

Friday Report – Issue 27

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COVID-19 Actuaries Response Group – Learn. Share. Educate. Influence.

COVID-19 is still one of the hottest topics for scientific papers and articles. The COVID-19 Actuaries Response Group provides a regular Friday update with a summary of the key papers and articles that we've looked at recently.

Clinical and Medical News

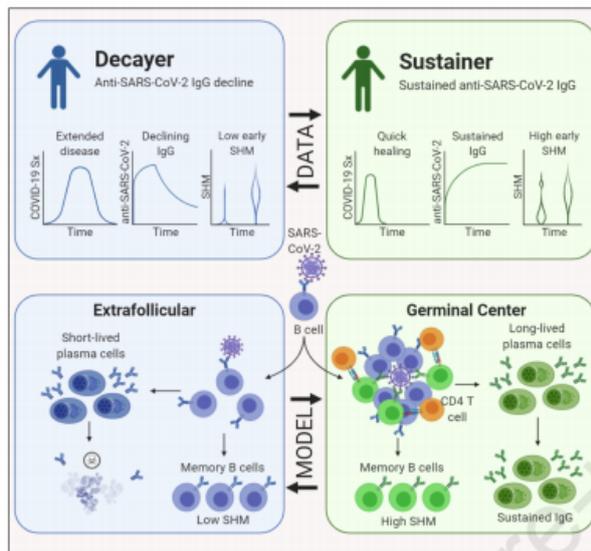
Predictors of Severe Illness and Mortality

A number of different biomarkers have demonstrated utility in being able to stratify morbidity and mortality risk in those hospitalised with COVID-19. Analysis of electronic health records of 2,511 hospitalised patients in Eastern Massachusetts between 1 March and 5 June 2020 was undertaken in this [study](#) to identify not only biomarkers, but also sociodemographic features and comorbidities that could aid the development of a risk stratification tool.

The combination of abnormal hematologic measures, renal function status, sociodemographic profile and comorbidity measures were associated with a greater risk of poorer outcomes and can be used as a robust risk stratification tool.

Quick COVID-19 Healers Sustain Anti-SARS-CoV-2 Antibody Production

One of the emerging concerns has been the durability of the antibody response with many reports suggesting that the response is not sustained.



In this [study](#), 76 recovering COVID-19 patients who were enrolled between March 2020 and June 2020 had antibody analysis performed in order to understand the duration of SARS-CoV-2 antibody responses and whether there any factors that could influence this response. The majority of the patients had mild disease and recovered at home; only 5 were hospitalised.

In general, most of the participants showed antibody decline across the 3 months of analysis. However, the study also identified that for some, this was not the case: antibody 'sustainers'. Sustainers were found to have had a shorter disease course and increased levels of immunologic adaptation. The latter in particular is felt to play a role in quicker symptom clearance.

Remdesivir for the Treatment of Covid-19 — Final Report

Results from trials of the anti-viral drug Remdesivir have been largely disappointing to date. The final [report](#) has been published from the Adaptive COVID-19 Treatment Trial (ACTT). This is a double-blind, randomized, placebo-controlled trial of intravenous Remdesivir in adults hospitalized with COVID-19 and evidence of lower respiratory tract infection.

In this study, patients given Remdesivir were found to have shorter time to recovery compared to those in the placebo group, (median, 10 days, as compared with 15 days). For those with more severe disease, this was 11 days vs. 18 days. The benefit of Remdesivir was larger when given earlier in the illness. The results also suggest that treatment with Remdesivir may have prevented the progression to more severe respiratory disease. A trend toward lower mortality was observed among patients who received Remdesivir, but the differences did not reach statistical significance.

T cell response lasts for at least six months after infection

T cells, of which there are a number of types, have an important role to play in our immune response. Their roles include directly killing infected host cells, activating other immune cells, producing cytokines and regulating the immune response. Each T cell will develop its own T cell receptor (TCR) that is specific to a particular antigen.

The T-cell response in 100 convalescent donors at 6 months following initial SARS-CoV-2 infection in March-April 2020 was analysed ([link](#)) in order to establish magnitude and phenotype of the SARS-CoV-2 cellular immune response at 6 months.

The researchers report that:

- Virus-specific T cells were detectable in all donors at 6 months;
- The magnitude of the T cell response was heterogeneous; the magnitude of cellular immunity was considerably higher in donors who had experienced symptomatic disease.

Distinct antibody responses to SARS-CoV-2 in children and adults

Children who become infected with SARS-CoV-2 appear to have milder disease with fewer respiratory symptoms than adults. In addition, some children who develop severe symptoms go on to develop a life-threatening multisystem inflammatory syndrome (MIS-C).

Age-specific antibody responses were analysed in this [study](#), in adult and paediatric patients seen at New York-Presbyterian/Columbia University Irving Medical Center (NYP/CUIMC) hospital and the Morgan Stanley Children's Hospital of New York (MSCHONY) during the height of the pandemic in New York City from March to June 2020.

