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UK COVID-19 INQUIRY

SECOND WITNESS STATEMENT OF
SIR PATRICK VALLANCE

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INTRODUCTION

1. The Covid-19 pandemic caused huge suffering and misery across the world and had both direct impacts as a result of the disease itself and indirect impacts as a result of the effort to tackle the virus. Unfortunately it will not be the last pandemic the world will see and future pandemics will take the world by surprise in different ways. One thing that should not be a surprise in any future pandemic is that the most disadvantaged and vulnerable parts of society are likely to suffer most, and this was tragically evident during Covid-19. I welcome the opportunity that the Inquiry provides to understand the lessons from the pandemic to try to ensure that the UK is better able to prevent and respond to new infectious disease threats that emerge. I would like to thank scientists, engineers, academics, healthcare professionals and experts who gave their time, effort and insights to help during the pandemic. They and their successors will be essential for any future response. I would also like to thank all those who helped others, whether that was through taking the difficult and personally restrictive actions that reduced the spread of the virus, participation in clinical trials, or responding quickly to the call for vaccination.

2. The science advice during the pandemic provided an important input to policy-makers in the UK and across the world. Much was helpful and saved lives but of course it was not infallible, no doubt we got some things wrong, and the advice evolved as evidence emerged. In the more than three years since the pandemic started important lessons have already been identified. Globally the WHO has recognised the need for an effective modern infection surveillance system that includes widespread sampling, effective new data approaches and genomic sequencing. The need for a radical approach to identifying and manufacturing diagnostics, vaccines and therapeutics and ensuring equitable distribution is part of the 100 Days Mission that was endorsed at the G7 and G20 and is being implemented by groups around the world and the UK must play its part. Ongoing work is seeking to work out which non-pharmaceutical interventions (NPIs) made the most difference to halt the spread of the virus and in what combination. And there are lessons to be learnt from the ways different countries approached the pandemic, especially from those that had a scaled capacity to test, contact trace and isolate individuals and outbreaks. We also need to understand better the undoubted harms caused by interventions and how policy-makers can be better informed to make the difficult trade-offs that will be required. In terms of science advice in the UK many of the lessons are captured in the work of the learned academies, in the process improvement work that has been undertaken in relation to the Scientific Group for Emergencies ("SAGE"), and in the Technical Report published earlier this year that deals with aspects of science, clinical

advice and health service responses. However a key lesson for all is that a report is just a report; it is concerted, determined, funded and sustained actions that will be needed to implement the findings.

3. There has been no national crisis of this scale since the war and government structures and processes were put under immense pressure. It affected every part of government and did so night and day for a very long time. If at times the order and sequence of events seems less structured than expected then that is an accurate reflection of the extraordinary task of trying to provide advice during a pandemic.

4. My final general point relates to the need to consider a pandemic over its full duration. Countries get affected differently at different stages of a pandemic depending on a variety of demographic, environmental, economic, societal and health factors, and that was certainly the case with Covid as it swept across the world. The UK was seeded with infection right across the country in February and March 2020, largely from importation from Europe rather than directly from China. In the UK the first and second waves caused the most damage, with the second causing more death and morbidity than the first. But subsequent waves were also lethal. In some other countries infection started locally rather than nationally and in others the most deadly waves came later. As the pandemic evolved different countries appeared to be struggling most at different times. For this reason it is important to consider the response across the 2-3 years in which Covid-19 was pandemic.

STRUCTURE OF THIS STATEMENT

5. This statement is provided in response to a Rule 9 request from the Inquiry, dated 21 April 2023. The request runs to 53 pages and 480 paragraphs containing more than 650 questions. Some of these questions are very broad, while others ask about specific meetings, comments or pieces of advice. Only a handful of documents were expressly referred to in the request.

6. I have done my best to answer all of the questions posed and have reviewed a large number of documents relating to the period January 2020 to February 2022 in an effort to identify the material relevant to the questions I have been asked. I would like to thank the Government Office for Science ("GO Science") team who helped identify the documents and provided extensive disclosure to the Inquiry over a short time period, despite being a small department with limited resources.

7. I have tried to refer to the most relevant documents and events in this statement, but this inevitably involves a degree of selection.

8. Furthermore, I am reliant on the material held by GO Science and, to a lesser degree, the disclosure made to Core Participants to the Inquiry to date. I am aware that there will be large repositories of potentially relevant documents and materials to which I have not had access and to which I have not been able to refer to in drafting this statement. In particular, I have not seen formal records of many of the meetings discussed below, which are held by other Government departments, in particular the Cabinet Office and the Department of Health and Social Care ("DHSC").

9. Of the documents available, by far the most important to someone trying to understand the science advice are the SAGE minutes and papers, which are all available online.[1] These are real-time records of the formal science advice to the Prime Minister and ministers, and of the evidence that informed that advice.

10. The approach I have taken to this statement is as follows.

    a. First, I have set out the structures within which science advice was provided. This section explains the roles of the Government Chief Scientific Adviser ("GCSA") and SAGE and the boundaries of those roles. It shows how SAGE fitted into the wider government architecture, particularly in relation to the main decision-making bodies and the Lead Government Department for pandemic planning and response, DHSC. It also identifies other sources of science input and operations within government in which neither I nor SAGE were involved, for example that provided by Public Health England ("PHE") and later the UK Health Security Agency ("UKHSA") directly into DHSC or the clinical advice that is outside the remit of SAGE. This section also sets out, in brief, the other work relevant to the pandemic in which I was involved (for example the National Core Studies and the Vaccine Taskforce). Finally, it touches upon key themes concerning the importance of data and modelling in the pandemic response.

    b. Second, I provide a chronological account of the science advice and my actions during the course of the pandemic, beginning in January 2020 and concluding with the advice given on Omicron in late 2021 and early 2022. The section

[1] See **[PV2/1 - INQ000231485**

concerning January to March 2020 is particularly detailed. While this was, of course, a very important period in the developing understanding of SARS-CoV-2 and Covid-19, the attention given to it in the statement simply reflects the very large number of questions the Inquiry has asked about those three months (approximately 120 paragraphs of questions, compared to around 50 paragraphs for the eighteen-month period after the first lockdown was lifted in July 2020). For the reasons I give above it is important to consider the overall response over the two to three years in which Covid was pandemic.

c. Third, I consider thematically a number of areas of science advice concerning particular NPIs and other areas about which I have been asked, for example asymptomatic transmission, testing, and care homes.

d. Fourth is a section on the long-term sequelae of Covid-19, in particular Long Covid, and the Covid-19 death rate.

e. Fifth, I respond to questions that I have been asked about government structures, decisions and decision-makers. This section draws on the evidence I have given earlier in the chronological section.

f. I also refer to areas in which I have been asked questions but in which I had little or no involvement (for example the legislation passed during the pandemic), before providing some concluding thoughts, including in respect of lessons that have been or can be learned from the events considered in Module 2.

11. In the course of this statement I will make reference to my first witness statement, dated 1 April 2023 **[PV2/2 - INQ000147810]**, which was produced following a Rule 9 request from the Inquiry in respect of Module 1. I will also refer to the four witness statements of Dr Stuart Wainwright OBE, two currently unsigned **[PV2/3 – INQ000252449 PV2/4 – INQ000252450** and two dated 13 April 2023 **[PV2/5 - INQ000187617; PV2/6 - INQ000187618]**. Dr Wainwright was the Director of the GO Science during the Covid-19 pandemic.

12. This statement is produced as part of the Inquiry process and I would encourage those interested in understanding lessons for science and science advice that affected the UK's experience of Covid-19 to read alongside it the Technical Report on the Covid-19

Pandemic published in January 2023 **[PV2/7 - INQ000130955]**. This was produced by the UK's Chief Medical Officers ("CMOs"), Deputy Chief Medical Officers ("DCMOs"), and me as GCSA. It was written for a specific audience – future CMOs, GCSAs, National Medical Directors and UK public health leaders facing a new pandemic or major epidemic in the UK – and was published as it may be of interest to others. It was produced after a rigorous process of research, analysis and review, involving eminent experts from both inside and outside government. Its purpose was to inform our successors of what we had learned and its focus was on things that we thought they would find useful. The Technical Report runs to some 380 pages and contains more detail, and in particular more technical detail, than is contained in this statement.

GOVERNMENT STRUCTURES AND SCIENCE ADVICE DURING THE PANDEMIC

The Role of the GCSA

13. I have set out in my first witness statement the roles of the GCSA and the GO Science, and the relationship between the GCSA, CMO and DCMOs **[PV2/2 - INQ000147810, §5 ff]**. Further evidence on these matters can be found in the third witness statement of Dr Wainwright **[PV2/5 - INQ000187617]**. I have also set out, briefly, my career before entering government **[PV2/2 - INQ000147810, §3]**. Much of this statement will concern my role in chairing SAGE and providing science advice during the pandemic. It is perhaps worth making the obvious point that it was not foreseen at the time of my appointment that so much of my time as GCSA would be dominated by health-related matters let alone Covid-19. It was by chance that as GCSA I had a background in medicine and pharmacology. The GCSA could come from any scientific discipline and is expected to cover all scientific areas. It would be wrong to expect that any future GCSA would have specialist knowledge on medical or epidemiological matters, or indeed pandemics. Those are expert matters for DHSC and its scientists, medics, advisers and specialist executive agencies and arm's-length bodies.

Government Structures

14. Government policy during the pandemic was decided by the Prime Minister and the Cabinet. In order to deal with the fast-moving nature of events, structures were established to consider policy decisions based in groups smaller than the full Cabinet. These included COBR (M),[2] the Ministerial Implementation Groups (MIGs), and the COVID Strategy

[2] COBR (M) was the ministerial meeting, as opposed to COBR (O) where officials met to prepare the COBR (M) meetings. References to "COBR" in this statement are to COBR (M) unless otherwise stated.

Committee (COVID-S) and the COVID Operations Committee (COVID-O). These groups were run by the Cabinet Office, and in particular the Civil Contingencies Secretariat ("CCS") and, later, the Covid-19 Task Force. These have been described in detail in the reports from others.

15. As the Inquiry has heard during Module 1, the government operated a system of Lead Government Departments for various emergencies. The Lead Government Department for pandemics was DHSC. DHSC was, therefore, the department that had principal responsibility for forming and implementing policy, particularly in the early stages of the pandemic, when COBR was chaired by the Secretary of State for Health and Social Care, Matt Hancock MP, before he was replaced in this role by the Prime Minister, Boris Johnson MP.

16. The key government decision-makers during the pandemic, from my perspective, were the Prime Minister, Mr Hancock, the Chancellor of the Exchequer (Rishi Sunak MP from 13 February 2020), the Chancellor for the Duchy of Lancaster (Michael Gove MP until September 2021), and the Prime Minister's Chief Adviser (Dominic Cummings), supported by the Cabinet Secretary and Departmental Permanent Secretaries. The Deputy Prime Minister and Foreign Secretary (Dominic Raab MP) was a key decision-maker during the Prime Minister's absence when he caught Covid.

17. It is important to distinguish between policy and operational delivery, i.e., putting the policy into effect on the ground. PHE (and later UKHSA) was the government agency responsible for maintaining public health and responding to threats to public health, including epidemics. Its remit was to *"protect and improve the nation's health and address health inequalities"*. It had more than 5,000 staff, including scientists, and when it became apparent that the UK faced a public health emergency in the form of Covid-19, PHE had operational responsibility for many parts of the public health response. The CMO role has a statutory duty in relation to public health.

18. The formal decision-making committees, groups and forums that I attended during the Covid-19 pandemic, including some of those mentioned above, are set out in Dr Wainwright's third statement **[PV2/5 - INQ000187617]**. The Inquiry has also received evidence from Simon Case on these bodies **[PV2/8 - INQ000092893]**. I do not think that I can add to the factual description that is contained in those statements. I was also invited to less formal, ad hoc meetings, including with the Prime Minister, where he would seek to gain more of an understanding of some of the underlying issues in the pandemic (always

with the CMO and often in the presence of individuals from No.10 staff, Mr Case or members of the Covid-19 Task Force). These informal meetings were to talk through matters to aid understanding rather than being occasions on which decisions were made.

19. My role in all of these structures and meetings was to provide science evidence and advice. The purpose was to inform policy thinking. It was for the decision-makers, and ultimately the elected politicians, to make choices, determine policy and ensure delivery of operational matters.

20. During the pandemic, the central structures for providing science advice were, for the most part, clear. With the assistance of the GO Science secretariat, I convened SAGE. The CMO, Professor Sir Chris Whitty, and I acted as co-chairs of SAGE and the minutes of the meeting served as the formal output of the group. The CMO and I would report the SAGE evidence and advice to COBR. The CMO and I would also provide briefings to the Prime Minister, the Cabinet Secretary and others in meetings as requested, including what became known as the morning dashboard meetings. I would also, on occasion, attend the Quad meetings with those Secretaries of State that were most closely involved in the response to the pandemic, and was invited to several meetings of the full Cabinet.

21. In addition to these vertical lines of reporting the work of SAGE would be disseminated to relevant government departments and the Devolved Administrations ("DA"s) both through circulation of the minutes and by participants and observers from those departments reporting back to them. As time progressed, the number of observers at SAGE increased. For some science and technical areas we organised teach-in sessions with experts to allow policy-makers from across Whitehall to hear directly from scientists and ask questions.

22. The SAGE-COBR structure was well established by 2020 and was adopted as the model to be used during the pandemic. COBR was the place where the cross-government response to an emergency would be co-ordinated under the guidance of CCS, and the science advice from SAGE was intended to inform COBR. The structure worked initially, but as the scale and duration of the pandemic became clear, CCS appeared to become overwhelmed. It is unclear to me why this happened but I understand that this is what led to the decision to establish alternative structures, as set out in Mr Case's statement **[PV2/8 - INQ000092893, §§1.20-1.26]**. From 16 March to 20 May 2020, the four MIGs were established to lead the UK Government's response in different fields (health, public services, economic and business response, and international affairs). From 28 May 2020 these were stood down and replaced with COVID-S and COVID-O, which were supported

by the Covid-19 Task Force. I would usually attend COVID-S and sometimes attend COVID-O meetings when science evidence or advice was required.

23. Throughout this time, SAGE continued to report to COBR as and when it was called. We also presented science advice directly into regular meetings in No.10. However, for a period of time between March and May 2020 it was less clear how science advice was feeding into the four MIGs. The situation improved with the appointment of Mr Case first as Director General in the Cabinet Office to lead the Covid-19 Task Force (6 April 2020 to 21 May 2020) and then as Permanent Secretary at No.10 (22 May 2020 to 8 September 2020). The replacement of the MIGs with COVID-S and COVID-O also helped to simplify the structure. In my view it is essential that whatever structure is chosen for an emergency response in the future there should be a single consistent docking point for SAGE science advice, a point that has been the focus of some of the work done in building resilience based on the lessons learned from the pandemic: see my first statement **[PV2/2 - INQ000147810, §54 and §60]**. COBR remains the docking point, but my understanding is that the structures around it have been strengthened in terms of their resilience and ability to scale up in quick time when required. GO Science has also put in place measures to ensure that it is able to do the same and these are described in my first statement.

24. It was not the role of SAGE or the GCSA to become involved in operational matters, but in the early months of the pandemic it seemed that there were some areas in which policy was not being effectively developed or operationalised. An example is that SAGE repeatedly indicated the need for a community survey of Covid-19 infection in order to inform advice and policy. When, in April 2020, PHE made it clear that it had no capacity or capability to provide this, at a SAGE meeting the Office for National Statistics (ONS) stepped forward to do so. A second example would be when SAGE established a sub-group on care homes in April and May 2020 because of a sense that the urgent work that the science advice had indicated was needed was not being done and we thought that a more operationally focussed sub-group could help those in DHSC who were leading this area. Both matters are discussed further below.

SAGE and Other Science Advisory Groups

SAGE structures and commissions

25. The structure of SAGE and its sub-groups and their commissioning processes are set out in Section 2 of Dr Wainwright's first statement. Section 3 of the same statement explains the key fora that I and/or GO Science attended **[PV2/3 – INQ000252449]**

26. The science advice that I gave during the pandemic was derived from the work of SAGE and its sub-groups. I have set out in my first statement the other meetings and networks that I attended with scientists and Chief Scientific Advisers ("CSAs") at which topics relevant to SARS-CoV-2 and Covid-19 were discussed.

27. SAGE and its many expert sub-groups were of course not the only source of science advice available to the government. Departments had their own scientists, executive agencies, arm's-length bodies, public sector research establishments, and advisory committees. DHSC would call upon clinical and scientific expertise from public health bodies such as PHE, the NHS and clinicians as well as the CMO and DCMOs. The Royal Society established two bodies that provided pandemic advice, (DELVE – data evaluation and learning for viral epidemics, and RAMP – rapid assistance in modelling the pandemic), and other learned academies were commissioned to provide science advice throughout the pandemic. Ministers were also aware of the many pieces written by scientists and medics in the press giving their views on aspects of the pandemic and the policy response to it. I am not aware of other systems that were put in place by ministers that would have provided alternative advice, but it is quite likely that ministers would have developed their own informal advice systems and networks through special advisers and others. On one occasion following a discussion with Mr Cummings, the CMO and I helped organise a meeting with dissenting scientists on 20 September 2020 which is discussed in more detail later in this statement.

28. The structures of SAGE and its sub-groups developed as the pandemic progressed. SPI-M (the Scientific Pandemic Influenza Group on Modelling) and NERVTAG (the New and Emerging Respiratory Virus Threats Advisory Group) – two pre-existing standing science advisory groups convened by DHSC – were re-deployed as sub-groups of SAGE in order to provide a single structure that compiled and disseminated relevant science advice. This was not controversial. Formally, SPI-M became SPI-M-O (i.e., SPI-M "Operational"), but for convenience and clarity I will refer to it as SPI-M in this statement. This happened at

SAGE 2 on 28 January 2020. The behavioural science group, SPI-B, was reconvened as an advisory group, again as a sub-group of SAGE in February 2020. Other sub-groups were formed, and all are listed in table 1 of Dr Wainwright's first statement **[PV2/3 – INQ000252449]** Some groups were convened for specific tasks and then disbanded (task and finish groups). Many of the groups would work together on tasks or provide input into one another's reports. A good example was on schools, where members of existing groups came together to form a schools advisory group which also involved specialists from relevant disciplines. There was, I felt, a very "can do" attitude among the sub-groups and those working on them, and I do not remember any instances of turf wars – people were simply too busy for that.

29. From time to time we would refresh the membership of the groups, and their chairs. The CMO and I asked Professor Dame Angela McLean (the CSA at the Ministry of Defence, and later my successor as GCSA) to co-chair SPI-M as we felt there needed to be someone with government experience there to help access data and ensure that the academic modellers were aware of the types of output most useful to Government.

30. SAGE and its sub-groups received commissions from CCS and, later, the Covid-19 Task Force. There was on occasion a tendency for these groups to ask questions that were too granular for the evidence that was available and SPI-M in particular could become overwhelmed by requests to model different and very specific scenarios and policy options, sometimes with the commission changing within a few days in response to a new policy approach. Professor McLean, the CMO and I would intervene to prevent this. In general, the process improved over time, particularly as GO Science began to work closely with those commissioning the work in order to help them frame requests more effectively.

31. Sub-groups could also self-generate their work, though the degree to which they were able to do so varied (the Environmental Modelling Group in particular produced a lot of its own research as did many participants in SPI-M). As I have said in my first statement, there was a balance to be struck. The sub-groups comprised experts in their fields who would naturally have their own thoughts on which research would be useful to undertake or present. However, they had been formed to provide SAGE with the inputs required to address urgent questions about the pandemic so that accurate and relevant science evidence and advice could be provided to government decision-makers in a timely manner.

32. On a regular basis smaller groups of expert scientists, including some from SAGE and some not on SAGE, were convened for "brain storming" sessions on particular topics.

These are described in more detail in my first statement **[PV2/2 - INQ000147810, §67]**. These provided an important opportunity to think more broadly about some anticipated questions and issues, and to bring in a different group of scientists.

33. As GCSA I commissioned work and reports from external bodies and a number of important papers were produced through this process. These include the Academy of Medical Sciences report "Preparing for a Challenging Winter 2020/21", published on 14 July 2020, which I discuss below **[PV2/9 - INQ000062402]**. The British Academy assisted with work on the societal effects of the pandemic, dealing in particular with inequality "Shaping the Covid Decade" **[PV2/10 - INQ000063552]**. The Royal Academy of Engineering reported on infection-resilient buildings **[PV2/11 - INQ000064015]** amongst other areas. Other academic groups would also feed work into SAGE, as did bodies within government, including the International Joint Comparators Unit (which I discuss further below). These were helpful and productive sources of information that greatly assisted SAGE in its work.

34. To further the research effort in matters relevant to the pandemic, I established the National Core Studies groups. These were designed to allow for cross-disciplinary research work to address questions relevant to the pandemic and its management. Six groups were established on: Epidemiology and Surveillance; Transmission and Environment; Clinical Trials Infrastructure; Immunity; Longitudinal Health and Wellbeing; and Data and Connectivity. They were led by leading figures in the relevant fields, drawn from government (such as Professor Sir Ian Diamond, UK National Statistician, who led the Epidemiology and Surveillance group) and academia (such as Professor Nishi Chaturvedi, Professor of Clinical Epidemiology, University College London, and Professor Jonathan Sterne, Professor of Medical Statistics and Epidemiology, Bristol Medical School, who led the Longitudinal Health and Wellbeing group). There was an oversight group of scientific leaders and a small international advisory panel. The National Core Studies did not report to SAGE but provided research outputs that were available to all. Their work is described in greater detail in table 2 in Dr Wainwright's first statement **[PV2/3 –** INQ000252449 I also started the Vaccine Taskforce, which I discuss later in this statement and will cover in more detail in Module 4.

SAGE output

35. The output of SAGE came in the form of its minutes, and these were a statement of the central view of the current science together with expressions of uncertainties and

unknowns. I have explained in my first statement the reasons for this approach **[PV2/2 - INQ000147810, §77]**, and as Dr Wainwright has said in his second statement, this is a well-established principle in the provision of science advice **[PV2/4 – INQ000252450 §§0.8, §§1.2-1.3]**. The Hine Review into the response to the H1N1 (Swine Flu) pandemic recommended that a process should be established, *"through which UK government ministers and the devolved administrations are presented with a unified, rounded statement of scientific advice"* **[PV2/12 - INQ000035085, recommendation 10]**. This is what the SAGE minutes sought to achieve.

36. The use of the phrase "consensus statement" may have led to some misunderstanding about the SAGE minutes and the process by which they were agreed. The phrase should not be taken to suggest that the meeting tried to reach some kind of compromise position on which all could agree, nor that it wasted time in so doing. The minutes were intended to provide a summary of the current state of scientific understanding, reflecting the uncertainties and explaining what the drivers of those uncertainties were. The minutes generally did not seek to say that the answer to a question was X; instead they would identify a range of possibilities between A and F and explain why it was the consensus view that A or B were more likely than E or F, with a caveat setting out the confidence that the meeting had in the conclusion. The scientific papers underlying the discussions were all available in a digital repository that was created.

37. In practice, during SAGE meetings I would usually seek to summarise discussions as they drew to a close and ask the participants if they agreed with that summary or wished to challenge or change anything. Participants would make suggestions and, at the end of the process, the resulting summary would be included in the minutes.

38. There was an attempt to get the broadest range of expert opinion and where necessary we invited experts for specific topics. Science works through challenge and discussion and that was the approach that I sought to foster in SAGE. Note for example the following comment made by Professor Derek Smith, an expert in infectious disease informatics at Cambridge University and someone with considerable experience of national and international science advisory groups including WHO. In an interview for an article speaking of the SAGE meetings that he attended he said that: *"It was absolutely clear that when there were disagreements or different opinions, or one lab's data said something different from another lab's data, there would be a genuine openness to figure out what was causing this difference."* **[PV2/13 – INQ000231040**

39. SAGE minutes represented the formal output and science advice from SAGE. Those minutes would be disseminated to decision-makers. The CMO and I would provide verbal briefings to the meetings that we attended based on the SAGE minutes.

40. I kept in mind four questions when providing my advice. First, is the evidence that is available sufficient to address the issue, and if not, what should be done to develop more evidence or reduce uncertainty? Second, has the advice been expressed clearly so that it has been understood by the policy-makers involved, bearing in mind that they may have no science background? And have you assured yourself that the evidence has been understood, including the uncertainties? Third, has the advice been presented in a way to make it relevant and useful for formulating policy? This might include the use of scenarios and options. Fourth, has the decision-maker and the relevant department understood the ways in which science can be used to update the advice and monitor the impact and effect of the relevant policy, once the policy has been formulated?

