



Friday Report: Issue 48

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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 key papers and articles.

Vaccination

Vaccine effectiveness against the Delta variant

A study into AstraZeneca and Pfizer-BioNTech vaccine effectiveness against the Alpha and Delta variants respectively has been published based on data from England ([link](#)).

Data on all positive PCR tests between October 26, 2020, and May 16, 2021, were extracted, while data on all recorded negative community tests among people who reported symptoms were also extracted for the test-negative case-control analysis. Vaccination status was extracted from the National Immunisation Management System.

The analysis considered covariates possibly associated with the likelihood of vaccination and the risk of exposure to COVID-19 in general, and specifically to the two variants. Logistic regression was used to estimate the odds of having a symptomatic, PCR-confirmed case of COVID-19 among vaccinated persons as compared with unvaccinated persons.

Vaccine effectiveness against symptomatic Delta variant COVID-19 for Pfizer was estimated at 36% and 88% after 1 and 2 doses respectively. The figures for AstraZeneca were a bit lower at 30% (1 dose) and 67% (2 doses). The table below shows the associated sample sizes and confidence intervals and shows that efficacy against Delta is lower than the associated efficacy against Alpha.

Table 2. Vaccine Effectiveness against the Alpha Variant or S Target–Negative Status and the Delta Variant or S Target–Positive Status, According to Dose and Vaccine Type.*

Vaccination Status	Test-Negative Status		Alpha Variant or S Target–Negative Status			Delta Variant or S Target–Positive Status	
	Controls	Cases	Case:Control Ratio	Adjusted Vaccine Effectiveness (95% CI)	Cases	Case:Control Ratio	Adjusted Vaccine Effectiveness (95% CI)
	no.	no.		%	no.		%
Unvaccinated	96,371	7313	0.076	Reference	4043	0.042	Reference
Any vaccine							
Dose 1	51,470	2226	0.043	48.7 (45.5–51.7)	1493	0.029	30.7 (25.2–35.7)
Dose 2	23,993	143	0.006	87.5 (85.1–89.5)	340	0.014	79.6 (76.7–82.1)
BNT162b2 vaccine							
Dose 1	8,641	450	0.052	47.5 (41.6–52.8)	137	0.016	35.6 (22.7–46.4)
Dose 2	15,749	49	0.003	93.7 (91.6–95.3)	122	0.008	88.0 (85.3–90.1)
ChAdOx1 nCoV-19 vaccine							
Dose 1	42,829	1776	0.041	48.7 (45.2–51.9)	1356	0.032	30.0 (24.3–35.3)
Dose 2	8,244	94	0.011	74.5 (68.4–79.4)	218	0.026	67.0 (61.3–71.8)

As well as this study, the Israeli Ministry of Health have published a report ([link](#)) with somewhat different conclusions. Their study indicates a reduction in vaccine efficacy for the Pfizer vaccine. They estimated that the efficacy of Pfizer’s vaccine in preventing infection has dropped to 39% but that, while the efficacy of the vaccine in preventing serious illness has also dropped, it still stands at 91% and the efficacy in preventing hospitalisations among the vaccinated now stands at 88%.

