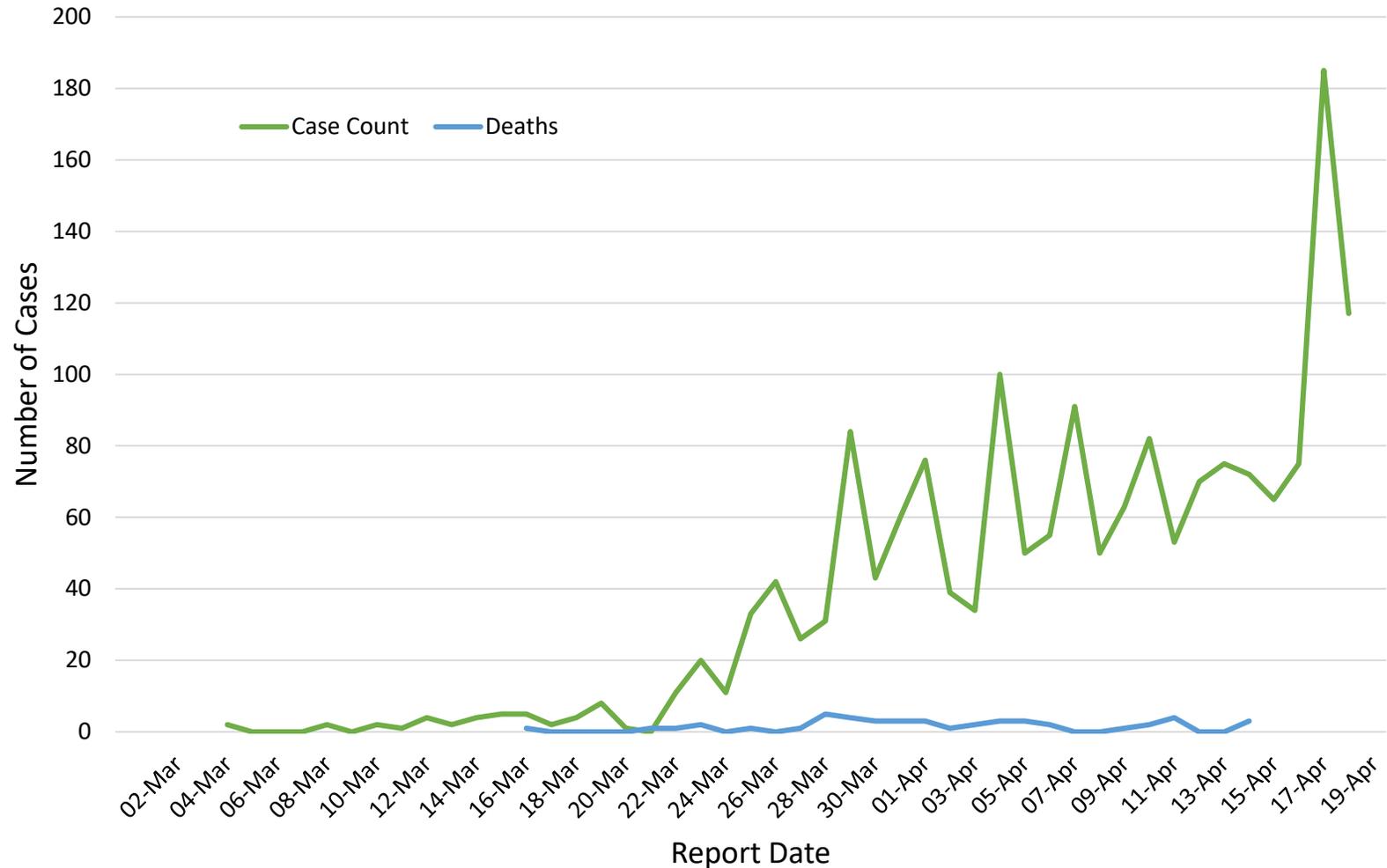
COVID-19 cases in Ontario

Figure 2. Confirmed cases (n=10,010) of COVID-19 by an approximation of symptom onset date*: Ontario, January 15, 2020 to April 17, 2020**



New cases and deaths of COVID-19 in Peel

As of April 19, 2020

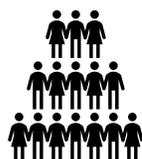


8.2-6

Source: Ontario Ministry of Health. integrated Public Health Information System (iPHIS) database, extracted by Peel Public Health.

