Questionnaire

UK COVID-19 Inquiry: Module 2 - Rule 9 Request to Professor John Edmunds - Reference: M2/SAGE/01/JE

Please provide the following information:

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

I hold a Chair in Infectious Disease Modelling at the London School of Hygiene and have been working in this area for about 30 years (having obtained my PhD in modelling the spread of hepatitis B virus in 1994). I have over 350 peer-reviewed publications in the field. It would be too long to list them all here. Google Scholar has a summary (https://scholar.google.co.uk/citations?user=4UihVasAAAAJ&hl=en). My most highly cited papers include those on underlying contact patterns (important for the parameterisation of mathematical models), the control of COVID and on the implementation of a novel trial design to evaluate an Ebola vaccine.

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 attended SAGE throughout the epidemic. I was also a member of NERVTAG and SPI-M-O. I was also on two of SAGE's topic-specific subgroups, namely the Environmental Modelling Group Transmission Subgroup and the Task and Finish Group on the Role of Children in Transmission. Other COVID-19 related committees that I attended during the pandemic that were not subgroups of SAGE included the Events Research Programme Science Committee; The Project Moonshot Scientific Advisory Group; and two UKHSA-led committees, namely the Variants Technical Group (VTG) and the Testing Initiatives Evaluation Board (TIEB).

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 applied for NERVTAG membership (in 2014, I believe), was interviewed and selected. For other committees I was simply asked whether I would join. I had been on SPI-M since the committee was formed, representing one of the larger modelling groups in the UK. I had also attended SAGE meetings previously, during the West African Ebola crisis.

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

I attended 97 SAGE meetings over the period in question; 74 NERVTAG meetings (including "Birdtable" and other COVID-19-related meetings). My records suggest that I attended 99 SPI-M-O meetings and 91 other SPI-M-O related meetings, including Medium Term Projections and Short-term Forecasting meetings, Roadmap modelling meetings, etc.

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

I am not sure that I understand the question, but provided input to these committees as is normal (i.e. commented during discussions and submitted papers when called for).

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.

See attached spreadsheet, which documents all SAGE papers to which I was a named author.

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.

Further details of the work provided by the group (Centre for the Mathematical Modelling of Infectious Diseases) is available on our repository (https://cmmid.github.io/topics/covid19/).

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;

SAGE: composition was initially based on NERVTAG supplemented by Government Department Chief Scientists, and Chairs of Subgroups. I don't know whether the initial focus on NERVTAG members as a means of quickly standing up SAGE was deliberate or was accidental, but it made some sense given that NERVTAG is a multi-disciplinary scientific group tasked with assessing the risks from emerging respiratory viruses. SAGE expanded substantially during the spring of 2020 when various subgroups were also formed. The additional expertise was welcomed, particularly that of Prof Kath Noakes and the Environmental Modelling Group and Prof Calum Semple who gave regular clinical updates through the CoCIN network. SAGE was a scientific advisory group, and as such did not address operational issues (indeed, we were regularly reminded of this by the Chair). Having said this, I still think that at times we were missing input from the front-line (e.g. NHS and care homes) that could have given important context and alerted the committee to potentially important issues. SAGE did not consider the wider economic impact of interventions – it was not constituted nor mandated to do this, and I think that it had more than enough work to do without expanding its remit. However, the fact that there was no equivalent structure set up to analyse and assess economic and social data might have led to an imbalance in the range and quality of evidence being presented to central government and the public, with voluminous, open, and detailed data on the scientific side but very little to counterbalance this.

SPI-M: when it transitioned to SPI-M-O (at the start of the pandemic) expanded considerably in membership, essentially including almost all groups working on human infectious disease transmission in the UK. This expansion was extremely successful, enormously expanding the expertise as well as the range and depth of the analyses that the committee could take on. Various subgroups were formed to address certain tasks,

some of these were regular (such as the Short Term Forecasting and Medium Term Projections subgroups), others were more time-limited (such as the Roadmap Modelling meetings).

NERVTAG: also expanded its membership, but not quite to the extent. As noted above, it was already a multidisciplinary committee tasked with assessing the risks from emerging respiratory viruses. Again, the additional members greatly improved the committee's ability to respond to the additional demands of the pandemic.

b. The way in which the groups were commissioned to work on the relevant issues;

The most active group – in terms of new scientific work - was SPI-M-O. My understanding is that the "asks" for the group were worked out between the Chairs of SPI-M-O, the SPI-M-O secretariat and Central Government (in practice this was usually the Cabinet Office). Generally, this was very successful, resulting in sensible requests that could feasibly be addressed. These would then be circulated to SPI-M-O members with the deadline for the results to be submitted. Groups then volunteered to take on the tasks. Occasionally, specific groups were asked to contribute to a task, usually to ensure that there were at least two independent views on any one issue. The committee then reviewed these analyses collectively (usually at the main SPI-M-O meeting) and wrote a consensus statement on the issue (or added a section to the weekly consensus statement), reflecting the results of the different, independent analyses. Note, that SPI-M-O's way of working was typically to: 1) commission new analyses from multiple groups at the same time on a given topic; 2) review these independent analyses collectively (i.e. provide a rapid peer-review and critique); 3) develop a consensus view on the topic which usually included statements about the level of uncertainty; 4) pass this consensus view to SAGE.

