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3 November 2022

Tim Suter
Module 2 Lead Solicitor
By email only: solicitors@covid19.public-inquiry.uk

Dear Mr Suter,

Re: Request with Reference M2/SAGE/01/ND

I am writing to respond to the questions you submitted to me on 2 September 2022 regarding my role as a participant in sub-groups of SAGE during the COVID-19 pandemic. My responses follow the questions copied herein for reference.

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

I obtained a B. Arts. Sc. (Honours) in Origins Research from McMaster University in 2009; an M. Sc. (Honours) in Integrative Biosciences from Oxford University in 2011; and a D. Phil. in Mathematics (Systems Biology) from Oxford University in 2016.

I have been employed by the Department of Infectious Disease Epidemiology at the London School of Hygiene and Tropical Medicine since 2016, first as a Research Fellow, and since 2020 as Assistant Professor of Mathematical Modelling. Additionally, between April and October 2021, I was seconded as an epidemiologist to the UK Cabinet Office COVID-19 Task Force for 2.5 days per week.

My professional expertise is in the mathematical modelling of infectious diseases, particularly in the evolution of antibiotic resistance in bacteria and in the transmission and control of SARS-CoV-2. My major recent publications are:

Davies NG; Jarvis CI; CMMID COVID-19 Working Group; Edmunds, W John; Jewell NP; Diaz-Ordaz K; Keogh RH. Increased mortality in community-tested cases of SARS-CoV-2 lineage B.1.1.7. *Nature* 593: 270–274 (2021). Link: https://www.nature.com/articles/s41586-021-03426-1

Davies NG; Abbott S; Barnard RC; Jarvis CI; Kucharski AJ; Munday J; Pearson CAB; Russell TW; Tully DC; Washburne AD; Wenseleers T; Gimma A; Waites W; Wong KM; van Zandvoort K; Silverman JD; CMMID COVID-19 Working Group; COVID-19 Genomics UK Consortium; Diaz-Ordaz K; Keogh R; Eggo RM; Funk S; Jit M; Atkins KE; Edmunds, WJ. Estimated transmissibility and impact of SARS-CoV-2 lineage B.1.1.7 in England. *Science* 372: eabg3055 (2021). Link: https://www.science.org/doi/full/10.1126/science.abg3055

Davies NG; Barnard RC; Jarvis CI; Russell TW; Semple MG; Jit M; Edmunds WJ. Association of tiered restrictions and a second lockdown with COVID-19 deaths and hospital admissions in England: a modelling study. *Lancet Infectious Diseases* 21: 482–492 (2021). Link: https://www.sciencedirect.com/science/article/pii/S1473309920309841

Davies NG; Kucharski AJ; Eggo RM; Gimma A; CMMID COVID-19 Working Group; Edmunds, W John. Effects of non-pharmaceutical interventions on COVID-19 cases, deaths, and demand for hospital services in the UK: a modelling study. *Lancet Public Health* 5: e375-e385 (2020). Link: https://www.sciencedirect.com/science/article/pii/S246826672030133X

Davies NG; Klepac P; Liu Y; Prem K; Jit M; CMMID COVID-19 Working Group; Eggo RM. Age-dependent effects in the transmission and control of COVID-19 epidemics. *Nature Medicine* 26: 1205–1211 (2020). Link: https://www.nature.com/articles/s41591-020-0962-9

A full list of my publications can be found at https://scholar.google.co.uk/citations?user=FnnXOvsAAAAJ.

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 started regularly attending SPI-M-O meetings, to the best of my recollection, in April 2020. I attended most meetings (90% of them or more) until the last SPI-M-O meeting in February 2022.

In addition to the full SPI-M-O meetings, I attended several "Medium-Term Projections" meetings in mid to late 2020 which were typically held the afternoon before each SPI-M-O meeting.

Based on my e-mail records, I also attended a joint NERVTAG/SPI-M-O meeting on December 21st, 2020, where I presented some work on the newly-emerged B.1.1.7 (Alpha) variant of SARS-CoV-2, outlining model-based projections of its potential impact.

On January 22nd, 2021, I attended a NERVTAG meeting to present some further work on the B.1.1.7 variant, this time having to do with the variant's increased severity relative to preexisting SARS-CoV-2 strains.

I attended a JCVI meeting on November 2nd, 2021, to present some work on the potential impact of extending booster vaccinations to under-50s.

