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Module 2 of the UK Covid-19 Public Inquiry
Request for Evidence under Rule 9 of the Inquiry Rules 2006
Reference for Request - M2/SAGE/01/NI

Dear Mr Suter,

Thank you for your letter of 2 September on behalf of Baroness Hallett, Chair of the UK Covid-19 Inquiry. Taking the questions in turn:

1. A brief overview of your qualifications, career history, professional expertise and major publications.

I am a mathematical modeller and epidemiologist. I hold a PhD in Applied mathematics and Control Engineering from the University of Lille (France) since 2003. Between 2004 and 2008, I was a post-doctoral researcher at the University of Cambridge working on the modelling of the spread of Equine influenza and the impact of vaccination campaigns. I then joined the Health Protection Agency (now UK Health Security, before Public Health England) leading on the modelling of respiratory pathogens and impact of immunisation. I moved to Imperial College London in 2019 as a Lecturer in infectious disease epidemiology on a joint appointment with the London School of Hygiene and Tropical Medicine (20%).

I have expertise in the modelling of infectious disease transmission to inform policy making and in particular building models using multiple data sources in real-time. I have worked on real time models used to inform several public health crises (e.g., 2009 influenza pandemic, 2014 Ebola west African outbreak). I have also contributed to the analyse of potential changes to the UK national vaccine programme, designing the modelling analysis triggering the start of the UK paediatric influenza national immunisation programme in 2012.

2. A list of the groups (i.e. SAGE and/or any of its sub-groups) in which you have been a participant, and the relevant time periods.

I have been a member of the Scientific Pandemic Influenza Subgroup on Modelling (SPI-M) since 2017 and for the whole duration of the pandemic, part of SPI-M-O. I am also a member of the "Comité technique des vaccinations" (French NITAG equivalent to UK JCVI) an expert committee in charge of vaccine related recommendation for the Haute autorite de la Sante (High authority on health) since 2020. I was part of the Serology Working Group from its creation in March 2020 until it was disbanded in April 2020.

3. An overview of your involvement with those groups between January 2020 and February 2022, including:
        a. When and how you came to be a participant;

I have been a member of SPI-M since 2017 and been included in the SPI-M-O meetings throughout the pandemic. I have also been part of the short-lived Serology Working Group (March-April 2020).

        b. The number of meetings you attended, and your contributions to those meetings;

I have attended almost all of the SPI-M-O meetings between January 2020 and February 2022. I have attended the meetings from the Serology Working Group. I have also attended one SAGE meeting (7th July 2021) where I was invited to present my group work on the roadmap modelling.

        b. Your role in providing research, information and advice.

Throughout the pandemic I have led the UK real-time modelling team as part of the Imperial Covid-19 response. The team I've led (whose members have varied during the period covered by this letter) was responsible for the development of a transmission model deriving epidemiological estimates (number of infections, hospitalisations and deaths over time) for the UK regions based on a series of data inputs. The data input has increased in number through the course of the epidemics to capture the complexity of the transmission of SARS-Cov-2 (variants, building of the vaccine-based immunity etc). The role of this model was to inform the UK government about the current epidemiological situation (e.g. the situation of the immunity in the population and the impact of a new variant emerging or the R number), provide short/medium-term forecasts to be used within the government and also provide a tool to generate scenarios to inform policy makers about the potential epidemiological impact of interventions.

We provided nowcasts and medium-term projections almost to all SPI-M-O meetings and we provided scenarios as a response to several commissions. Most notably, we provided input for the reasonable worst case scenario for the winter 2020/21 in June/July 2020, for the impact of circuit breakers during the autumn 2020, for the roadmap out of the lockdown (January to June 2021) and during the emergence of Omicron in November 2021. Note that each of these commissions have led to several reports and follow-up requests by the SPI-M-O secretariate in interaction with the Covid response taskforce in Cabinet Office. The commissions around the lifting of restrictions and the roll up of the vaccination programme for example lasted for several months from January to June 2021.