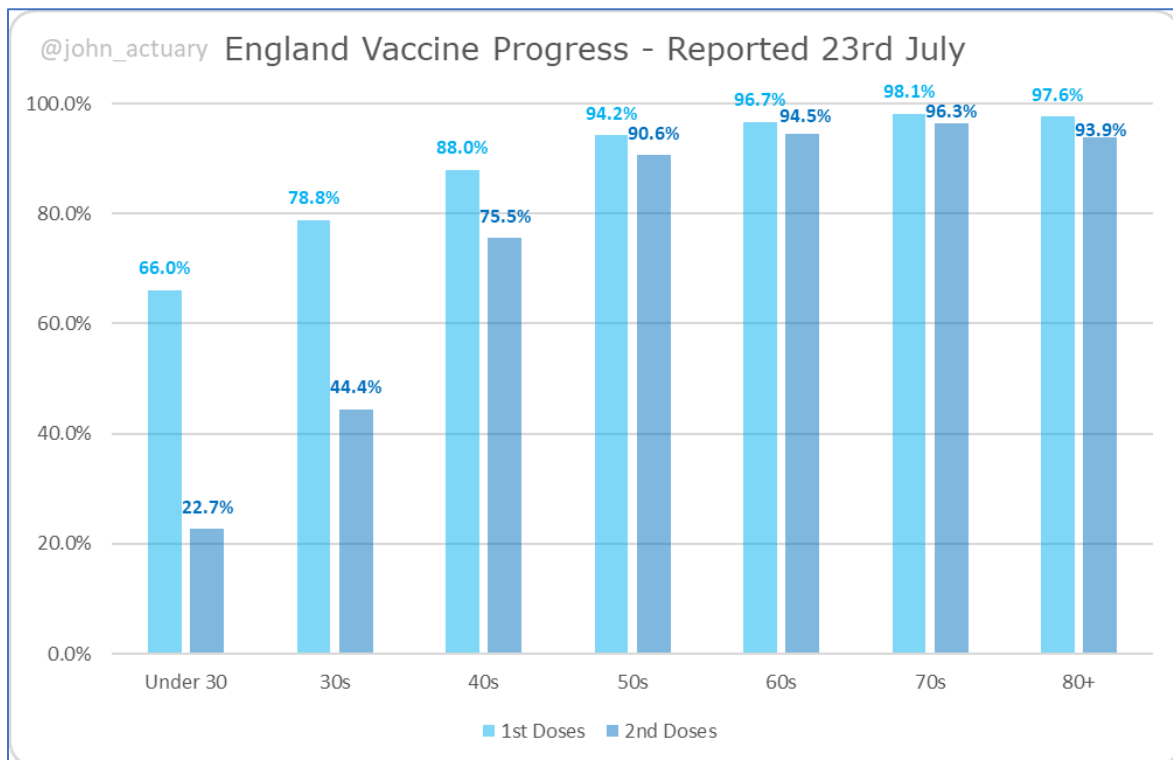
There is some speculation as to the causes of the different conclusions – these may include allowance for confounding factors and the dosing schedule. Israel used a 3-week gap between first and second doses while the UK has recently adopted an 8-week delay, down from 12 weeks ([link](#)).

In the meantime Israel has started rolling out third Pfizer booster shots to immunocompromised people ([link](#)). The UK plans to start rolling out boosters in September ([link](#)) but with constrained global supply there are questions about equity in relation to countries that have yet to receive sufficient supply even for first doses.

UK Progress and Take-up Rates

Vaccination rates in the UK have slowed in the last couple of weeks, with little movement in first doses. Last week first doses for under 30s were at 64% and, for people in their 30s, 78%. For second doses there has been little movement for the under 30s, with an 8-week delay between doses being recommended. For those in their 30s second dose take-up has increased from 38% to 44% while for those in their 40s this take-up has increased from 72% to 76%, with little movement at older ages.

The vaccination roll out for adults appears to be drawing to a close and as a result we will be issuing updates less frequently.



Clinical and medical news

Higher incidence of severe COVID-19 with sickle cell disease

Sickle cell disease (SCD) is an inherited condition that affects the development of red blood cells. Those who inherit sickle cell genes from both parents produce unusually shaped red blood cells that predispose to blood clots, restrict gas exchange and are more likely to break down in the spleen. If a single copy of the gene is inherited, this is termed “sickle cell trait” and the changes are less restricting. Sickle cell disease, is associated with a protective benefit against malaria.

Prior research has identified that those with SCD who become infected with COVID-19 are more likely to be hospitalised, principally because the condition exacerbates worse outcomes through severe pain, joint and organ damage.