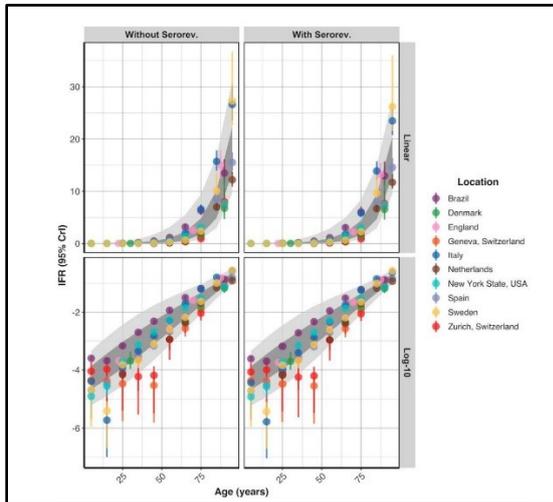
Compared with adults, children produced fewer antibodies against the virus's spike protein, with lower levels of neutralising activity. It is thought that the innate immune system plays a key role in children, helping to reduce the viral load thus leaving less for antibodies and T-cells to have to do. In addition, children express less ACE-2 in their airway cells.

These results suggest a distinct infection course and immune response in children independent of whether they develop MIS-C.

Modelling

Imperial College Report 34 – COVID-19 Infection Fatality Ratio Estimates from Seroprevalence ([link](#))

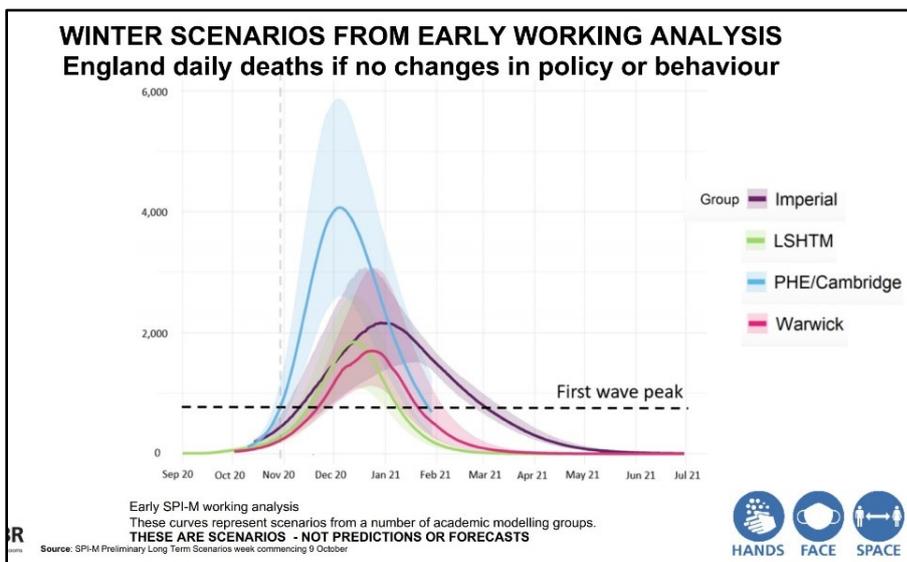
This report looks at the infection fatality ratio across 10 populations (based on representative antibody surveys which were selected from 175 surveys in total). It notes the correlation between income levels and age distribution of populations, and the effect this has on IFRs. It concludes that for low income/low average age countries, a typical IFR is around 0.23%. In contrast, for high income, relatively elderly populations a rate of around 1.15% is more usual.



The conclusion that a high-income country might suffer an IFR of around five times that of a low income country is of course startling, and initially counter-intuitive, until one understands the main reason behind it which is that the age related mortality rate of the virus follows a steep curve, doubling approximately every eight years, and these countries differ markedly in their age profiles.

Projections Debacle

The press conference on Saturday at which the Prime Minister announced a second lockdown in England was notable for the scathing criticism of one of the slides, which showed various models projecting future deaths with no further changes in restrictions.



The PHE/Cambridge model suggested a peak of 4,000 deaths, but the plausibility of this was highlighted by the fact that the estimate for the day of the briefing was no less than 840 deaths, around four times the likely actual figure. The lower bound confidence interval was 550, still over twice the (then) current run rate.

This apparent lack of sense checking / peer review has had the effect of undermining the credibility of those presenting, and the message they were trying to convey. It has been highlighted by those who are sceptical about the rationale for a second lockdown, further undermining the intention of the presentation.

The two lower projections, which appear much more sensible in relation to the current position (Warwick estimated 240 deaths by 31 October), both project a peak of between 1,700 and 1,800 deaths per day by mid December.

It has also been announced that the two following slides in the pack have been amended, reducing the SPI-M peak projections upper limit for hospital admissions and deaths.