41. In my first witness statement I set out the steps that I took to try to guard against "groupthink" and optimism bias on SAGE **[PV2/2 - INQ000147810, §§63-67]**. These included inviting Sir Ian Boyd to act as an observer at each meeting with a remit to identify problems with groupthink or ways of working, and in May 2020 asking Sir Adrian Smith to undertake interviews with attendees and others to provide a report on what SAGE could do better. I also benefitted from creating small group "brainstorming" meetings that brought together SAGE participants and other scientists to think through designated topics ranging from "virus evolution" to something as broad as "what are we missing". As Chair I sought to encourage a culture of open and constructive discussion and to include more junior or reticent participants in the meetings. The breadth and quality of the SAGE participants was important, as was the use of sub-groups and task and finish groups. Many hundreds of scientists were engaged and there were changes of participants within SAGE and sub-groups, including in the chairs of some of the sub-groups. None of this should be taken to infer that groupthink could not have happened or did not happen. It can in any situation including in policy, economics, operations, journalism and even when trying to learn lessons.

42. At least as important as the steps taken within SAGE was the decision to publish SAGE minutes and papers. I have been clear that I think this should have happened from the very beginning of the pandemic. Making the minutes and papers public allowed for external discussion and challenge, which in turn helped to protect against groupthink and contributed to the robust scrutiny of the SAGE output by academics and others. Publication

and peer review is part of the normal scientific process, but the high profile of the SAGE work and the fact that it was made so accessible during the emergency to which it was relevant meant that the scrutiny was particularly intense. I have stated in Module 1 evidence that I think the default position for SAGE going forward should be that the minutes and papers are published except in specific circumstances of national security.

43. The fact that SAGE minutes and papers were published may have given rise to a mistaken impression of the role of science advice. It was one input, but it was not the only advice that ministers considered. They took account of other advice including legal, economic, clinical, political, and on some occasions national security advice – before coming to their decisions. It seems to me appropriate that elected politicians should make decisions based on the totality of advice.

44. SAGE was, as I understood it, the only formal group comprising external experts that would advise the central government structures that I have set out above. For example there was no equivalent group on economics, although I did suggest the potential need for that on several occasions (something on which I provide more detailed evidence below).

Data

45. During the pandemic the key sources of data that SAGE and SPI-M and other sub-groups used when formulating its advice were the following:

a. Data flow from the NHS, PHE, test and trace and other sources that came into SPI-M, including from that collated by the Defence Science and Technology Laboratory (Dstl) in the Ministry of Defence (MOD). The Joint Biosecurity Centre ("JBC") became an important hub to pull together data from different sources, but others will be better placed than me to discuss this.

b. The ONS' Covid-19 Infection Survey
   - A community survey identifying a percentage of people testing positive for Covid-19 in private residential households across the UK, which included regional and age breakdowns. This was established in late April 2020 in circumstances that I describe below.

c. The Covid-19 Clinical Information Network (CO-CIN)

- CO-CIN collated clinical information from health care records of people of all ages admitted to hospital in the UK to characterise the clinical features of patients with severe Covid-19 in the UK. I believe it was established in late February 2020 but it built on a pre-existing consortium.

d. The Covid-19 Hospitalisations in England Surveillance System (CHESS), later renamed Covid-19 SARI-Watch
   - A data set relating to demographic, risk factor, treatment, and outcome information for patients admitted to hospital with a confirmed Covid-19 diagnosis. I believe it was established in mid-March 2020.

e. CoMix Social Contact Survey
   - A survey in which participants reported the total number of direct contacts that they had on the day before the survey. This was overseen by the LSHTM Centre for Mathematical Modelling of Infections Disease (CMMID) Covid-19 working group. Its first weekly report was published on 7 May 2020.[3]

f. The UK Government Covid-19 dashboard
   - The official UK Government website for data and insights on Covid-19. Others will be better placed than me to explain the sources of that data used to compile the dashboard. This included economic, travel and movement patterns and other data.

g. The Real-time Assessment of Community Transmission (REACT) Study undertaken by Imperial College on behalf of DHSC
   - Like the ONS survey, this was a community-based survey intended to measure the prevalence of Covid-19 in different areas of the country including in people who do not have any symptoms.

h. The data strand of the National Core Studies and Health Data Research UK provided important sources of health-related data for research. OpenSafely was a crucial source of GP data. Data from Scotland from electronic heath records and the EAVE II studies was very useful and provided rapid information.

[3] See **[PV2/14 - INQ000092690**

i. Various studies were set up including clinical trials and monitoring studies of infection rates in health care practitioners. These are described in the Technical Report and in the third statement of the CMO **[PV2/7 - INQ000130955; PV2/15 - INQ000184639]**.

46. We received information provided by the ONS and other government and private sector sources that related to levels of activity in the economy (e.g., use of transport, mobile phone data, use of credit cards and so forth).

47. I have given evidence in Module 1 of the shortcomings in the provision of data in the first few months of the pandemic **[PV2/2 - INQ000147810, §§87-94; PV2/16 – INQ000230999 p.147, p.166-171 (transcript 22 June 2023); see also the evidence of Professor Whitty, 22 June 2023, p.112-114]**. During this time even quite basic data about things like how many people were in hospital, or how many people were in intensive care with Covid-like diseases, were difficult to obtain and in some cases unreliable or very delayed. Initially we did not know the distribution of the disease around the UK and poor data collection, interoperability and systems hampered our ability to understand the spread of Covid-19 or evaluate which individuals might be most at risk. As a consequence we were, to a degree, flying blind. This made it difficult both to give effective science advice and to make decisions based on that advice.

48. The situation improved and aspects of the UK's approach to data won international admiration later in 2020. The ONS survey was excellent. We advised the need for a central data centre and the subsequent creation of JBC helped to bring clarity and focus, and sped up the provision of data. It also brought single point accountability, and it was clear whose job it was to bring pandemic-related health data together. The No.10 Data Science and Analytics Team, led by Tom Shinner, was highly effective in working with the different bodies and collating data in the dashboard.[4] I thought the dashboard greatly assisted the presentation of data and its use in decision-making. Together with the JBC, this also allowed us to see where there were gaps and how they could be filled.

49. NHS data also improved markedly during the pandemic, though there were still some questions about inter-operability (for example the vaccines database did not link to the NHS patient database). I hope that the improvements made will be maintained. Care

[4] The 2019 Science Capability Review had identified the advantages of good data presentation in advice and decision-making **[PV2/17 - INQ000061614]**.

homes remained more of a problem due to the fragmented nature of the sector, which comprised many thousands of private providers.

50. The improvements were welcome, and can be dated from late April and May 2020 onwards. Before then, and in particular in January, February and March 2020, the data situation was poor and this was detrimental to both the science advice and the political decision-making. I discuss this in more detail below, by reference to specific events.

51. Throughout the pandemic there was a time lag for many data sets, such that the data being analysed at any point in time would often reflect the situation many days, or even weeks, before. This lag was identified and commented upon in the SAGE minutes and it was factored into our science advice, but it remained an acknowledged difficulty.

Modelling

52. Other witnesses, particularly those from SPI-M, will be better placed to speak to the technical aspects of the modelling, which is outside my area of expertise, but it may be helpful in this section to make a few general points from my perspective as GCSA.

53. Modelling is a well-established and useful tool in epidemiology and will be important for any response to a pandemic. As I told the Health and Social Care Committee of the House of Commons on 17 March 2020, the UK has a strong science base, including in modelling, so much so that other countries adapted the models that the UK produced or asked modellers based in this country to assist in their responses **[PV2/18 - INQ000064519, Q88]**. We were fortunate to have first call upon them.

54. Epidemiological models will always be shaped by the assumptions that underly them and the data that are fed into them. This is the very nature of a model. When data improve, and when it proves possible to refine the assumptions (for example by learning more about how people are reacting to the spread of a virus), the models can be refined and will become more precise. But they will always be models.

55. Models are not predictions. They are outputs based on the assumptions, data and approach adopted, and they are designed to show a range of possible scenarios rather than to give "the answer". Some models during the pandemic were presented on the basis of an explicit assumption of people not changing their behaviour. This was not a prediction that this is what would happen but an attempt to understand the "do nothing" scenario. The

modellers and the rest of us on SAGE fully expected people to modify their habits and cut down on their contacts either spontaneously or in response to government advice or rules. Indeed, the very act of publishing the model was likely to influence that behaviour. The model was intended to assist planning by examining what might happen in certain scenarios and to identify the broad trends and directions in the epidemiological curve.

56. These two fundamental points – the importance of assumptions that underlie the models and the fact that models were not predictions – were repeatedly explained to decision-makers and to the public. I am confident that the core decision-makers to whom I provided advice knew and understood this, as is shown by the fact that they would often ask about and challenge the assumptions that underlay the models.

57. They also understood that modelling outputs were going to have a large range of uncertainty, particularly at the start of the pandemic when data were limited and unreliable. As time progressed and the supply of data improved, the models improved, but we were also able to rely more directly on real-time observed data rather than modelling. We learned more about people's responses to behavioural and social interventions and that was built into some of the modelling, albeit with suitable warnings about uncertainty.[5] To aid this work SPI-B and SPI-M worked closely together, as I explained to the joint hearings of the House of Commons committees on Science and Technology, and Health and Social Care, on 9 December 2020 **[PV2/21 - INQ000064526, Q809 and Q810]**.

58. Modelling was inevitably more precise over relatively short periods, with more uncertainty resulting from seeking to model over a longer-time period. I believe that the decision-makers also understood this point, and it is one that I made to the House of Commons Science and Technology Committee on 3 November 2020 **[PV2/22 - INQ000064525 - Q1435]**. SPI-M started to produce "nowcasts" that showed very short-term potential trends.

59. While modelling is well-established and helpful, it is always trumped by data. As the data accumulated and the data flows improved we were able to base advice and policy more soundly on the data that we had. There was still a role for modelling in identifying trends (particularly where there was a time lag in the data) and examining the potential effects of

[5] See, for example, the SPI-M "Comments on Social Distancing Measures" dated 20 May 2020 **[PV2/19 INQ000236965]** and 22 June 2020 **[PV2/20 - INQ000074930]**, which showed a series of results obtained from models that were predicated by different assumptions on how effective different measures would be in altering behaviours and reducing transmissions and contacts. These "ready reckoner" graphs allowed the user to see the modelled consequences of different changes to NPIs, behaviours and viral properties.

various interventions and scenarios. But, as I said to the Select Committees on 9 December 2020, we were always considering data whenever possible, rather than modelling alone **[PV2/21 - INQ000064526, Q814]**.

60. SPI-M received commissions from COBR and the Covid-19 Task Force throughout the pandemic. These sometimes asked for a level of precision that a model simply could not provide. This, too, improved during the pandemic, particularly when GO Science officials worked directly with the commissioning departments to help them frame appropriate questions that could be addressed. The modellers would also produce work autonomously, on their own initiative.

61. Models that formed part of the discussion at SAGE were published. The papers would show the assumptions that underlay the models and these were open to scrutiny by scientists, media, ministers and the public. The modelling codes were not always published, though some were. I asked for and would have liked all codes to have been published,[6] but was unable to enforce it. It should be remembered that these scientists were under no compulsion to assist SPI-M and SAGE. They did so at considerable cost to their personal and family lives, without payment, and worked incredibly hard under immense pressure. I would however like to state clearly that I think the code underlying models should always be published. I hope that research funding agencies and universities will ensure that this is a requirement.

62. SAGE did not rely on a single model nor a "consensus model". Instead, a number of different modelling teams would produce work which would then be compared, challenged and discussed at SPI-M and at SAGE. Those teams included groups from Imperial College, London ("Imperial"), the London School of Hygiene and Tropical Medicine ("LSHTM"), the University of Warwick, the University of Edinburgh, the University of Bristol, the University of Exeter and the University of Cambridge. The point was to ensure that a range of models were considered and that differences in their results were identified and discussed with the intention of improving understanding. SPI-M produced consensus statements, but these showed where differences lay and what might be driving them and resulted from rigorously working through the models their outputs. Like SAGE consensus statements, they conveyed the uncertainties and range of opinions involved and were not a single compromise position.

[6] See, for example, the discussion at SAGE 17 (18 March 2020), §19 **[PV2/23 – INQ000061525]**.

CHRONOLOGY: EVENTS OF JANUARY 2020

Initial Knowledge of SARS-CoV-2 and Covid-19

63. I became aware of what would later be identified as SARS-CoV-2 and Covid-19 at the end of December 2019 as a result of news reports of unexplained pneumonias in Wuhan. I was concerned about these developments and on 3 January 2020 I activated the internal SAGE team to monitor the outbreak and consider if and when we might need to activate SAGE **[PV2/24 – INQ000228603]** This was intended both to keep GO Science informed about the emerging virus and to make sure that it was ready to respond further should this be required.

64. The SAGE team had links to DHSC and CCS in the Cabinet Office but had no formal role at this stage. The Lead Government Department for pandemic planning was DHSC and both the CMO and DCMO, Professor Van-Tam, were experts in infectious diseases and experienced in epidemic responses.

65. I do not have a precise record of what I knew and when during early January 2020 but I do know that I was kept informed through the GO Science SAGE team and had meetings and calls with the CMO. The CMO and I met at 8am on 7 January and would have discussed the outbreak but I do not have a record of what was discussed.

66. On 9 January an email was circulated within GO Science concerning the WHO statement identifying the new virus as a coronavirus **[PV2/25 – INQ000228604]** The WHO update stated that, *"According to Chinese authorities, the virus in question can cause severe illness in some patients and does not transmit readily between people."*[7] The update commented on China's *"strong public health capacities and resources"* and praised the *"notable achievement"* of identifying the novel virus quickly, which *"demonstrates China's increased capacity to manage outbreaks."* The WHO advised against the application of travel or trade restrictions, or any other specific measures for travellers.

67. I cannot now recall whether I had already been told orally that the virus was strongly suspected to be a coronavirus; I may well have been. The Inquiry has drawn my attention to information received informally by Professor Van-Tam from sources in the United States on 8-9 January to the effect that the Wuhan outbreak was likely to relate to a novel

[7] See **[PV2/26 - INQ000106040]**

coronavirus which had a high hospitalisation rate. I do not think Professor Van-Tam relayed this information to me in person, but I was probably informed of it at or around that time. On 9 January, GO Science circulated the "Wuhan Update" email referred to above which clearly indicates that this was a coronavirus.

68. The identification of the cause as a coronavirus and the availability of a draft genetic sequence on 11/12 January was an important step, particularly in relation to research efforts on diagnostics, vaccines and therapeutics. However, in terms of how the outbreak would develop it is recognised that coronaviruses can be markedly different from one another. SARS and MERS caused serious illness but spread less effectively than influenza whereas other coronaviruses spread rapidly and are causes of the common cold. Knowing that the new virus was a SARS-like coronavirus was significant, but many critical questions remained: for example how was it spread and how transmissible was it? Did it spread from person-to-person? What were the case and infection fatality rates? What was the clinical picture? What countermeasures could be employed?

69. I have been asked by the Inquiry about a NERVTAG meeting that took place (by telephone) on 13 January at which the new virus was discussed **[PV2/27 – INQ000230973]** I was not invited and did not attend this meeting. I was not a member of NERVTAG, which was a DHSC scientific advisory group with a specific expert focus on new and emerging viral threats, and the GCSA would not be expected to be invited to or attend its meetings. I note from the minutes that two observers attended from GO Science in order to keep the GO Science resilience team in touch with the developing situation in case a SAGE was called. Observers also attended from DHSC, NHS England and PHE.

70. The minutes of the meeting show that NERVTAG considered that the *"Risk to the UK population is considered: Very Low."* I am asked what the conclusion was based upon and whether I agreed with it. I was not at the meeting, so cannot comment on why the expert group reached that conclusion – others will be able to assist the Inquiry with that point. However my understanding is that this type of risk assessment made by PHE was intended to describe the risk to the UK at that moment and was not a prediction of what might happen. As of 13 January, no known cases had reached the UK and according to the minutes only one case had been reported outside China (a Wuhan resident who had flown to Thailand). The PHE risk assessment was endorsed by NERVTAG but of course they would have been aware that the risk could increase and their risk assessment concluded: *"[T]his risk assessment will be reviewed as new information becomes available and any potential risks that may become present"* [§3.9].

71. The meeting rightly expressed caution about *"making conclusions about the absence of human-to-human transmission"* given the ambiguity of the information emerging from China [§3.2]. However, it found that on the evidence then available *"the novel virus does not look to be very transmissible"* [§3.3]. The meeting also noted that *"data and guidance on pandemic influenza is not directly relevant for this novel coronavirus because pandemic influenza is efficiently transmitted from person to person and has a shot incubation period. The incubation period distribution is likely to be relatively long for this novel coronavirus when taking into account the long incubation period seen in both SARS and MERS"* [§5.6]. At this stage PHE and NERVTAG viewed the new disease as potentially similar to SARS or MERS with low transmissibility and noted the need for a diagnostic test. I think at this stage PHE would have planned to manage any incursion into the UK by containment and contact tracing but PHE is best placed to address that.

72. On 16 January 2020 I participated in a call with chief scientific advisers from New Zealand, Canada, India and the United States. This was part of a regular series of calls. The new coronavirus was discussed as part of Any Other Business, at my request, and it was agreed that this was something that we needed to keep in communication about **[PV2/28 – INQ000228614]**

73. By this stage we were concerned about SARS-CoV-2 and the potential for spread. However, there was a lack of reliable data about the nature and transmissibility of the virus, which meant that scientists and governments throughout the world did not appreciate the full extent of the threat that had already emerged. Although Chinese scientists had shared the draft genetic sequence there was much less sharing of clinical and epidemiological data[8] although individual scientists within China did provide information at considerable personal risks.

74. Following discussions with the CMO throughout January we decided to call a precautionary SAGE meeting. This was noted in NERVTAG on January 21 and the meeting took place on January 22. This meeting later became known as SAGE 1 **[PV2/32 - INQ000061509]**.[9]

[8] As can be seen from the SAGE minutes from this period, scepticism was expressed about accuracy of figures emerging from China: see SAGE 2 (28 January 2020) **[PV2/29 - INQ000061510, §11]**, SAGE 3 (3 February 2020) **[PV2/30 - INQ000061511, §9 and §14]**, SAGE 4 (4 February 2020) **[PV2/31 - INQ000061512, §1 and §11]**. It should be remembered that a degree of uncertainty in the data in the early stages of a pandemic is inevitable.

[9] In this statement I have adopted this nomenclature, so that the precautionary SAGE meeting on 22 January 2020 is SAGE 1 and the first full SAGE meeting on 28 January 2020 is SAGE 2, and so forth.

As the Inquiry has heard, precautionary SAGE meetings can be convened by the GCSA without the formal activation of COBR. I took this step because although DHSC was the Lead Government Department and the science, public health and medical advice was coming through that route it seemed likely that the scope of the potential risk would involve departments beyond DHSC, and CMO and I agreed that COBR would need to be activated. I think I informed GO Science officials of the intention to convene the precautionary SAGE on either Friday 17 January or Monday 20 January but these were verbal discussions and I have no record of the precise date. In accordance with usual practice SAGE 1 and all subsequent SAGE meetings during the pandemic were co-chaired by the CMO as this was a health emergency. This followed a precedent established from before my time as GCSA, one that I supported.

75. SAGE 1 was attended by experts from inside and outside government and the attendees would have been discussed with the CMO as the overall scientific lead in DHSC for public health. They included experts in:

- Public health and epidemiology (Professor Whitty, Dr Jim McMenamin, Professor Van-Tam, Pasi Penttinen (European Centre for Disease Prevention))
- Epidemiological modelling (Professor John Edmunds, Professor Neil Ferguson)
- Viruses and emerging infectious diseases (Professor Peter Horby, Professor Maria Zambon (PHE), Professor David Lalloo)
- Animal infectious disease (Professor Christine Middlemiss (Chief Veterinary Officer))
- Behavioural science (Professor James Rubin)

76. Several of the participants at SAGE 1 were also members or observers at NERVTAG, and so were informed by the discussions that had taken place in that group. This applies to Professor Horby, Professor Edmunds, Dr Benjamin Killingley, Dr McMenamin, Professor Ferguson and Professor Van-Tam. Professor Wendy Barclay, an expert virologist and NERVTAG member, attended SAGE at and after SAGE 2.

77. The meeting was also attended by a number of CSAs and other officials from government departments most relevant to the emerging pandemic at that stage: DHSC, Department for International Development ("DfID"), the Foreign and Commonwealth Office ("FCO"), the

Department for Environment, Food and Rural Affairs ("Defra"),[10] and the Department for Transport ("DfT"),[11] the Home Office, CCS, PHE and Health Protection Scotland ("HPS"). In some instances, these individuals fulfilled a dual role as both experts in relevant disciplines and as departmental observers. For example Professor Charlotte Watts then CSA in DfID is an expert epidemiologist and mathematician, the representatives from PHE have deep expertise in infectious diseases and public health and the Chief Veterinary Officer brought knowledge of animal diseases.

78. Re-reading the minutes of SAGE 1, it seems like the central scientific issues at that moment were addressed, but that a common theme was the lack of data and evidence at that stage. For example, it was noted that there was some evidence of person-to-person transmission, but it was unknown whether this was sustainable transmission [§7]. The incubation period was unclear, but appeared to be within 5 to 10 days, with 14 days after contact considered a sensible outer limit to use [§8]. The mortality rate was assessed to be lower than for SARS, but it was too early to reliably quantify [§10]. There was no evidence at that stage on asymptomatic infection, but it was plain that this was a matter that was under active consideration by those at the meeting even at that early stage [§12]. The meeting also considered the NERVTAG advice on port screening and monitoring measures [§§16-20], other transport-related issues [§§21-22] and UK health readiness and planning [§§23-27], including anticipating the development of a specific test within days [§23]. It was agreed that the UK Government should review its response either in the case of onward spread of SARS-CoV-2, person-to-person outside China or in the event of a severe confirmed case in the UK [§29].

79. The minutes of SAGE 1 were provided to relevant UK Government departments and were intended to provide the co-ordinated scientific evidence and advice for which SAGE was created.[12] DHSC remained the Lead Government Department but the SAGE outputs were the means by which the CMO and I advised decision-makers about the emergence of SARS-CoV-2 and Covid-19, including about issues such as human-to-human transmission.

80. On the same day as SAGE 1, the WHO Emergency Committee on the novel coronavirus convened for the first day of a two-day meeting. This led to the confirmation of human-to-

[10] In particular re. zoonosis.
[11] In particular re. possible spread through travel routes.
[12] The circulation of these minutes to the DAs is discussed below.

human transmission and an estimate of R_0 of 1.4 to 2.5.[13] 25% of cases were reported to be severe, and the proportion of deaths in reported cases was 4% (17 of 557). The Committee was apparently split on whether it was too early to declare a Public Health Emergency of International Concern ("PHEIC") and as a result no PHEIC was declared.[14] Although I was not involved with the interactions with WHO my understanding is that the UK sought to use its influence internationally to persuade the WHO that a PHEIC should be declared. The declaration was made on 30 January 2020. The UK Government had anticipated this decision, and the declaration was helpful to reinforce the urgency and importance of the situation.

81. The first COBR (M) meeting took place on 24 January 2020, which I attended. Initially I had not been invited to the meeting, but when this omission became apparent the CMO asked for this to be rectified **[PV2/34 – INQ000228613 PV2/35 – INQ000228612**. The meeting was presented with a Commonly Recognised Information Picture ("CRIP") **[PV2/36 – INQ000056162** These are documents compiled by CCS to inform the attendees at COBR, and their departments, of the current situation. As can be seen from the CRIP prepared for the meeting, CRIP 1, the document comprises slides which are marked in the bottom left-hand corner with the provider of the relevant information. In the CRIP, COBR were informed of the outcomes of the precautionary SAGE meeting on 22 January [pp.6-7]. In particular, the agreed triggers to reassess the UK Government's response were noted, namely sustained human-to-human transmission outside China and/or a severe UK case. The CRIP also contained information about coronaviruses, including the range of illnesses that they can cause and the possibility of human-to-human transmission [p.16]. The COBR meeting was organised by CCS and led by DHSC.

82. Before the first COBR (M), I think I spoke to Mr Cummings about the forthcoming meeting. I believe he subsequently attended the meeting, which was chaired by the Secretary of State for Health and Social Care, Mr Hancock.

83. There was a variable level of understanding of and concern about the emerging pandemic by those outside government towards the end of January. For example Richard Horton, editor of *The Lancet*, tweeted on 24 January 2020: *"A call for caution please. Media are escalating anxiety by talking of a 'killer virus' + 'growing fears'. In truth, from what we*

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13 R_0 is an estimate of the number of secondary cases generated by a typical infected individual ("index case") when the rest of the population is susceptible (so at the start of a novel outbreak). This is an intrinsic property of the virus. Different variants have different R_0.