Epidemiologic profile of COVID-19 cases in Peel

As of April 16, 2020



1,334 Total cases

54 Median age

677 Female

570 Male



16 Outbreaks*

159 Outbreak Cases

9 Long Term Care Deaths

*In acute care, long-term care, or retirement homes



71 Ever Hospitalized

59 Median age of people hospitalized



158 Recovered

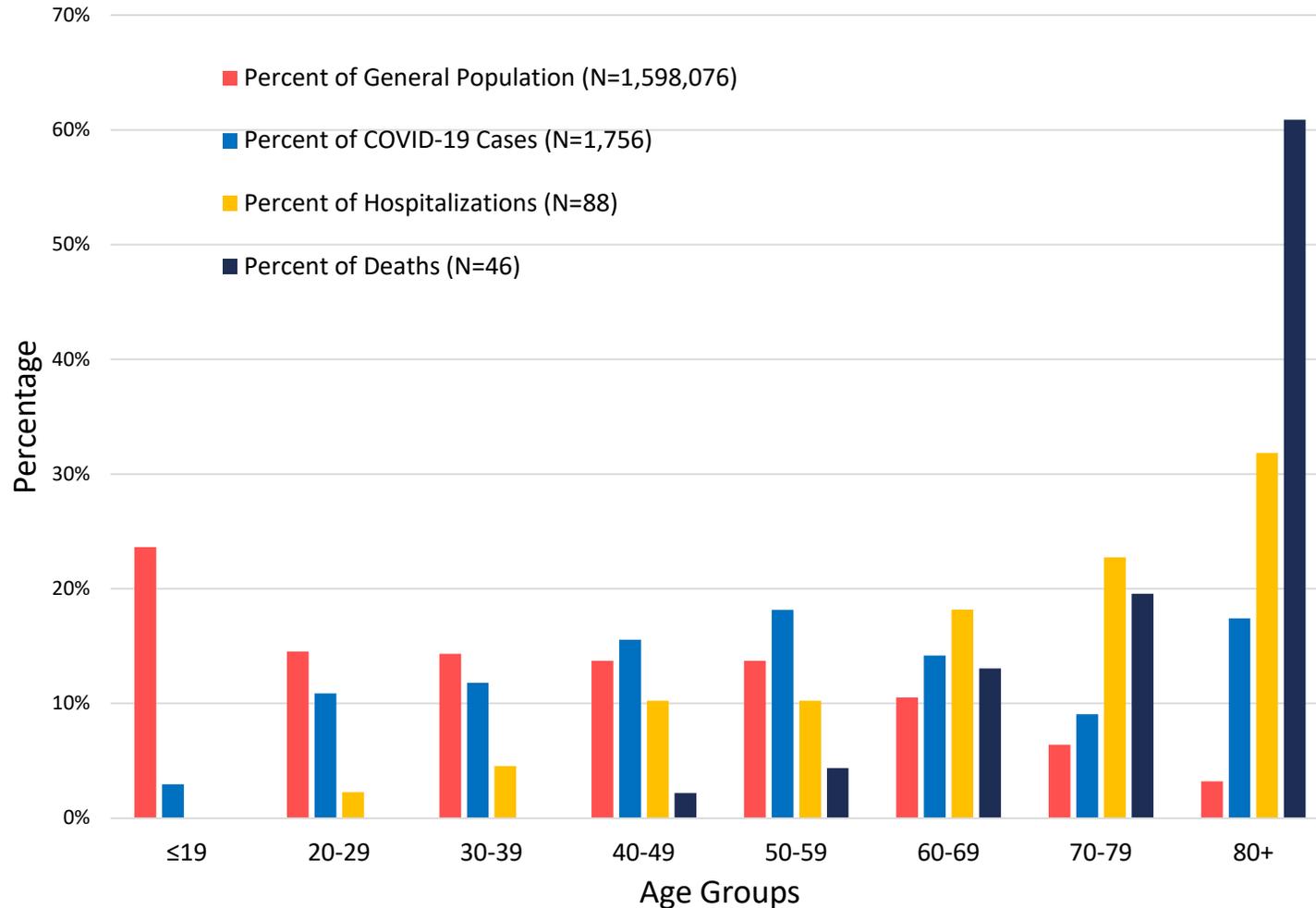


32 Deaths

77 Median age of people who have died

Peel COVID-19 cases by age group

As of April 19, 2020



8.2-8

Public Health Planning: Modelling the impact of interventions

- Based on work by modellers Drs David Fisman, Ashleigh Tuite and Amy Greer (University of Toronto/Guelph)
- Modelling can look at the potential impact of interventions:
 - **Improved detection** and isolation/quarantine of cases and contacts
 - **Social (physical) distancing**
- **Fixed intervention durations**
 - Interventions remain in place for fixed durations of time (e.g., 1 month, 6 months, 18 months)
- **Dynamic intervention duration:**
 - The intervention is cycled on and off, whenever the number of cases exceeded or fell below a pre-determined (200 COVID-19 Ontario cases in ICU) threshold, respectively.

Modelling Scenarios and Assumptions

Assumptions

- Individuals remain infectious until hospitalized or recovered
- Recovered individuals remain immune
- Deaths happen in ICU
- Equal infectivity by age group
- Differential severity in outcomes by age and by comorbidity status
- Model begins with 750 prevalent cases (based on 150 reported cases in Ontario on March 19, assuming reporting rate of 20%)