A study of 750 children and adults in the USA ([link](#)) found that those with SCD who had suffered two severe pain episodes were 2 times more likely to be hospitalised with COVID-19 and 2-3 times more likely to suffer severe COVID-19 outcomes for adults or children respectively.

A further study ([link](#)) from the UK followed 5,000 people with SCD and 25,000 that had just one copy of the sickle cell trait. The study concluded that those with SCD are 4 times more likely to be hospitalised and twice as likely to be hospitalised as controls. Moreover, hospitalisation and mortality rates were raised for those with the sickle cell trait – in the study, 10 from the SCD group and 50 from the sickle cell trait group died over the period of follow-up.

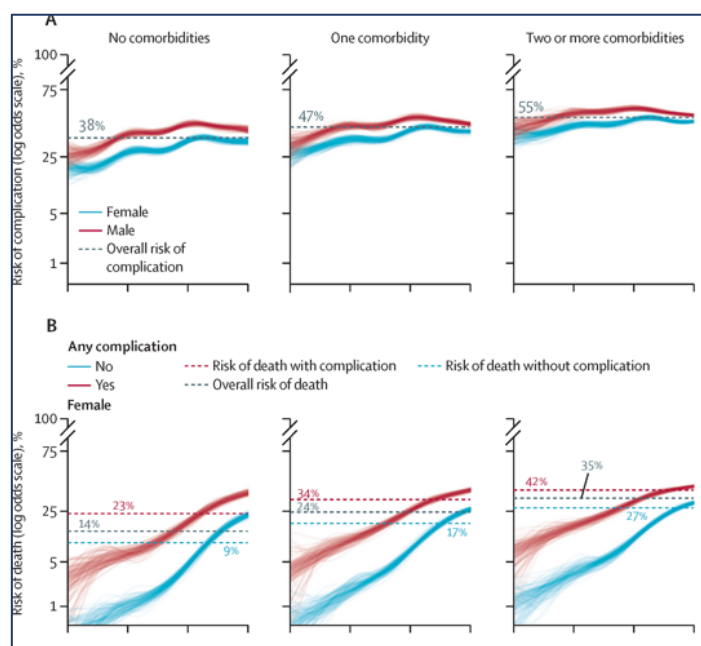
Screening for sickle cell disease is part of the neonatal screening programme in the UK. However, in the absence of all-age population screening, some older individuals with sickle cell trait may be unaware that they are carriers of the condition.

Serious organ damage is a concern for younger COVID-19 patients as well

Since the early stages of the pandemic, it has been apparent that COVID-19 is a systemic disease affecting multiple organs, rather than just a respiratory disease. The focus has understandably been on older people where the risk of mortality and hospitalisation is much higher.

However, a recent UK study ([link](#)) published in the Lancet has examined the prevalence of complications in different age groups. The study followed 73,000 people admitted to 300 UK hospitals during the first wave. The most common organs affected were kidneys, followed by lungs and heart – with 40% of those aged between 18 and 50 reporting at least one organ complication.

The graphs illustrate the higher risk of complications with increasing numbers of prior co-morbidities, and how complications lead to higher risk of mortality across age groups.