14 See **[PV2/33 – INQ000220085**

currently known, 2019-nCoV has moderate transmissibility and relatively low pathogenicity. There is no reason to foster panic with exaggerated language." **[PV2/37 – INQ000231031]**

84. The GCSA can play a role in considering what other scientific research and evidence would be needed by government and I convened the first of a series of meetings of research funders in January 2020. These included the Medical Research Council, The Economic and Social Research Council, UKRI, National Institute of Health Research and Wellcome Trust. These meetings laid the foundations for rapid funding of research programmes, including in genomics and vaccines, and the minutes of the meeting of 27 January are included **[PV2/38 - INQ000063572]**. These note the need for research on therapeutics, the potential importance of mRNA vaccines, social science, data collection, diagnostics (including with industry), testing asymptomatic people, impacts in Africa amongst others. Further meetings were held on 4 February **[PV2/39 – INQ000228646]** 17 February **[PV2/40 – INQ000228663]** 28 February **[PV2/41 – INQ000228688]** and 13 March **[PV2/42 – INQ000228773]** I understand that this aspect of my work will be considered further in Module 4.

85. SAGE met on 28 January 2020 **[PV2/29 - INQ000061510]**. This was the first "full" SAGE meeting, the group having been formally convened by COBR. For ease of reference, though, this meeting has become known as SAGE 2 to avoid confusion with the precautionary SAGE six days earlier. The minutes reflect a structural change, with SPI-M and NERVTAG now operating as de facto sub-groups of SAGE as agreed with the CMO. This was, in my view, a sensible arrangement designed to ensure that science advice was being co-ordinated effectively before being communicated to COBR. This change was not controversial and it did not affect the running of SPI-M or NERVTAG. Both groups retained their DHSC secretariat and affiliation.

86. It can be seen from the minutes that there was concern about the infection but much uncertainty about the nature of the virus and the data obtained about the disease and its spread. However, some important themes were beginning to emerge. The meeting considered that the virus was being sustained by human-to-human respiratory transmission [§§9, 17]. There was stated to be *"limited evidence of asymptomatic transmission, but early indications imply some is occurring."* PHE were tasked to produce a paper on this matter [§16]. It was also noted that I had set up a separate group to consider the UK science funding and coordination response.

87. The meeting considered the similarity and differences between what was known of SARS-CoV-2 and comparable viruses. As has been noted, participants included experts in relevant academic disciplines, including Professor Horby who was an acknowledged authority on SARS. The minutes record that *"SAGE urges caution in comparing WN-CoV [as SARS CoV-2 was then known] with SARS and MERS: the transmission dynamics are different."* By this, it was meant that SARS-CoV-2 was more transmissible that either SARS or MERS and now appeared to have a more 'flu like' transmission pattern [§18]. The case fatality rate was estimated to be lower than SARS, but it was expressly recorded that *"many uncertainties remain."* It was agreed by SAGE that the pandemic influenza control guidance should be used as a base case and adapted [§20]. The global reasonable worst case scenario (RWCS) was similar to an influenza pandemic where no vaccine or specific treatment is available [§25], and SAGE considered that the UK's own RWCS should be based on a pandemic influenza type scenario [§27].

88. These points reflect the attitude that SAGE adopted, and continued to adopt over the coming weeks. The closest model that we had at that time to the likely spreading pattern of this new virus was pandemic influenza. This was in large part because SARS-CoV-2 was a respiratory virus that appeared to be more transmissible than SARS or MERS. However, we were also conscious of the significant differences between SARS-CoV-2 and influenza viruses, including in terms of the incubation period (then thought to be an average of five days, but with considerable variation in specific cases [§14]). It was also acknowledged that asymptomatic infection and transmission were possible [§13, §16]. SAGE did not simply adopt a pandemic influenza model. Instead, it used what we knew of such models where they helped in the analysis of the emerging pandemic, while remaining conscious of both the limitations of such models and the uncertainties in the available data and evidence. As is stated in the minutes: *"There are a number of scenarios that this outbreak could follow, depending on virulence and transmissibility"* [§24]. This approach was subsequently captured in a series of tables that compared directly where Covid-19 was similar to an influenza virus and where it showed important differences, which are discussed below.

89. SAGE also considered control measures at the second meeting. It was noted that *ideally* infections would be controlled in healthcare settings and by the rapid detection of cases. This is what was later termed the *"contain"* stage of the UK Government's strategy, as defined by DHSC, and is similar to the proposals that were initially discussed in Exercise Alice to contain a MERS or SARS type illness and prevent it from spreading. The inclusion of the word *"ideally"* is important. As was noted earlier in the minutes, a specific test was

anticipated to be ready by the end of the week (the meeting being held on a Tuesday). This was a great achievement on the part of PHE, but the minutes also record that the capacity was likely to be 400 to 500 tests per day. Rapid detection of cases depends on testing capacity and an effective system for contact tracing and case isolation. If there is low prevalence of the virus compared to the capacity to test, contact trace and isolate those who may have been exposed to it, then there is a higher likelihood that the virus can be contained (as SARS-CoV-2 was in South Korea during the first wave, and as SARS and MERS previously had been in the UK). If there is relatively high prevalence compared to the capacity to test, contact trace and isolate, then it becomes much harder, and ultimately impossible, to contain the virus. 400 to 500 tests per day was not going to be sufficient to contain a virus in the event of a major outbreak even if an effective contact tracing system was in place. As I have discussed elsewhere, and below, the inability of the UK to scale up the number of tests available severely hampered the country's ability to respond to SARS-CoV-2 **[PV2/2 - INQ000147810]**.

90. Testing capacity is not simply the number of tests, but also the ability to process them in a quality-assured manner, and inform the relevant people of the results. If a virus is to be contained, the testing stage must then be followed by contact tracing and isolation of cases. Isolation will, of itself, require facilities to isolate (whether at home or some other place or quarantine), and sufficient support to allow for isolation (including the availability of food and, where appropriate, adequate financial support). These are some of the measures that were identified in Exercise Alice in 2016 and required an infrastructure to be developed with the public health system. That infrastructure was not in place.

91. SAGE also considered other interventions that could be used to slow the spread of the virus if it could not be contained. It was noted that there was, at that time, no evidence of control measures that were being taken in China having had a measurable impact on transmission, but that that was probably a reflection of the fact that not enough time had passed since they were implemented [§21]. SAGE expressed support for the principle of self-isolation and noted the importance of behavioural science informing policy and of public trust in the government's approach [§22, §31]. SAGE had an expert behavioural scientist member from SAGE 1 onwards and the possibility of convening a sub-group on behavioural science (what became SPI-B) was identified at this meeting, the first full SAGE [§32]. SPI-M was commissioned to advise on actions that the UK could take to slow down the spread of the outbreak [List of actions, 1st bullet point].

92. SAGE also reaffirmed the triggers that would require a rapid change in the UK Government's approach, namely sustained human-to-human transmission outside China or a severe case in the UK [§28]. Those trigger points were themselves to be kept under review, with a further possible trigger point being introduced: multiple, geographically spread mild cases in the UK [§30].

93. The position of DHSC at the end of January is well expressed in an email sent by the CMO on 28 January 2020 to Will Warr, the health special adviser at No.10. I was among a number of people copied in **[PV2/43 – INQ000047585]** The CMO referred to two scenarios that were worthy of consideration for planning purposes at that stage. The first envisaged the virus mainly being contained in China with only a small number of cases emerging in the UK and no sustained onward transmission in this country. The second envisaged the *"opposite end of the risk scale"* with a major pandemic affecting the UK and causing significant mortality. As the CMO wrote, *"What makes this a difficult dichotomous decision is that the economic consequence of over-calling can be substantial, but the mortality and social consequences of under-calling are even more substantial."* He stated that the current priority was to prevent any UK transmission – what was later termed the *"contain"* phase. However, he acknowledged that *"if there was worldwide transmission (which may be the scenario within weeks) this would cease to be a realistic goal."* Once a pandemic was established, the aim was *"to minimise mortality (including indirect due to NHS load) and reduce social disruption."* The UK would use its current influenza pandemic plans *"as a base case"*, but without a vaccine or antivirals.

94. For completeness, the CMO also set out two other scenarios in which the virus proved to be less transmissible or less virulent and hence did not cause a pandemic. These did not require major planning efforts as they would be dealt with by the NHS in the same way as new variants of "normal" respiratory tract infections.

95. The CMO's email was, in my view, a realistic assessment of the situation given the information available to us at that time. It also reflects the fact that the ability to contain the virus was dependent on the ability to scale the necessary measures of testing, contact tracing and isolation. A paper from PHE on 12th February acknowledged that the case and contact isolation system would not be of sufficient scale **[PV2/44 - INQ000087180]**.

96. I attended a COBR meeting on 29 January, where the CMO and I presented the SAGE output **[PV2/45 - INQ000056166, p.7]**. The CMO gave a verbal update on the UK RWCS

planning assumptions, which was along the lines set out in his email and which was recorded in subsequent CRIPs **[PV2/46 – INQ000230988**

97. On 31 January, the CMO publicly confirmed that two patients in England had tested positive for Covid-19. They were receiving specialist care and work on contact tracing was underway **[PV2/47 - INQ000089121, p.2]**. I think that I may have learned of these suspected cases the day before. These were individuals who had come to the UK with Covid-19, rather than cases where the virus had been transmitted in the UK. Given the publicity, and the communication of these cases in the CRIPs and within DHSC and PHE, relevant decision-makers would have been aware of them.

My role in January 2020

98. My role in January 2020 was to convene SAGE if required and to communicate the output to the relevant decision-makers through COBR once it was called. It was not my role to give science advice within PHE or DHSC, to ascertain the state of the UK's emergency pandemic preparedness, or to become involved in the planning and execution of the operational response. As I explained in my first witness statement for Module 1, DHSC was the Lead Government Department for pandemic planning and operations **[PV2/2 - INQ000147810, §30]**. It would be inappropriate for the GCSA to become involved in operational delivery plans, whether that is a pandemic, or other emergency such as a nuclear incident, terrorist attack or a mass-flooding event. The CMO and one of the DCMOs were infectious diseases experts and epidemiologists, NERVTAG was chaired by a leading authority on SARS and respiratory disease and PHE was an executive agency with accountability for public health.

99. The wider role of the GCSA and GO Science in the UK Government's emergency planning processes, and specifically in the National Security Risk Assessment and the National Risk Register, is set out in my first statement **[PV2/2 - INQ000147810, §§24-35]**, in my oral evidence for Module 1 **[PV2/16 INQ000230999 p.154-161]**, and in Dr Wainwright's third statement **[PV2/5 - INQ000148407, §§88-96]**. In short, and as I told the Inquiry in my oral evidence **[PV2/16 – INQ000230999 p.154, l.14-20]**:

> "The role of the Government Chief Scientific Adviser is to look across at the methodology and ask: are there some anomalies or things that need to be changed in order to get the appropriate consistency across? Or indeed other

areas where we think that there's a need for different types of approaches given different types of risk."

100. I have reflected on whether I reacted appropriately to the information that was available to me in January 2020. I think that I did, although that does not mean that every decision or piece of advice was as good or as clear as it could have been. I recognised that the virus was a serious threat and at the very start of the month I ensured that GO Science was monitoring the position so that SAGE could be activated if needed. The presence of GO Science observers at NERVTAG on 13 January shows that we were sighted on the discussions of the relevant expert group in case it proved necessary to convene SAGE. I initiated the precautionary SAGE meeting on 22 January and co-chaired the first full SAGE six days later. I think I alerted Mr Cummings to my concerns about the emerging pandemic on 23 January. I brought together research funders on 27 January to lay the foundations for research that became important throughout the pandemic, including on vaccines. The early SAGE meetings addressed important issues and were informed by leading experts in relevant fields, though, as is acknowledged above and in my first statement there are legitimate questions about whether there could be greater diversity in participation from the outset (and work has been done to ensure that there is a system in place to achieve this in future) **[PV2/2 - INQ000147810, §57(4) and §64]**. I spoke to national and international colleagues both to gain information and to seek to emphasise my view that the virus was a serious matter that required careful and urgent global attention. From the 31 January near-daily calls between the CMO, the scientist in charge of infectious diseases in PHE (Professor Sharon Peacock) and I were instituted, with the National Medical Director of NHS England (Professor Steve Powis) joining from 28 February.

101. I have asked myself whether I should have convened the precautionary SAGE earlier. I could have done and discussed doing so with CMO, but at that stage DHSC had convened the appropriate scientific expert committee (NERVTAG) and we were fortunate to have a deeply expert CMO and DCMO. An earlier date would have meant that we had even less data and evidence with which to work, and hence even more uncertainty. I think the dates on which SAGE met are justified and with the process of having a Lead Government Department it would not have been particularly helpful to have held SAGE earlier.

102. I am asked the extent to which there were tensions between the CMO and me in January 2020 about the response to Covid-19. I think that we were aligned and do not recall any specific tensions. DHSC led the response and we agreed when SAGE was needed to supplement the work being undertaken within DHSC and its specialist committees.

103. I am asked what consideration, if any, I gave to the fatality rates and reports, including the "lessons learned" reports relating to SARS-CoV-1 and MERS. Those who sat on SAGE and NERVTAG were well aware of the SARS CoV-1 and MERS outbreaks and the responses to them. The initial "contain" approach was based on the approach to managing SARS or MERS but of course the scale became very much larger than that. I had read both the Golden Hour Document and the longer GO-Science primer for the GCSA on non-flu pandemics **[PV2/48 - INQ000212240; PV2/49 - INQ000142139]**. I was not aware of the findings from Exercise Alice at the time which was an internal PHE/DHSC exercise. The findings were relevant and covered areas including testing, isolation and contact tracing but it is unclear to me what actions were taken. Scaling those functions in advance of the pandemic would have allowed "contain" to function longer and better than it did. As can be seen from the minutes of SAGE 1, SAGE 2 and the NERVTAG meeting on 13 January, thought was being given to how SARS-CoV-2 compared to other coronaviruses and where it might be similar to or differ from an influenza pandemic. However, the fact that we knew we were dealing with a coronavirus rather than an influenza virus did not mean that there was a clear path ahead nor the operational capacity to respond to it. On 3 February SAGE asked for work to determine how to stop the spread of Covid in the UK.

CHRONOLOGY: EVENTS OF FEBRUARY 2020

3 February to 7 February 2020

104. SAGE met for the third time on 3 February 2020, specifically to discuss the impact of travel restrictions **[PV2/30 - INQ000061511]**. I return to this topic in more detail later in this statement, but the collective view at SAGE 3 was that *"draconian and co-ordinated measures"* would be required to achieve sufficient reduction of imported infections to make an appreciable difference in the UK's preparedness. Even then, on the limited data available, a 95% reduction in imported infections would only allow for *"maybe"* an additional month delay. The minutes recorded that direct flights from China were not the only route for infected individuals to enter the UK, a point that was borne out by later studies and the large infection importation that occurred from Europe [§3]. It was also stated that stopping travel *"would also have other impacts, including on supply chains"* [§4]. Any policy decision would have to take into account those other impacts. At this meeting there was also discussion of the need to understand measures that would stop spread in the UK.

105. The minutes of SAGE 3 identified that *"case ascertainment in China appears to be low: potentially 1 in 15 being identified, possibly 1 in 20"* [§9]. I am asked what I did to liaise with other countries to understand their infection and mortality figures. I explain below the approach the CMO and I took to discussions with our counterparts in other governments. I had no concerns that those I spoke to were suppressing their figures, although the data available to them were often very incomplete or unreliable (as they were in the UK in this period). Other colleagues from SAGE also used their own contacts and networks to obtain the figures that they could. Updated confirmed cases and fatalities around the world were included in CRIPs (see, for example CRIP 2 **[PV2/45 - INQ000056166, p.2]** and CRIP 4 **[PV2/47 - INQ000089121, p.2]**). In April 2020,[15] the International Comparators Joint Unit (ICJU) was established to co-ordinate information from other countries to inform UK advice and policy.

106. On the following day, 4 February, the WHO issued further guidance. This noted that 132 confirmed cases of Covid-19 had been reported in 23 countries outside China, and that 14 of those cases had been attributed to secondary transmission (person-to-person transmission). The report included a reference to the uncertainties surrounding the virus, *"including the full extent of the current outbreak within China, and the full clinical spectrum of illness, including the prevalence of mildly symptomatic cases."* [16] I would have been aware of this publication at the time and would have considered it, as I did all WHO advice on Covid-19 and SARS-CoV-2. SAGE had already highlighted the possibility of asymptomatic or pauci-symptomatic (i.e., those with few or mild symptoms) infection by then. There had also been some discussion of this among scientists following the circulation on 1 February of a paper published in the New England Journal of Medicine **[PV2/52 – INQ000230995]**

107. A further SAGE meeting, SAGE 4, took place the same day, 4 February **[PV2/31 - INQ000061512]**. Among the matters raised were asymptomatic transmission, which the minutes recorded could not be ruled out, with transmission from mildly symptomatic individuals considered likely [§19]. I had commented to the GO Science SAGE team and Professor Watts on 1 February that asymptomatic seemed to be occurring **[PV2/53 – INQ000228632]** There was discussion of various non-pharmaceutical interventions, including school closures (the effect of which was *"currently unknown"* **[PV2/31 - INQ000061512, §36]**), shutting public transport and suspending public gatherings (*"probably … ineffective*

[15] See **[PV2/50 - INQ000252717]**
[16] See **[PV2/51 - INQ000087457]**

in creating any meaningful delay in spread [§5, §39]), and wearing of facemasks (not recommended by NERVTAG, other than for symptomatic people [§42]). I return to some of the advice given on some of those interventions below. It can be seen from the minutes that the limited data meant it was difficult to provide advice on the effect of these measures without expressing considerable uncertainties. SAGE agreed that, in the absence of more reliable data the UK Government should continue to plan using influenza planning assumptions [§45]. In the List of Actions, SPI-M was tasked with reviewing the UK pandemic flu RWCS planning assumptions on a weekly basis and updating SAGE *"on whether they should be revised, as new data emerges."* There was clear awareness that SARS-CoV-2 was not influenza and that this would need to be factored into the work.

108. The meeting discussed approaches taken by other countries to testing asymptomatic travellers from China and the UK's own testing capacity. It was recorded that: *"Although the UK is building regional diagnostic capability within weeks, overall capacity is limited. Capacity cannot be substantially increased during this winter influenza season"* i.e., over the following six to eight weeks [§26]. A UK science co-ordination group was established to consider whether the UK could accelerate diagnostic capacity to include routine SARS CoV-2 testing alongside regular influenza testing before the onset of the following winter influenza season. This was considered by PHE.

109. The meeting also saw a more systematic approach being taken to SAGE meetings as it became apparent that the group would be required for some time to come. In particular, participants were asked to indicate confidence around statements where possible [§9]. This was intended to communicate uncertainties in the evidence to the decision-makers who were receiving the SAGE output.

110. SAGE 4 preceded a COBR meeting that was held on 5 February. This was chaired by Mr Hancock and I attended to present SAGE's work. By this time two patients in England had tested positive for Covid-19. The CRIP recorded that they were receiving specialist NHS Care and that contact tracing was underway **[PV2/54 - INQ000230989, p.10]**. The Scenarios for Cross-Government planning contained in the CRIP were based on the CMO's email of 28 January, to which the following was added: *"CMO and SAGE will continue to review whether the planning assumptions for the [pandemic] flu RWCS are appropriate to this scenario as more data emerges"*.

111. SAGE met again on 6 February, for SAGE 5. This meeting concerned the geographical element of the case definition (the criteria for decision whether an individual has the

disease), routes of air travel links and extending the number of countries from which cases should be suspected. **[PV2/55 - INQ000061513].** The aim of this work was to inform PHE and DHSC decision-making on isolation of suspected cases, and quarantining measures.

112. I attended a meeting on vaccines called by Mr Hancock and also attended by the CMO amongst others on 7 February. DHSC will have records of the minutes of the meeting.

Briefing the Prime Minister, 10 February 2020

113. On the same day, Friday 7 February, I spoke to Mr Cummings privately at the end of a meeting. I wanted to check that the Prime Minister had been appropriately briefed on matters relating to Covid-19 and understood how important and dangerous this was. Mr Cummings told me that he had not. Mr Cummings told me that the matter had been raised at a more general visit to DHSC by the Prime Minister but that there had not seemed to be a high level of concern. I later learned that the topic had indeed been raised during a briefing given by DHSC but my impression was that the importance of this issue had not been fully understood. I understand that DHSC representatives thought that there had not been much engagement by the Prime Minister. I was concerned by this and so pressed Mr Cummings to arrange for a further meeting. I was subsequently informed that a meeting had been arranged for me to see the Prime Minister on Monday 10 February. The Prime Minister's time is tightly controlled and it is unusual for a meeting to be arranged so quickly (for the next working day). I took this as a sign that Mr Cummings had understood my concerns and agreed that the Prime Minister should receive a further, and specific, briefing on this matter.

114. The meeting on 10 February was the first time that I spoke to the Prime Minister about the pandemic. Mr Cummings was also present, as was the CMO. I think the meeting was just the four of us and perhaps one or two private secretaries from No.10. GO Science has no records of this meeting and I have seen no official record of it. I recall the CMO setting out the possible scenarios, in line with his email of 28 January. At the end of meeting I think the Prime Minister expressed a view that he thought the problem would be contained but there was no doubt that Mr Cummings and the No.10 team understood the level of concern.

115. I have been asked whether I was aware of the Prime Minister expressing an initial view in early 2020 that Covid-19 was not a serious threat and was akin to swine flu. I do not recall him saying that. It is worth noting that swine flu itself led to deaths and so was not a benign disease.

116. I am asked if I feel I should have met the Prime Minister before the 10 February. DHSC was the Lead Government Department for pandemic planning and had already briefed the Prime Minister, possibly more than once. That is the appropriate route for escalation to the Prime Minister for a health-related matter. However when I became concerned about the level of the Prime Minister's knowledge of the issue, on 7 February, I asked for a meeting and one was arranged for the next working day. This was attended by the CMO but there were no other officials from DHSC and no ministers.

11 February to 18 February 2020

117. SAGE 6 was held the following day, 11 February **[PV2/56 - INQ000061514]**. There were at that time eight confirmed Covid-19 cases in the UK, all of whom acquired the virus overseas [§5]. SAGE emphasised that it was *"essential"* to obtain the maximum amount of information from these cases, a responsibility that fell to PHE [§2, §§24-26]. SAGE agreed that the UK Government should continue to plan using the influenza pandemic assumptions, but again identified important differences. These included the shedding of significant amounts of virus before symptoms were evident. The meeting considered a paper prepared by the SAGE secretariat that expressly contrasted characteristics of influenza viruses with those of SARS-CoV-2 (as known at that time) **[PV2/57 – INQ000229127]** The information was presented in a table, the first few rows of which are reproduced (in simplified form) below.

Assumption	**Pan-flu RWCS**	**WN CoV current estimate**
Incubation period	Short incubation period – 1-3 days	Range remains 2 to 14 days, with average of 5 days
IFR	2.5%	Unlikely to be higher than SARs. Current internal estimate is 1-3%
Doubling rate	No number included in planning assumptions	3 to 5 days
Duration of illness	Assumes normal flu profile – most people back to normal activities in 7-10 days	Median of 15 to 18 days, but great uncertainty around this. Longest time so far appears to be 41 days.

The table contained 17 elements for comparison in total – in addition to those listed above they were: duration of infectivity; transmission; waves/duration; population with illness; workforce absences; numbers requiring assessment at health services; hospital cases; hospital critical care; excess deaths; clinical counter-measures; vaccine development; school closures; and border control measures. The table was adapted and updated repeatedly in February and March, with the intention of checking what was known about the virus against the planning assumptions that underlay the pandemic influenza RWCS, and hence assessing the extent to which planning for pandemic influenza served as a useful guide. **[PV2/58 –INQ000074896 PV2/59 – INQ000213035 PV2/60 – INQ000074987**

118. The SAGE minutes and accompanying papers once more reflect the limited data that were available to participants, with the minutes recording that *"A lack of data from China continues to hamper understanding of Covid-19"* **[PV2/56 - INQ000061514, §16]**. It was explained that the case fatality rate remained uncertain, but planning was based on an assumption of 2 to 3% [§9]. The CMO and I discussed this figure, and how it related to the estimated 1% of Covid-19 patients requiring ITU care, after the meeting. It probably meant that the data sources were still poor **[PV2/61 – INQ000228653**

119. SAGE was advised by PHE that, *"It is not possible for the UK to accelerate diagnostic capability to include Covid-19 alongside regular flu testing in time for the onset of winter flu season 2020 to 2021"* **[PV2/56 - INQ000061514, §7]**. This was the first indication that scaling of testing was going to be severely rate limiting for detecting cases and that there was no plan to involve the private sector in testing capacity. It is unclear what action was taken as a result of this finding.