Model Outputs

- Cases
- Hospitalizations
- ICU admissions
- Deaths

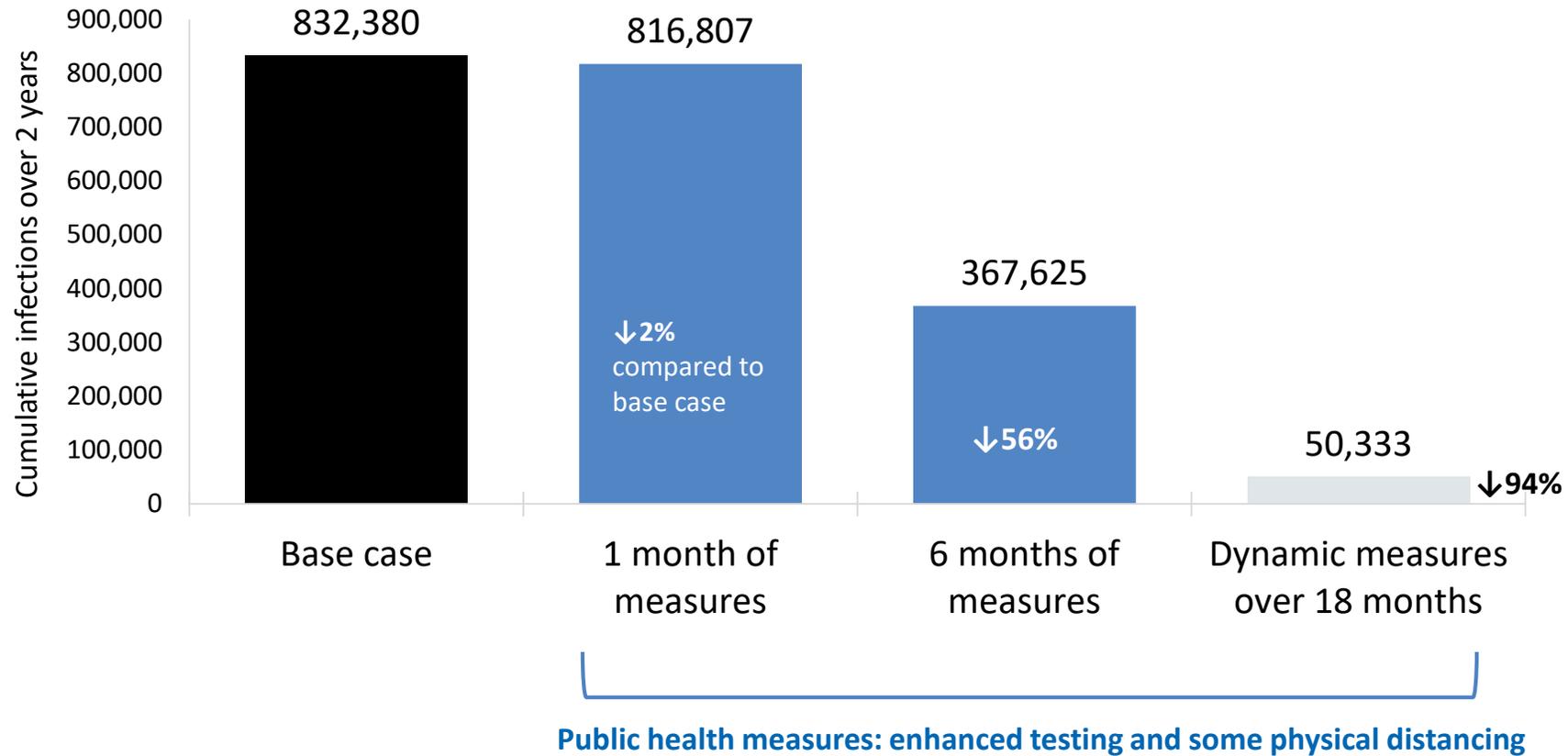
An example of applying the model to Peel

*These numbers are not to be taken at face value as this initial model used assumptions informed by the China experience.

The **shape** of the curves and the anticipated **impact** of measures is the main take-away for planning.

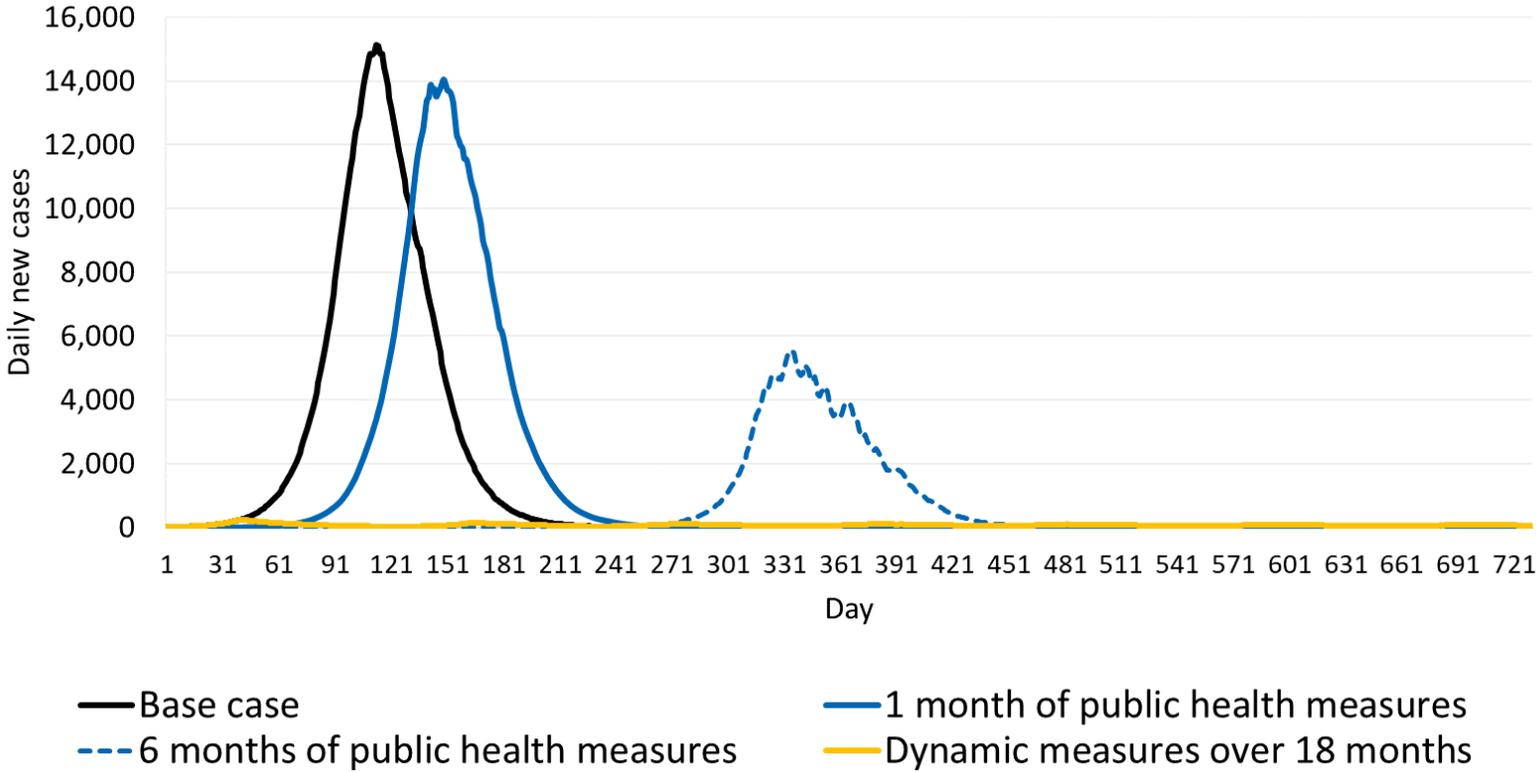
Modelled total cases in Peel:

Base case vs. enhanced testing and some physical distancing

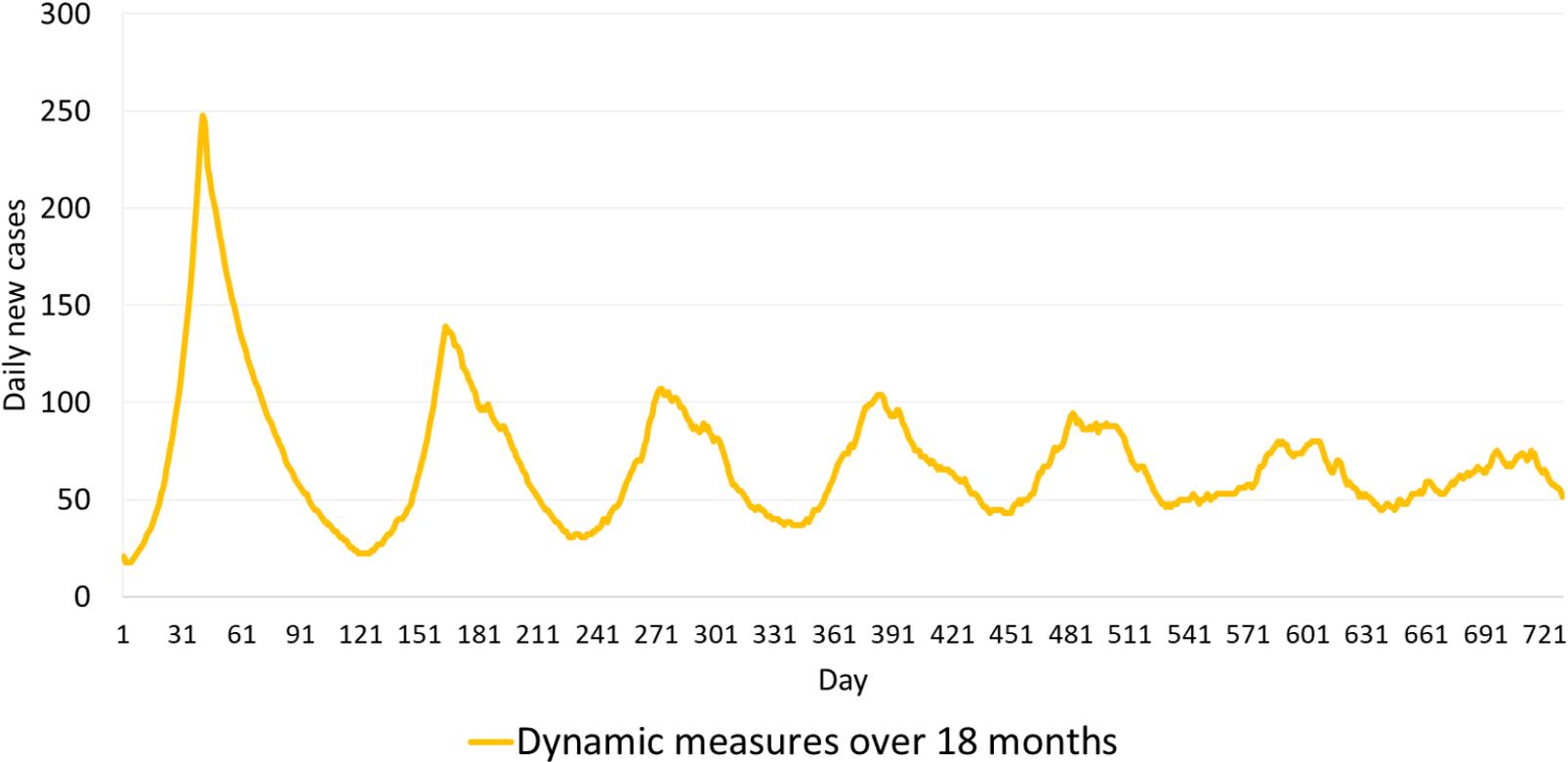


Modelled daily new cases in Peel:

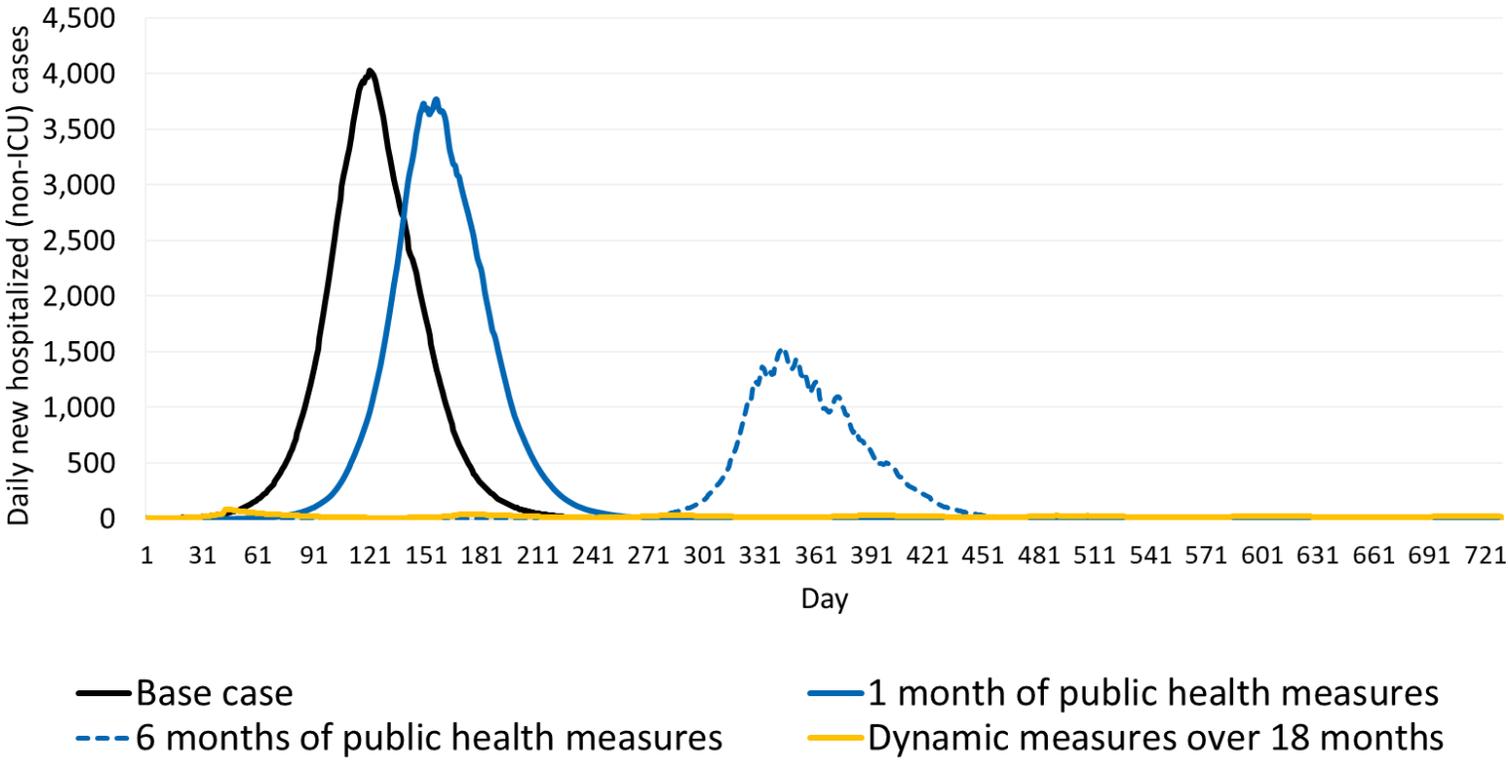
Base case vs. enhanced testing and some physical distancing