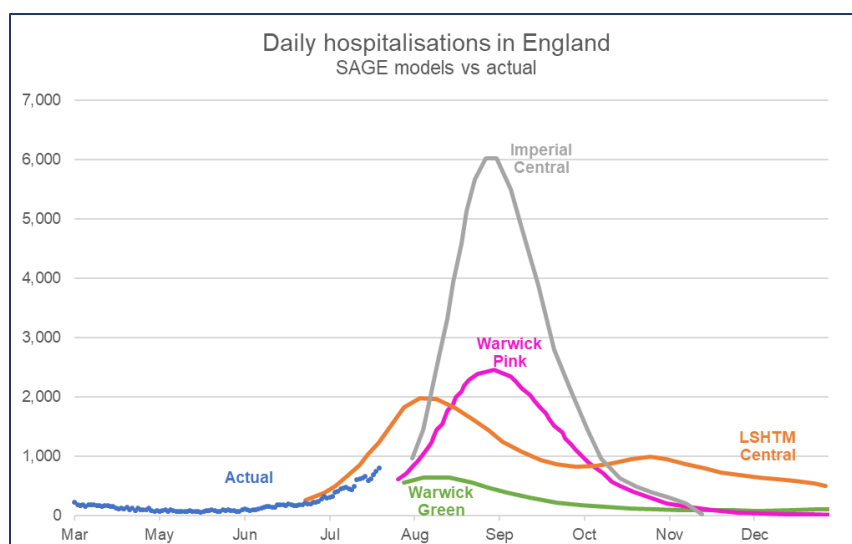


Modelling

We recently published a bulletin ([link](#)) summarising modelling papers from London School of Hygiene and Tropical Medicine (LSHTM), Warwick University and Imperial College London. These papers plotted possible trajectories for cases, hospitalisation and death over the coming months, given the move to step 4 of the Government's roadmap on 19 July.

The chart below monitors the actual trajectory of hospitalisations in England against four of the projections produced by the groups:

- LSHTM central model (assuming waning immunity of 15% over the next 12 months)
- Imperial central model
- Warwick "green" and "pink" models which represent the two extremes of their assumptions on precautionary behaviour:
 - "Green" assumes a gradual move towards pre-pandemic behaviour (to March 2022)
 - "Pink" assumes an immediate step-change to a state close to pre-pandemic behaviour, with a full return to pre-COVID mixing reached by September 2021



It is clear that actual hospitalisations (blue) are tracking slightly below the LSHTM estimate but are already above Warwick's estimates for late July.

The models diverge significantly from each other in early August; we will continue to track the figures regularly.

UK Data

Impact of COVID-19 on UK term assurance mortality experience

The Continuous Mortality Investigation (CMI) has reported indicatively on the impact of COVID-19 on UK term assurance experience in the first six months of 2020 ([link](#)).

Overall mortality experience is significantly higher in 2020 than in 2019, with a pronounced spike in April 2020. For males the excess in is line with that seen in the general population, while the excess is lower among female insured lives. The insured lives excess for ages 30 to 75 is +9% compared with 15% for the same age range in the general population.

In contrast, accelerated critical illness experience is lower in 2020 than in 2019, particularly for females. This may be the effect of delayed diagnoses.

Schools data

The Department of Education reported that on 15 July COVID-related pupil absence in state-funded schools in England was 14% ([link](#)). The table below shows that the majority of those (11%) were self-isolating because of a contact inside school.

Table 1: Proportion of pupils absent from open schools due to COVID-19 reasons on 15 July (adjusted for Y11-13 not expected to attend)

Phase	Proportion of pupils with a suspected case of COVID-19 (%)	Proportion of pupils with a confirmed case of COVID-19 (%)	Proportion of pupils self-isolating due to contact inside school (%)	Proportion of pupils self-isolating due to contact outside school (%)
State-funded primary	0.4%	0.5%	9.0%	2.0%
State-funded secondary	0.5%	0.9%	13.4%	2.5%
State-funded special	0.7%	0.4%	7.9%	2.0%
All state-funded schools	0.5%	0.6%	10.6%	2.2%

A pre-print study from Oxford University was released on 23 July ([link](#)) and reports on the results of a randomised controlled trial in students and staff from 49 secondary schools and further education colleges in England. Schools were randomised to self-isolation of COVID-19 contacts for 10 days (control arm) or to voluntary daily lateral flow device (LFD) testing for school contacts with LFD-negative contacts remaining at school (intervention arm).

In the control arm there were 657 symptomatic PCR-confirmed infections (59.1/100k per week). In the intervention arm there were 740 symptomatic PCR-confirmed infections (61.8/100k per week). This resulted in an adjusted incidence rate ratio of 0.96 [CI 0.75-1.22; p=0.72] showing little difference in positive tests in the control vs the intervention group.