As a member of the Imperial Covid-19 response (from January 2020) I have also inputted, commented, or advised on other pieces of work outside of the UK real-time modelling work but the large majority of my effort was directed to the development and running of the Imperial UK real-time model in order to produce scientific advice for the UK government through SPI-M-O.

4. A summary of any documents to which you contributed for the purpose of advising SAGE and/or its related subgroups on the Covid-19 pandemic. Please include links to those documents where possible.

All of the following documents are reports or analyses from the Imperial Covid-19 response. My input to these reports has been variable as all are the result of work by many members from our team.

1. Early "Modelling inputs" – https://www.gov.uk/government/collections/scientific-evidence-supporting-the-government-response-to-coronavirus-covid-19#modelling-inputs
   - *Emerging Evidence – "Estimates of the severity of COVID-19 disease"*
   - *Reports from Imperial College London* – 8 reports listed on that page
2. Potential effect of school closure on a UK COVID-19 epidemic: annex to SPI-M-O consensus view – https://www.gov.uk/government/publications/annex-to-spi-m-o-consensus-view-on-the-impact-of-mass-school-closures-20-february-2020
3. Potential effect of non-pharmaceutical interventions on a COVID-19 epidemic – https://www.gov.uk/government/publications/potential-effect-of-non-pharmaceutical-interventions-on-a-covid-19-epidemic-25-february-2020
4. Sensitivity of proposed UK sentinel ICU pneumonia surveillance – https://www.gov.uk/government/publications/sensitivity-of-proposed-uk-sentinel-icu-pneumonia-surveillance-25-february-2020
5. Sensitivity of proposed UK sentinel GP COVID-19 surveillance – https://www.gov.uk/government/publications/sensitivity-of-proposed-uk-sentinel-gp-covid-19-surveillance-25-february-2020
6. Summary indicative effects of non-pharmaceutical interventions (NPIs) to reduce COVID-19 transmission & mortality – https://www.gov.uk/government/publications/summary-indicative-effects-of-non-pharmaceutical-interventions-npis-to-reduce-covid-19-transmission-mortality-2-march-2020
7. Adoption and Impact of NPIs – https://www.gov.uk/government/publications/adoption-and-impact-of-non-pharmaceutical-interventions-for-covid-19-3-march-2020; https://www.gov.uk/government/publications/impact-of-non-pharmaceutical-interventions-npis-to-reduce-covid-19-mortality-and-healthcare-demand
8. Timing & local triggering of non-pharmaceutical interventions (NPIs) to reduce COVID-19 mortality and healthcare demands – https://www.gov.uk/government/publications/timing-local-triggering-of-non-pharmaceutical-interventions-npis-to-reduce-covid-19-mortality-and-healthcare-demands-5-march-2020
9. Impact of non-pharmaceutical interventions (NPIs) to reduce COVID-19 mortality and healthcare demand – https://www.gov.uk/government/publications/impact-of-non-pharmaceutical-interventions-npis-to-reduce-covid-19-mortality-and-healthcare-demand-16-march-2020
10. Modelling for "Planning assumptions for the UK reasonable worst case scenario" – https://www.gov.uk/government/publications/planning-assumptions-for-the-uk-reasonable-worst-case-scenario-draft-25-march-2020 and https://www.gov.uk/government/publications/reasonable-worst-case-planning-scenario-29-march-2020
11. Reasonable worst-case planning scenario, 30 July 2020, note that this is a copy of the document written for SAGE by SPI-M-O with an important contribution from my group and has been published by the Spectator rather than a link to the original (unpublished) document https://www.spectator.co.uk/article/classified-covid-in-winter-2020-a-worst-case-scenario
12. Effect of relaxing current measures – https://www.gov.uk/government/publications/effect-of-relaxing-current-measures-2-april-2020
13. Intervention options and testing needs for long-term suppression of COVID-19 transmission – https://www.gov.uk/government/publications/imperial-college-london-intervention-options-and-testing-needs-for-long-term-suppression-of-covid-19-transmission-28-april-2020
14. Exit strategies: https://www.gov.uk/government/publications/imperial-college-london-response-to-covid-19-in-south-korea-and-implications-for-uk-exit-strategies-3-may-2020

