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# INFECTIONS, HOSPITALIZATIONS, AND DEATHS PREVENTED BY COVID-19 VACCINES IN CANADA

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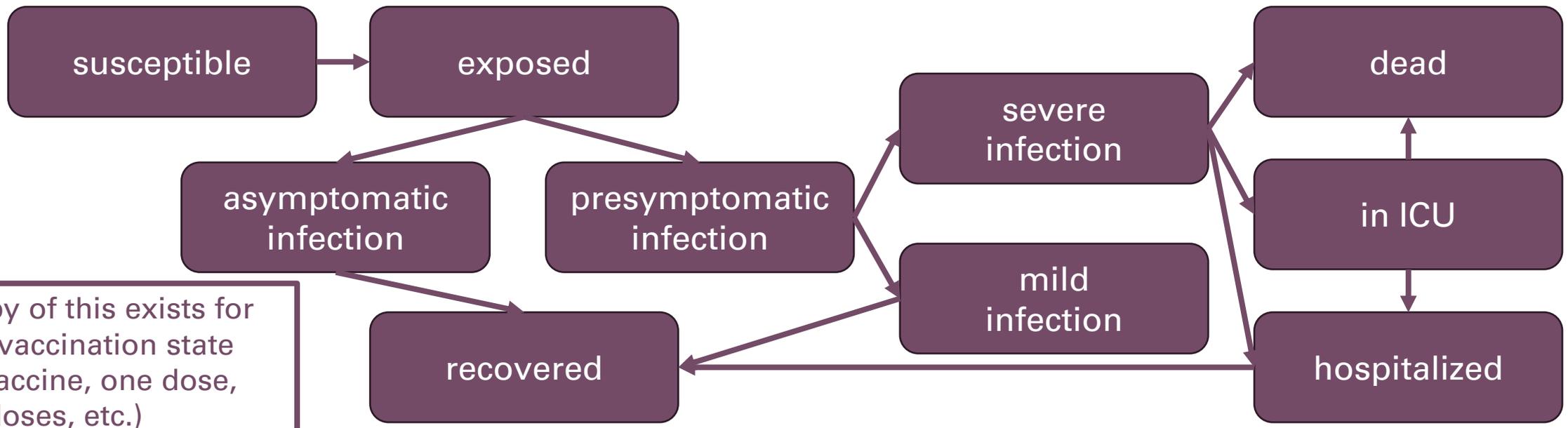
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# Background

- According to reports by Public Health Agency of Canada and Canadian Institute for Health Information, to date there have been:
  - Approximately 4.8 million confirmed COVID-19 infections
  - 54,902 deaths due to COVID-19
  - 188,920 people hospitalized from COVID-19, with 39,946 in intensive care
- These numbers were lessened by the introduction of vaccines in early 2021
- How much exactly did the vaccines help?
- Our goal is to quantify the impact of vaccines on the numbers of infections, hospitalizations, and deaths

# Background

- To answer this, we start by fitting a compartmental model to data on daily infection reports and hospital occupancy (acute and intensive care)