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;*
    b. *The number of meetings you attended, and your contributions to those meetings;*
    c. *Your role in providing research, information and advice.*

SPI-M-O: I started attending meetings of the CMMID COVID-19 Working Group (CMMID is the Centre for Mathematical Modelling of Infectious Diseases at LSHTM) around January 2020. The Working Group was established to discuss research relating to the emerging COVID-19 pandemic. Through these meetings, I started working with John Edmunds, Rosalind Eggo, Adam Kucharski, and others on mathematical modelling of SARS-CoV-2 transmission. In mid-to-late February 2020 through early March 2020, I contributed to the development of scenarios for the transmission of SARS-CoV-2 in the UK and the potential impact of interventions such as social distancing, shielding of the elderly, school closures, workplace closures, and stay-at-home orders in the UK. This work was presented to SPI-M-O but not by myself as I was not then attending SPI-M-O meetings. Because of my contribution to this work, I was eventually invited to start attending SPI-M-O meetings, which, to the best of my

recollection, I started attending regularly in April 2020. I attended most (90% or more) SPI-M-O meetings from that point onward.

Throughout my time participating in SPI-M-O, I contributed several papers and participated in scientific discussion, primarily relating to mathematical modelling of SARS-CoV-2 in the UK and on COVID-19 situational awareness in the UK. My role was as a scientist with expertise in epidemiology and mathematical modelling of COVID-19, and in particular as the researcher at LSHTM who initially led and then maintained the development of the mathematical model, CovidM, that we were using at LSHTM to generate scenarios and projections relating to SARS-CoV-2 transmission and disease-related outcomes (hospitalisations and deaths). This work was done as part of a team comprising myself, Rosanna Barnard, John Edmunds, and Mark Jit, all at LSHTM, with additional contributions from other researchers at LSHTM and occasionally from other institutions.

NERVTAG: As I indicated above, I attended a joint NERVTAG/SPI-M-O meeting on December 21st, 2020, where I presented some work on the newly-emerged B.1.1.7 (Alpha) variant of SARS-CoV-2, and on January 22nd, 2021, I attended a NERVTAG meeting to present some further work on the B.1.1.7 variant, this time having to do with the variant's increased severity relative to preexisting SARS-CoV-2 strains. I came to attend these two NERVTAG meetings because I was conducting this work as a participant in SPI-M-O, and representatives of NERVTAG felt it would be useful for me to present this work to NERVTAG.

JCVI: As I indicated above, I attended a JCVI meeting on November 2nd, 2021, to present some work on the potential impact of extending booster vaccinations to under-50s. Again, I was conducting this work as a participant in SPI-M-O and representatives of JCVI felt it would be useful for this work to be presented to JCVI.

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.*

I contributed to several documents that were communicated to SPI-M-O, in addition to the two documents for NERVTAG described above and the document for JCVI described above. The SPI-M secretariat has provided me with a list of all documents contributed to SPI-M-O by LSHTM authors, from which I have removed apparent duplicates and papers that I did not contribute to, to the best of my recollection. The resulting list is attached with this e-mail as an Excel spreadsheet.

The documents I contributed to concerned mathematical modelling of COVID-19 in the UK, COVID-19 epidemiology, and situational awareness pertaining to COVID-19 in the UK. I do not have access to any workspaces for JCVI or NERVTAG, but I do have copies of the documents I presented to these groups and would be able to provide them.

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.*

Research documents provided to SAGE and subcommittees

As detailed above.

Scientific articles

I am including here, to the best of my recollection, all scientific articles that I co-authored and which relate either to COVID-19 in general or to COVID-19 in the UK specifically. There are other articles that I co-authored that are

specifically about COVID-19 in other countries; I am not including these here, but they can be found in my full list of publications (see link in response to question 1).

I was also part of the CMMID COVID-19 Working Group at LSHTM. One of the aims of the Working Group was to internally review COVID-19–related papers by researchers in CMMID prior to their being submitted to academic journals or posted as preprints. I may be listed as an author of some of these papers in some online databases, solely because I was a member of the Working Group, but that does not mean that I was a co-author of the paper, and does not necessarily mean that I was one of the internal reviewers for any given paper. I have omitted all papers where my only involvement was via the Working Group from my full list of publications and from the publications listed below.