15. Input (with Warwick and LSHTM) into "Non-pharmaceutical interventions (NPIs) table" – https://www.gov.uk/government/publications/npis-table-17-september-2020
16. Input into SPI-M-O: COVID-19: Preparatory analysis long term scenarios – https://www.gov.uk/government/publications/spi-m-o-covid-19-preparatory-analysis-long-term-scenarios-31-october-2020
17. Meeting at https://www.gov.uk/government/collections/sage-meetings-december-2020)
18. Evaluating the roadmap out of lockdown (multiple inputs into SAGE)
    a. https://www.gov.uk/government/publications/imperial-college-london-potential-profile-of-the-covid-19-epidemic-in-the-uk-under-different-vaccination-roll-out-strategies-13-january-2021
    b. https://www.gov.uk/government/publications/imperial-college-london-strategies-for-gradually-lifting-npis-in-parallel-to-covid-19-vaccine-roll-out-in-the-uk-4-february-2021
    c. https://www.gov.uk/government/publications/imperial-college-london-unlocking-roadmap-scenarios-for-england-5-february-2021
    d. https://www.gov.uk/government/publications/imperial-college-london-unlocking-roadmap-scenarios-for-england-18-february-2021
    e. https://www.gov.uk/government/publications/imperial-college-london-evaluating-englands-roadmap-out-of-lockdown-30-march-2021
    f. https://www.gov.uk/government/publications/imperial-college-london-evaluating-the-roadmap-out-of-lockdown-step-3-5-may-2021
    g. https://www.gov.uk/government/publications/imperial-college-london-evaluating-the-roadmap-out-of-lockdown-modelling-step-4-of-the-roadmap-in-the-context-of-b16172-delta-9-june-2021
    h. https://www.gov.uk/government/publications/imperial-college-london-evaluating-the-roadmap-out-of-lockdown-for-england-modelling-the-delayed-step-4-of-the-roadmap-in-the-context-of-the-delta-v
19. Autumn/Winter 2021/22 scenarios: https://www.gov.uk/government/publications/imperial-college-london-autumn-and-winter-2021-to-2022-potential-covid-19-epidemic-trajectories-13-october-2021
20. Report 49, Growth, population distribution and immune escape of Omicron in England – https://www.gov.uk/government/publications/imperial-college-london-report-49-growth-population-distribution-and-immune-escape-of-omicron-in-england-15-december-2021

5. A summary of any articles you have written, interviews and/or evidence you have given regarding the work of the above-mentioned groups and/or the UK's response to the Covid-19 pandemic. Please include links to those documents where possible.

I have not discussed any of the SPI-M-O meetings in interviews. I have though tried to engage and communicate with journalists and discuss the scientific evidence, in particular explaining our reports and findings when published (whether through the Imperial report platform or on the government dedicated webpages). As such I have participated in many press interviews.

I've also hold three press conferences at the Science Media Centre alongside other members of SPI-M-O, in order to explain the science behind the analyses that informed the decisions on the roadmap out of the lockdown. These press conferences were held on January 21st, June 15th and July 14th 2021.

6. Your views as to whether the work of the above-mentioned groups in responding to the Covid-19 pandemic (or the UK's response more generally) succeeded in its aims.