Work commissioned for other groups (e.g. NERVTAG, SAGE etc) more frequently took the form of a review: a small group of volunteers were asked to rapidly review the evidence on a topic (see for instance, many of the NERVTAG papers in the SAGE archive). New analyses, or new experimental evidence was rarely asked for. Note the difference to SPI-M-O which usually asked for new primary analyses.

c. The resources and support that were available;

Resources were significantly overstretched at many points in the epidemic. Teams were overloaded and worked extremely long hours for many months on end. This led to significant "burn-out". When the epidemic struck most academic researchers were employed on contracts to research other issues. The build-up of response teams involved negotiating with these grant-giving bodies to release these researchers as well as finding alternative temporary funding streams to pay them over the course of the epidemic. This was a major distraction at the beginning of the epidemic and points to a structural weaknesses (i.e. a lack of trained researchers who can be quickly deployed to work on emergencies and a way to organize and pay for this). Although temporary arrangements were largely found, there was a significant problem of funding during the second year of the outbreak (most temporary arrangements were for 12-18 months). During the second and even third year of the pandemic urgent questions continued to arise (e.g. when the Omicron waves hit), but by then there were few individuals able to respond to these questions due to a combination of exhaustion and the need to return to the research that they were doing before the pandemic (and which paid their wages).

The committee secretariats were exemplary.

d. The advice given and/or recommendations that were made;

Scientific advice is only one component in decision-making: operational, economic and political considerations come into play. It would be wrong for Governments to "follow the science" only. As noted above, it is not clear what other advice the Government was receiving (e.g. on the economic and social impacts of different policies), how rigorous this advice was and to what extent it had been subject to peer review. The setting up of a parallel system to SAGE to gather and analyse economic and social data could have helped improve decision-making and raised the standard of public debate.

e. The extent to which the groups worked effectively together;

The subgroups of SAGE worked well together. Their mandate was generally clear and there was little overlap. The structure – with the various subgroups feeding into SAGE – was clear and understandable.

f. The extent to which applicable structures and policies were utilised and/or complied with and their effectiveness.

I am not sure that I understand what this is pertaining to.

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.

Good decisions are aided by sound analyses, which in turn depend on good data. Our situational awareness at the beginning of the pandemic was extremely poor as our surveillance system was inadequate. This inevitably led to a confused picture and delays in decision-making (or poor decisions). This changed dramatically in April/May 2020 with the expansion of testing and the setting up of the special studies, such as the ONS Coronavirus Infection Study, REACT, VIVALDI, CoCIN, COG-UK, etc. The RECOVERY trial was also critical in testing new interventions in a rigorous manner. By the summer of 2020 our knowledge of the virus, its prevalence in the community and how to control and treat it was good. We did not always put this knowledge to best use.

The rapid availability, sharing and publishing of high-quality data transformed the ability of the scientific community to contribute to improved public health and clinical decision-making. As the epidemic has drawn to a close, barriers to data access have increased again. We need to look at our culture of data sharing much more closely. Ideally, the level of access granted during the pandemic should be the norm, unless there is a valid reason for this not to be the case. The huge advances that UK science made during the pandemic (from vaccine and clinical trials to genomic and epidemiological analyses) could then continue for other diseases in "peace-time". This would bring enormous benefit to global health and the UK science base at a minimal costs (i.e. the cost of ensuring secure data access).

Similar points can be made regarding the funding of science. The huge advances that were made during the pandemic demonstrated what UK science can achieve given the resources.

Very few of the non-pharmaceutical interventions (NPIs) from restrictions on daily activity, closing of sectors of the economy, testing, tracing and isolation, were subject to rigorous evaluation. The highest standard of evidence is the randomized controlled trial (RCT). No NPI was tested in the UK using an RCT. Indeed, other designs, such as the stepped wedge design, were not implemented either. It has always surprised me that there is such a lack of high quality evidence on the effectiveness of these interventions, given the enormous cost of implementing them. It would have been very difficult to do so during the rapidly increasing phases of the epidemic, as the public health imperative to slow the epidemic down rightly dominated decision-making. However, during periods when restrictions were being lifted it may have been possible to adopt a more rigorous design which could have helped control further waves more efficiently.

The Government's strategic aims were unclear. Indeed, they seemed to vacillate at different points in the epidemic. For instance, after the first lockdown – which drastically reduced community transmission – we were extolled (and paid) to "Eat out to help out" as well as to return to the workplace. Measures such as this helped fuel the second wave. A similar lack of clarity at the outset made it difficult to guess what the full range of acceptable options was. A clear exposition of what the Government wanted to achieve would have allowed pathways towards these aims to be assessed.

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.

My LSHTM e-mail and our local (CMMID) SLACK channel.