Effects of non-pharmaceutical interventions on COVID-19 cases, deaths, and demand for hospital services in the UK: a modelling study
NG Davies, AJ Kucharski, RM Eggo, A Gimma… - The Lancet Public Health, 2020

Age-dependent effects in the transmission and control of COVID-19 epidemics
NG Davies, P Klepac, Y Liu, K Prem, M Jit, RM Eggo - Nature Medicine, 2020

The effectiveness of social bubbles as part of a Covid-19 lockdown exit strategy, a modelling study
T Leng, C White, J Hilton, A Kucharski, L Pellis… - Wellcome Open Research, 2020

Susceptibility to SARS-CoV-2 infection among children and adolescents compared with adults: a systematic review and meta-analysis
RM Viner, OT Mytton, C Bonell, GJ Melendez-Torres… - JAMA Pediatrics, 2021

Study protocol: comparison of different risk prediction modelling approaches for COVID-19 related death using the OpenSAFELY platform
OpenSAFELY Collaborative, EJ Williamson, J Tazare… - Wellcome Open Research, 2020

Short-term forecasts to inform the response to the Covid-19 epidemic in the UK
S Funk, S Abbott, BD Atkins, M Baguelin, JK Baillie… - MedRxiv, 2020

Estimated transmissibility and impact of SARS-CoV-2 lineage B. 1.1. 7 in England
NG Davies, S Abbott, RC Barnard, CI Jarvis… - Science, 2021

Increased mortality in community-tested cases of SARS-CoV-2 lineage B. 1.1. 7
NG Davies, CI Jarvis, WJ Edmunds, NP Jewell… - Nature, 2021

Association of tiered restrictions and a second lockdown with COVID-19 deaths and hospital admissions in England: a modelling study
NG Davies, RC Barnard, CI Jarvis, TW Russell… - The Lancet Infectious Diseases, 2021

The potential health and economic value of SARS-CoV-2 vaccination alongside physical distancing in the UK: a transmission model-based future scenario analysis and economic evaluation
FG Sandmann, NG Davies, A Vassall, WJ Edmunds… - The Lancet Infectious Diseases, 2021

How immunity from and interaction with seasonal coronaviruses can shape SARS-CoV-2 epidemiology
NR Waterlow, E Van Leeuwen, NG Davies… - Proceedings of the National Academy of Sciences, 2021

Projected epidemiological consequences of the Omicron SARS-CoV-2 variant in England, December 2021 to April 2022

RC Barnard, NG Davies, CAB Pearson, M Jit… - MedRxiv, 2021

Unexposed populations and potential COVID-19 hospitalisations and deaths in European countries as per data up to 21 November 2021
LAC Chapman, RC Barnard, TW Russell, S Abbott… - Eurosurveillance, 2022

Modelling the medium-term dynamics of SARS-CoV-2 transmission in England in the Omicron era
RC Barnard, NG Davies, M Jit, WJ Edmunds - Nature Communications, 2022

Impact of non-pharmaceutical interventions on SARS-CoV-2 outbreaks in English care homes: a modelling study
A Rosello, RC Barnard, DRM Smith, S Evans, F Grimm… - BMC Infectious Diseases, 2022

Comparison of methods for predicting COVID-19-related death in the general population using the OpenSAFELY platform
EJ Williamson, J Tazare, K Bhaskaran, HI McDonald… - Diagnostic and Prognostic Research, 2022

Television and radio interviews

To the best of my recollection, these are the television/radio interviews I have done. There may be a few that I have forgotten.

5 Jun 2020 – Channel 4 News – Regarding the relaxation of restrictions following the first lockdown
19 Nov 2020 (air date) – BBC 2 – Interviewed for "*Lockdown 1.0: Following the Science?"*
24 Dec 2020 – NPR (Washington, DC) – Regarding the Alpha variant
22 Jan 2021 – BBC Radio 4 – Regarding increased severity of the Alpha variant
22 Jan 2021 – BBC News – Regarding increased severity of the Alpha variant
11 Dec 2021 – Sky News – Regarding the Omicron variant
11 Dec 2021 – BBC News – Regarding the Omicron variant

Newspaper interviews

I gave several interviews to newspaper journalists over the course of the pandemic. This is only a partial list that I was able to reconstruct by searching through my e-mail and searching online, as I did not keep a record of each interview. I know that I spoke to journalists at the Sunday Times, but any resulting articles are not included below as I cannot find links to the articles in my e-mail records, and cannot search for the articles online as there is a paywall. However, I think that the links below probably cover a majority of the newspaper interviews I gave.