120. SAGE advised that the UK Government should plan for impacts on the NHS and on the wider UK workforce [§36]. SAGE itself would consider school options, public behaviour, public gatherings and advice on absenteeism in future meetings – in other words, the effect of some of the NPIs that may be available. In early February the impacts of NPIs alone and in combination (various degrees of lockdown) was comprehensively modelled by Neil Ferguson and others. NERVTAG was to consider advice to frontline workers and the cleaning of surfaces (which would be relevant to spread by fomites – i.e., objects likely to carry infection on their surface) [§§37-38].

121. On 12 February, I attended a meeting of the National Security Council's officials (NSC(O)) with the hope of speaking about Covid. There was no agenda item or room to discuss

Covid and I recall several people commented afterwards on why Covid was not being discussed in the meeting.

122. On the same day, I attended a ministerial table-top exercise, Exercise NIMBUS. The records of this exercise are not held by GO Science and so I have not been able to consult them before giving this statement. According to a later CRIP, the intention of the exercise was to test the decision-making process by COBR in response to Covid-19, including by exposing the potential scale and range of impacts in the RWCS, to work through some of the most difficult decisions that would have to be made by ministers, and to rehearse strategic decision-making **[PV2/62 - INQ000056150, p.14]**. The following day there was a Cabinet re-shuffle that meant that some of those at the meeting were no longer in post to implement the outcome of the exercise.

123. During February Whitehall as a whole was paying variable attention to Covid-19 with some responding and others not. SAGE and COBR continued to meet, with ministers being updated accordingly, but my sense was that the central government machine was not sufficiently engaged on the operational requirements. For example, the weekly meetings of Permanent Secretaries on Wednesday mornings would often dedicate more time to other matters, and Covid-19 was usually an "add on" to meetings, not the central feature of them and that others were not giving the topic its due prominence.

124. However some of those present heard the briefings and acted. For example, I later learned that Sir Andrew Parker, the Director General of MI5, implemented its pandemic emergency plan in early February in response to warnings he received from the CMO and me at either a meeting of Permanent Secretaries or of NSC(O).[17] He stated *"I'm inclined to listen to scientists and so having been told this is coming, pretty much that day I instructed the implementation of our contingency planning"*. This gives me confidence that the CMO and I were providing sufficient information to prompt action.

125. I also had a number of meetings during February with Mr Cummings and another No.10 adviser, Ben Warner, whose background was in data science. According to my appointment diaries, I met one or both of them on 14, 20, 21 and 27 February, though not all of these discussions were about Covid-19. The meeting on 27 February included Mr Hancock, Sir Chris Wormald (Permanent Secretary at DHSC), the CMO and Katharine Hammond (Director, CCS). My impression throughout this period was that Mr Cummings

[17] See **[PV2/63 - INQ000231023**

and Mr Warner were aware of the risk posed by Covid-19 and were helpful in communicating that message on to others at No.10. They would, entirely appropriately, challenge what we told them and ask questions, and I felt that they understood the information that we were trying to convey.

126. Mr Warner began to attend SAGE as an observer on 20 February 2020 and attended numerous meetings thereafter. Mr Cummings attended four meetings in March and April 2020, the first on 5 March. I had no concerns about their attendance and considered it helpful as they would be able to see first-hand the discussions that were taking place. They could also provide the group with relevant information about the policy context in which the discussions were taking place.[18] I never had the impression that they were interfering inappropriately, and if they had done the co-chairs and other participants would have had no hesitation in telling them to stop. The only issue which caused me concern was when a No.10 special political adviser or official inaccurately briefed the Prime Minister and Mr Cummings on the SAGE discussion before the minutes were circulated and before the CMO and I had had a chance to explain the evidence. At that point the CMO and I made it clear that the sole outputs from SAGE should be the minutes, papers and the briefings from the co-chairs. This was accepted by No.10 and as far as I am aware the issue did not arise again.

127. Returning to the chronology of events, SAGE 7 took place on 13 February 2020 **[PV2/64 - INQ000061515]**. This reconsidered a paper produced on 3 February 2020 by SPI-M on the impact of interventions to delay the spread of a UK outbreak of Covid-19 [§1]. The paper had previously informed some of the discussion at SAGE 4.[19] SPI-M had modelled the effect of a number of NPIs, including travel restrictions both into the UK and within the UK, quarantine of those entering the country from affected areas, mass closure of schools, restrictions on mass gatherings, mass university closures, contact tracing of cases, voluntary home isolation of those with respiratory symptoms and their household contacts, encouraging the wearing of facemasks, and basic public health advice such as handwashing. SPI-M also considered a combination of those NPIs. This approach was modified and continued in the coming weeks. The table produced by SPI-M to present their findings included three placeholders, for effective antivirals, effective antibiotics and effective vaccination in anticipation that these pharmaceutical interventions might become available at a later date.

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[18] See the explanation of the roles of scientific experts, observers and government officials and the secretariat in the Addendum to the SAGE 1 minutes **[PV2/32 - INQ000061509]**

[19] See **[PV2/65 - INQ000087430**

128. Among the notable matters discussed at SAGE was the view that there was *"no current evidence to suggest prevention of mass gatherings is effective in limiting transmission. Public actions in the absence of a mass gathering could have comparable impacts (for example watching a football match in a pub instead of a stadium as likely to spread the disease"* [§8]. This was a topic to which SAGE returned, and which I explore in greater depth below. The risk of mass gatherings was considered numerically smaller than the risk of multiple smaller gatherings in indoor environments. The consensus statement in this respect reflects the SPI-M findings on combining NPIs (i.e., something akin to lockdown): while some may reinforce one another and increase the delay in the spread of Covid-19, *"some may reduce the impact of others"* **[PV2/65 – INQ000087430**. It became clearer as time progressed that for NPIs to be effective, they would have to be implemented in a wide-ranging and co-ordinated way.

129. On school closures, it was noted that the impact of Covid-19 on school age children remained poorly understood **[PV2/64 - INQ000061515, §14]**. The importance of school aged children to transmission in an *influenza* pandemic was explained, but it was not assumed that this would apply to Covid-19 [§13]. The SPI-M paper provided more detail on the difficult balances involved and noted that: *"Mass school closures have a large cost in terms of parental absenteeism as well as foregone education"* **[PV2/65 – INQ000087430**. While SAGE did not have the expertise or remit to quantify those costs, it was right to raise them for others to consider. SPI-M also noted the potential unintended consequences of closing schools, including potential negative consequences for older people if it led to grandparents caring for children. Representatives from the Department for Education were at the meeting.

130. As the SAGE minutes record, a decision on school closures *"must consider what objective is being sought in terms of seeking to affect the epidemic curve (peak, duration, waves of infection)"* **[PV2/64 - INQ000061515, §11]**. Again, more explanation is provided in the SPI-M paper:

> "If mass school closures were effective with 2019-nCoV, their timing would be important. To delay a UK epidemic, they would be most useful early on in order to reduce community transmission. To reduce the overall attack rate, or lower the peak attack rate, they are normally most effective just before the local peak of the epidemic and when timed around school holidays.

In theory, mass school closures could increase the overall attack rate if done at the wrong time."

131. The decision on which objective was to be pursued was a matter for the politicians and those deciding on policy. It is an early example of the science advisers setting out the different options available in terms of NPIs to inform, but not make, policy choices.

132. It should be remembered that SPI-M was working at this stage with very limited data. As was stated in the paper, the impact of any intervention would be highly dependent on the patterns of transmissibility of the virus. As this was poorly understood at that stage, the impact of the interventions was hard to determine **[PV2/65 – INQ000087430]**.

133. SAGE also considered how to limit spread within the prison estate and prisoner population **[PV2/64 - INQ000061515, §§17-20]**. Emphasis was placed on the *"high degree of movement across the prison estate"* and the most effective way of limiting spread was thought to be *"reducing transfer of individuals between prisons"*. Although this information was given in the context of prisons, it was well understood that it would also apply to other residential facilities, including care homes and this was explicit in the Chair's brief **[PV2/66 – INQ000221781]** Indeed, care homes were a particular concern and were referred to a few days later in a paper from the NHS produced by Professor Keith Willett on the management of Covid-19 in the UK. Professor Willett, the National Director for Emergency Planning and Incident Response for NHS England, wrote of the need to *"develop the concept of 'closed communities' to avoid inbound infection,"* and identified care homes specifically in his paper **[PV2/67 – INQ000229869]**

134. SAGE 7 also considered a number of matters relating to behavioural science. This discussion was led by Professor James Rubin who had been on SAGE since SAGE 1 and Professor Brooke Rogers of King's College London. They became Chair and Deputy Chair of SPI-B respectively which was established at that meeting. The minutes record the consensus statements that emerged from this discussion, including the importance of coherent and consistent public messaging that, at that stage, stressed the importance of personal responsibility and responsibility to others **[PV2/64 - INQ000061515, §§21-31]**.

135. The next SAGE meeting, SAGE 8, took place on 18 February 2020 **[PV2/68 - INQ000061516]**. This included discussion of PHE's capacity for contact tracing. At that point in time, it was stated that this could cope with five new cases per week, with the possibility of increasing capacity to 50 new cases each week, although that would need to

be stress-tested. It was agreed that *"When there is sustained transmission in the UK, contact tracing will no longer be useful."* [§§7-9]. This refers to when the ability to test and contact trace would be overwhelmed and therefore become ineffective in terms of overall spread. A paper from PHE on 12 February states that *"the PHE capacity to provide case identification, contact tracing and isolation can be expected to be not sufficient or sustainable at the limits of controlling higher rates of incursions into the UK"* **[PV2/44 - INQ000087180]**.

136. At the time of that discussion, there were nine confirmed cases in the UK and in retrospect we can see that the number at that time was actually at least 33 **[PV2/68 - INQ000061516 - §13]**.

137. The meeting also discussed drugs that were being used to treat Covid-19. The minutes recorded that: *"It is essential that the UK agrees principles for clinical trials and treatment should an outbreak occur [in] the UK, learning lessons from previous epidemics such as Ebola in West Africa and severe flu in the UK. This will support NHS planning."* I have referred to the importance of the national-scale clinical trials conducted within the NHS in my first statement **[PV2/2 - INQ000147810, §§106-109]**. It was right that such an emphasis was placed on obtaining a proper evidence-base for treatment. A direct consequence was the RECOVERY trial that identified the effectiveness of dexamethasone, an inexpensive and widely available steroid drug, in treating Covid-19, and did so within 138 days of the WHO declaring the pandemic. It is estimated that this saved a million lives worldwide **[PV2/69 – INQ000231012]** I understand that the Inquiry will consider this issue further in Module 4.

138. I attended the COBR (M) meeting that took place on the same day, 18 February. The relevant CRIP 11 indicates that I updated the meeting in line with the discussions that had been held in SAGE **[PV2/70 - INQ000056150, pp.6-7]**. The two pages of scientific advice presented through the CRIP again contrasted what was known about Covid-19 with the pandemic influenza RWCS, pointing out similarities, differences and the (many) matters that were still unknown at that stage in the pandemic. The COBR meeting discussed a number of topics, including the repatriation of passengers on the Diamond Princess cruise ship and proposed emergency legislation. The cruise ship data strongly supported the idea that indoor environments were a particular spreading risk. The formation of SPI-B as a formal SAGE sub-group was agreed **[PV2/71 - INQ000052070, p.3]**.

Data and Government Policy in February 2020

139. SAGE 9 convened on 20 February **[PV2/72 - INQ000061517]**. The minutes record two essential precursors to SAGE's work: the need to understand and improve the surveillance of the virus in the UK [§7] and an understanding of what the overarching objective – the policy goal – behind the UK's management of the epidemiological curve (i.e., the number of illnesses over time) [§8].

140. The first of these reflects the points I have made above and in my first statement about the importance of data in the early stages of a pandemic **[PV2/2 - INQ000147810, §§87-94]**. It had already become apparent to me and to others on SAGE that we were struggling, and would continue to struggle to collect, share, and analyse the data that we needed to inform our response to the pandemic. This was true for NHS data and for community infection data. The need for a national surveillance study was noted in this meeting with an action for PHE to work up proposals and to do so together with the DAs. In the event PHE simply did not have the capacity to undertake the work and sometime later (16 April) ONS picked up the task (something I discuss in more detail below). The need for a community surveillance system of this type had been anticipated in Exercise Alice.

141. The second of the points was a call for clarity from the politicians and decision-makers. It was not for the experts on SAGE to determine what the UK policy should be. However, we needed to know what the intended policy outcome was so that we could address the science questions that arose from it. In essence, there were three points on a broad spectrum of policy outcomes if containment was not successful. At one end was a policy goal of minimising to the greatest degree possible the mortality caused directly by the virus by imposing tight and widespread restrictions intended to stop the virus from spreading. At the other end was a policy goal of keeping society as open as possible with minimal interventions, which would mean that the virus would spread relatively unimpeded through the country. Between those two ends was a policy that sought to manage the epidemiological curve so that the peak of the virus did not lead to the NHS being overwhelmed, while protecting the vulnerable (see the reference in the minutes to *"flattening the peak, spreading the duration, avoiding winter"* [§8]). All of those options came with adverse consequences. Once contact tracing and isolation was ineffective in controlling spread, minimising infections would mean closing the economy and reducing individual freedoms and this would inevitably cause its own health consequences. Minimising restrictions would mean higher Covid-19 related mortality, even though the population would be expected voluntarily and spontaneously to take measures to protect

themselves, and the economy would be damaged due to the effect of widespread illness, including the consequences for the NHS overall. Seeking to manage the curve ran the risk of misjudging the extent of the outbreak and acting too early or too late. It was for the politicians to determine the point on the spectrum for which they wished to aim. Once they had done so, SAGE could look at the emerging data and advise on what may be required to achieve this goal, and to consider what the effects would be of taking or not taking such steps.

142. I was aware that we would not achieve perfect clarity either on data or on the preferred policy goal. However, the more relevant data there were available, and the clearer the policy goal, the more directed and accurate the science advice would be. With less data, and less clarity, the science advice would be more uncertain, more disparate, and less effective. As was stated in the SAGE minutes: *"Once there is clarity on those issues, SAGE should review all potential methods to limit spread (schools, travel, large gatherings, home working), including their likely relative effectiveness"* [§9]. These papers formed the basis of a lockdown option.

143. The data situation did improve, but was inadequate at this time. As is discussed below, that led to under-informed advice and decisions. The minutes of SAGE 9 reveal some of the deficiencies that were already apparent, with SAGE concluding that individual cases could already have been missed [§11], and a request for screening of all those in hospital with unexplained pneumonia. This would give an indication of the tip of the iceberg and how big the iceberg beneath it might be. Among the action points from the meeting was a request for PHE to produce and share detailed proposals for surveillance from clinical settings.

144. On policy, there was a degree of clarity but with limitations. It was never the UK Government's policy to simply let the virus pass through the community in order to achieve population (or "herd") immunity as quickly as possible. Had the policy been "do nothing", I think it is likely I and others would have resigned.

145. Once the "contain" phase of the strategy was overrun nor was the policy to impose whatever restrictions were required to try to go back to "zero Covid". SAGE was concerned about a pandemic with multiple waves of infection and that any policy should understand the consequences over a longer time period, including consideration of how to exit from interventions. The minutes of SAGE 8 recorded, there was some evidence emerging of decreasing incidence in China: *"However, this does not rule out a resurgence once*

restrictions on internal movements are lifted" **[PV2/68 - INQ000061516, §1 and §3]**. This concern was borne out by later events.

146. The initial strategy of DHSC was "contain, delay, research, mitigate". My understanding was that the UK Government's policy was initially to try to contain any infections and avoid spread. This would be through testing, contact tracing and isolation. However if that became overwhelmed and the infection was spreading and uncontained, the desired aim was to seek to reduce the infection rate to ensure that the disease did not peak in a size and time in a way that would mean that the NHS was overwhelmed. While doing this, the policy was also to seek to protect those who were at highest risk of mortality (particularly older people and those with relevant co-morbidities). As of 20 February, the time of SAGE 9, this was a policy to be pursued in the event of a sustained outbreak in the UK that could not be contained, something that was not then thought to be inevitable on the data available. Later, it would become the direct policy response to contemporary events. While the policy can be easily stated and understood, in practice it allows for a wide variety of approaches and outcomes. In other words, the policy can move either way along the spectrum while seeking to achieve the overarching goal depending on questions of judgment and NHS capacity. I recall the question being put to ministers: how many deaths were acceptable? None gave an answer. The question was posed to help inform and focus the research and modelling being undertaken by and on behalf of SAGE and its sub-groups. It is, though, an extraordinarily difficult question for an elected politician, or anyone, to answer.

147. The minutes of SAGE 9, and the list of actions, reflect that we understood the UK Government's policy goal in the event of a wide-scale UK outbreak that could not be contained was to be the protection of the NHS. They also indicate the steps that were proposed to better inform science advice to achieve this goal, particularly on surveillance, modelling and behavioural science. The meeting also considered further the role of school closures in slowing the peak of an epidemic and the possible detrimental impact on children. The Department for Education was represented at that meeting.

148. The day after SAGE 9, on 21 February, Professor Ferguson sent an email to the CMO, Professor Van-Tam and me, copying in Sir Jeremy Farrar, Professor Edmunds and Professor Horby. He identified reports of an Italian cluster of Covid-19 cases and suggested that the UK needed urgently to formulate an evidence based contingency plan for how it would respond to a similar situation. This prompted further discussions on email about case numbers and approaches in Italy, South Korea, Japan, China and Iran. At my

suggestion PHE were tasked with producing a paper dealing with the steps that would be taken to contain an outbreak of Covid-19 in the UK, and to slow the spread of the outbreak if containment were not possible. This was intended to lead to a discussion about how the PHE approach compared to what was being done in other countries. The CMO explained to those involved in the discussion that SAGE would focus on the science questions (in particular the epidemiological effectiveness of various interventions), rather than matters of policy or operations **[PV2/73 –INQ000228676 PV2/74 –INQ000228672**

149. PHE produced its paper, dated 24 February, detailing a proposed response to three scenarios: a community-based outbreak, a nosocomial outbreak (i.e., within hospital) and an outbreak on a ship in a UK port **[PV2/75 - INQ000074910]**. In each case, the initial response was to be containment through measures such as isolation, contact tracing and treatment in dedicated facilities; measures to slow the spread of the virus would be introduced if containment proved insufficient.

150. The paper was tabled at SAGE 10 on 25 February 2020 **[PV2/76 - INQ000061518]**, and the meeting discussed evidence from Wuhan, Hong Kong and Singapore about the effect of social distancing and school closures. It was considered that a combination of these measures would be needed and could reduce the spread of the virus in the UK, but would only slow and not halt an epidemic once it had exceeded testing and isolation capacity. Other NPIs had also been modelled (home isolation and household quarantine), as had their combined effect. It was considered that all measures would require implementation for a *"significant duration"* in order to be effective [§§10-13].

151. SAGE also considered that public messaging was likely to be most effective if recommendations to act were definite, rather than being presented as optional or a pick and mix menu. Public uptake was likely to be *"significantly impacted"* by whether the government was seen to be acting competently [§§16-17] and would be better if a sense of collectivism or community spirit were promoted. SAGE also agreed that PHE's surveillance approach would be sufficiently sensitive to detect an outbreak in its early stages. In the event the capacity was very limited and rapidly became overwhelmed, [§4].

152. On the same day, 25 February, I attended a meeting with the Prime Minister, the Development Secretary, the Foreign Secretary, the CMO and others. Among the points to emerge from the meeting was a request for a paper setting out *"the most significant choices should a pandemic occur in the UK."* This paper was produced by CCS and I provided comments on some of the scientific parts of the document. It laid out the strategy the

government wished to pursue and reiterated the intention to contain the infection if possible **[PV2/77 – INQ000136749**

153. The next SAGE meeting, SAGE 11, took place on 27 February **[PV2/78 - INQ000061519]**. This saw a number of important developments. First, SAGE set out agreed priority areas [§5], which were to:

- Detect and monitor any outbreak as effectively as possible
- Understand effective actions to help contain a cluster (i.e., contain, contact trace and isolate)
- Understand measures to alter the shape of a UK epidemic
- Model UK epidemic and identify key numbers for NHS planning
- Understand risk factors around demographics, geographies and vulnerable groups (e.g., age)
- Generate behavioural science insights for policy-makers
- Ensure NHS trials key interventions
- Consider emerging therapeutic, diagnostic and other opportunities

154. The meeting reviewed the Covid-19 planning assumptions, including by considering further the similarities and differences with pandemic influenza **[PV2/58 – INQ000074896** Based on SPI-M modelling, SAGE advised that the RWCS was that 80% of the UK population may become infected with an overall fatality rate in those infected of 1% [§6]. In a population of 67 million,[20] this would amount to more than 500,000 deaths. This, it was explained, was a measure of deaths as a direct result of infection and did not include those related to NHS overload or other second order effects [§9]. As was explained in the minutes. SAGE agreed that the case fatality rate remained the same at 2% to 3%, but the fatality rate for the overall infected population was closer to 1% given the number of *"mild and possible asymptomatic infections"* [§8]. In other words, while the mortality rate in confirmed cases of Covid-19 was between 2% and 3%, there were many cases that were not being reported or confirmed as people did not realise that they were infected with the virus, meaning that the fatality rate for overall infections (the infection fatality rate) was lower. The figures in the RWCS were still stark, even if they were a reduction on the number of excess deaths relative to previous planning assumptions [§7].

[20] See **[PV2/79 - INQ000231049**

155. I am asked how the RWCS was communicated to core decision-makers, how it affected my advice, and whether the government's response changed in light of it. The information was communicated in the usual way, through the SAGE minutes, and through CRIP 16, which referred to a figure of 525,000 fatalities in the RWCS **[PV2/80 - INQ000052225, p.2 and p.4]**. It was discussed in COBR meetings and directly with the Prime Minister and other ministers and decision-makers. The advice related to it is contained in the same sources. This was a downward revision of the RWCS and was below the figure in the RWCS for pandemic influenza. It was important information but only part of the wider picture. It created a sense that government needed to act. It is worth recalling that at this stage even relatively "simple" interventions such as self-isolation for those infected or household isolation were seen as difficult and potentially unacceptable policy choices by some. Looking back at Exercise Alice it is interesting to note that that exercise also indicated that policy-makers found those choices likely to be difficult or impractical.

156. SAGE went on to review interventions intended to contain, delay and mitigate the spread of Covid-19. This was done by reference to a table summarising the impacts of NPIs **[PV2/81 – INQ000236282]** As can be seen, this set out a number of NPIs – closure of schools, a 13 week period of 7-day home isolation of symptomatic cases, a 13 week period of 14-day voluntary household quarantine following the identification of a symptomatic case in the household, and a 13 week period of social distancing (which implied a cessation of all activities outside the household, including social contact between different households, other than essential functions and attending school and work). For each, the assumptions behind the analysis were set out, and an assessment made of their potential effectiveness in containing an outbreak, delaying an outbreak and reducing the peak of an outbreak, alone and in combination. Each was also the subject of analysis from the perspective of behavioural science, identifying issues that would be relevant to the impact of the measures and compliance with them. Drawing from the work behind this table, the SAGE minutes record a number of points **[PV2/78 - INQ000061519]**:

a. Mitigations can be expected to change the shape of the epidemic curve or the timing of a first or second peak, but are not likely to reduce the overall number of total infections. [§11]
b. The optimal shape of the epidemic curve will differ according to sectoral or organisational priorities. [§12]
c. Modelling suggests that earlier and/or combined interventions will have more significant impact. Such interventions would have to be maintained for an extended period. [§13]

157. It can be seen from the assumptions underlying the different NPIs that a combination of all of these measures, if followed or enforced, would be similar to what later became termed "lockdown" – i.e., a closure of schools and universities, home isolation for those who were tested positive and their household members, and the cessation of social contacts beyond essential functions and work. There would be some policy differences, notably in the compulsory nature of the lockdowns that followed and the distinction between "key workers" and those who could work at home, but the broad elements of lockdown were being considered, modelled and communicated from mid-February 2020. The advice from SAGE was that earlier and combined interventions would have a more significant impact. So at this time it was clear that significant interventions were likely to be needed if containment failed and the decision that would need to be made was when. The policy and operational delivery of this advice was not a question for SAGE.