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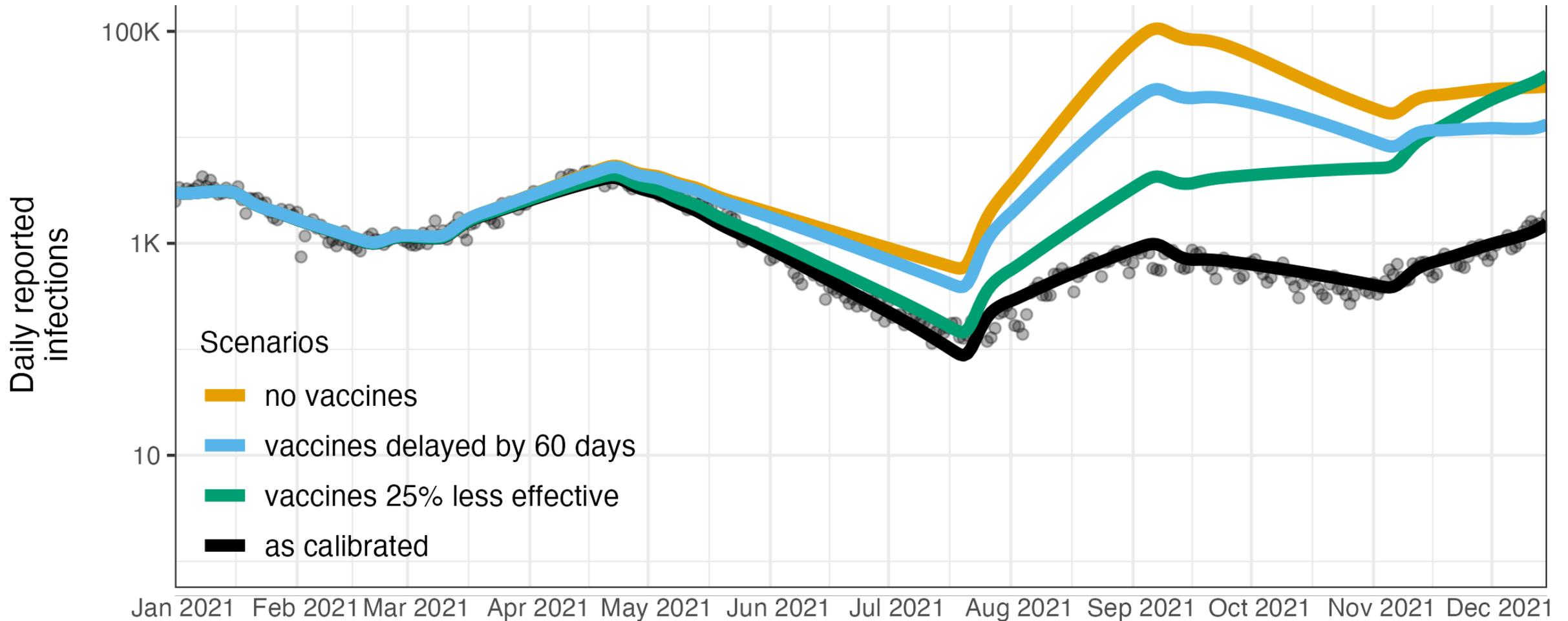
- We then model a few alternate scenarios and predict the effects on the number of infections, hospitalizations, and deaths:
  - Vaccines were never introduced
  - Vaccine rollout was delayed by 60 days
  - Vaccines were 25% less effective
- To get a sense of how well we would have been able to control disease spread using other measures (social distancing, masking, lockdowns) we consider the effects of:
  - A hypothetical lockdown that achieves a transmission reduction of 10%
  - A hypothetical lockdown that achieves a transmission reduction of 30%
  - A hypothetical lockdown that achieves a transmission reduction of 60%

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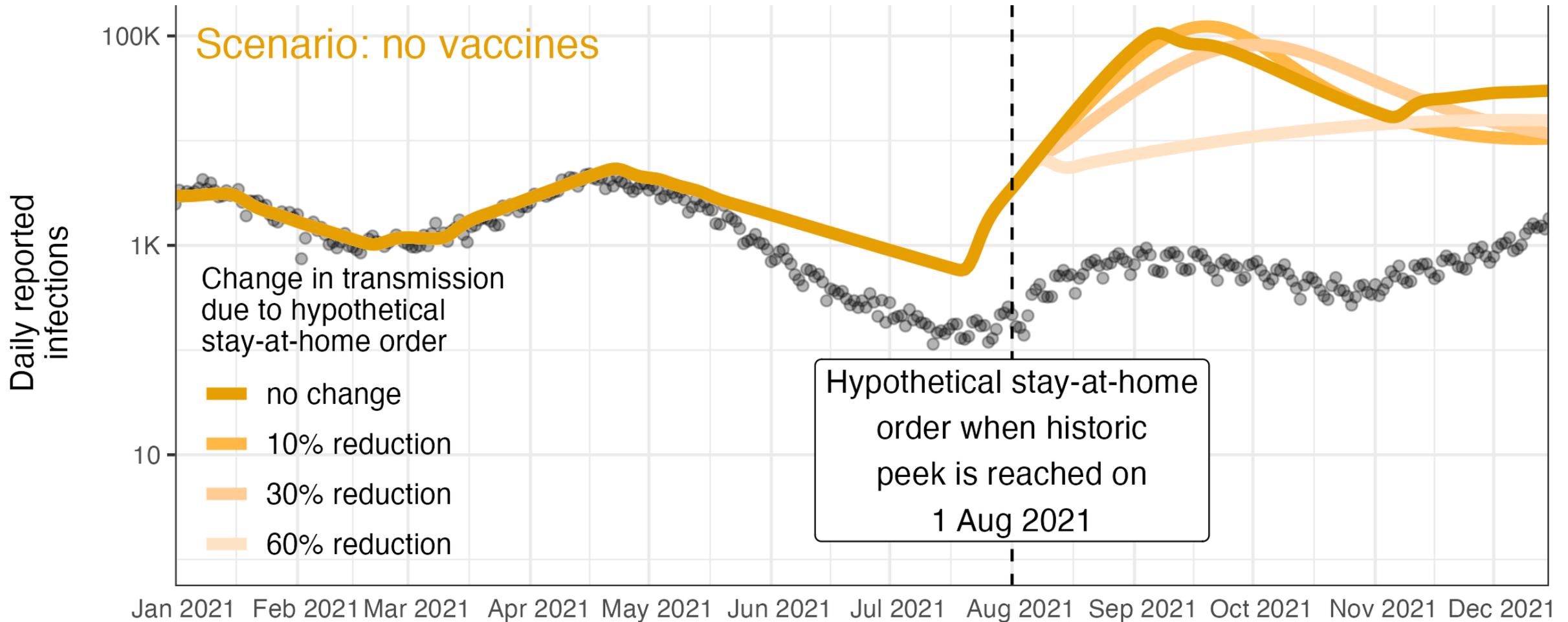
# Background