16 June 2020. Children are only half as likely to get infected with the coronavirus, study finds. Washington Post. https://www.washingtonpost.com/health/children-are-only-half-as-likely-to-get-infected-by-the-coronavirus-research-shows/2020/06/16/be86aff4-afb6-11ea-856d-5054296735e5_story.html

18 June 2020. How likely are kids to get Covid-19? Scientists see a 'huge puzzle' without easy answers. STAT News. https://www.statnews.com/2020/06/18/how-likely-are-kids-to-get-covid-19-scientists-see-a-huge-puzzle-without-easy-answers/

23 Dec 2020. Coronavirus Variant Is Indeed More Transmissible, New Study Suggests. The New York Times. https://www.nytimes.com/2020/12/23/health/coronavirus-uk-variant.html
24 Dec 2020. England could have more Covid deaths in next six months than whole of 2020 without stricter controls. The Guardian. https://www.theguardian.com/world/2020/dec/24/england-could-have-more-covid-deaths-in-next-six-months-than-whole-of-2020-without-stricter-controls-study

29 Dec 2020. 'Tier 5': England faces possible new covid restrictions, source says. The Guardian. https://www.theguardian.com/world/2020/dec/29/tier-5-england-faces-possible-new-covid-restrictions-source-says

30 Dec 2020. Experts stress importance of following public-health advice as COVID-19 variant emerges. The Globe and Mail. https://www.theglobeandmail.com/canada/article-how-can-you-protect-yourself-against-the-new-covid-19-variant/

1 Feb 2021. A study shows the variant spreading rapidly in Britain might make vaccines less effective. The New York Times. https://www.nytimes.com/2021/02/01/health/covid-variants.html

7 Feb 2021. Virus Variant First Found in Britain Now Spreading Rapidly in U.S. The New York Times. https://www.nytimes.com/2021/02/07/health/coronavirus-variant-us-spread.html

24 Feb 2021. Pfizer's vaccine trial data holds up in the real world, according to large-scale study in Israel. The Los Angeles Times. https://www.latimes.com/world-nation/story/2021-02-24/pfizer-vaccine-is-effective-across-demographics-according-to-large-scale-data-from-israel

9 April 2021. Rise of Variants in Europe Shows How Dangerous the Virus Can Be. The New York Times. https://www.nytimes.com/interactive/2021/04/09/world/europe/europe-coronavirus-variants.html

12 April 2021. Kent coronavirus variant does not cause more severe disease, studies show. Financial Times. https://www.ft.com/content/e113edb5-2b6c-4322-919a-832d636e4e95

8 June 2021. How serious is Delta Covid variant for UK and do vaccines stop it? Financial Times. https://www.ft.com/content/f2ae00ee-e3ae-48b5-853e-49f5cb540321

6 Dec 2021. Patchy monitoring means UK Omicron numbers unclear. The Guardian. https://www.theguardian.com/world/2021/dec/06/patchy-monitoring-means-uk-omicron-numbers-unclear-say-officials

11 Dec 2021. I gave a press conference along with Rosanna Barnard, John Edmunds, and Mark Jit of LSHTM on modelling of the Omicron variant via the Science Media Centre on this day. Coverage of this press conference which was covered by several newspapers/outlets, such as:

- The BBC https://www.bbc.co.uk/news/uk-59621029
- The Guardian https://www.theguardian.com/world/2021/dec/11/omicron-covid-variant-could-cause-75000-deaths-in-england-by-end-of-april-say-scientists
- The Daily Mail https://www.dailymail.co.uk/news/article-10301259/Nadhim-Zahawi-confirms-Omicron-cases-UK-hospitals.html

12 Dec 2021. U.K. PM declares Omicron emergency, orders immediate COVID-19 booster shots for entire country. The Globe and Mail. https://www.theglobeandmail.com/world/article-boris-johnson-sets-new-covid-19-booster-target-as-uk-sounds-the-alarm/

15 Jan 2022. Looking back at lockdown: how we got it wrong. The Telegraph. https://www.telegraph.co.uk/news/2022/01/15/looking-back-lockdown-got-wrong/

16 March 2022. Britons less cautious over Covid than at any point during pandemic. Financial Times. https://www.ft.com/content/abb2f882-0eff-42df-969a-a02f22f3a4a1

Evidence given

I gave oral testimony to Parliament's Science and Technology Select Committee on June 10th, 2020 on LSHTM's contribution to early modelling of the COVID-19 pandemic.

