Modelling the current impact of COVID-19 in Australia

16 April 2020
Next phase of modelling

- University of Melbourne (Doherty Institute) pandemic modelling team with international experts now working on next phase of modelling using Australian data to establish current state of the epidemic, known as “nowcasting”

What this means
- Modelling is based on real Australian data
- Better understand present state of epidemic
- Model ‘forecasts’ can be projected to estimate the next fortnight
- We will be able to review effectiveness of current measures and be better prepared to define future response strategies
Where we are now

Number of new cases each day are reduced

Total number of cases are flattening
How do we know if strategies are effective?

- How well are our public health measures detecting cases?
  - London School of Hygiene and Tropical Medicine has developed a method that assesses the symptomatic case detection rate, based on a comparison between observed hospitalisations today and cases detected in earlier weeks.

- Further analyses of known cases to estimate the effective reproductive numbers (Reff)
  - \( R_0 \) (basic reproductive number) = the number of people a single case infects on average (assuming whole population is susceptible and no strategies in place), estimated about 2.5 for COVID-19
  - Effective COVID-19 control strategies reduce this number so \( Reff < 1 \)
Symptomatic Case Detection Rate

Australia is estimated to be currently detecting approximately 92% of all symptomatic cases.

Each state and territory individually estimated to be detecting over 80%.

Figure: Time series estimates of the symptomatic case detection rate for each jurisdiction using publicly available data up to 24 March.

Red vertical line = Date of the first reported case
Black ticks on x-axis = Deaths
Dark blue line = Mean Case Detection Rate
Shaded ribbons = 50% and 95% CI
Symptomatic Case Detection Rate

Red vertical line = Date of the first reported case
Black ticks on x-axis = Deaths
Dark blue line = Mean Case Detection Rate
Shaded ribbons = 50% and 95% CI

Figure: Time series estimates of the symptomatic case detection rate for each jurisdiction using publicly available data up to 24 March
Symptomatic Case Detection Rate

How do we compare internationally?

International comparisons from LSHTM show that Australia has one of the highest reported detection rates globally (point estimate 84%).

Effective Reproduction Number (Reff)

Figure: Time-varying estimate of the Reff of COVID-19 up to 5 April based on data up to and including 13 April, for each Australian state and territory with sufficient local transmission (excludes ACT and NT)

Black dotted line in middle = 1 (target value for the Reff required for control)

Red dotted line at top = 2.68 (Reff estimated for early epidemic phase in Wuhan in the absence of public health interventions and assuming that the population was completely susceptible to infection)

Light blue ribbon: Reff = 90% credible interval
Dark blue ribbon: Reff = 50% credible interval
Effective Reproduction Number ($R_{eff}$)

**Figure:** Time-varying estimate of the $R_{eff}$ of COVID-19 up to 5 April based on data up to and including 13 April, for each Australian state and territory with sufficient local transmission (excludes ACT and NT)

- Black dotted line in middle = 1
  *target value for the $R_{eff}$ required for control*
- Red dotted line at top = 2.68
  *(R_{eff} estimated for early epidemic phase in Wuhan in the absence of public health interventions and assuming that the population was completely susceptible to infection)*
- Light blue ribbon: $R_{eff} = 90\%$ credible interval
- Dark blue ribbon: $R_{eff} = 50\%$ credible interval