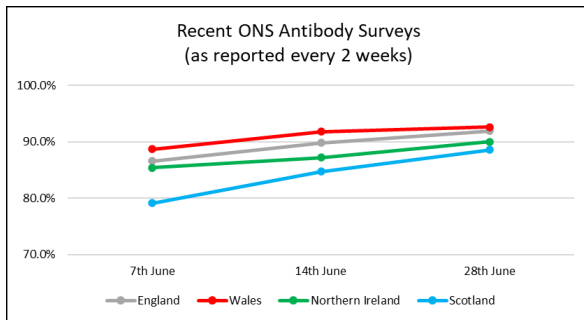
In the control arm there were 55,718 COVID-related absences (1.8%) and in the intervention arm there were 48,609 absences (1.5%) resulting in an adjusted incidence rate ratio of 0.80 [CI 0.53- 1.21; p=0.29].

The authors conclude that daily contact testing of school-based contacts was not inferior to self-isolation for control of COVID-19 transmission and that daily contact testing is a safe alternative to home isolation.

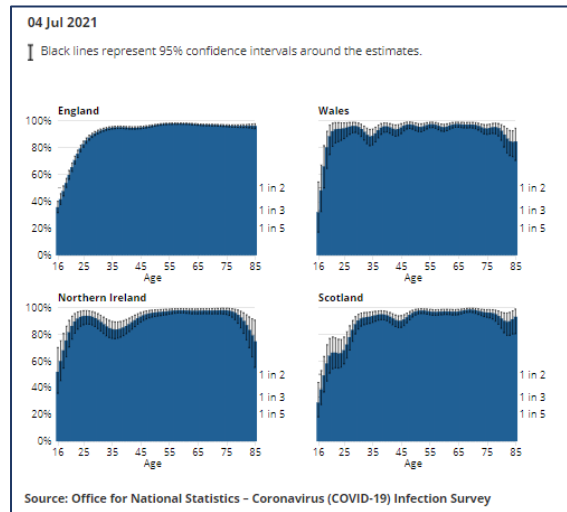
ONS Antibody data [\(link\)](#)

The latest fortnightly analysis by ONS on antibody levels in adults (whether from infection or vaccination) shows a continued increase with all nations except Scotland now topping 90%.

England, Wales and Northern Ireland all show modelled antibody levels of at least 80% for ages 25 and older, perhaps with a dip in Northern Ireland at ages 84 and older. For 16 and 17-year olds, antibody levels are between 29% and 60% which reflects naturally acquired infection as the minimum vaccination age is currently 18.

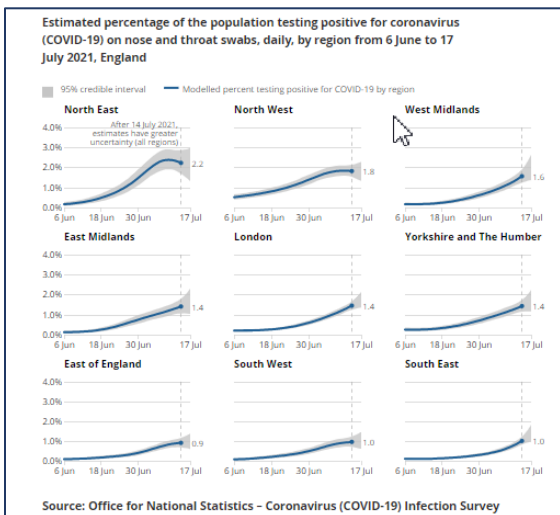
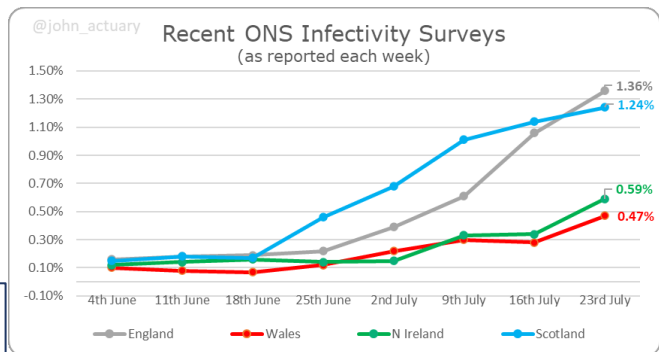