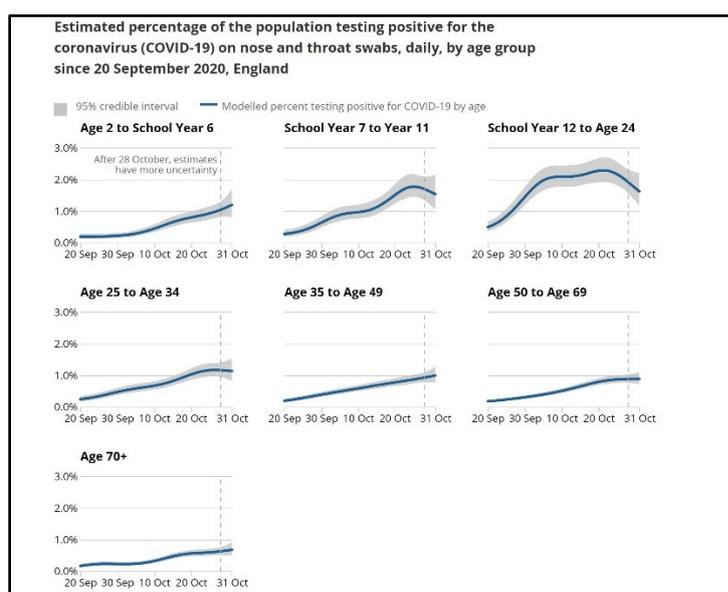
Data

ONS Infectivity Survey ([link](#))

Some more encouraging news in today's update from the ONS. It reports that new infections in England appear to have levelled off at around 50,000 per day. This follows several weeks of rapid increases. Overall levels have increased, albeit modestly, with around 1 in 90 of the population estimated to be infected.

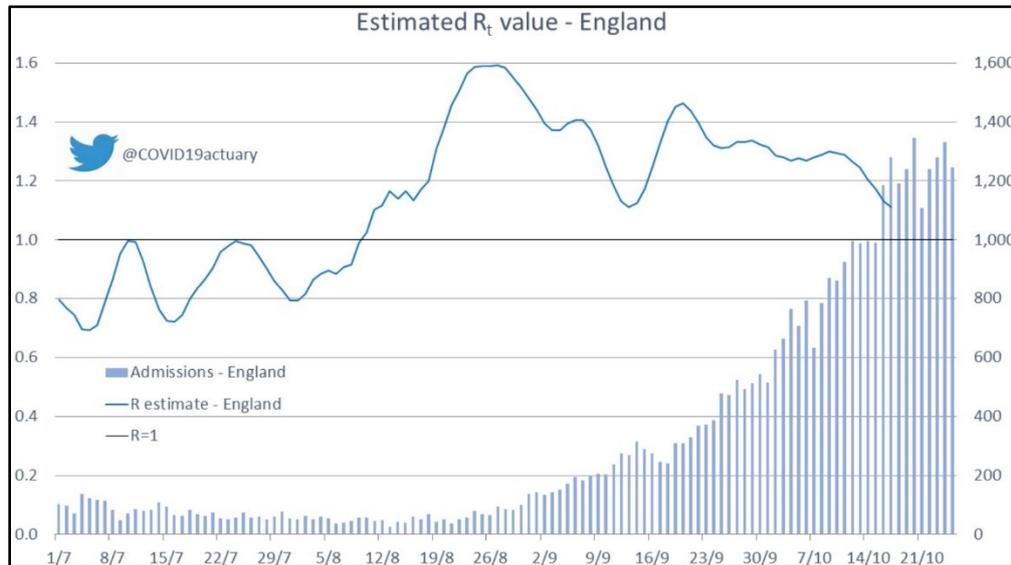
A degree of caution is needed however, as the age profiles show that much of this is due to a fall in new infections amongst the younger population segments, notably upper school years and 18 to 24 year olds. The picture is much less certain amongst the older age groups, which drive hospital admissions.

As we enter a second lockdown, this survey suggests a more positive starting situation on which to build progress over the coming week. Although with infection levels much higher than they were even two or three weeks ago, the downward curve will inevitably be at a higher level than it would have been with an earlier lockdown, which will result in more deaths than might have been the case.



Estimate of R

The latest SAGE estimate of R for the UK is unchanged at 1.1 to 1.3, with the same range for England. Our own estimate, based on recent hospital admissions data, is slightly more encouraging, and has dropped steadily over the last week to around 1.1. This analysis is updated on Tue/Thu/Sat and can be found [here](#) shortly after the NHS publishes the latest admissions figure, typically early evening.



And finally ...

As we are now in a second lockdown, the internet is full of helpful suggestions on activities to relieve the stress/boredom. But for those for whom baking the ultimate banana bread, improving your warrior pose or organising a virtual quiz night sounds horrifying, why not indulge in a little virtual tourism? Let [webcamtaxi](#) take you to the beaches of Thailand or Hawaii, the koala sanctuary in Queensland or the Grand Canal in Venice. If you prefer something a little less grand, you can even sneak a peek at numerous small bird feeder stations.