This may include, but is not limited to, your views on:
    a. The composition of the groups and/or their diversity of expertise;
    b. The way in which the groups were commissioned to work on the relevant issues;
    c. The resources and support that were available;
    d. The advice given and/or recommendations that were made;
    e. The extent to which the groups worked effectively together;
    f. The extent to which applicable structures and policies were utilised and/or complied with and their effectiveness.

a. I will give my opinion on what I have experienced from close – the expertise on epidemiological modelling as provided by the SPI-M-O SAGE sub-group. Between January and March 2020, the group has considerably grown from the relatively small group of "peace-time" SPI-M members (an expert group on pandemic influenza linked with the Department of Health). Many academics representing groups from all other the UK have inputted in some way or another during the SPI-M-O meetings. Many academics from outside the UK have also been invited to present or discuss their analyses, and SPI-M have had links with "non-epidemiological" quantitative modellers through the RAMP initiative led by the Royal Society. The remit of the SPI-M-O subgroup was limited though to the scientific advice related to the epidemiological development of the pandemic to the benefit of the UK government. Within this remit I think the advice from SPI-M-O has been diverse and extensive.

b. Most of the commissioned work were coming to us through the SPI-M-O secretariate which in my opinion has made a remarkable job at translating policy maker asks into modelling questions and translating back the modelling results into significant and relevant information to support decision making in response to the original public health questions, including -importantly- areas of scientific uncertainty.

c. The resources provided to the scientific community in the UK have been a key to provide one of the most internationally acclaimed multi-disciplinary body of work on Covid-19.

d. I think the level of scientific analyses and work to tackle the Covid-19 public health emergency has been unprecedented and that the involvement of academic groups in the UK has been key to inform the response domestically but also internationally. Many of the key studies which shaped the understanding of the transmission of the virus and the impact of the interventions have come from the UK which is a testimony to the quality of the UK scientific response.

e. I don't think there was a lot of interactions with SPI-B, the sub-group on behaviours, nor any dialogue with/communication about the role of the economical drivers to the decision. While potentially outside of the remit of SPI-M-O, more communication would have possibly help building bridges.

f. In my opinion, it is difficult to tell much about the early response (March 2020) given the level of uncertainty, the lack of data and the speed of the events. However, there was in the Autumn 2020 a clear consensus (September-October 2020) among the modelling community that the trajectory followed by the epidemics, in a largely immunologically naïve population, was close or above the worst case scenarios planned during the summer 2020, that this would lead to a large number of deaths during the winter 2020/21, and a huge pressure on the NHS (in particular in sourcing mechanical ventilation beds and clinical staff).

Modelling results done at the time suggest that an earlier response would have resulted in a more positive situation in December 2020 and January 2021, with less deaths and a lower level of hospital occupancy.

7. Your views as to any lessons that can be learned from the UK's response to the Covid-19 pandemic, in particular relating to the work of the above-mentioned groups. Please describe any changes that have already been made, and set out any recommendations for further changes that you think the Inquiry should consider making.

While I'm not sure it has been officially acknowledged, I have noticed a change in the interactions between the government and the scientific modelling community before and after December 2020. It has been, I think, a great improvement. The main characteristic of the change was more transparency in the way the original epidemiological advice was linked to the policy decisions. After December 2020, the reports with the analyses related to policy decisions were published alongside the announcements of the decisions by the government on an official governmental platform so that the general public and scientific journalists could have access to these analyses. This was in sharp contrast to earlier in the pandemic when the scientific advice was whether kept undisclosed or sometimes leaked in the press. The push for more transparency in the scientific analyses done by the different modelling groups was accompanied by more transparency and easier access to the data as exemplified by the excellent job done by the Covid dashboard team to provide an easy platform to navigate these data.

I think a focus on transparency should be at the heart of any response to a future public health emergency.

8. A brief description of documentation relating to these matters that you hold (including soft copy material held electronically). Please retain all such material. I am not asking for you to provide us with this material at this stage, but I may request that you do so in due course.

I have held all my email correspondence related to my role in SPI-M-O, all scientific papers and reports (see list above) are whether publicly available or can be shared. The code of the model used by the Imperial UK real-time modelling team to produce the results informing the UK government has been part of a public repository from the start (see sircovid repository on Github). The repository is version controlled using the Git software and thus all versions of the codes can be accessed and reviewed.

The questions and answers above span almost 2-years of work which was undertaken at pace. The responses are as accurate and complete as possible but if you require further details or there are inadvertent omissions, please do not hesitate to let me know.

Yours sincerely,

Marc Baguelin

Personal Data