Covid-19: Modelling the pandemic

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When the pandemic hit, the reaction of researchers around the world was “How can I help?”. The consequence was over 10,000 well-meaning but unreviewed preprint papers and hundreds of amateurs cluttering the inboxes of the government’s scientific advisors.

There had to be a better way. The Royal Society sent an appeal to the computer modelling community to help the epidemiologists. “Rapid Assistance to Modelling the Pandemic”: RAMP - an acronym which seemed snappy in March. Soon dozens of coders were seconded to the leading modelling groups, contributing to the signal, not the noise. Ackland was awarded the role “Leading New Research”: partly a polite shorthand for “shielding the existing experts”. We rethought how to do peer review in a crisis – triage: crowdsourced reviews of the preprints, then a rapid filtering to an expert review panel, and onwards to the UK government advisory committees SPI-M and SAGE.

With rapid turnaround required by policymakers, even the best groups are in danger of slip ups, so another RAMP task was replication of influential work. We looked at the code for the model of Imperial College’s Neil Ferguson. His group’s blandly-titled “Report 9” predicted half a million deaths if nothing was done, and is generally regarded as “The Science” behind the lockdown. Reading it, carefully, we noticed something odd – while all the proposed measures slowed the epidemic, school closures increased the total number of deaths. Our first thought was that it was a mistake, but after a little work on the code, we replicated the result. The basic reason for this counter-intuitive result is that an intervention that substantially suppresses the first-wave epidemic leads to a stronger second wave once the interventions are lifted.

So, why was this advice ignored? Perhaps because the result only holds if there’s no successful vaccination programme for a couple of years. But more likely, the natural impulse of anyone faced with a result that goes against their preconceived ideas is denial – and scientists are no different in this respect. The UK had planned for a flu epidemic, and schools are a hotbed for influenza transmission. So, even though the low infectivity and morbidity for young people was well understood by March, it may have been difficult to accept how different influenza and COVID really were, and some nervousness about trying anything counter-intuitive based on a model. Moreover, failing to suppress the epidemic in the short term, based on a prediction of saving lives in the long term would be politically brave: especially when the identities of those saved could never be known.

While school closures are an interesting case, the general lesson from the model is simple. The effective interventions are those which focus strongly on protecting the vulnerable. Broader measures across all of society turn out to be counterproductive in the long term, even if compliance on the most effective features is uncompromised. In practice, the failure to focus on protecting care homes meant that the first wave was, disastrously, to concentrate the epidemic on the most vulnerable.

Scientific predictions are often published to great fanfare, with retrospective analysis seldom attracting as much attention. Report 9 appeared in March, we completed our study in June, and a lot has happened since. Infections went down steadily during lockdown, as predicted, and at the time of writing are rising again, just as predicted. With hindsight, the

Imperial model has proved remarkably accurate, whereas the enthusiastic amateurs have fared less well. It turned out that the experts really are expert.