158. The action points of the meeting record that the table would be reviewed weekly to see if it required updating. SPI-M was also commissioned to produce a narrative describing the effects of interventions in other countries.

159. SAGE considered the risks posed by large events, including sports events. The consensus view was that national and international travel associated with the events was *"not significant relative to overall numbers"* but advised further investigation on that question. It also pointed out that alternative or replacement behaviours, for example going to an enclosed pub rather than an open-air stadium, would pose comparable or greater risks. [§§14-15]. This is an important point. The message was not against the closure of mass gatherings but against assuming that that alone would be sufficient.

160. An important part of the assessment was the modelled capacity of the NHS. It was very difficult to get a clear assessment of NHS capacity or how that would change in response to the levels of infection **[PV2/82 - INQ000061629]**.

161. WHO produced a report of its joint mission with China on Covid-19 on 28 February and increased its assessment of the risk of spread and impact to *"very high at a global level."* [21] I would have been aware of these developments. We were already working on the basis that there was a very high level of risk.

[21] See **[PV2/83 - INQ000231017**

Situation at the end of February 2020

162. In early February SAGE formalised its structures, with SPI-B re-established to provide behavioural science input and NERVTAG and SPI-M reporting directly to SAGE. The priorities for SAGE had been established and recorded. There were still many uncertainties about the virus and its effects, but increased data had allowed for modelling of NPIs. As a result, SAGE was able to advise that earlier and/or combined interventions would have the most effect. The RWCS had been modified in light of what was known of the virus, and while this had led to a downward estimation of fatality figures the RWCS was still more than 500,000 deaths.

163. SAGE had also identified vulnerabilities in UK preparedness related to science, in particular in respect of surveillance and obtaining and using data (including on NHS capacity). It had also identified the importance of identifying the policy objectives behind the Covid-19 strategy. At that time, I understood them to be to protect the NHS from becoming overwhelmed in the event of an outbreak that could not be contained, and to protect the most vulnerable, but without a specific target for the prevention of a certain level of excess deaths **[PV2/77 – INQ000136749]**

164. As of 28 February 2020, there were 19 known cases of Covid in the UK **[PV2/80 - INQ000052225, p.2]**. At that level, it would still have been possible to contain the virus through testing and contact tracing, as had been achieved with SARS and MERS. As such the country was still in what became known as the "contain" phase. Retrospective analysis, however, suggests that there were in fact already 68 UK cases **[PV2/84 – INQ000231043 p.3]** and infection rates would have been higher again. The pandemic was more advanced than we knew from the data available to us at the time. With the return of travellers from Europe at the end of school half-term holidays, the seeding of the virus was to become still more extensive in the days that followed **[PV2/85 – INQ000230986]**

165. Of the 19 known cases in the UK, ten had been discharged from hospital and nine remained under NHS care **[PV2/80 - INQ000052225, p.2]**. While the CMO and I continued to emphasise the risk from Covid-19 it proved difficult at that time even to gain acceptance for the principle that people should be urged to self-isolate if they displayed symptoms given that this was seen to be (and of course was) an infringement of individual freedom and liberty. Given what was to follow, this reluctance to implement even the most moderate of measures seems hard to imagine.

166. I am asked if I consider that the Prime Minister should have been more involved in the response to Covid-19 during February 2020, and what effect his absence from COBR meetings had. It is undoubtedly the case that the involvement of the Prime Minister means that an issue or policy will get more traction and focus across Whitehall, and so it must be the case that Prime Ministerial leadership of COBR would have had an effect. I cannot say whether that would have led to a sharper operational or policy outcome and I do not know how involved the Prime Minister was during February on matters not visible to me outside of COBR. I do not know what operational preparedness was being undertaken in PHE, the NHS or other bodies.

167. I am asked whether there were differing views between the CMO and me in January and February 2020 about whether to take a proactive over a more cautious approach to responding to Covid-19. We both thought and advised that a proactive approach should be taken, and there was a clear focus in February on the containment phase. As I have said, I do not recall there being any significant difference between us in January 2020. As February 2020 progressed, and going into March 2020, I think that I was probably slightly more of the view that the imposition of wide-ranging NPIs was going to be needed early, but this difference should not be overstated. To a degree I think it reflects our different professional backgrounds. The CMO was an expert in public health who was, rightly, concerned with the detrimental effects of lockdown on health and other social factors. This gave him a different perspective to me and may have resulted in our (slight) difference in emphasis. The questions facing us were incredibly difficult ones. We had incomplete data, imperfect evidence and were aware of the grave consequences of both the pandemic and the measures available to counter it. In those circumstances, it is unsurprising that our views would at points diverge a little or we would challenge each other. This required constant dialogue between us.

Discussions with international colleagues

168. I had many discussions with international colleagues during the period from January to March 2020. These included calls with colleagues from the following countries:

a. 16 January: an international group of USA, India, New Zealand and Canada.
b. 24 January: USA.
c. 2 February: New Zealand.
d. 13 February: Japan.
e. 14 February: Singapore.

f. 2 March: the international group of USA, India, New Zealand, Canada, Australia and Brazil.
g. 10 March: Ireland.
h. 11 March: the international group of USA, India, New Zealand, Canada, Australia, Brazil, Italy, Germany, Singapore, Japan and South Korea.
i. 14 March: Ireland.
j. 15 March: New Zealand.
k. 18 March: the international group of USA, India, New Zealand, Canada, Australia, Brazil, Italy, Germany, Singapore, Japan, South Korea and France.
l. 25 March: the international group of USA, India, New Zealand, Canada, Australia, Brazil, Italy, Germany, Singapore, Japan, South Korea, France, Spain, Belgium and Portugal.
m. 26 March: Hong Kong.

169. The CMO had discussions with his international colleagues in this period, including those from Singapore, Hong Kong, France, Canada and the United States. He was also the UK's official representative to the WHO and attended meetings or calls with the WHO, G7 and the United Nations Under-Secretary General for Humanitarian Affairs and Emergency Relief Coordination. The CMO gave updates to SAGE directly from WHO as required, and also kept me informed of his conversations with scientists in other countries. DHSC and PHE also had formal mechanisms to link to WHO. I was aware of WHO announcements as were other SAGE participants.

170. Many of our colleagues on SAGE had their own contacts with scientists in the international community and would report back on the information that they obtained from them. For example, Professor Horby was a recognised international authority on SARS and had long-standing connections with Vietnam having been the founding Director of the Oxford University Clinical Research Unit in Hanoi, which was established in 2006. Sir Jeremy Farrar also had extensive experience and contacts in Asia and the modellers had contacts in China and globally. The CSAs from DfID and the FCO attended meetings of SAGE as participants to bring an international perspective. Officials from PHE were able to liaise with equivalent public health bodies in other countries.

171. I am asked to what extent I had regard to the response of other counties to Covid-19 in January to March 2020, including Taiwan, Singapore and New Zealand. I have set out above the discussions the CMO and I had with international colleagues in this period. I have also referred to how SAGE participants brought information from their own contacts,

and have included above some (but by no means all) references to overseas comparators that were raised in SAGE minutes and CRIPs. We were aware, in broad terms, of what those countries were doing and our knowledge became more systemised through the creation of the International Comparators Joint Unit in April 2020. An example of how the experiences of other countries informed SAGE's work is the discussion that took place before and at SAGE 10 (25 February 2020) of the case numbers and approaches in Italy, South Korea, China, Japan and Iran, which I have set out above.

172. In respect of Singapore, in addition to the discussions referred to above I was in regular email contact with Professor Tan Chorh Chuan (chair of the Committee of Government Scientific Advisers). Singapore maintained and shared a detailed list of cases and I wanted to understand how they were approaching containment and response. I also wanted to understand what else they knew from China. This information was shared on 14 February with the CMO and DCMO **[PV2/86 – INQ000228659** Further information about ICU cases and treatment in Singapore was provided and shared with the NHS on 20 and 21 February **[PV2/87 – INQ000228668 PV2/88 – INQ000228659**

173. The following month, on 2 March 2020, I received an email from Ms Foo Chi Hsia, the Singaporean High Commissioner setting out the steps that Singapore was taking, and in particular its emphasis on testing and contact tracing. This attached a briefing from the Singaporean Ministry of Health **[PV2/89 – INQ000228698 PV2/90 – INQ000228694** This in turn informed GO Science's work in preparing information for SAGE and COBR. CRIP 17 was produced on the same day and included a comment in a slide from GO Science that, *"In China, Hong Kong and Singapore there is evidence that when undertaken in combination [measures such as social distancing, self-isolation and restrictions on public events] can slow the spread of the virus to an extent and reduce the height of the peak"* **[PV2/91 – INQ000055227, p.2]**. The slide also noted that such measures would have economic and social impacts.

174. In respect of New Zealand, I had extensive discussions with the New Zealand CSA, Professor Dame Juliet Gerrard, and with Dr Ian Town, the CSA at the New Zealand Ministry of Health. We spoke either directly or as part of the same meeting on seven occasions between 16 January and 25 March, and also exchanged emails and papers. We discussed the approach they were proposing to take before they announced it. They subsequently followed this with papers and further discussions **[PV2/92 – INQ000228707 PV2/93 – INQ000228717** It is worth noting that the travel connections and importation requirements for food and other products were a big factor in some of their responses. New Zealand's

geography, demographics and economy are very different from those of the UK. The first case in New Zealand came much later than the UK's and they did not experience an early mass seeding event as we did.

175. I am asked what, if any, assumptions were made about whether measures used by others would work in the UK. I do not think it is a question of assumptions being made, more that PHE and others had to consider how the UK's position and capabilities differed from those of other countries. Singapore and South Korea, for example, were able to scale up and deploy testing and contact tracing because of the capabilities they had developed in previous years following their experiences of SARS and MERS. The UK did not have an equivalent capacity, which meant that in practice the contain phase could not be maintained in the event that the virus became widely seeded. In terms of the wider imposition of NPIs, politics inevitably affected when steps were taken and what those steps where. This was true throughout the pandemic and can be seen clearly in relation to the events leading up to the second and third lockdown periods. As a science adviser it was not my role to make policy or enter a public debate about policy, but to provide the scientific evidence and advice as to what difference the various interventions might make either individually or in combination. That advice was given without any assumptions being made about cultural or social attitudes (other than those informed directly by the work of behavioural scientists).

176. The UK's vulnerability to the Covid-19 pandemic resulted from a number of factors, some inevitable, some long-standing, others of more recent origin. The UK has a high population density and is, by international standards, extremely inter-connected with the rest of the world. It was not self-sufficient in food and essential items, meaning that cross-border movement was essential. Demographically the population is older than in many countries that were not so severely affected and we are fatter as a nation. Health inequalities and co-morbidities are more pronounced. The public health infrastructure did not exist to allow for a virus of high prevalence to be contained through testing and contact tracing. Those were some of the realities with which those making policy in the UK, and those advising them, had to contend.

177. I am asked what contact I had with Iran during this period concerning Covid. I did not have any and I do not know what contact, if any, the UK Government had with that country. I am aware that some of the modellers accessed information about Iran; for example, Professor Ferguson referred to them in an email of 21 February 2020 **[PV2/74 –** INQ000228672 The

number of fatalities from Iran were included in the CRIPs (see for example CRIP 15 **[PV2/94 - INQ000056152, p.3]** and CRIP 16 **[PV2/80 - INQ000052225, p.3]**).

CHRONOLOGY: MARCH 2020

The Covid-19 Action Plan

178. On 1 March 2020, the Secretary of State for Health announced the UK Government's "battleplan" for Covid. This was followed two days later by the more detailed Action Plan. Both the announcement and the Action Plan were documents on which DHSC led. I was shown a draft of the Action Plan and commented on the science within it but not on the policy or the operational details.

179. The four stages in the plan were contain, delay, research and mitigate. At that time the UK Government was still in the "contain" phase, in that it was thought that prevalence was sufficiently low to allow for testing, self-isolation and contact tracing to contain the virus. The "research" element had already begun and should not be thought to have awaited the development of the pandemic into the "delay" stage: see §1.27 §1.47 ff of the Action Plan **[PV2/95 - INQ000087175]**, and the third witness statement of Sir Chris Whitty dated 5 May 2023 **[PV2/15 - INQ000184639, §§8.10-8.11]**. The early coordination and funding of science in the UK was crucial for the domestic response and was also used globally. This includes everything from sample sharing to clinical trials, observational studies, vaccine development, insights into transmission routes and genomic evolution of the virus.

180. The Action Plan expressed the UK Government's intended policy objective in the "delay" phase in the following terms **[PV2/95 - INQ000087175]**:

> "[1.45] Our experts are considering what other actions will be most effective in slowing the spread of the virus in the UK, as more information about it emerges. Some of these will have social costs where the benefit of doing them to Delay the peak will need to be considered against the social impact. The best possible scientific advice and other experts will inform any decision on what will be most effective.
>
> [1.46] Delaying the spread of the disease requires all of us to follow the advice set out below. The benefits of doing so are that if the peak of the outbreak can be delayed until the warmer months, we can reduce significantly the risk of

overlapping with seasonal flu and other challenges (societal or medical) that the colder months bring. The Delay phase also buys time for the testing of drugs and initial development of vaccines and/or improved therapies or tests to help reduce the impact of the disease. There is therefore a strong dependency between the different elements of our approach."

181. This reflected my understanding of the policy at that time, which I have set out above. It was also a public statement of the stages that had been identified in CRIP 16 on 28 February **[PV2/80 - INQ000052225, p.10]**. The Action Plan stated that the decision to move from contain to delay *"will be taken on advice from the UK's Chief Medical Officers, taking into account the degree of sustained transmission and evidence of failure of measures in other countries to reduce spread"* **[PV2/95 - INQ000087175, §1.56]**. The Action Plan did not envisage such advice coming from me as GCSA, although SAGE outputs would no doubt be relevant to any such decision. In essence, this was a medical and operational question, and ultimately a policy decision. By this time there had been some known cases of transmission within the UK, but this was not, at that time, thought to be sustained.

182. It is clear in §1.45 of the Action Plan that the decisions on what measures to introduce, and when, would involve balancing the beneficial effect of those measures in slowing the virus against the social and economic impact. Those were decisions for ministers.

183. I am asked if I considered the "contain, delay, research, mitigate" strategy to have been the right one. While matters of policy were for decision-makers and not for me, I do think that the strategy was a reasonable one. I am not sure what an alternative strategy would have looked like at that time. The central problem for the UK was that it did not have the capacity to maintain the contain stage. A much more effective and high-capacity test, trace and isolate system would have enabled a more effective contain phase. A policy that implemented immediate effective implementation of multiple NPIs ("lockdown") once the initial contain phase had failed might have brought things down to a level where a larger scale testing, contact tracing and isolation approach might then have worked. For the future the ability to rapidly scale such a system would be beneficial.

184. On 2 March there was a briefing for the Leader of the Opposition, Jeremy Corbyn. This was led by Mark Sedwill and Helen MacNamara, and the CMO and I were asked to present scientific and medical data. There was also the first of the regular morning dashboard meetings with the Prime Minister and Cabinet Office staff. These sometimes included other

ministers. The readout of the meeting gave a "top line" to be developed **[PV2/96 – INQ000228700** *"taking all steps possible and reasonable, driven by the science, with an emphasis on protecting the vulnerable"* while keeping as liberal an approach for others as we can. This was the preferred policy option, a decision made by the politicians. The readout also stated: *"Do not ask people to stop shaking hands at this stage; PM request to keep under review."* This was not the public health recommendation.

185. It was at around this time the Prime Minister was becoming more personally engaged in Covid-19 and was taking over leadership of the issue from Mr Hancock. This was shown by him attending and chairing COBR (M) meetings from 2 March.

186. The CRIP produced that day (CRIP 17) included reference to the work that SAGE was finalising on mitigations that could be employed to reduce and/or slow the spread of Covid-19 in the UK, the evidence of the effect such measures had had in China, Hong Kong and Singapore, and a statement that the measures *"will also have economic and social impacts"* **[PV2/91 - INQ000055227, p.4]**.

187. On 2 March I received an indication from Mr Cummings that a rapid response £30M fighting fund for R&D to be allocated by CMO and I would be approved and allocated **[PV2/97 – INQ000228702 PV2/98 – INQ000228685**

3 March to 5 March 2020

188. On 3 March I attended the morning dashboard meeting with the Prime Minister and the SAGE meeting, SAGE 12 **[PV2/99 - INQ000061520]**. This reviewed the NPIs to reduce and delay Covid-19 transmission, including their impact and behavioural science implications. It was noted in particular that social distancing for over-65s would have a significant effect on overall death and peak demand for critical care beds, but would not significantly reduce transmission of the virus in the population as a whole. The challenges of implementing this measure within care homes was expressly noted [§6], as was the need to assess the wider health implications such as the effect of self-isolation on mental health [§9]. It remained the advice, based on SPI-M modelling, that there was no evidence that cancelling large events alone would be effective [§7]. SPI-M was tasked to work on the optimal timing of the interventions [§1]. The meeting also considered the behavioural science analysis of the NPIs, including the need to consider unintended consequences such as alternative behaviours (e.g., people congregating elsewhere when events were cancelled) [§14]. SAGE emphasised the need for coherent and unambiguous

communication in increasing compliance [§11]. The meeting again indicated the need for a population-based survey of spread of the disease.

189. That morning before SAGE I attended my first press conference of the pandemic, at which the Prime Minister spoke about the Action Plan. During that press conference he stated that he had been *"at a hospital the other night where I think there were actually a few coronavirus patients and I shook hands with everybody."* He then turned to me to give the science advice. I gave advice that included to wash your hands **[PV2/100 – INQ000231042]** I have been asked what advice, if any, I gave to the Prime Minister before this press conference about shaking hands. I cannot recall, other than that the advice at that time was to wash hands. Avoiding shaking hands was recommended by the CMO and me and was included in SAGE papers the same day. At the end of the press conference I think the Prime Minister left without a debrief.

190. SPI-B advised in a paper dated 3 March that *"Government should advise against greetings such as shaking hands and hugging, given existing evidence about the importance of hand hygiene"* **[PV2/101 – INQ000129014]**

191. I am asked if, in my view, the Prime Minister and the UK Government were taking Covid-19 seriously. I thought that they were in general but of course they had strong views on what they were and were not prepared to do. As to whether comments made by the Prime Minister about shaking hands were inconsistent with public health messaging at the time, the central advice from PHE at that time was to wash your hands, which is something that I stated at the press conference. The CMO and I had advised that it would be sensible to avoid shaking hands.

192. Two days later, on 5 March, the Prime Minister was interviewed on ITV's *"This Morning"* programme and said, in relation to Covid-19 that: *"one of the theories is that perhaps you could take it on the chin, take it all in one go and allow the disease, as it were, to move through the population, without taking as many draconian measures."* I am asked to what extent I had advised the Prime Minister, prior to his comments, that this was a viable strategy.

193. As I have said above, this was a *possible* approach to the virus, one that lay on one end of the spectrum. I did not advise that this policy was *"viable"* and it was certainly not *desirable*. It was not SAGE advice and was not advised by me or the CMO. It is clear from the preceding SAGE minutes and the CRIPs that work had already been done and was

continuing to be done to model the effect of individual and combined NPIs, which – when taken together – were the lockdown measures that were later imposed. For example, SAGE's consensus view at SAGE 11 on 27 February had been that early and combined interventions would have a more significant impact **[PV2/78 - INQ000061519]**.

194. SAGE returned to the topic on the same day as the Prime Minister's interview with *"This Morning"*, 5 March, at a meeting that was attended by Mr Cummings. At SAGE 13 the consensus view was that while the UK remained in the containment stage, *"HMG should plan for the introduction of behavioural and social interventions within 1 to 2 weeks to contain and delay spread; precise timings depend on progress of the epidemic."* It was stated that measures of social isolation, household isolation and "cocooning" of the vulnerable would be most effective were they implemented in combination at an early stage and then adhered to throughout the peak period of infection **[PV2/102 - INQ000061521, §§6-11]**. Neither SAGE nor I was advising the government that it was a "viable strategy" to "*take it all in one go and allow the disease … to move through the population.*"

195. The same SAGE meeting again considered the possibility of banning very large gatherings. The consensus view was that there was no evidence to suggest that this ***alone*** would reduce transmission. However: *"Preventing all social interaction in public spaces, including restaurants and bars, would have an effect, but would be very difficult to implement"* [§14]. A decision to take such a step was plainly a political matter.

196. The CRIP produced on the same day (prior to the output of the SAGE meeting) contained several tables setting out the behavioural and social interventions that were being contemplated and their likely impact **[PV2/103 – INQ000230990 pp.4-8]**.

197. Also on 5 March, Covid-19 was listed as a notifiable disease. I am asked if this should have happened earlier. This was an operational decision for PHE that has important technical and practical consequences and as such is not something upon which I can helpfully comment. It was not something that changed the science advice.

198. I am asked whether, in early to mid-March I was concerned that the NHS could be overwhelmed as a result of Covid-19. The answer is yes.

199. On 4 March there were 85 known cases of Covid-19 in the UK, and on 5 March there were 115 **[PV2/84 – INQ000231043 p.4]**. Sadly that day also saw the first death of a person who had tested positive for Covid-19 in the UK; another UK citizen had died a week before

having contracted the virus on the Diamond Princess cruise ship. Using retrospective data, it is estimated that there were actually 247 cases in the UK on 4 May and 296 cases on 5 May.

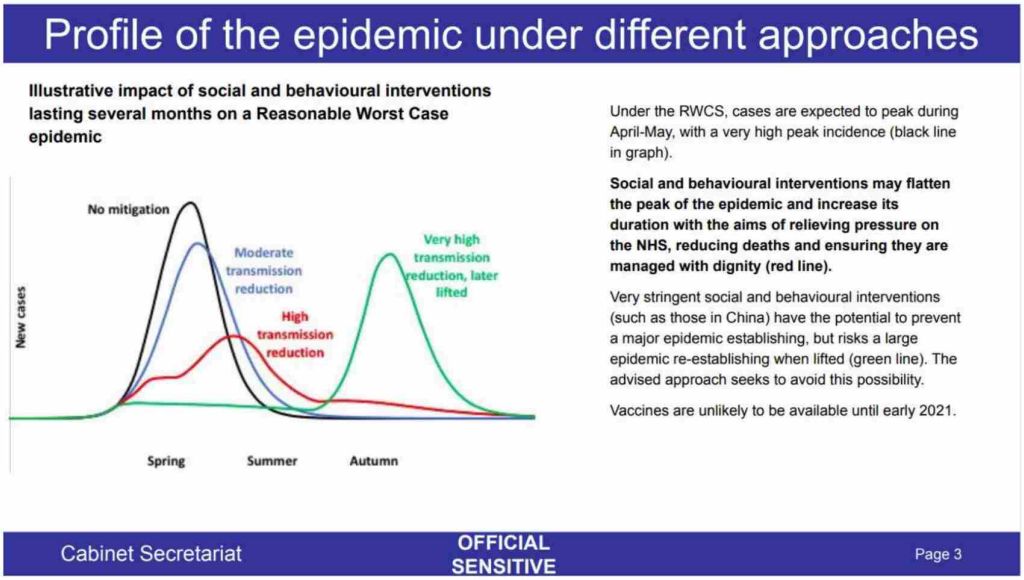
The move from "contain" to "delay"

200. The output of SAGE 13 was presented in CRIP 22 on Monday 9 March 2020 (which recorded information to be correct as of 19:00 on Sunday 8 March) **[PV2/104 – INQ000230991]** A slide prepared by the Cabinet Secretariat stated that: *"Advice from SAGE is that our response will soon need to move from contain to delay."* This is not accurate. It was not for SAGE to make this policy decision, although SAGE analytical output would clearly be a relevant factor for the decision-makers to consider. Nor should this change be over-stated. The pandemic developed incrementally and did not allow for neat, defined boundaries between its stages. What SAGE did identify was that the level of transmission within the UK was such that the virus could not be contained in a relatively small number of patients who could be identified, isolated and treated. More extensive interventions were going to be required if the government's policy of avoiding the NHS being overwhelmed was to be effective. I refer back to the paper from PHE from February that outlined the response to the outbreak of a cluster in the UK **[PV2/75 - INQ000074910]**.

201. SPI-M had stated in a consensus statement on 2 March 2020 that: *"It is highly likely that there is sustained transmission of COVID-19 in the UK at present. It is almost certain that there will be sustained transmission in the UK in the coming weeks."* **[PV2/105 – INQ000119430 §1].** The SAGE consensus view on 5 March, at a meeting attended by several of modellers who sat on SPI-M, was that: *"There are currently no scientific grounds to move away from containment efforts in the UK."* In other words, although sustained transmission was occurring, efforts should still be made to contain the virus. However, the same meeting advised planning for the introduction of further behavioural and social interventions. It is clear that by now containment still remained the preferred option but the reality was that it was close to becoming overwhelmed and other interventions would likely be needed. By the time of CRIP 22 on 8 March, the DHSC was producing policies on those interventions and implementation of individual and household isolation by the end of that week (13 or 14 March) **[PV2/104 – INQ000230991 p.2]**.