- One of the most closely related previous studies is by Ogden, Turgeon, Fazil, Clark, Gabriele-Rivet, Tam, and Ng (CCDR 2022)
- They used an agent-based modelling approach to make predictions about the numbers of infections, hospitalizations, and deaths across the country in the absence of both vaccines and other public health measures
- Two key things we want to add to this conversation:
  - Providing predictions from a compartmental model, which can more easily be calibrated to multiple data streams
  - We are working on contributing a more fine-grained picture of the impact of vaccines across Canada by exploring these counterfactual scenarios within multiple provinces (AB, BC, MB, ON, QC, SK)

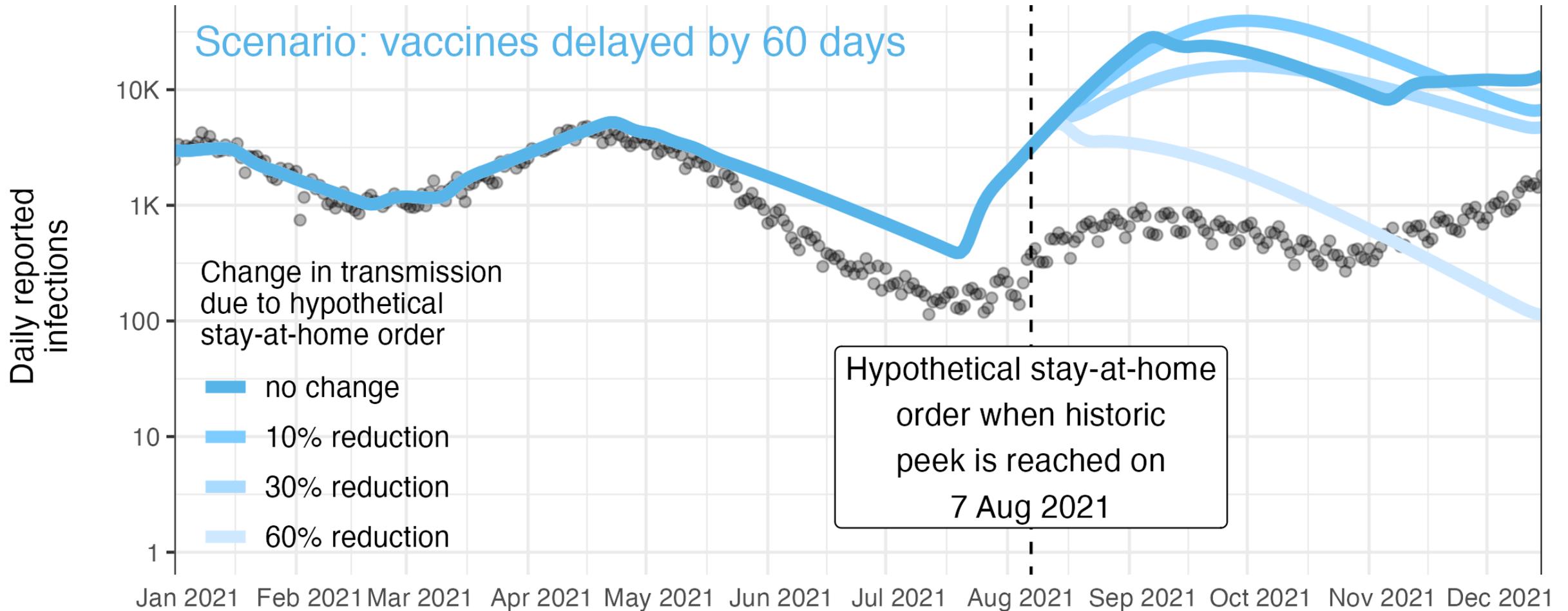
# RESULTS



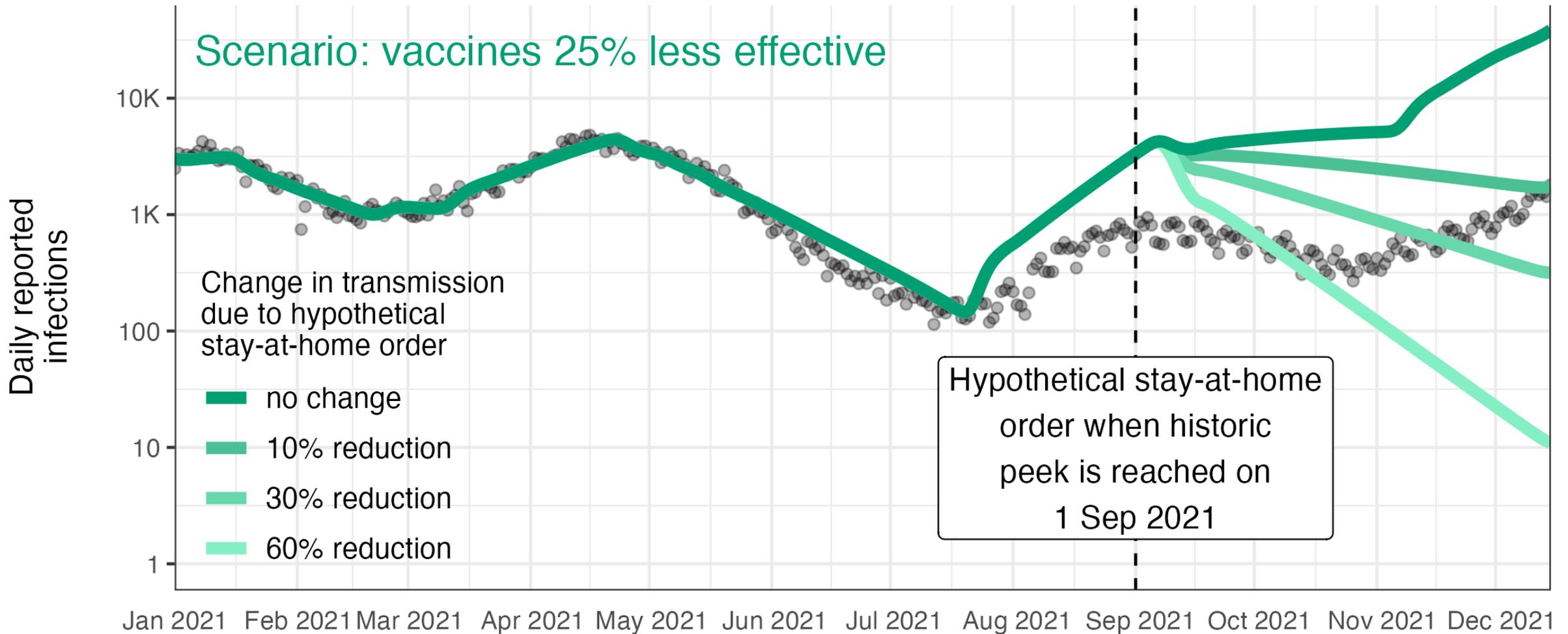
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# RESULTS

Percentage increase in peak hospital occupancy and daily deaths:

Scenario	Hospital (Acute)	Hospital (ICU)	Deaths
No vaccines	10,000%	11,000%	10,000%
Delayed vaccines	1,200%	1,500%	1000%
Less effective vaccines	500%	700%	150%

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# Conclusions

- Two main takeaways:
  1. The numbers themselves to quantify just how much of an impact vaccines had on the pandemic
  2. Things would be much harder (if not impossible) to control with other public health measures in the case of no vaccines or delayed vaccines, suggesting it is beneficial to get a vaccine out as soon as possible
- We are currently working on expanding these results to other provinces for which we have available data to help build a province-by-province picture of the impact of COVID-19 vaccines

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# Thank You!

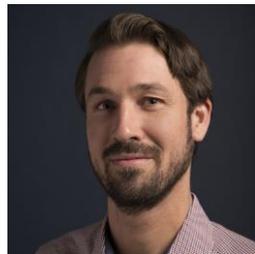
Funding support provided by:



Collaborators:



Irena Papst  
PHAC



Steve Walker  
McMaster



David Earn  
McMaster



Ben Bolker  
McMaster

A special thank you to: Michael Li for compiling the data used for calibration in this study