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.*

I do not feel that I am in a position to comment on SAGE, NERVTAG, or JCVI, because I had little direct experience with these groups. Therefore I will keep my comments focused on SPI-M-O.

a. Composition and diversity of expertise.

First, I would like to express my view that both co-chairs of SPI-M, Graham Medley and Angela McLean, as well as all of the members of the SPI-M Secretariat, did an outstanding and hugely commendable job. Meetings were conducted efficiently, conversations were kept focused and relevant, and opposing views were respected. In my view, SPI-M-O succeeded in its aim—to generate a snapshot of the scientific consensus on modelling evidence for SAGE—thanks to the leadership, expertise, and professionalism of the co-chairs and secretariat.

Participants of SPI-M-O were drawn from academia, public health (e.g. PHE/UKHSA and representatives of scientific bodies from the devolved administrations), and industry. Participants came from across the UK and all levels of career progression were represented. For these reasons, I do believe that the diversity of expertise within SPI-M-O reflected the diversity of expertise within the UK modelling community to an appropriate degree.

b. Commissioning.

Which issues SPI-M-O considered was partly driven by participants bringing their own questions to the meetings, and partly by requests from government to consider specific questions. I think this provided a good balance of expert opinion and government need to drive SPI-M-O's work. For example, government made requests to SPI-M-O concerning the impact of potential public health measures, while individual participants of SPI-M-O brought important matters to light, such as the apparently increased transmissibility and severity of the B.1.1.7 variant, which were then investigated by multiple participants of SPI-M-O. This worked well.

The commissioning process from the government improved over the course of the pandemic. Especially during 2020, some of the requests from the UK government were ambiguous in key aspects or were lacking important details. These issues were spotted by the scientists on the committee and requests were sent back to be clarified. This took time, and I think this type of issue could have been avoided by having more scientific input during the formulation of the request.

Over time, this process improved. We began having representatives from the UK Cabinet Office COVID-19 Task Force attend SPI-M-O meetings around early 2021. This seems to have been beneficial, though I think part of the reason that questions improved was also just due to experience and time. Based on this observation, it seems to me that it would be helpful in the event of another similar emergency to ensure that there are robust channels of communication between scientific groups and government, with representatives of both attending meetings at all levels of the hierarchy.

c. Resources and support.

The work done for SPI-M-O was voluntary and unremunerated. We were not able to get appropriate support directly from government for computing resources, which we had to arrange funding for from research grants. These were ultimately often funded by UK funding bodies, but more direct support would have been helpful.

d. Advice and recommendations.

I did not participate in any groups which provided advice or recommendations directly; the purpose of SPI-M-O was to provide scientific evidence, so that bodies such as SAGE could then formulate advice and recommendations. Therefore, I can't comment on this point.

e. Extent to which groups worked effectively together.

Within SPI-M-O, there were several groups independently developing evidence on similar subjects, which was an advantage for the robustness of the process. Certain participants were in multiple groups (e.g. SPI-M-O, SAGE, JCVI, NERVTAG) which helped communication between groups and was valuable.

f. Compliance with structures and policies.

The SPI-M-O secretariat was very effective in ensuring compliance of SPI-M-O evidence statements with appropriate structures and policies.

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.*

A great deal of the work in producing scientific evidence for the government during the COVID-19 pandemic was done by academics, or other scientists who were not part of any government agency or department. In my experience, external scientists often struggled to gain access to key data held by government agencies and departments, particularly early in the pandemic. Also, as a scientist I found that it was difficult to communicate effectively with policymakers, and to clearly understand what policymakers wanted, because of the many layers of separation between scientists and policymakers. I think it would be helpful if there was a mechanism for external scientists to be embedded within government agencies, like UKHSA or the COVID-19 Task Force, during a crisis, in order to meet key data needs and to facilitate communication.

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 hold some drafts of papers that were submitted to SPI-M, computer code relating to the analyses described in those papers, and electronic correspondence (e-mail and Slack messages) between myself and my colleagues regarding these analyses.

Sincerely,

Personal Data

Nicholas G. Davies

Assistant Professor of Mathematical Modelling
Department of Infectious Disease Epidemiology
London School of Hygiene & Tropical Medicine