How to unlock safely

Strategic aim: to prevent COVID-19 fatalities post lockdown

Mechanisms: to protect vulnerable people by minimising their **exposure to infection** and the **prevalence of infection** in the community:

Minimising exposure of the vulnerable:

- **Maintaining shielding** until the prevalence of infection is very small (i.e., 0.01%).

Shielding means avoiding any situation that precludes a 2-m rule if you are vulnerable or living with somebody who is vulnerable. Vulnerable can be read as over the age of 65 or with underlying health problems.

Minimising prevalence by reducing viral transmission:

- Isolating infectious individuals; via find, test, trace, isolate and support (**FTTIS**)

The objective of FTTIS is straightforward: it affords the opportunity to reduce viral transmission by isolating yourself shortly before you could become infectious. This is the only mechanism that will pre-empt a second wave of infections, saving over 6,000 lives.

- Isolate infected communities; via **local lockdown** and cordon sanitaire

Isolating infected communities will require:

1. Local lockdown to reinstate of the 2-m rule (i.e., closure of public venues and amenities).

2. Local lockdown should persist until the prevalence of infection falls below 0.6% based upon (community) testing.

3. Enhanced (community) testing to estimate the local prevalence of infection.

4. Enhanced FTTIS should be resourced in terms of local testing facilities and ensuing surveillance.

5. Consensual and community-based implementation of cordon sanitaire, resolving any legislative or jurisdictional issues in advance.

Strategic recommendations:

- Clear **central public health advice** reflecting the three tenets of the unlocking strategy. Particular emphasis here is placed on distinguishing unlocking for people who are and are not vulnerable. In other words, **shielding and self-isolation for people who are clinically vulnerable should be maintained rigorously**, while a controlled relaxation of social distancing proceeds in the nonvulnerable population.

- In terms of FTTIS, the imperatives for **enhancing the efficacy of testing and tracking** are manifest in quantitative modelling (see below). Namely, a substantial number of lives will be saved if FTTIS can be implemented with a reasonable degree of efficacy (e.g., 50%).

- Finally, a **clear protocol and quantitative guidelines needs to be established for local lockdown**. This would be usefully underwritten by rehearsing the scenario in advance—so that local authorities know what they have to do, and potential problems can be identified in advance.

Local lockdown is only workable when there is a clear quantitative criterion for unlocking. The recommendation above (unlocking when the prevalence of infection falls below 0.6%) is based upon quantitative modelling of lockdown responses during the first wave. Lockdown and implicit social distancing at this kind of threshold can preclude resurgence of infections, when aggregated at a regional level (i.e., averaged over local outbreaks).

The quantitative recommendations above are based upon dynamic causal modelling of the outbreak in the United Kingdom. For technical details please see (Friston, Parr et al. 2020). Perhaps the most important conclusion of this modelling is the role of FTTIS in pre-empting a second wave and saving thousands of lives. Figure 1 illustrates this by plotting the expected fatality rates under a scenario with and without FTTIS. Mathematically, FTTIS is implemented in a straightforward way in terms of the probability that if I am infected but asymptomatic, I will self-isolate. If this probability can be increased to about 50%, via FTTIS, then the second wave can be pre-empted or deferred, thereby substantially reducing mortality and morbidity.

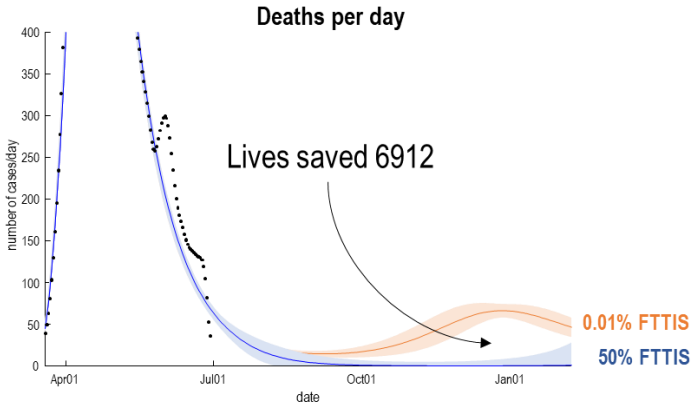

Figure: Predicted fatality rates per day for a 380-day period, with (blue) and without (orange) an effective FTTIS strategy starting on 1 July 2020. The lines correspond to the expected rates of death, while the shaded areas correspond to 90% Bayesian credible intervals. The dots show recorded deaths (smoothed over seven days). Here, an effective FTTIS strategy is modelled with a 50% chance that I will self-isolate, if infected but asymptomatic.

Note that this criterion is not based upon the reproduction rate (R), which is a potentially misleading statistic. For example, the reproduction rate for a population with negligible levels of infection is R = 1 (because R reflects the rate of change of infection not the level of infection). The level of infection can be estimated in a straightforward way from new cases and deaths-by-date on a regional level. See for example: https://www.fil.ion.ucl.ac.uk/spm/covid-19/dashboard/

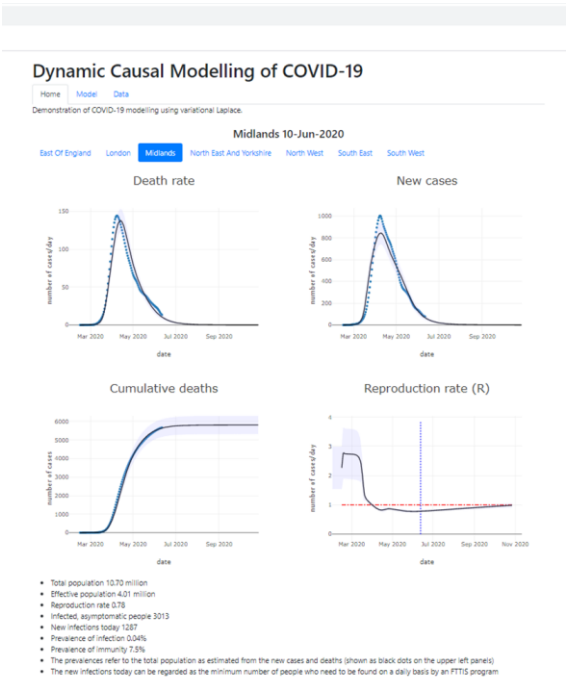

Figure: This dashboard provides an estimate of the regional prevalence of infection and the expected number of new, asymptomatic, infection cases per day (**New infections today**). This can be taken as a rough guide to the minimum number of people that need to be identified.

Friston, K., T. Parr, P. Zeidman, A. Razi, G. Flandin, J. Daunizeau, O. Hulme, A. Billig, V. Litvak, C. Price, R. Moran and C. Lambert (2020). "Testing and tracking in the UK: A dynamic causal modelling study [version 1; peer review: awaiting peer review]." Wellcome Open Research **5**(144).