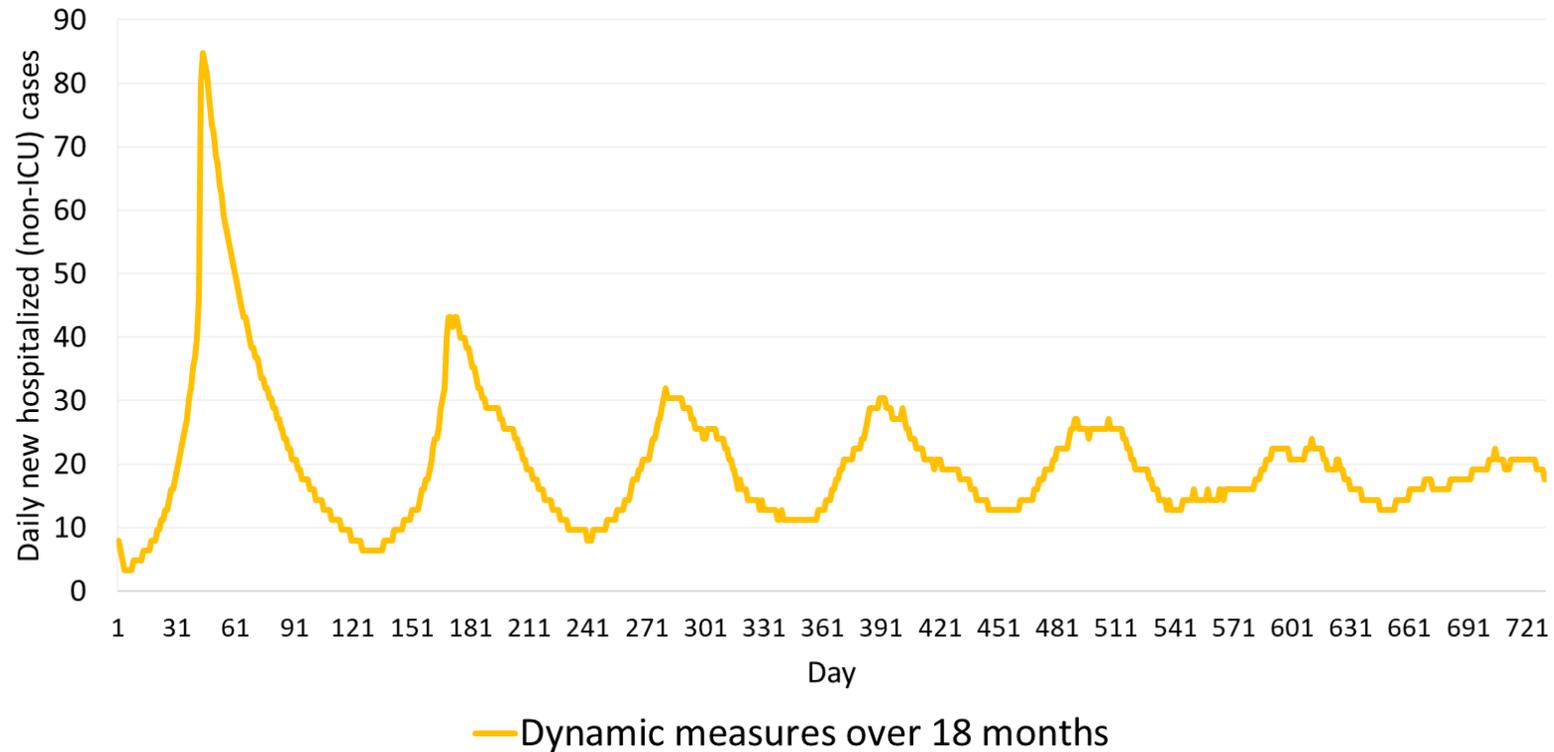
Modelled daily new cases in Peel: Dynamic public health measures over 18 months



Modelled daily new hospitalized cases in Peel: Base case vs. enhanced testing and some physical distancing

