What works, and
Challenges of delays in epidemics
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What works?

- Economically crippling lockdowns can keep R(t) below 1 (if followed)
- Modest reopening in summer can happen with R(t) under control
- Infection control in nursing homes can keep mortality in check
- Not clear: how far can you go with reopening and keep R(t)~1?
- How does it scale with absolute case numbers?
- How much will seasonality make it harder?
Learning about natural history

MEASLES

SUSCEPTIBLE

EXPOSED

INFECTED/INFECTIOUS

RECOVERED/IMMUNE

VIRUS TEST SENSITIVITY <100%

ANTIBODY TEST SPEC <100%

TRUE - / FALSE +

TRUE - / FALSE +

TRUE - / FALSE +

TRUE - / FALSE +

Recrudescence

Partial Immunity

Waning Immunity

SARS-COV-2
Pandemic Data analysis is all about (unmeasured, changing) delays

- Infection
- Symptoms
- Hospital
- ICU
- Death
Consequences for control
Consequences for contact tracing

48%*39%<20% is upper bound of effectiveness before accounting for
- Delay from index symptoms to testing (up to weeks!)
- Delay from index testing to result
- Delay from result to isolation and tracing

NB prime viral shedding is before symptoms to 3-5 days after onset.
Contact tracing in a raging epidemic
Methods for reproduction number

**Cori Method**

\( R_t \) is the average number of new infections caused at time \( t \), by a person already infectious at time \( t \).

→ \( R_t \) reflects transmission happening at time \( t \).

**Wallinga and Teunis Method**

\( R_t \) is the average number of new infections caused (eventually) by a person who becomes infectious at time \( t \).

→ From the perspective of an observer at time \( t \), this is a leading estimate. It predicts transmission events that have not yet occurred.
Subtle methodologic choices can lead to major errors in policy evaluation

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Comment on data from Pan et al.
JAMA 2020
Opinion

The United States Needs a ‘Smart Quarantine’ to Stop the Virus Spread Within Families

Evidence from around the world shows that stay-at-home orders take us only so far.

By Harvey V. Fineberg, Jim Yong Kim and Jordan Shlain
Dr. Fineberg, Dr. Kim and Dr. Shlain specialize in public health.