	Week commencing		
	7th June	14th June	28th June
England	86.6%	89.8%	91.9%
Wales	88.7%	91.8%	92.6%
Northern Ireland	85.4%	87.2%	90.0%
Scotland	79.1%	84.7%	88.6%
Published	22nd June	7th July	21st July



ONS Infection Survey [\(link\)](#)

Infectivity has continued to rise in all nations, but with signs of a decrease in the growth rate in Scotland. The English region with this highest weekly level of infections remains the North East but with possible signs that infection rates may be starting to fall there.



“R” Estimate [\(link\)](#)

The latest estimate by the UK Health Security Agency is that R is between 1.2 and 1.4 in England, unchanged from last week’s range.

The regional estimates are shown here.

Region	R	Growth rate % per day
England	1.2 to 1.4	4 to 6
East of England	1.3 to 1.5	5 to 8
London	1.2 to 1.4	4 to 6
Midlands	1.2 to 1.4	5 to 7
North East and Yorkshire	1.2 to 1.5	4 to 7
North West	1.0 to 1.2	1 to 3
South East	1.2 to 1.5	5 to 8
South West	1.3 to 1.5	6 to 8

International Data

Excess mortality in India

India’s official COVID-19 death count as of end-June 2021 is 400,000. India is one of the few major economies that does not have estimates of excess deaths during the COVID-19 pandemic. A study by Anand, Sandefur and Subramanian [\(link\)](#) use three methods to extrapolate national excess deaths estimates and reports that excess mortality is 8.5 to 12.25 times higher than the official COVID-19 death statistics.

Table 1. Comparing Alternative Estimates of All-Cause Excess Mortality (millions)

	Wave 1 (April 2020- March 2021)	Wave 2 (April - June 2021)	Total
1. States' Civil Registration Systems (CRS)	2 [0.1-2.3]	1.4 [1-2]	3.4 [1.1-4]
2. International age-specific infection fatality rates applied to Indian demography and seroprevalence	1.5	2.4	4.0
3. Consumer Pyramid Household Survey (CPHS)	3.4 [2-4.8]	1.5 [0.8-2.3]	4.9
<i>Official</i>	<i>0.16</i>	<i>0.24</i>	<i>0.4</i>

The state-level civil registration data is from a subset of seven states, one of which is Uttar Pradesh where the figures reported for the second wave appear to be underestimates which the authors allow for with a wide range for the second wave.

For seroprevalence estimation a nationally representative survey was carried out between December 2020-January 2021, placing India’s infection rate at about 22% percent. This study references a recent WHO-AIIMS survey which covered the period mid-March to early June and estimated the infection rate at 58% for ages below 18 and 64% for ages 18 and above.

The Consumer Pyramid Household Survey (CPHS) is a longitudinal panel of over 800,000 individuals across all states. Since September 2014, the CPHS has recorded whether any member of the family has died in the four months covered by each survey.

Based on this dataset, the authors of the World Mortality Dataset ([link](#)) suggest that India now has the highest estimated number of excess deaths in the world during the pandemic. After adjusting for population size, it is ranked 9th and is ranked 6th in terms of undercount ratio of official statistics to excess mortality.

And finally ...

With most of us habituated to lives of constant Zoom calls, and now looking for 'staycation' options, help is at hand.

Nissan have helpfully invented a remote-working 'home office camper van', allowing workers to keep Zooming all through the summer.

One silver lining may be the chance to impress colleagues with more varied backgrounds on all of those video calls ...

Or perhaps we should be more positive, and regard it as a chance to add a holiday flavour to the 48 weeks of grind, rather than the other way round!



24 July 2021