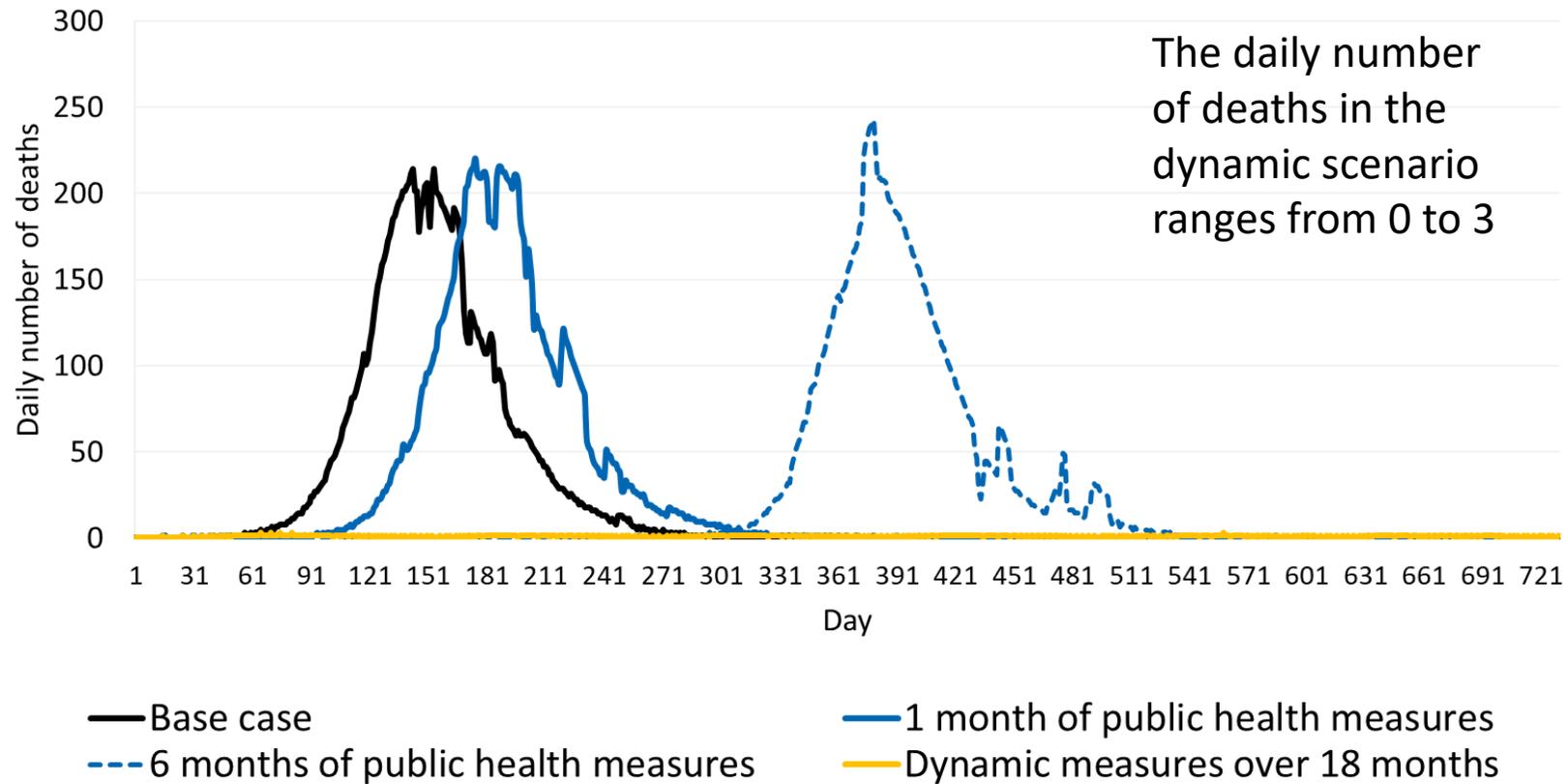


Modelled daily new hospitalized cases in Peel: Dynamic public health measures over 18 months

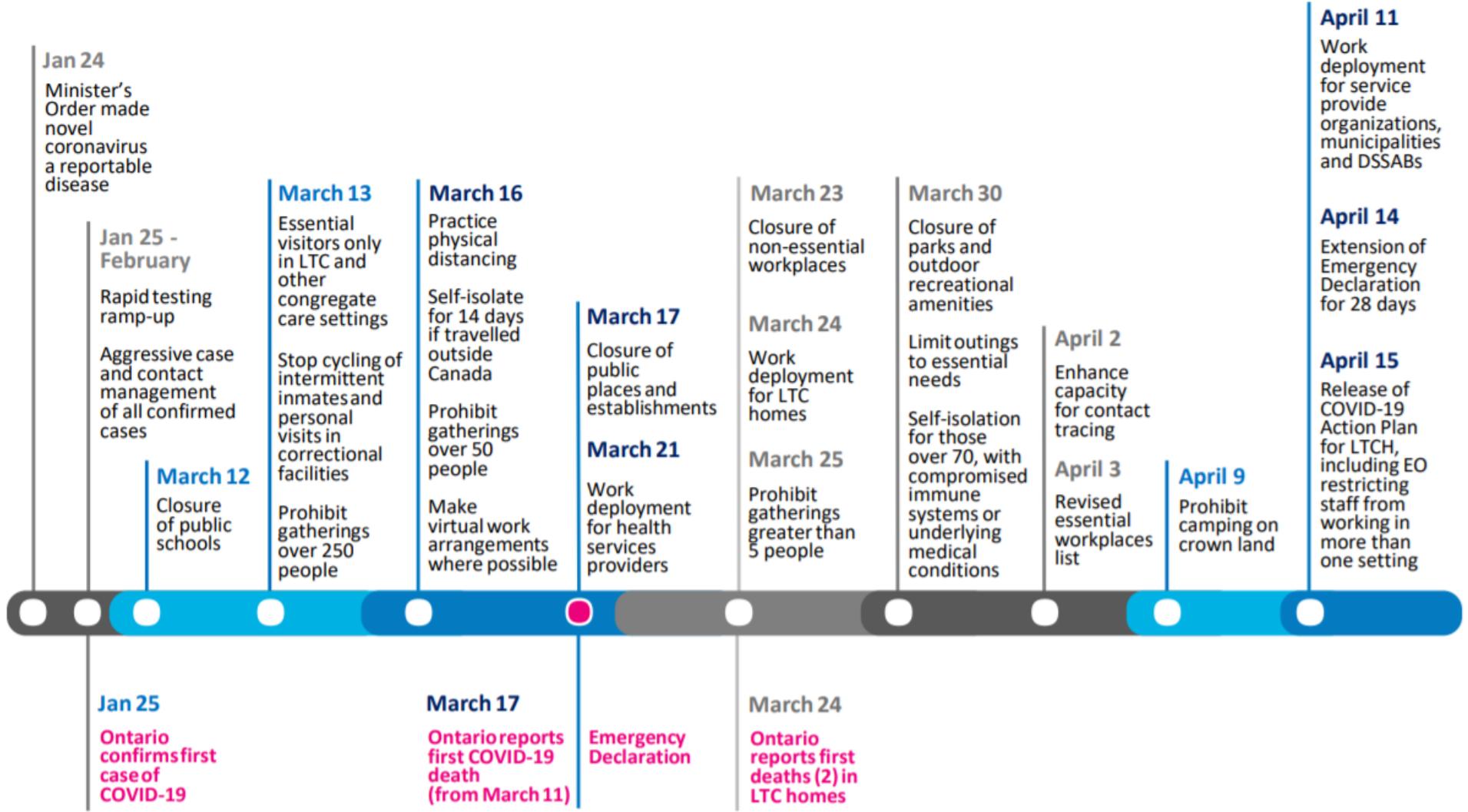


Modelled daily new deaths in Peel:

Base case vs. enhanced testing and some physical distancing



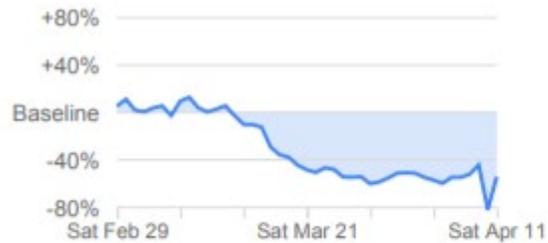
COVID-19: Key Public Health Measures Timeline