202. The same CRIP contained a graphical representation of the three broad policy options that I have outlined above: minimise Covid-19 spread, minimise restrictions on society, or a policy of managing the epidemic curve. This was produced by the Cabinet Secretariat

[PV2/104 – INQ000230991 p.3], but was based on a similar illustrative graphic contained in a paper prepared by the SAGE secretariat on the potential impact of social and behavioural interventions, stated to be valid as of 14:30 on 4 March **[PV2/106 – INQ000129014]** The accompanying text is slightly different, with a little more detail and explanation given by the SAGE secretariat, including on the assumptions adopted to produce the image. The version used in CRIP 22 is reproduced below, together with the accompanying text.



203. Each of those options came with consequences. Following the black line, with no mitigations, was likely to result in an outcome that approached the RWCS (depending on the extent to which people voluntarily entered into social distancing). The RWCS at that stage was still thought to be in the region of 500,000 deaths from Covid-19 alone (with more possible should the health and social care services become overwhelmed). Following the green line of stringent social and behavioural interventions – a "zero Covid" policy as it came to be called – risked a high resurgent peak whenever the restrictions were lifted and therefore would need to be maintained long-term. There was no guarantee that a vaccine would be effective, meaning that future waves of infections and deaths could not be ruled out. There was also no confidence in PHE or DHSC that this level of reduction could be achieved given that the number of cases outstripped testing and contact tracing capacity.

204. The preferred option of the UK Government was to pursue a policy that would flatten the curve, as shown by the red line in the graph. I understood this to be a continuation of the existing policy goal once containment was not possible. However, the graph should not

give rise to a false sense of precision. No minister defined a cut-off point for the number of infections or deaths other than by reference to avoiding the NHS being overwhelmed.

205. The CRIP also contained a further table showing the interventions considered by SAGE, an analysis of their effectiveness, and the degree of confidence SAGE attached to that analysis [p.4]. This was essentially a lockdown table.

206. I am asked if I consider that we had adequate data and information to assess what the epidemiological curve would look like and how it could be flattened. At that time we had very considerable uncertainty, as is shown by the table below showing the disparity between known cases at the time, and the estimated number of cases using retrospective data **[PV2/84 – INQ000231043]**

Date	Known cases at time	Retrospective data
09.03.2020	319	650
10.03.2020	373	915
12.03.2020	590	1,802

207. The virus was more prevalent in the UK than we realised. This was, in large part, a consequence of the limitations on UK testing and data collection at that time.

208. Our knowledge of the effects of NPIs was also imperfect, as is shown by the confidence intervals illustrated in CRIP 22. It was, and remains, very difficult to assess how effective the measures would be both in isolation and combination.

209. On 8 March I contacted Mark Sweeney from the Cabinet Office on self-isolation, intensive cocooning for the vulnerable and the need for special consideration for care homes **[PV2/107 – INQ000061651]**.

210. COBR (M) met later on the morning of 9 March. Among its actions was a direction to SAGE to *"set out the thresholds for triggering each of the three interventions"* discussed in CRIP 22 **[PV2/108 – INQ000061655]**

211. The first evening press conference took place later that day. The Prime Minister stated that while the UK remained in the contain phase of the outbreak, *"our scientists think that containment is extremely unlikely to work on its own and that is why we are making*

extensive preparations for a move to the delay phase." I would agree with this characterisation if it were intended to mean that the science advice was that further interventions would be necessary to achieve the policy objective to reduce the peak of the pandemic in order that the NHS was not overwhelmed, and that containment by testing, contact tracing and isolation looked to have been overwhelmed. At the press conference I emphasised the importance of applying a combination of measures at the right time in order for them to be most effective. This would be informed by the data from the UK and the science analysis of that data **[PV2/109 – INQ000086763**

212. It was clear that by Monday 9 March, both internally and in its public communication, the UK Government was foreshadowing the implementation of further behavioural and social interventions and the declaration that the county had moved from the "contain" to the "delay" stage.

213. On Tuesday 10 March 2020 I spoke to the CMO by telephone before attending the morning meeting with the Prime Minister **[PV2/110 - INQ000228746** Among the issues we discussed was a request for work to be done on the situation in Italy, and possibly also Germany and France. On 9 March Italy had implemented further social distancing measures and we were keen to understand more of the position in European countries.[22] As will be seen, this work was taken forward through SAGE.

214. I also spoke to the CMO about how far along the pandemic curve the UK was and what data were available to understand this. The summary of the call reads:

> "Where are we – what do we really think our numbers are and how widely dispersed? What are the implications of having both nosocomial [within hospitals] and community transmission?
> Can we get a better handle on where we are in the epidemic and use that to get a better prediction on when we must start our interventions. Soon I suspect."

215. I followed up on this point with an email to Professor Horby on the same morning which included a question about safe distances between people.

[22] CRIP 25 (12 March 2020) recorded that it was not until 11 March that the Italian government announced measures closing all non-essential business with immediate effect **[PV2/111 - INQ000106200 p.2]**.

216. The readout from the morning meeting with the Prime Minister suggests that the focus of the discussion was on other matters, such as statutory sick pay, rather than the imposition of NPIs **[PV2/112 – INQ000061658]**

217. SAGE 14 took place later that morning **[PV2/113 - INQ000061522]**. The minutes recorded that the UK likely had thousands of cases at that time, that transmissions were taking place in hospitals and in the community, and that *"Available data for the UK are accruing fast. Firmer estimates of infection rates will be available next week"* [§§5-7]. The data lag meant that the formal calculations of numbers were inaccurate and we estimated that there may be 5,000-10,000 infected individuals spread widely across the UK. The UK was thought to be four to five weeks behind Italy (six to eight weeks if interventions were applied) but on a similar curve [§12]. Modelling now suggested that the UK was 10 to 14 weeks from the epidemic peak if no mitigations were introduced [§18]. Discussion took place of those mitigations, and a series of trigger points and timings were set out, in response to the request from COBR (M). These all related to the number of cases in intensive care units, which again shows the importance of preventing the NHS from being overwhelmed as a policy objective. It was estimated that the recommended trigger point for home isolation of symptomatic cases would be reached within the next 10 days [§§32-34]. This remained science advice, based on what was understood to be the UK Government's preferred policy. Any decision on whether and when to impose the measure lay with the politicians, informed by this advice. In respect of social distancing for those over 70 and vulnerable groups, SAGE advised that *"special policy consideration be given to care homes and various types of retirement communities"* [§30]. It also noted that *"Long periods of social isolation may have significant risks for vulnerable people"* [§27]. SAGE undertook to consider again its advice on public gatherings, which were noted to *"pose a relatively low but not zero public risk"* [§37].

218. On Wednesday 11 March, I spoke to international colleagues on a joint call in which the participants discussed the level of the response to the virus in their countries **[PV2/114 – INQ000346269]** I also attended meetings with the Prime Minister to provide an update on Covid-19, and a meeting with various figures from government and senior figures from technology companies in No.10. GO Science hold no records of those meeting. On this day I called Duncan Selbie at PHE and indicated that their representative on SAGE (Professor Sharon Peacock) needed more support and better links to operational activities within PHE.

219. Wednesday 11 March was the date on which the WHO declared that Covid-19 was a pandemic.[23]

220. Thursday 12 March saw the official announcement of the move from "contain" to "delay".[24] This did not affect the science advice that was being provided as, for the reasons I have given, it was a statement about what was happening and a continuum of the response rather than a point of departure. At the evening press conference the Prime Minister announced the advice that those with Covid-19 symptoms should self-isolate for seven days. This reflected the science advice from SAGE 14 and NERVTAG. The Prime Minister also said that *"At some point in the next few weeks, we are likely to go further"* in respect of household isolation and that the government was considering the question of banning major public events **[PV2/117 – INQ000231053** Those announcements reflected the decisions made at the COBR (M) meeting that had been held earlier that day, and which I attended **[PV2/118 - INQ000052482]**. These in turn had been informed by the SAGE advice and evidence that I have discussed above. This was the first step in the "delay" programme.

221. I am asked if, on reflection, any changes should have been made to the timing, content or advisory nature of this guidance. We later learned that viral shedding continued after seven days, but at the time and on the evidence then available a seven day period seemed reasonable. I discuss the timing of the NPIs further below. The question of whether the intervention should have been advisory or mandatory was a policy decision and not a matter of science advice. The behavioural science advice on being clear and consistent with advice was provided at an earlier stage. I have stated above that had significant NPIs been introduced early and coupled with an effective and scaled test, trace and isolate system that might have contained the spread more effectively.

222. At the same press conference I said the following **[PV2/117 – INQ000231053**

> "The actions that we need to take are to try to do two things. It is to delay the peak and to push the peak down. So we are trying to reduce the number of cases at any one time, that's very important for the NHS in order to make the NHS able to cope with this. But it is also important because it pushes it out into summer months when the NHS is less busy but also when there may be less

[23] See **[PV2/115 - INQ000231018**
[24] See **[PV2/116 – INQ000231019**

transmission of virus…that is one aim, to change the shape of this [peak]. It is important to recognise that it is not to stop everybody getting it, you can't do that, it's not possible to stop everybody getting it. And it is also not desirable because you want some immunity in the population. We need to have immunity to protect ourselves from this in the future.

The second big aim we need to look for is how in that we protect the vulnerable and the elderly who are at most risk of serious illness and dying from this… during the period of peak transmission, we need to protect them at that phase. If you look at the curves, it becomes obvious that if you do that at the moment you aren't protecting anybody really because the number of cases are too small. If you do it at the right time then you are protecting them over the peak, and you're not asking them to be in isolation for too long. Similarly, the idea of households going into complete isolation, that comes a bit later when you have some more cases coming up. At the moment, if you asked households to completely isolate if one person's ill, most people will not have coronavirus and you may have to do the whole thing all over again and what happens then is the effect of that wanes because people get fed up with this and you end up with not being able to do it time and time again. So the timing is critical, and that is true across all of the interventions we have looked at. That is why this is a package of things that need to happen, at the right time and in the right phasing [...] The idea is to do things at the right time, not to end up with measures stopping during the peak and exposing more people to illness".

223. These comments were made to try to explain to the public the science advice that had been considered by the government as it made its policy choices. That advice, and my comments, were based on the various inputs into SAGE and the discussions at SAGE, as documented above. The minutes of the previous SAGE meeting (SAGE 14 on 10 March) recorded that *"the public will face considerable challenges in seeking to comply with these measures (for example poorer households, those relying on grandparents for childcare)"* [§34]. It was also minuted that while: *"in theory maximum efficacy from all interventions would be achieved through simultaneous introduction … there is some flexibility in timing that would not materially alter the effectiveness. Long periods of social isolation may have significant risks for vulnerable people"* [§27]. That meeting was attended by Professor Rubin, chair of SPI-B, and Professor Rogers. Beyond this, it was undoubtedly the case that imposing NPIs would result in social, health and economic consequences, which politicians would need to take into consideration.

224. There was a concern that onerous NPIs could have detrimental effects, and that prolonging the period of isolation might have an effect on longer term compliance. We did not know what the degree of compliance would be if the measures were imposed when there were fewer visible signs of the effects of the pandemic. As of 12 March, there had been eight Covid-19 deaths in the UK, all were patients in the "most at risk" cohort. The number of known cases in the UK was 456 (though many more were suspected) **[PV2/111 – INQ000106200 p.2]**.

225. SAGE advice was also based on an assessment drawn from the modelling and other evidence of when the interventions would be most effective in assisting with the UK Government's policy objective. I discuss my view, with the benefit of lessons learned, of the timing of the NPIs further below. The most important lesson that I learned and stated repeatedly from the first lockdown onwards in respect of the timing of interventions was that you had to go earlier than you would like, harder than you would like, and broader than you would like. This observation was picked up by others. The key in the lessons is the "than you would like to" as there was an immense reluctance to take these actions at every stage of the pandemic.

226. Looking at my comments in the press conference with the knowledge of the public debate that was about to take place about "herd immunity", I can see that they may have given the impression that building up immunity in the population was a primary goal of the government's strategy. That was not my understanding of the government's strategy and the building up of immunity within the population was considered to be a secondary effect of the chosen policy objective of flattening the curve.

227. At the same press conference, the CMO made comments about the timing of NPIs with reference to a tendency for people's enthusiasm to flag as time progressed. I am asked what my understanding was of why the CMO made these comments, and what his evidence was. The CMO will be able to speak to this better than I can. I am also asked if, on reflection, I consider that it was right to delay implementing social distancing measures on this basis. As I have said, the timing of the implementation of the NPIs was based on a number of factors and was a decision for the politicians; as far as I am aware, the implementation was not delayed as a result of the CMO's remarks.

228. I am also asked if I, SAGE or anyone else advised that the population would be likely to suffer from "behavioural fatigue". This is not a term I used and it is not found in the SAGE

minutes at this time. It is not a concept that directly affected the advice given at the time though, as I have said, SAGE did discuss both the timing of the NPIs and the consequences associated with them. It may also be relevant to note that later in 2020, WHO published a guidance document entitled "Pandemic fatigue: Reinvigorating the public to prevent Covid-19" **[PV2/119 – INQ000249732]** The document defined pandemic fatigue as *"demotivation to follow recommended protective behaviours, emerging gradually over time and affected by a number of emotions, experiences and perceptions"* [p.4]. It was, according to the WHO, *"an expected and natural response to a prolonged public health crisis"* which had been observed by Member States in their populations [p.4, p.6].

229. I am asked to what extent the policy of flattening the curve was influenced by concerns that public compliance with NPIs would wane over time. I do not believe that it was but the question of compliance with measures had been discussed. The thinking behind the policy, as I understood it, is set out above. However I do believe that moving earlier, harder and broader with NPIs is the correct approach and the one that we advocated very clearly thereafter. I think the timing of implementation of NPIs was affected by (i) scientific and medical concerns expressed about the potential negative health impact of NPIs, (ii) political resistance to taking any interventions that impacted liberty and the economy, and (iii) operational factors around policy development, legal concerns and practicalities.

230. I am asked what effect a letter dated 13 March 2020 signed by 681 behavioural scientists and academics had on my subsequent advice to core decision-makers. I was of course aware of the letter and for the reasons stated above I think it misunderstood what was already being advised. By mid-March I was already very clear that more interventions were required very soon.

Population immunity and "herd immunity"

231. On 13 March I did a round of early morning media interviews with Sky, BBC Breakfast, LBC, BBC Radio 4's *"Today"* programme, GMB and ITN. In the interview with the *"Today"* programme, I was asked about the risk that imposing strict NPIs (as had been done elsewhere) *"may lead to Covid-19 coming back more aggressively in the autumn."* In response I said the following **[PV2/120 - INQ000064580]**:

> "That is exactly the risk that you would expect from previous epidemics. And if you suppress something very, very hard, when you release those measures, it bounces back and it bounces back at the wrong time. So our aim and this has

been described very well by Tony Fauci, from the US, is to try and reduce the peak, broaden the peak not to suppress it completely. Also the vast majority of people get a mild illness to build up some degree of herd immunity as well so that more people are immune to this disease and we reduce the transmission at the same time we protect those who are most vulnerable from it. Those are the key things we need to."

232. In the first part of that answer, I explained the rationale behind the policy objective of "flattening the curve", which I have described above. In the penultimate sentence I referred to the concept of "herd" or "population" immunity. I regret having done so, and in particular not taking sufficient time to explain the concept fully.

233. Population immunity is a well-established concept and is the means by which many pandemics come to be controlled, including Covid-19. The strict definition of herd immunity means absolute immunity to an infection when people can no longer be infected, whereas population immunity takes many forms and is often partial. When sufficient numbers of the population have become immune the force of transmission will usually reduce, R will fall and the epidemiological curve will flatten. Often the disease severity abates even in a partially immune population. A more detailed explanation is contained in Dr Wainwright's second statement **[PV2/4 – INQ000252450 §§2.33-2.38]**. For Covid-19, the estimated figure to achieve effective population immunity was then thought to be around 60%, based on its R at that time. Immunity can be achieved through antibodies or T cell responses that are developed through infection, or through immunisation. Mutations of the virus can mean that previously immune people can become re-infected (hence the need for annual flu injections and why true herd immunity is not achieved for flu). I went on to discuss that point in my *"Today"* interview. I was trying to explain a technically difficult concept of how infections reduce their impact and eventually stop and did so in a rather poor way.

234. During the pandemic, and since, the phrase *"herd immunity"* has been used in two ways. One was as a synonym for either absolute or relative population immunity, in other words describing a well-established scientific concept. The other was as shorthand for a policy approach, namely removing or not imposing NPIs so that the virus would spread quickly through the population (as in *"going for herd immunity"*). This was similar to the theoretical approach the Prime Minister had mentioned of *"taking it on the chin."*

235. When I used the phrase *"herd immunity"* in my Radio 4 interview, it was in response to a question which followed a line of questioning that Dr David Halpern had raised on the BBC

on 11 March when he used the expression herd immunity **[PV2/121 – INQ000237404** I adopted the terminology solely as a way of describing the scientific concept of population-based immunity. It was the endpoint that we would reach, eventually through a combination of natural infection and vaccination, should a vaccine become available. I was not suggesting, or advocating, that the country should *"go for herd immunity"* in the sense of loosening NPIs to increase the spread of the virus. That was not the policy advice that I was giving, nor was it the output from SAGE. On the contrary, my advice at that time was that significant NPIs would have to be introduced in the coming days in order to slow the spread of the virus if the UK Government's preferred policy objective of "flattening the curve" was to be achieved.

236. Some interpreted my Radio 4 interview as meaning that the government was seeking to build up a degree of population immunity as its principal policy objective. I do not understand that to be the policy being pursued by the government at that time and that was certainly not the advice that was being given either by me individually or by SAGE, as can be seen clearly from the SAGE minutes during the period. What I was trying to say was that an increased level of immunity in the population was a by-product of the policy of "flattening the curve" and was one that would not be achieved through a stricter series of measures as had been implemented in China and elsewhere (which, as I said in the interview, risked a fierce second wave once the measures were eased). I did not anticipate that the policy would lead to 60% population immunity, just that a degree of immunity would be built up (something that I reiterated in a message to Mr Cummings on 15 March **[PV2/122 – INQ000228793** I regret that I did not express this clearly enough in this interview and that it caused both anxiety and confusion.

237. This episode shows the importance of transparency in science advice. The SAGE minutes and papers had not, at that time been published (and I return to the discussions that I had on this issue below). Had they been in the public domain I do not think that the same degree of misunderstanding would have occurred. People would have seen that SAGE had long considered the role of NPIs in responding to the threat of SARS-CoV-2, and that it was at that time refining its advice on the timing and effect of those measures. It is obvious from the minutes and papers that neither SAGE nor I were advising a strategy of *"going for herd immunity",* quite the opposite. That was also clear from the other interviews that I gave that morning. For example, I explained to BBC Breakfast what NPIs the UK Government had advised, and what future NPIs might be proposed in the weeks that followed **[PV2/123 - INQ000064457]**.

238. I have been asked what discussion I had with the CMO and core decision-makers about my comments in the following days. I apologised to them for not expressing myself clearly enough and causing an unnecessary distraction.

239. I have been asked a number of other questions about herd immunity, most of which are based on an assumption that there was an intentional "herd immunity strategy". As far as I am concerned there was no such strategy and I am quite certain that no such strategy was recommended by me or by SAGE. In respect of other points that the Inquiry has raised in respect of this matter:

a. In February and March 2020 thought had been given in SAGE and elsewhere to "cocooning" or "shielding" the vulnerable through the use of additional measures. This was a sensible and normal clinical approach to protecting those most at risk from the disease and was not part of an approach to let the virus spread amongst the rest of the population. Allowing the spread in the general population would carry two risks – first many many more people would have suffered and died, and second it is inevitable that there would be leakage of transmission between the different groups thereby potentially actually increasing the overall risk in the shielded vulnerable group. The sheer number and range of people who would be in scope for special isolation would have been huge including those providing care or services for the vulnerable who would have had to separate themselves from their families and friends, and those in multigenerational households. While such an approach might be considered a theoretical response to a pandemic I think to have done it without restrictions to decrease spread in the overall population would have been both unethical and impractical. SAGE much later were asked looked at the question of "segmentation" in the community and reached a similar conclusion (see, in particular SAGE 50 (6 August 2020) **[PV2/124 - INQ000061558, §§29-34]** and SAGE 62 (15 October 2020) **[PV2/125 - INQ000061570, §§18-22]**).

b. The shielding plan that was put in place during the Covid-19 pandemic was an operational matter and other witnesses will be better placed than me to speak to it. SAGE considered evidence relevant to the protection of vulnerable groups on many occasions, and also helped identify those most at risk, as I have set out elsewhere in this statement.

c. There was no assumption made by SAGE that there would only be one wave or one peak of Covid-19, indeed our assumption was that there would be multiple waves until some greater degree of population immunity had been achieved, ideally through vaccination. As I said in my interview to Radio 4, and in another interview that morning, I anticipated that Covid-19 would ultimately become a seasonal infection probably requiring annual vaccination amongst certain groups **[PV2/126 –** INQ000231020

240. I am asked whether, on reflection, I considered that adopting a strategy of "flattening the curve" was the wrong approach. This was a policy objective determined by decision-makers based on a variety of inputs. However, looking back now I am not sure what alternative approaches were realistically available to the government at that time, given the UK's vulnerabilities to the virus and its limited capacity for resilience in a pandemic. Ideally, the virus would have been contained through a combination of extensive testing, contact tracing and isolation of infected persons. However, in February and March 2020 the UK was unable to scale up testing and contact tracing to deal with a virus that had already become widely seeded. The required infrastructure was largely lacking and could not be built in the time that was available. While a "zero Covid" strategy could have been pursued, to be successful this would have required extensive NPIs akin to a national lockdown and border closures by the end of February, to be continued indefinitely in the hope that a vaccine may become available at some unknown future date. There were no guarantees that a vaccine would be discovered and indeed many scientists were worried about possible harmful effects of vaccines, particularly a phenomenon known as antibody-dependent enhancement, a point that will be covered in Module 4. It is possible that following the seeding event in February/March that a very early lockdown coupled with effective and scaled testing, contact tracing and isolation could have held the infection wave at bay. This decision would have had to have been taken at a time when there were only 19 identified cases and the WHO had not declared a pandemic and it would have required a test, trace and isolate infrastructure that did not exist at scale. After that time, the virus became too widely seeded for "zero Covid" to have been achievable, in particular because of the return of people from European holidays during school half-terms and in March **[PV2/85 –** INQ000230986 For the reasons I have given, I do not think that a policy of extreme shielding the vulnerable while allowing the rest of society to continue could have been successfully implemented in practice, it would have been especially difficult for multigenerational households and may have increased risk for the most vulnerable. It was always going to be a "leaky" protection and would have caused major long-term morbidity. I do think an alternative approach of very early lockdown coupled with an effective test

trace and isolate system could have worked but the infrastructure for this took a long time to develop. In the situation we found ourselves there was no "good option", only a series of bad ones with different risks and downsides.

Comments on lockdowns

241. During the same round of interviews, I made the following comments to Sky News **[PV2/127 –** INQ000231021

> "[I]t is the case of course that if you completely locked down absolutely everything probably for a period of four months or more then you would suppress this virus. All of the evidence from previous epidemics suggests that when you do that then when you release it all comes back again. So, the other part of this is to make sure that we don't end up with a sudden peak again in the winter which is even larger which causes even more problems."

242. The Inquiry has drawn my attention to these comments and asked what advice I provided on a national lockdown and why that advice later changed.

243. The term "lockdown" has been taken to mean different things at different times. In essence, it amounts to a range of NPIs that are put in place in combination with the intention of slowing or suppressing a virus. A lockdown is a tool, not a policy objective. It can be used as part of a "zero Covid" strategy that seeks to drive R down to the lowest possible level (which then might be maintained by a very effective test, trace and isolate system). In instances where there is already widespread seeding of a virus, such a lockdown needs to be extensive (in terms of the measures applied) and prolonged (in terms of how long it is in place). It can also be used as part of a policy of "flattening the curve," when more restrictions are required to be in place to stop the peak rising above a level that is deemed acceptable. It could also be used as a "circuit breaker" to bring prevalence down to a lower level intermittently.

