The impact of COVID-19 interventions in Switzerland: what can models tell us?

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This talk

The impact of COVID-19 interventions in Switzerland: what can models tell us?

• The key questions
  - How can modelling support?

• The OpenCOVID model

• How we model vaccines, NPIs, and testing

• Recent model output and interpretations

• Take away messages
The key questions

• What level impact can we expect from future interventions?
  - Eg Vaccines, testing, contact tracing, NPIs

• What is most likely to hinder our ability to control the epidemic?
  - Eg Viral variants, waning adherence to measures

Scenario analysis

Sensitivity analysis

• What is the public health-economics trade off?

Health economic analysis
OpenCOVID

• Individual-based model of SARS-CoV-2 transmission and COVID-19 disease
• Configured to represent COVID-19 epidemic in Switzerland
• Independently funded by BRCCH and SNF
• Model uses publicly available data
• Model code is open source
• Model methodology publicly available (very soon)
• Simulations are performed on SciCORE, the Uni Basel cluster
OpenCOVID: the team

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Sherrie Kelly
Nakul Chitnis
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OpenCOVID

- Swiss demographics
- Age structured, contact data from surveys
- Considers healthcare workers and people with comorbidities
OpenCOVID

Network

Seasonality

Viral variant

Viral load

Immunity

P(infection)

Fully susceptible

Latent infection

Pre-symptomatic

Asymptomatic infection

Mild disease

Severe disease

Fully immune

Immune status

Isolation

Hospital care

Intensive care

Death

SARS-CoV-2
Individual-based transmission model
OpenCOVID: interventions

Non-pharmaceutical interventions
- All social distancing and facemask policies
- Testing, contact tracing, and subsequent isolation
- **Oxford Containment and Health Index** by canton
  - Reduction in effective contacts
  - A systematic, viable approach
OpenCOVID: interventions

Non-pharmaceutical interventions
- All social distancing and facemask policies
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  - Reduction in effective contacts
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Pharmaceutical interventions
- Represent improved therapeutics
- Represent vaccine roll out to priority groups
  - Development of immunity
  - Reduction of disease severity
  - Waning immunity (?)
- Implemented per FOPH guidelines

[Diagram of the SARS-CoV-2 individual-based transmission model with nodes for immune status, vaccine properties, and infection stages including fully susceptible, latent infection, pre-symptomatic, asymptomatic infection, mild disease, severe disease, isolation, hospital care, intensive care, and death.}
Model calibration: effect of NPIs

Effect of NPIs is assumed proportion to the Oxford Containment and Health Index

Data we align to

NPIs reduce effective contacts
Vaccination and NPIs

What is the health gain of delaying openings as we scale up vaccination?

Approx. 5 percentage points on the OCHI

Vaccination effect: lower peaks after relaxing
Vaccination and NPIs

What is the health gain of delaying openings as we scale up vaccination?

Vaccination effect:
Gains achieved from fast vaccination similar to gains from 2-3 month delayed openings

Vaccination and NPIs

What is the health gain of delaying openings as we scale up vaccination?
Vaccination and NPIs

Comparing scenarios: the relative comparison more useful than absolute numbers

Vaccination with phased NPI:
Reduced risk of needing later re-strengthen
Comparing scenarios: the relative comparison more useful than absolute numbers

Vaccination and NPIs

Vaccination with phased NPI: Reduced risk of needing later re-strengthen

Fast NPI relax with slow vaccination: High probability of needing to re-strengthen or overload hospitals
The key uncertainties

What assumption have a **major impact** of these findings?
Take away messages

• Modelling **is not** a crystal ball
  - We cannot know exactly what will happen in the future
  - New evidence comes to light – models are updated accordingly
  - New interventions, changes in scope of current interventions

• Modelling can provide quantitative evidence about **relative effects**
  - Eg effects of delaying relaxation steps

• Modelling can provide quantitative evidence about **trade offs and synergies**
  - Eg how vaccination speed can enable flexibility to relax measures faster
Take away messages

• **We do not** tell decision makers what to do
  - Modelling is **one part** of the evidence used by decision makers to make **informed** decisions

• We do not have statistical power to comment on **explicit measures** (e.g., opening restaurants, back to office)

• A **fast vaccination campaign** into the summer enables **more flexibility to relax NPIs without later needing to restrengthen**

• Increased infectiousness of new viral variants is key – **genomic surveillance** is critical
Thank you for your attention

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And collaborators at:
• Swiss National COVID-19 Science Task Force
• Swiss Federal Office of Public Health