Public health measures decreased mobility and interactions in Ontario

Retail & recreation

-54% compared to baseline



Grocery & pharmacy

-9% compared to baseline



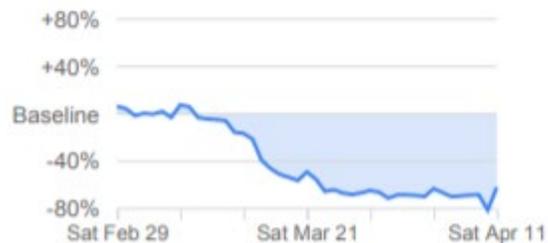
Parks

-20% compared to baseline



Transit stations

-62% compared to baseline



Workplace

-48% compared to baseline



Residential

+16% compared to baseline

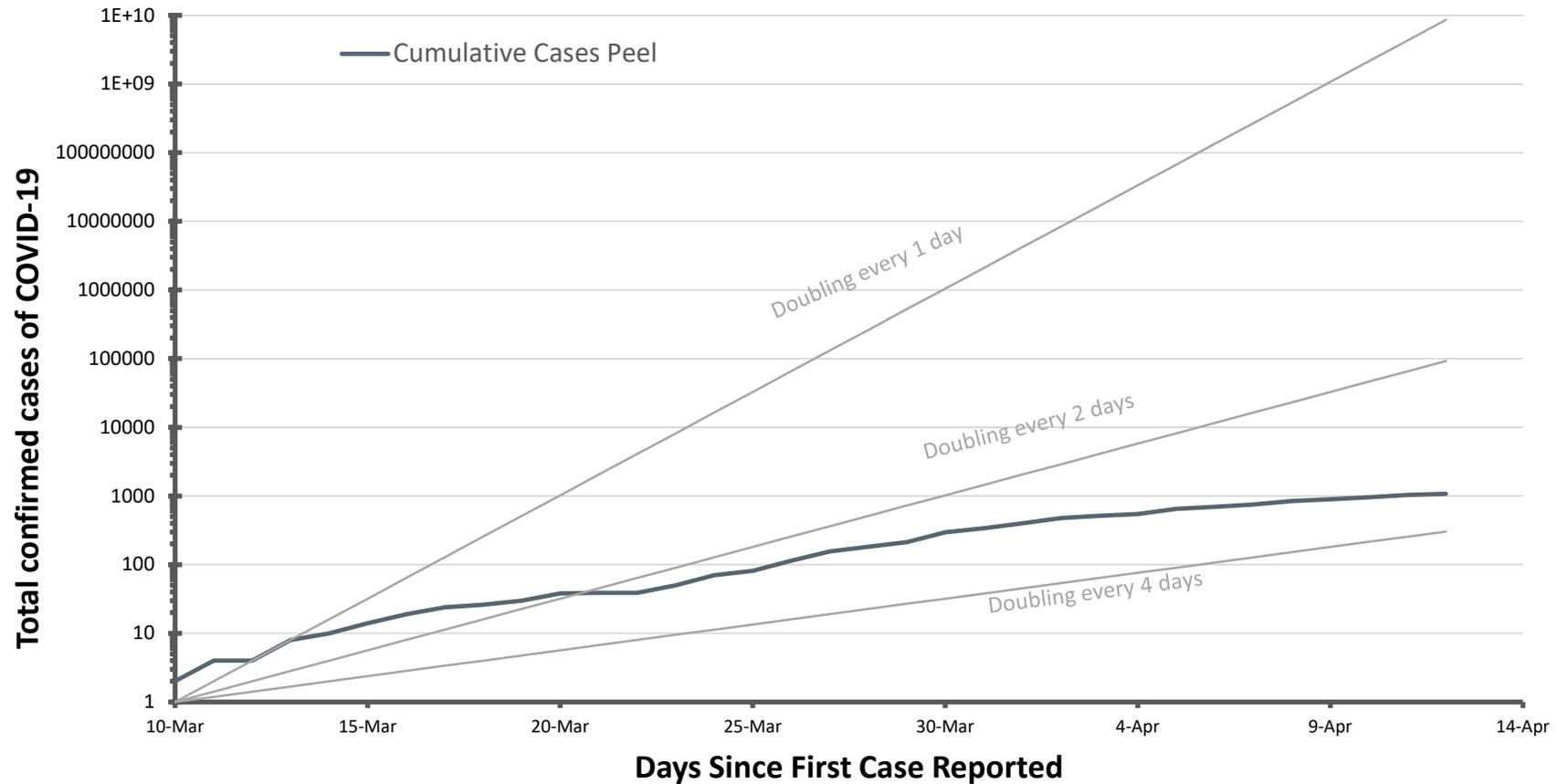


8.2-19

Google Mobility reports for Ontario:

https://www.gstatic.com/covid19/mobility/2020-04-11_CA_Mobility_Report_en.pdf

Bending the curve: Doubling time of Peel cases



8.2-20

Source: Ontario Ministry of Health, integrated Public Health Information System (iPHIS) database, extracted by Peel Public Health [April 13].

Key messages to date

- Measures like physical distancing, isolating cases and quarantining contacts **are effective**
- The results we have seen are due to the efforts of Peel residents, however, we need to continue
- These measures may need to continue to some degree to:
 - flatten the curve overall (avoid burden on the health system and ensure everyone who needs to be hospitalized gets care)
 - delay the peak (to buy time for effective treatment or development of a vaccine)

Continued and emerging priorities

- Continued case finding and contact management
- Stopping localized clusters, particularly in vulnerable settings
- Planning for the long-term
 - Continued physical distancing while minimizing the impacts of these important public health measures