244. A lockdown was always possible, in theory, in the UK but had never really been considered in any detail before the Covid-19 pandemic. The same was true in virtually every other Western democracy. Some discussion of more limited NPIs was a feature of Exercise Alice, although the conclusion seems to have been that they would be impractical to operationalise. The possibility of extensive NPIs – as had been used in China – informed the discussion in SAGE and with decision-makers: see, for example, the graphs and discussions in CRIP 22 **[PV2/104 –** INQ000230991 Combination NPIs were modelled from

early February. The science advice during Covid was that using lockdowns to pursue a "zero Covid" strategy could work for the first wave but that subsequent waves were likely to be bad once the lockdown was lifted: see, for example the view of SAGE 13 on this point, expressed to be a *"near certainty"*, on 13 March 2020 **[PV2/102 - INQ000061521, §24]**. The minutes could be taken to imply that a hard lockdown would "cause" a second peak. This is incorrect, multiple waves of infection were always anticipated but it was considered that these would be worse after a very stringent lockdown. This was based on existing scientific literature (for example Richard J. Hatchett et al, "Public health interventions and epidemic intensity during the 1918 influenza pandemic" **[PV2/128 – INQ000228601** and papers produced during the pandemic (for example the Imperial College paper "Potential effect of non-pharmaceutical interventions on a COVID-19 epidemic", which was considered at SAGE 10 on 25 February 2020 **[PV2/129 – INQ000236282]**[26] The UK Government elected to "flatten the curve".

245. As other countries, notably Italy, began to extend their own NPIs in March 2020 the discussion around lockdowns grew. A mandatory, enforced national lockdown which had not been contemplated in Europe and North America before the pandemic, was now being discussed as a policy option given the situations in which countries found themselves.

246. I have been asked about the advice I gave on imposing a mandatory national lockdown, and about why this advice changed. Like many others, I became more aware of the possibility of mandatory national lockdowns being used as a tool in the UK as the pandemic progressed. National lockdowns were in essence a combination of NPIs which could be expected to lower R and reduce infections while they were in place. SAGE developed options for multiple NPIs from early February onwards. However, the benefits of imposing lockdowns had to be balanced by the policy-makers against the social, health and economic detriments that they would cause. These were spelt out in the "four harms" that were described early in the pandemic – direct harm from the virus, indirect harm due to the NHS being overwhelmed, social isolation, mental health and other harms caused by

[25] PNAS vol.104, no. 18, May 1, 2007, 7582-7587: "These findings support the hypothesis that rapid implementation of multiple NPIs can significantly reduce influenza transmission, but that viral spread will be renewed upon relaxation of such measures." (p.7582)

[26] "Aggressive NPIs may have a substantial impact on COVID-19 transmission, potentially dramatically slowing epidemic growth or reducing R to below 1 while in operation. Recent reported case incidence data from China support this conclusion. However, the primary impact of such measures is to delay transmission and reduce peak incidence; when they are lifted, transmission can be expected to resume given the measures only protect the population while in operation (unlike vaccination). The overall impact on overall attack rate is therefore limited – though if measures are fine-tuned to allow sufficient transmission to allow population immunity (acquired through infection) to reach the herd-immunity threshold, significant reductions in overall attack are also possible."

the interventions themselves, and harms due to economic effects **[PV2/130 – INQ000048167]** Lockdowns were also not a complete answer. Once they had been imposed they were followed by the question: what is the exit strategy?

Other events on 13 March 2020

247. SAGE met later on 13 March for SAGE 15 **[PV2/131 – INQ000061523]**. The minutes began by acknowledging that due to a lag time in data provision for modelling, SAGE now believed that there were more cases in the UK than SAGE had previously expected and that the UK may be further ahead on the pandemic curve. However, the country remained on *"broadly the same epidemic trajectory and time to peak"* [§1]. The meeting discussed the prospective timing for introducing household isolation and shielding for the vulnerable and supported the former being implemented *"as soon as practically possible"* [§§14-15]. SAGE agreed that: *"There is a risk that the current proposed measures … may need to be coupled with more intensive actions to enable the NHS to cope, whether regionally or nationally"* [§19].

248. The meeting went on to consider behavioural science matters. The minutes record the following:

> "[28] There is some evidence that people find quarantining harder to comply with the longer it goes on. The evidence is not strong but the effect is intuitive. There is no comparable evidence for social distancing measures, but experience suggests it is harder to comply with a challenging behaviour over a long period than over a short period.
>
> [29] There is no strong evidence for public compliance rates changing during a major emergency. There is, however, a link between public anxiety and protective behavioural change.
>
> [30] Difficulty maintaining behaviours should not be treated as a reason for not communicating with the public about the efficacy of the behaviours and should not be taken as a reason to delay implementation where that is indicated epidemiologically."

249. The minutes also recorded that community testing was ending that day [§33]. This was a decision made by DHSC because there were too few tests to allow for testing both in the

community and in hospitals. The decision was to prioritise testing in hospitals. The absence of community testing at this crucial stage of the pandemic limited our knowledge of what was happening with the virus in the country. This led to under-informed science advice and decision-making. I am asked if it was a mistake to stop community testing in March 2020.[27] It was not so much a mistake as a failing due to lack of capacity. I find it difficult to conceive that diagnostic testing in hospitals could have been reduced to allow community testing.

250. I am asked what issues were encountered in ramping up testing capacity during this period. This is a matter that I have addressed in my Module 1 evidence **[PV2/2 - INQ000147810; refs.]**. The question of how, operationally, to increase the amount of testing available was one for DHSC and PHE. It was not a question of science advice although SAGE had discussed, with increasing concern, the limited testing capability available in the UK in February, as is set out above. The lack of testing constrained options and limited the knowledge base about the disease.

251. I am asked what advice, if any, I provided to core decision-makers about the removal of responsibility for testing from PHE in March 2020 and whether I supported the decision. I cannot recall what, if any, advice I gave, although I may have raised the need for a dedicated function with one empowered leader to be properly resourced to deliver a scaled testing system (as with the Vaccine Taskforce model and built on the GCSA paper "How to run a mission" **[PV2/132 - INQ000063426; PV2/17 - INQ000061614, Annex D]**). I don't think I had a view about whether this should be inside or outside PHE but it needed dedicated focus and resources and the ability to deliver. PHE was very overstretched at the time and needed to concentrate on many other areas as well. I would also have been clear that involvement of the private sector would be helpful.

252. On the evening of Friday 13 March a WhatsApp group discussion took place between the Prime Minister, Mr Cummings, Mr Hancock, the CMO and me. This referred to a meeting that was due to take place the following day. I wrote that, *"we will need to show some action on next two interventions and on how/when we would do more social distancing."* Mr Cummings made suggestions about further measures that he thought should be implemented, including signalling that *"we will move through the gears as fast and hard as necessary to avoid NHS collapse."* He suggested talking through on Monday 16 March the

[27] I understand that contact tracing still continued at this time, based on the tests that were done largely in hospitals.

"full plan up to full lock down if necessary in time to stop Italy style collapse" **[PV2/133 - INQ000048399**

253. I am asked if I was aware of Helen MacNamara, the then Deputy Cabinet Secretary, expressing her view on the evening of 13 March 2020 that the *"country is heading for a disaster."* I do not recall hearing this, but the sentiment would not have surprised me and it is what many of us felt. As can be seen from the WhatsApp discussion and the SAGE minutes from that day, there were concerns that the actions then envisaged would not be enough to prevent the collapse of the NHS. The RWCS was still that more than 500,000 people might die, and the relevant emergency plans contemplated the need for adequate supplies of body bags and the possibility that mortuaries would over-flow. These were horrific discussions.

Saturday 14 March to Monday 16 March 2020

254. In the early hours of Saturday 14 March 2020 I received a message on WhatsApp from Mr Cummings. He was concerned about rumours that some people on SAGE were *"getting twitchy"*. He invited me to offer any process that might help to assure SAGE participants that *"we are dealing with this right, happy to listen to different views etc – our only real goal It make more rational decisions."* I replied just after 6.30am that I thought that those who had been *"twitchy"* before the SAGE meeting the previous day were okay afterwards, given the advice to move faster on NPIs that had been agreed. I mentioned that the meeting had agreed the advice to *"go with the flow on gatherings (ie close because it reinforces other social distancing good practice) and that intermittent lock downs may be a way to help manage NHS peaks in specific locations."* I also noted the support in the meeting for making all models and papers public **[PV2/134 - INQ000061674]**.

255. A few hours later, I emailed Professor Edmunds, Professor Ferguson and Professor Medley: *"Were you ok with where we got to yesterday in SAGE? I want to push for faster action."* **[PV2/135 – INQ000212052**

256. By that time, the data supply to SAGE was improving and it was apparent that there were more cases, and more sustained transmission, than we had previously thought. My reference to pushing for faster action was to introducing NPIs earlier and I also thought that they may need to be more extensive if the government's objective of safeguarding the NHS were to be achieved. Professors Edmunds, Ferguson and Medley replied expressing broad agreement **[PV2/135 –INQ000212052 PV2/136 –INQ000212052**. As can be seen from

those emails, the reference point for the science advice was ensuring that the NHS was not overwhelmed. Professor Ferguson pointed out that this would have other consequences: *"Needless to say, the social and economic impacts will be very high."* It was for the politicians, not us, to weigh all of the relevant impacts and determine what should be done.

257. As can be seen from the tone of these emails, a range of views had been given at SAGE and some were closer to my personal interpretation of the situation than others. The minutes attempted to reflect the position and to convey that there remained uncertainties in the data. Later on 14 March Sir Jeremy Farrar, emailed me to ask whether I was content that the minutes of SAGE 15 conveyed the *"urgency that was palpable at the meeting"* as well as other points including about the speed at which events were unfolding, where the UK was in the epidemiological curve, and the frustration of many SAGE participants at the UK's testing capacity **[PV2/137 –** INQ000228791 I replied, following my meeting with the Prime Minister on 14 March, to say that *"my read out to politicians has spelled out [t]he urgency clearly but if we haven't reflected that in the minutes then we should"* **[PV2/137 –** INQ000228791

258. I attended a morning meeting with the Prime Minister, which resulted in the following readout **[PV2/138 - INQ000061676]**:

> "CMO/CSA provided an update on SAGE's work and the medical situation, and the implication that the right time to implement measures in our plan might be sooner than previously envisaged given the latest analysis. The plan allowed for this possibility, and the PM was clear that any measures adopted in the coming days was fully in line with our message that we would take the right measures at the right time, and that we must nest our response within the framework of last Thursday. The objective remained protecting the most vulnerable and protecting the NHS in supporting the public."

259. A further meeting was scheduled for the following day, Sunday 15 March. During Saturday Dr Wainwright and I prepared for that meeting, including through email exchanges with Professor Ferguson discussing the comparison to Italy (which, according to Professor Ferguson's email had experienced 1,300 deaths compared to the 10 reported fatalities in the UK), and requesting further visuals aids to reflect the latest modelling on the effect of NPIs **[PV2/139 –** INQ000228783 **PV2/140 –** INQ000228787 Professor Ferguson's responses show that it was his view that the planned interventions would not prevent the NHS capacity

from being exceeded, and hence that more NPIs would be required. He also identified the uncertainties around the impact of the spontaneous social distancing that was already taking place.

260. At 00:31 on the night of 14 to 15 March the CMO and I received a further email from Professor Medley in which he suggested that his latest review of the data suggested that the *"transmission is growing faster than all expectation and that we are days away from facing NHS overall load in 3 weeks (i.e. sufficient cases have been infected that will lead to hospitalisations in the near future)"* **[PV2/141 – INQ000228790** This was in keeping with Professor Ferguson's warning in his earlier emails that NHS capacity limits would be reached well before the peak of the epidemiological wave in the UK **[PV2/139 – INQ000228783]**

261. The CMO and I received a further overnight email at 03:36 from Professor Ferguson, marked "Urgent". He compared the figures for NHS England capacity that had been circulated the previous day with his modelling of the various NPIs. His conclusion was stark **[PV2/142 – INQ000195888]**

> "The minimum policy will require: closing schools & universities, home isolation of cases, and large scale intensive social distancing – reducing all contacts outside the home and work by 75%+, preferably reducing work contacts by some extent.
>
> From social contact data collected in the past, the only way I can see the latter reductions being achievable is to close all leisure venues – non-essential shops, bars, restaurants, cinemas etc.
>
> …It is hard to predict accurately how long these measures will need to be in force. Likely at least 4 months. More if we delay.[28]
>
> This policy is basically suppressing transmission, so population immunity will build up slowly. In the absence of vaccine, we'll still be doing it in over a year's time.

[28] In the same paragraph Professor Ferguson had commented that it may be possible to have intermittent social distancing measures, with interruptions and restarts triggered by case numbers in intensive care units.

…Last, if the initial epidemic is not to exceed ICU capacity, I estimate that these policies will need to be brought in before ICU admissions exceed 250/week. I'm afraid that the quality of data we're getting doesn't let me judge how far away that is. I would guess < 2 weeks.

Also, for containment, it is always better to act early – unlike mitigation. So we should be doing this as soon as … minimal planning can be done and it can be announced. Like this coming week.

…Sorry to be the harbinger of such depressing news. But if govt policy is to keep within NHSE's stated surge limits, there is no other way."

262. Professor Ferguson also stated that a full report would be produced, with the aim of releasing all of the behavioural and social interventions modelling work early in the coming week.

263. I replied to this email at 05:15 am, thanking Professor Ferguson and saying that we needed to think hard about how to respond.

264. A consistent picture had emerged from these emails that in order to achieve the government's policy objective it would be necessary to implement wider social distancing measures as early as possible, meaning within the coming week at the latest. Although the term "lockdown" was not used, the measures suggested included: closing schools, universities, non-essential shops and venues, home isolation of cases and reducing work contacts by working from home.

265. The other consistent theme from these emails was the paucity of the data with which we had had to work. As can be seen by my email of 11:44 on 14 March, even at that time it was not clear how many Covid cases were being treated in Intensive Care Units **[PV2/139 – INQ000228783]** Professor Edmunds referred to *"considerable confusion"* about whether cases reported as part of the FF100 data were truly sporadic (i.e. transmission within the UK) **[PV2/141 – INQ000228790]** Sir Jeremy Farrar expressed impatience at both the existing diagnostic testing capacity and the plans to increase it **[PV2/137 – INQ000228791]** Professor Ferguson wrote that: *"Resolving the surveillance issues is a key priority"* **[PV2/136 – INQ000212052]** The data situation was improving, as Professor Edmunds acknowledged in his email at 08:21 on 14 March **[PV2/135 – INQ000212052]** and this had allowed for a greater

understanding of the degree of infections in the UK and the consequent need for action. However, the data were still imperfect, incomplete and sometimes unreliable.

266. Having considered these emails and the other evidence, it was my clear view that more extensive NPIs would have to be introduced quickly. At 10:24 on the morning of Sunday 15 March I messaged a WhatsApp group comprising the Prime Minister, Mr Hancock, Mr. Cummings, Lee Cain, the CMO and me that: *"I think we will need to move to the stricter quarantine and social distancing."* **[PV2/143 - INQ000048399**

267. At 11:12 on the same morning I emailed Mr Cummings. This was an email sent jointly in my name and that of the CMO. We attached the slides on which we and others had been working over the weekend. We wrote the following **[PV2/144 – INQ000229866 PV2/145 – INQ000106215**

> "**Objectives**
> Our two key aims are:
> 1. To ensure that the curve of the epidemic is flattened to a degree that allows the NHS to cope
> 2. Protect lives through appropriate shielding of the elderly and vulnerable…
>
> **Current state and effects of interventions**
> The current stage of the epidemic and its trajectory suggests that we are a few weeks (we cannot be precise about how many) away from the NHS reaching a point where it could not cope.
> There is uncertainty in all of the modelling and it is critical that we have accurate near real time monitoring of the epidemic and the NHS figures.
>
> **This week**:
>
> The three measures that have the biggest impact to reduce the numbers of people needing ICU care are case isolation, home quarantining and shielding of the elderly. The two of these that have not yet been implemented should be implemented as soon it is practical to do so. Particular care should be taken with the shielding of the elderly to ensure that we do not get unintended adverse effects on health.
>
> These measures should be accompanied immediately by actively encouraging enhanced social distancing – including encouraging businesses to facilitate

home working where they can, asking individuals to reduce social contacts and avoid gatherings, reduce unnecessary travel (all this will require precise guidance on what exactly we are asking people to do). This could be accompanied by closing venues for social gathering (see below), asking shops to limit numbers etc.

Soon:

On current data and reasonable worst case scenario it is modelled that these interventions will not be enough to keep numbers below the threshold required for the NHS to cope as the epidemic progresses, but we cannot be sure. Continuous evaluation of their impact is essential.

If the effect of the measures proposed above does not look big enough, it will be necessary to take further steps. These include – (i) closing venues such as cinemas, theatres, night clubs, sporting fixtures, places of worship, and bars and restaurants (ii) more complete total population social distancing (75% reduction in contacts outside the workplace and school, 25% reduction within workplace) (iii) closing schools and universities. The order should be to do (i) and (ii) first and keep school closures last (not least because of the effects on NHS staff and others). London is probably furthest along the epidemic curve and so these measures could be started there if a regional approach is thought appropriate.

The measures will need to be in place for about 5 months, but it is possible that with good monitoring measures could be started for a month or so, released and then restarted as needed in an on/off cycle (both on/off cycles and regional approaches are being modelled now). Both starting and stopping could be done regionally provided we have the right data collections systems.

Other things that need to be in place

1. Good data flows on NHS use, ICU bed use, cases, effects of interventions.
2. NHS increased capacity for ICU beds, ventilators and people who can run them
3. Massively enhanced testing capabilities with a fast turnaround time.

4. Serology testing applied asap to find out the proportion of asymptomatic cases.
5. Better information flows to and from individuals (e.g. with App)
6. Clear understanding of the effects on critical roles for both NHS and other key public sector and industries
7. Clinical trials

Uncertainties

The single biggest uncertainty in all the modelling is the number of people with very mild or asymptomatic disease. We simply do not know how big this proportion is and it makes a very significant difference to all of the models (if very high then ghe [sic] mortality estimates and other numbers will be quite substantially over estimated at the moment)."

268. The CMO and I received a further email from Professor Ferguson at 13:04, in which he stated that *"it would be preferable for the inevitable policy pivot to happen now rather than later."* He commented on the messaging to be associated with this change, emphasising that it was only in recent days that the ICU requirement estimates had been refined and that NHS surge limits had been identified. He said that it was also *"important to highlight that we are still acting faster than most other EU countries and the US, given the relative stage of epidemics"* **[PV2/146 –** **INQ000228799**

269. In the same email, Professor Ferguson referred to the paper that he and his team were preparing, and which would be published the following day (see below). He commented that *"the cure may end up being worse than the disease in adopting long term suppression. But we will conclude that suppression [i.e. extensive NPIs to reduce R below 1] is the only feasible strategy given how much hospital demand is likely to be exceeded".*

270. A short while after we received Professor Ferguson's email, the CMO and I received one from Professor Edmunds. This returned to the issue of poor data and data flows, and suggested that this should give rise to what he called a *"precautionary approach to our social distance policy. If the data are unreliable, then we need to step up our social distance measures much more rapidly than we might otherwise have thought necessary."* He recommended the immediate introduction of household quarantine, and banning all social contact, cocooning for high-risk groups. He also proposed raising the possibility of school closures **[PV2/147 –** **INQ000207029**

271. Sir Jeremy Farrar also sent an email at around this time urging *"early and decisive"* action in introducing extensive NPIs **[PV2/148 – INQ000228800**

272. I attended three meetings that took place on the afternoon of Sunday 15 March: a meeting of officials at 14:30 to prepare for the later meetings; a meeting at 16:00 at which the Prime Minister was given an analytical update where the latest data were presented; and a meeting at which NPIs were discussed between 17:00 and 18:00. I suggested the need for an urgent lockdown at this meeting and was subsequently given a message that DHSC and Cabinet Office were "incandescent" with me for doing so **[PV2/149 – INQ000229547** GO Science only holds one document created after these meetings, which is a list of the actions and decisions following the final meeting. This reads as follows:

> "It was agreed that a package of announcements would be put to COBR on Monday 16 March, for announcement at a press conference afterwards. These decisions were as follows:
>
> 1. To announce and launch the household stay at home policy from Monday 16 March;
>
> 2. To announce a package of 'soft' social distancing advice for the general public. Of the options set out in the DHSC paper this would include:
>   a. Advising against social mixing in the community (e.g. at the cinema, theatre, pubs, restaurants, clubs);
>   b. Advising against receiving friends and family in the house;
>   c. Remote access to NHS and other essential services;
>   d. Advising varying of daily commute - less public transport;
>   e. Advising working from home.
>
> 3. To communicate to more vulnerable groups (e.g. 70+, pregnant women and those with particular health conditions) that these social distancing measures should be followed more rigorously.
>
> 4. That 'shielding' for the c.1.4 million individuals with serious health conditions (i.e. the most vulnerable) would commence within one week. These individuals would be contacted by their GP or specialist within a week, and those who had not been contacted in this period should reach out to their

GP. The proposed support package that would accompany this measure would be put to Ministers on Wednesday 18 March.

5. That, given the measures outlined above, it would be advised (but not mandated) that mass gatherings should not take place. It was agreed that public services support would not be provided to any mass gatherings and this would be announced. A decision was not taken on providing compensation as a result of this announcement."

273. Although this document states that a *"fuller note will issue shortly"* I understand that this was not received by GO Science.

274. The *"household stay at home policy"*, combined with the other measures of social distancing agreed at this meeting, are close to what would later be referred to as a "national lockdown", albeit one that was at that time advisory rather than mandatory. Although, as I discuss below, some additional measures would be added to the package over the week that followed, my feeling on the evening of 15 March was that a decision had been taken to enter a lockdown and work started on what it would take to implement that. What is difficult to understand in the days that followed is the gap between taking the decision and implementing lockdown with full legal effect. The need for speed between decision and operational implementation is a point to which I will return. It is an area of preparation that is worthy of attention.

275. For completeness I add here that I spoke to the CSAs for Ireland and New Zealand on 14 and 15 March, but there were no read outs arising from these calls. I also spoke to Professor Neil Ferguson after the meetings on the evening of the 15 March, after the meetings I have described above. Again, no readout of that call is held by GO Science.

276. On Monday 16 March, Professor Ferguson and his colleagues at Imperial College published their paper – "Report 9: Impact of non-pharmaceutical interventions (NPIs) to reduce Covid-19 mortality and healthcare" **[PV2/150 – INQ000049647** Its central conclusion was as follows:

> "We find that that optimal mitigation policies (combining home isolation of suspect cases, home quarantine of those living in the same household as suspect cases, and social distancing of the elderly and others at most risk of severe disease) might reduce peak healthcare demand by 2/3 and deaths by

half. However, the resulting mitigated epidemic would still likely result in hundreds of thousands of deaths and health systems (most notably intensive care units) being overwhelmed many times over. For countries able to achieve it, this leaves suppression as the preferred policy option.[29]

We show that in the UK and US context, suppression will minimally require a combination of social distancing of the entire population, home isolation of cases and household quarantine of their family members. This may need to be supplemented by school and university closures, though it should be recognised that such closures may have negative impacts on health systems due to increased absenteeism. The major challenge of suppression is that this type of intensive intervention package – or something equivalently effective at reducing transmission – will need to be maintained until a vaccine becomes available (potentially 18 months or more) – given that we predict that transmission will quickly rebound if interventions are relaxed. We show that intermittent social distancing – triggered by trends in disease surveillance – may allow interventions to be relaxed temporarily in relative short time windows, but measures will need to be reintroduced if or when case numbers rebound. Last, while experience in China and now South Korea show that suppression is possible in the short term, it remains to be seen whether it is possible long-term, and whether the social and economic costs of the interventions adopted thus far can be reduced.

…

We do not consider the ethical or economic implications of either strategy here, except to note that there is no easy policy decision to be made. Suppression, while successful to date in China and South Korea, carries with it enormous social and economic costs which may themselves have significant impact on health and well-being in the short and longer-term."

277. The Imperial team found that, on their modelling, a "mitigation" strategy would likely see the surge capacity of the NHS *"being exceeded many times over"* even if the most effective strategy was followed, and would still result in *"the order of 250,000 deaths in GB."*

[29] "Suppression" is defined in the paper as reducing R to below 1 and hence to reduce case numbers to low levels or (as for SARS or Ebola) eliminate human-to-human transmission." "Mitigation" was defined as being a policy not to interrupt transmission completely, but to reduce the health impact of an epidemic.

