The Friday Report - Issue 1

By Matt Fletcher and Nicola Oliver for

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

Every week, more is written on COVID-19 than any individual could possibly read. Collectively, the COVID-19 Actuaries Response Group read more about the outbreak than most, so we've decided each Friday to provide you with a curated list of the key papers and articles that we've looked at recently.

As this is the first issue of the Friday Report, we will cover the key papers and articles that we've read since the group was formed – future reports will cover only new information that we've picked up in that week.

Though we will try to be thorough, it won't be possible for us to cover everything that comes out - if there's anything that we've missed, that you think really should have made the cut, please let us know and we'll consider it for the next Friday Report.

Modelling - reports

Imperial College COVID-19 Response Team

It is worth keeping an eye on the Imperial College COVID-19 Response Team's reports – this team has been helping to inform the Government's response to the outbreak. Their reports can be found [here](#).

We found the following of particular interest:

[Report 9 (16 March 2020)](#) – *Impact of non-pharmaceutical interventions (NPIs) to reduce COVID-19 mortality and healthcare demand*
We commented on this report in our [first paper](#)

[Report 12 (26 March)](#) – *The Global Impact of COVID-19 and strategies for mitigation and suppression*
An interesting set of projections of what might have happened in scenarios with no intervention, mitigation, and suppression scenarios.

[Report 13 (30 March](#)) – *Estimating the number of infections and the impact of non-pharmaceutical interventions on COVID-19 in 11 European countries*
The team estimate that across the 11 countries monitored, interventions (social distancing, lockdowns etc.) have averted 59,000 deaths up to 31 March 2020. In the UK, they estimate that between 1.2% and 5.4% of the population were infected as of 28 March 2020.

Other groups

Fundamental principles of epidemic spread highlight the immediate need for large-scale serological surveys to assess the stage of the SARS-CoV-2 epidemic (Lourenço et al, 24 March 2020) ([Link](#))
We commented on this in our [second paper](#)

An international comparison of the second derivative of COVID-19 deaths after implementation of social distancing measures (Pike & Saini, 25 March 2020) (Link)
We commented on this in a short note.

The effect of control strategies to reduce social mixing on outcomes of the COVID-19 epidemic in Wuhan, China: a modelling study (Prem et al, 25 March2020) (Link)
Researchers from the Centre for the Mathematical Modelling of Infectious Diseases COVID-19 Working Group at the London School of Hygiene & Tropical Medicine modelled the control strategies in place in Wuhan, China, and the impact of lifting these measures at different stages of the outbreak. They found that the optimum approach, in terms of the median number of infections, was to start a staggered return to work at the beginning of April. This type of modelling may inform approaches to lifting control strategies in other countries.

Modelling – available models

There are a number of models that have been made available online. These are two that our readers may find helpful:

An online Susceptible – Infected – Recovered (S-I-R) model (Link) – this is a simple model of disease spread and can be used either to test results from other models, or as a building block to produce more complex models of the outbreak.

David Wilkie has produced a simple Excel sheet (Link) for modelling COVID-19. It is based on an S-I-R model but has more states, which are further subdivided by duration. It should be accessible for anyone with good Excel skills, and is able to produce almost immediate results, for 'what if' investigations.

Clinical and Medical News

As with the output from various model teams, the picture of the current pandemic from a medical perspective is constantly being updated; here's a roundup of key medical developments.

The COVID-19 Genomics UK Consortium (Link)

A consortium comprising of the NHS, Public Health Agencies, Wellcome Sanger Institute, and numerous academic institutions was launched on 23 March in order to rapidly sequence the viral genome of SARS-CoV-2 circulating in the UK. It is hoped that understanding the genomic sequence of the virus will allow for monitoring of any potential changes in the virus and importantly, whether the virus is undergoing mutation.

Samples from patients with confirmed cases of COVID-19 will be sent to a network of sequencing centres which currently includes Belfast, Birmingham, Cambridge, Cardiff, Edinburgh, Exeter, Glasgow, Liverpool, London, Norwich, Nottingham, Oxford and Sheffield.

SOLIDARITY – Global megatrial launched by the World Health Organisation (WHO) (Link)

On March 20, the WHO launched a multi-country clinical study for potential treatments for COVID-19, part of a rapid global search for drugs to treat COVID-19. In this unique approach, the simple study design will allow for hospitals in the frontline of the health crisis to take part.

The Solidarity trial will test four different drugs or combinations – remdesivir, a combination of two drugs, lopinavir and ritonavir, the two drugs plus interferon beta, and chloroquine – and will

compare their effectiveness to what is called standard of care — the regular support hospitals treating COVID-19 patients use now.

COVID-19 Testing (Link)

The WHO has repeatedly recommended that testing is the key way to track the spread of the virus and hence effectively manage it. In this article, the FT neatly summarises the two types and methods of testing, production and distribution of tests and importantly, reliability.

The first is the antigen test which requires a throat swab and subsequent identification of viral DNA, and the second which requires a blood test to identify the presence of antibodies which indicates that the patient's immune system has responded to past infection.

Respiratory Ventilators (Link)

A respiratory ventilator is the vital piece of equipment in hospital intensive care units that provide respiratory support to extremely sick patients. In essence, it is a sophisticated air pump that delivers variable levels of oxygen enriched air to a patient's lungs via a tube that is placed inside the patient's trachea (endotracheal or ET tube). Throughout this process the patient is sedated and very closely monitored as the risk of further physiological collapse is high. The ventilator is also able to monitor the pressure inside the patient's airways and alert the medical personnel should blockage of the tube begin to take place. A patient requiring ventilation must be cared for by suitably qualified and experienced medical personnel.

It is a fact that many health systems do not have enough ventilators, or experienced staff, to meet the surge in demand that the current pandemic is exerting.

This article reviews the current challenges with manufacturing and the innovative ways in which they can be tackled including basic models that can be quickly buildable in university workshops to collaboration with Mercedes Formula One team.

Data

Many people will be downloading and analysing the data emerging, to track the outbreak. These are the best sites for up to date data that we are aware of:

Worldwide data on confirmed cases and deaths, on a country by country basis, is updated daily at 1pm by the European Centre for Disease Prevention and Control (ECDC)

UK data is updated daily at 2pm – figures relate to confirmed cases as of 9am on the day of publication, and deaths as of 5pm on the day before publication.

As an example of why caution is needed when interpreting the figures produced, a recent article suggests that the number of deaths in a small Italian region may be four times higher than the official numbers recorded as being related to COVID-19

Data Visualisation

Once the data is downloaded, it is often helpful to produce charts, to better understand how the outbreak is developing. These are some of the sites that we like to visit to find the best visualisations of the data:

Financial Times – their COVID-19 coverage has been placed outside of the paywall. Their data visualisation team add new and useful charts almost on a daily basis, as well as updating for the most recent data

Our World in Data – the team produce good charts and a lot of useful information about the outbreak. In their commentary, they make the point well that interpretation is needed when comparing statistics for different countries

Worldometers – provide up to date information about deaths and cases by country and sub-region (e.g. US states)

Washington Post – a simulator showing how and why social distancing works to slow the spread of an outbreak

And finally…

Please do allow yourself a smile and spare a thought for Dr Daniel Reardon, an astrophysicist at Melbourne University. Whilst attempting to alleviate the boredom of self-isolation, he tried to invent a way to stop people touching their faces. After failing to do this, he inadvertently inserted four magnets into his nose, which required removal in hospital! (Link)

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