278. The paper stated that: *"In the UK, this conclusion has only been reached in the last few days, with the refinement of estimates of likely ICU demand due to COVID-19 based on experience in Italy and the UK (previous planning estimates assumed half the demand now estimated) and with the NHS providing increasing certainty around the limits of hospital surge capacity."*

279. It is important to note, that the Imperial report stressed the uncertainties in the data and explained the assumptions that had been made in its modelling. It also acknowledged that one unknown variable was the extent to which spontaneous social distancing would occur even without government action.

280. I am asked what my view was of the Imperial College paper published on 16 March, and what effect this paper had on my advice and government policy. As can be seen from the narrative of the events provided above, I was already of the view that more extensive NPIs would have to be introduced earlier in order to meet the government's policy objectives. The Imperial College paper, and the advice I received from Professor Ferguson and others, confirmed me in that view. I thought the work of Professor Ferguson and his team was of high quality and was informative and important, and I read it carefully.

281. I do not think that the paper led to a change in the government's policy from "flattening the curve" to one of "suppression". "Flattening the curve" – i.e. managing the epidemiological curve so that the NHS did not become overwhelmed, while protecting high-risk groups – remained the policy objective, and it effectively meant suppression of transmission to the required objective. Due to the prevalence of the virus and the capacity of the NHS, that could no longer be achieved by what the Imperial team termed "mitigation" (i.e., managing the epidemic with a moderate combination of NPIs). Instead, the policy objective required what the Imperial team termed "suppression" (i.e., imposing a stricter and more extensive combination of NPIs to reduce R below 1). "Mitigation" and "suppression" are, in this context, tools to be used to obtain a policy aim. For some countries and some commentators, the preferred policy objective was "zero Covid", for which complete "suppression" was clearly required. That was never the policy of the UK Government.

282. The Imperial paper was widely reported and may have been influential for that reason. However the direction of travel was already clear and had been building from early February, including from the work by Professor Ferguson. By the 14/15 March it was very clear that urgent and significant action would be required to meet the policy objectives. The Ferguson paper drew this to a sharp focus. It should also be remembered that while the

Imperial report referred to the possibility of 250,000 deaths, the RWCS was already over 500,000.

283. Professor Ferguson sent a draft copy of the paper to me and to SPI-M participants on the morning of 16 March, ahead of a SAGE meeting, SAGE 16 **[PV2/151 – INQ000087315** The other SAGE participants would have received it as part of their package of papers for that meeting. SAGE 16 also considered a paper dated 11 March 2020 by Professor Edmunds and his team at the London School of Hygiene and Tropical Medicine (LSHTM) that contemplated the use of aggressive, short-term (3 week) lockdowns that were triggered when ICU services were being overstretched **[PV2/152 – INQ000212040**

284. SAGE met at 13:00. The summary contained in its minutes recorded that **[PV2/153 - INQ000061524]**:

> "1. On the basis of accumulating data, including on NHS critical care capacity, the advice from SAGE has changed regarding the speed of implementation of additional interventions.
> 2. SAGE advises that there is clear evidence to support additional social distancing measures be introduced as soon as possible.
> 3. These additional measures will need to be accompanied by a significant increase in testing and the availability of near real-time data flows to understand their impacts."

285. Later in the minutes it was recorded that the objective of the measure was to avoid critical cases exceeding NHS capacity [§10], and that SAGE could not be certain that the measures then being considered by the UK Government would be sufficient to achieve this [§16]. School closures, although one of the less effective single measures that could be taken, may still be required and would be considered at the next meeting [§4, §17]. SAGE agreed that its advice would be based on NHS requirements and what the modelling showed of the effect of NPIs, not by *"the (limited) evidence on whether the public will comply"* [§18].

286. The SAGE minutes informed CRIP 27 **[PV2/154 – INQ000230992** which was circulated that afternoon ahead of the COBR (M) meeting **[PV2/155 - INQ000061687]**. This advised that the Prime Minister announce a further range of (voluntary) measures, which are set out

below. COBR (M) agreed and the announcement was made that evening at the press conference **[PV2/156 - INQ000064488]**. The measures were:

1. Household quarantine: when any member of a household is symptomatic, the whole household should stay at home for 14 days.[30]
2. Social distancing:
    - Advice to the whole population: to reduce social contact where they can through 'soft' social distancing – e.g. encouraging home working, advising against social mixing, not going into crowded areas when unnecessary. The Prime Minister expressly said that: *"You should avoid pubs, clubs, theatres and other such social venues."*
    - Advice to specific groups: for those groups in a more vulnerable category the advice is to follow this social distancing guidance more rigorously: (i) 70+ (regardless of medical conditions); (ii) under 70 with defined long-term medical conditions; (iii) pregnant women.
3. Shielding the most vulnerable: Within the next week, moving to shield the most vulnerable (c.1.4 million individuals) for around 12 weeks, with a full support package to be announced later that week for England.
4. People in London (where the virus was particularly prevalent and the pressure on the NHS was the greatest) were asked to *"pay special attention"* to the advice on social distancing.
5. Large gatherings: in light of the above measures, advice that large gatherings should not go ahead, and that public and emergency service cover would not be provided to any large events. This was advice rather than a ban.

Further measures and the first national lockdown: 16 to 23 March 2020

287. These measures were close to the first national lockdown, other than in three regards. The first was that the measures were at that time voluntary rather than legally enforced. The second was that schools were not closed. The third is that there was no compulsory closure of shops, venues such as bars, restaurants and gyms ("places of leisure"), and non-

[30] It is important to distinguish between the 7-day period advised for an individual who showed symptoms, and the 14-day period advised for members of a household to isolate if someone within that household became symptomatic. The science and analysis that led to these figures being adopted is contained in the SAGE and NERVTAG minutes and papers, but ultimately the decision was a policy one for DHSC. **[PV2/157 INQ000229192 PV2/113 - INQ000061522]**

essential workplaces. At the meeting with ministers on 16 March I again argued that stronger measures and a lockdown for at least London would be required if the government's stated policy of protecting the NHS and the vulnerable was to be achieved, something I repeated on the 19 March. I recall that the Chancellor was opposed to the idea of doing anything more in London.

288. I am asked what consideration was given to making the measures legally enforceable. This was a matter of policy and operations, rather than one of science advice. From my perspective, SAGE, the CMO and I had given clear advice that these measures needed to be introduced and followed in order to meet the government's policy objective. My understanding is that it took around a week to work up the voluntary measures into legally enforceable duties. It is also my understanding that in France advice was given by the official science advisory body, Conseil Scientifique Covid-19,[31] to lock down on 16 March and it was implemented, in law, the following day. In the UK the advice was given on the same day as in France, and was accepted that day, but the legally enforceable measures did not come into effect for a week. One of the lessons that I think should be learned from the UK experience is that the time between such a decision being taken and it coming into legal effect should be as short as possible. The time to take action needs to be much shorter than the doubling time of the pandemic. The Prime Minister did announce on Monday 16 that people should not go to bars and restaurants or travel, but at this stage it was not a legal requirement.

289. Personally, I did not know what effect the advice would have on public compliance with the measures. However, I (and others) received a WhatsApp message from Mr Cummings on 18 March suggesting that focus groups were indicating that they were finding the *"soft"* measures on social distancing confusing. I agreed with Mr Cummings that this suggested that a firmer line should be taken and wrote: *"We need to have the effect on behaviour and if we are not then we need to go harder and make it clear we mean it."* **[PV2/159 - INQ000061693]**.

290. In respect of school closures, and as anticipated, SAGE discussed the matter at its next meeting, SAGE 17 on Wednesday 18 March **[PV2/23 - INQ000061525]**, by reference to a number of papers **[PV2/160 – INQ000074897 PV2/161 – INQ000074903 PV2/162 – INQ000074921 PV2/163 – INQ000075790 PV2/164 – INQ000212224** That meeting advised that, *"the available evidence now supported implementing school closures on a national level as soon as*

[31] See **[PV2/158 - INQ000228810**

practicable to prevent NHS intensive care capacity being exceeded" **[PV2/23 - INQ000061525, §2]**. It was emphasised that the evidence base was uncertain [§20, §25], and that there were trade-offs that had to be considered, such as the impact on childcare arrangements (particularly from grandparents who may be at higher-risk if children who were mixing with others came to stay with them) and in terms of keeping places open for the children of NHS workers [§§21-23]. School closures had been considered on previous occasions at SAGE **[PV2/31 - INQ000061512; PV2/64 - INQ000061515; PV2/72 - INQ000061517; PV2/102 - INQ000061521; PV2/153 - INQ000061524]**, and the decision on whether to recommend this step was finely balanced. The advice given on 18 March was a consequence of our concerns about the rapid doubling time and number of infections. Although uncertain and of limited effect, it was our view that school closures should be added to the interventions intended to prevent the virus overwhelming the NHS. We were all conscious of the adverse effects closing schools would have on children's health (physical and mental), education and social interaction, and the fact that those in poorer households would be disproportionately affected. There was no harder issue than whether or not schools should be closed during the pandemic.

291. The decision to bring forward the Easter holiday and close schools from Friday 20 March until further notice was made on the same day in COBR (M) **[PV2/165 - INQ000107254]**, and was announced by the Prime Minister in the press conference that evening, and by the Secretary of State for Education in Parliament **[PV2/166 - INQ000064490; PV2/167 – INQ000075716]**

292. Discussions about closing shops and venues initially took place in the context of considering additional measures that could be implemented in London, which was thought to be further along the epidemiological curve than other parts of the country and was within weeks of exceeding NHS critical care capacity. At SAGE 17 on 18 March **[PV2/23 - INQ000061525]**, it was noted that there was insufficient data on the NPIs that had recently been implemented to judge compliance levels [§26]. This led to a discussion of what additional interventions could be undertaken to reduce transmissions. The measures with the strongest support were closure of schools (which was announced that day), and closure of places of leisure and workplaces (in order of effect). It was thought unlikely that the impact of these measures could be analysed with great precision [§29].

293. I presented the SAGE output to the Prime Minister in a meeting the following day, Thursday 19 March **[PV2/168 – INQ000056062]** The following day, COBR (M) decided that, as of that night, measures would come into effect for the closure of places of leisure across the UK

[PV2/169 - INQ000106265]. That meeting had considered a paper in which it was reported that, while it was too early to judge properly compliance with the voluntary measures that had been announced on Monday 16 March, initial data were mixed **[PV2/170 – INQ000231024** The objective remained the same, namely to achieve a 75% reduction in non-household contacts, but it was now considered necessary to expand the range of interventions to achieve it. It was also suggested in the paper seen by COBR (M) that the measures would be more effective if they applied across the country as a whole, as this would avoid people travelling in order to access goods and services that were not available locally. It now seems that the effects of the advice given on 16 March were probably significant and there is some evidence that contact patterns reduced to a level that week that would have led to R reducing. Certainly transport figures show that travel into London was markedly reduced.

294. On the night of Saturday 21 March, Professor Ferguson emailed the CMO and me about the situation in London. On anecdotal evidence, and in the absence of data to the contrary, he queried whether a 75% reduction in contacts outside the household was being achieved. He estimated that ICUs would be full in less than two weeks and thought that it may be necessary to force all but designated shops to close in the next 24 to 48 hours and to consider some degree of enforcement of "stay at home" recommendations. I replied the following morning to say that I had heard the same and the matter would need to be discussed again **[PV2/171 – INQ000228862**

295. The following day, Sunday 22 March, Professor Van-Tam emailed me, the CMO and Professor Steve Powis to provide an update from the SPI-M meeting. He said that the modellers were *"of one mind that extra measures needed right now – right across the country not just London."* Their view was that even with these measures, the risk of the NHS being overwhelmed was *"now critical"* and that transmission chains within households could not be averted even without external contacts **[PV2/172 – INQ000228874** I attended a meeting with the Prime Minister later that day, but GO Science hold no record of a readout from that meeting.

296. SAGE met on Monday 23 March for SAGE 18 **[PV2/173 - INQ000061526]**. The minutes began by recording that UK case accumulation suggested a higher reproduction number than previously anticipated [§1]. R was thought to be around 2.6 to 2.8, with doubling time for ICU patients estimated to be three to four days [§8]. It was thought that case numbers could exceed NHS capacity in London within 10 days on the then current trajectory [§7]. Although social distancing behaviours had been adopted, there was uncertainty whether

they were at the level required to bring the epidemic within NHS capacity [§20]. The *"key areas for further improvement"* included reducing contacts with friends and family outside the household and contact in shops and other areas.

297. I attended an update meeting with the Prime Minister after SAGE, but GO Science holds no record of this. It was followed by a COBR (M) meeting, where the decision was taken to require, from midnight, the closure of non-essential retail, ban all gatherings of more than two people in public, and ban all social events. People would be directed to stay at home, leaving only in accordance with a restrictive list of permitted activities **[PV2/174 - INQ000052692 PV2/175 – INQ000052705** This was the first national lockdown.

General questions concerning the lead up to the first national lockdown

298. I am asked various questions about the timing of the measures set out above, and generally about lockdown. Throughout this time, and once containment had failed, the government's core policy remained the same: to stop the NHS being overwhelmed and to protect those in high-risk groups. The approach before 23 March had been an incremental one. Before the discussions on 13 to 16 March, the consensus view on SAGE was that the epidemiological curve could be managed in by the imposition of a combination of relatively modest behavioural and social interventions once certain trigger points of ICU case numbers were met. On Friday and over that weekend, improving data flows and the consequent modelling led us to conclude that this was not going to be effective, and that more extensive intervention would be required with immediate effect. That advice was conveyed on 14 to 16 March and a combination of advisory NPIs were announced on Monday 16 March. These had a significant effect and it is possible that they drove R below 1. However in the week that followed, the emerging (limited) data suggested that those measures had not achieved the 75% reduction in contacts that was necessary to prevent critical care capacity being breached. As such, further measures were introduced on Wednesday 18 March (school closures in two days), Friday 20 March (immediate closure of pubs, restaurants and other places of leisure), and Monday 23 March (closure of non-essential retail and "full lockdown"). These measures were given legal effect once the relevant legislation was in place.

299. The single most important lesson that I took from this was that when dealing with a pandemic, you have to impose restrictions earlier than you would like, harder than you would like, and broader than you would like. That informed my subsequent advice. I remain

firmly of this view in relation to the situation that the UK faced and the stated policy objectives.

300. I also think it is important that once science advice is given and a policy position has been agreed, it must be implemented quickly. In March 2020 I think that the government as a whole took too long to put into operational effect the measures that had effectively been agreed. The specific example is that over the weekend of 14/15 March it was clear what needed to be done. Nonetheless the Prime Minister announced many of the measures in an advisory tone on the Monday. It took a week or more before the measures became fully enacted. I am not familiar with the technical processes that apply to the promulgation of legislation but, from my perspective, this seemed to be an excessive and potentially avoidable delay.

301. Looking back, it is regrettable that the most extensive interventions were not implemented as soon as it was obvious that they were needed. Given the information and science advice at the time, I think measures should have been introduced fully on the 15 or 16 of March in support of the government's stated policy. I do not know whether policy-makers would have been able to impose a full lockdown much before then. For example on the morning of 12 March there were 456 identified cases of Covid in a UK population of over 67 million, with eight Covid-related deaths. Later in the pandemic when the effects of Covid were clear for everyone to see and it was known that acting quickly was important, decisions to impose restrictions only came at much higher levels of cases and deaths. When the second lockdown was announced on 5 November 2020, the seven-day average number of new daily cases in the UK was 24,090 and there were 388 deaths, whilst when the third national lockdown was announced on 4 January 2021, the seven-day average number of new daily cases was 58,150 and there were 896 deaths.[32]

302. There is also a question of whether SAGE was trying to be too precise in terms of the idea of an optimal timing of interventions. I think the answer to this is yes, especially given the poor state of data that were available. This lesson was learnt for subsequent waves.

303. A major reason SAGE did not advise earlier and more extensive interventions, for example on 10 March rather than 16 March, was that we were unaware of how widely seeded the virus was in the UK and how short the doubling time had become. As I have said, we were, to a significant extent, flying blind but I don't think we knew how blind we were. I

[32] See **[PV2/176 - INQ000231048**

have addressed what I consider to have been the causes of the national failures on data in my Module 1 evidence **[PV2/2 - INQ000147810]**.

304. I have reflected on whether I could have been more forceful or outspoken in the advice that I gave. Perhaps I could have been, but there is a balance to be struck when presenting people with unpalatable advice about things that they (understandably) do not want to do. I was an adviser, not a decision-maker and it was not my role to insist on a particular course of action in response to the advice I was providing. Vociferous disagreement from me with policy decisions made by those with responsibility for making difficult judgments in an unprecedented situation would have made no impact whatsoever and may have led to the science advice being marginalised. That said, I do not think that I held back from expressing myself clearly and, where appropriate, forcefully, and indeed over the weekend of 15 March I was reprimanded for the advice I did give. Later in the pandemic both the CMO and I had built trust and I do think we were able to be increasingly forthright and convey urgency more effectively, but even then there were still important delays in decisions and implementation. At the beginning of the pandemic it was difficult to persuade decision-makers of even the lightest of behavioural and social interventions, and I recall being relieved that we had managed to get something as clear as self-isolation over the line. In some ways this issue was foreshadowed in the outputs from Exercise Alice and its conclusion that many things would be difficult to operationalise. Overall across the pandemic I believe that informed policy decisions were possible as a result of the CMO and I remaining neutral and giving objective, measured science advice.

305. There are some claims about the period before the first lockdown that I do not think are correct. I took the threat of SARS-CoV-2 and Covid-19 very seriously from the start of January. I believe that all of those involved in SAGE did. While there were, inevitably and helpfully, some differences in views on what the data were showing, and what the advice should be as a result, these arose from differences in analysis, experience, expertise and perspective. No-one connected to SAGE failed to take the matter seriously.

306. Nor do I think this was a case of "British exceptionalism" or complacency, at least insofar as the science advice is concerned. I spoke to international colleagues regularly and SAGE was fortunate to be able to call on participants with personal networks that included some of the leading scientists throughout the world. Professor Horby had experience of SARS and he and Sir Jeremy Farrar (to give but two examples) had deep and long-standing experience of infectious diseases in Asia. We listened to and learned from other countries, but ultimately had to face the virus in the UK with the tools and vulnerabilities that we had.

Had our public health infrastructure been as developed as that in South Korea for testing and contact tracing then other paths and outcomes may have been open to the country. But it was not. Again, I have addressed some of the reasons for this in my Module 1 evidence, and have also made suggestions as to how the situation may be avoided in the future.

307. The UK was not an outlier in Western Europe in terms of when it began the steps that culminated in the full legal lockdown on 23 March. It is difficult to make direct comparisons with other countries, but the decision of the 16 March was the same date that France made its decision and we were probably a little behind France in terms of the pandemic progression at that stage.[33]

308. On a similar theme, it is simply incorrect to say that the UK pursued a policy of *"going for herd immunity"* in the sense of letting the virus spread through the population. The policy remained consistent: prevent the collapse of the NHS and protect those in high-risk groups. The initial approach to this was to contain the virus through testing and tracing. That was only sustainable when the virus was at very low prevalence (unlike in South Korea, with its greater capacity). Once that approach became unrealistic, steps were taken to seek to delay the virus and flatten the curve through the NPIs described above. At no stage were NPIs deliberately eased or avoided in order to allow the virus to spread more quickly with the intention of rapidly building up population immunity.

THE FIRST LOCKDOWN AND THE LIFTING OF THE LOCKDOWN: MARCH T0 SEPTEMBER 2020

The work of SAGE, March to September 2020

309. The work of SAGE and its sub-groups during and after the first lockdown can be seen from the publicly available minutes and papers that it produced. The Inquiry is unlikely to be helped by my setting these out in detail here, but it is worth noting that SAGE met on 36 occasions between 23 March 2020 (SAGE 18) and 27 August 2020 (SAGE 53). There were many more meetings of sub-groups and other relevant scientific advisory forums. The pace and quantity of work continued to be gruelling and SAGE expected there to be multiple waves of infection which could be as deadly or worse that the first wave. Most of

[33] A Guardian article from 16 March 2020 reported 1395 cases in the UK and 5437 in France **[PV2/177** **INQ000252718** We now know these figures are likely to have been underestimates of the number of cases in each country.

the population had no immunity to the virus at all. It is important to note at this stage of the statement that the second wave of infection caused more deaths and hospitalisation than the first.

310. Among the issues considered by SAGE in this period are the following:

a. Testing, tracing and isolation
b. Lifting interventions
c. Face masks
d. Care homes and other high-risk institutions
e. Children and schools
f. Higher and further education
g. Borders
h. Environmental transmission
i. Ethnicity
j. Therapeutics, vaccines and clinical trials
k. 'Bubbles'
l. Nosocomial infection and transmission
m. Local measures
n. Segmentation of vulnerable groups
o. Virus variants
p. Excess deaths
q. Immunity

311. During this period I also started the Vaccine Taskforce. It had been clear from the beginning that vaccines were a potentially important way out of the pandemic. At the meeting of science funders I called on the 27 January we started the process of ensuring that rapid research funding was in place, and identified that mRNA vaccines looked likely to be important **[PV2/38 - INQ000063572]**. I understand that vaccines will be considered in detail in a later module, so at this stage I briefly outline the work I was undertaking on vaccines alongside my other roles. From early February it was my view that business as usual procurement of vaccines was simply not going to work, not least because vaccines were still in the discovery phase **[PV2/178 – INQ000228652]** What was needed was a co-ordinated research and development, clinical development, manufacturing and procurement approach led by experts. I assembled a group that included manufacturing experts such as Ian McCubbin, vaccines scientists including Sarah Gilbert, people with venture expertise including Dame Kate Bingham, Dr Richard Hatchett from CEPI (Coalition for Epidemic Preparedness Innovation) and others. A civil service team led by Alex Jones

(then Director for Science, Research and Innovation at the Department for Business, Energy and Industrial Strategy (BEIS)) was assembled outside normal departmental boundaries with an aim to get things moving fast and with a dedicated focus. The landscape of all vaccine projects across the world was mapped and contacts with small and large companies made. I spoke to Moderna in mid-March and Pfizer in early April. I asked the Prime Minister to become directly involved. In May 2020, Kate Bingham was appointed to provide full time leadership in this model of a joint private sector, academia and government taskforce.

312. I am asked what the purpose was of the first lockdown and whether I consider that purpose was achieved. I understood the purpose to be to reduce the transmission of the virus in the UK so as to prevent the NHS being overwhelmed and reduce harm. It achieved that purpose but it was still a traumatic and appalling time for the health service, those that worked in it and for the many patients who suffered or died during this first frightening wave of infections. There was also clinical uncertainty about how best to treat patients. There was no doubt that the NHS was under extreme pressure and suffered as a consequence. However the lockdown worked, in that the wave of infections did come under control and began to subside. By 31 March (SAGE 21) it was estimated that R was between 0.6-0.9 and over the following week cases and hospitalisation reached a peak and then declined **[PV2/179 - INQ000061529]**.

Advice on easing behavioural and social interventions and the "exit strategy"

313. Work began on providing advice about an "exit strategy", and more general easing of behavioural and social interventions, from the first SAGE following lockdown, SAGE 19, on 26 March 2020. The minutes record: *"SAGE will begin shifting attention to future phases of the epidemic to anticipate challenges and opportunities to minimise impacts and harms, release current measures safely and advise on long-term issues"* **[PV2/180 - INQ000061527]**. The work at this stage had a broad scope. For example, SAGE repeatedly emphasised the need for extensive, reliable and accessible testing and data in order to track where on the epidemic curve the UK was both during lockdown and when measures were eased: see, among other example, SAGE 26 (16 April 2020) **[PV2/181 - INQ000061534, §1, §§8-10]**; SAGE 28 (23 April 2020) **[PV2/182 - INQ000061536, §§9-19]**; SAGE 37 (19 May 2020) **[PV2/183 - INQ000061545, §§14-15]**. It also advised on the need for an effective test, trace and isolate scheme in order to limit the spread of the virus in the community: see, in particular, SAGE 35 (20 May 2020) **[PV2/184 - INQ000061543, §6]** and SAGE 38 (21 May 2020) **[PV2/185 - INQ000061546, §§12-31]**. On 16 April 2020

PHE confirmed that it was unable to establish a community testing programme and it was agreed that ONS would set one up (SAGE 26), and I assisted with that. SAGE established the Environmental Modelling sub-group and a group to advise on science related to nosocomial transmission. It gave advice on specific measures, such as an NHS App, the proposed introduction of bubbles, and modelled the effect of easing individual NPIs (although it was stressed that much of this work had a low confidence attached to it): see (among other examples) SAGE 36 (14 May 2020) **[PV2/186 - INQ000061544, §1, §§12-25** (bubbles)**]**; SAGE 38 (21 May 2020) **[PV2/185 - INQ000061546, §§12-22** (modelling of changes to measures)**]**. A cross-disciplinary sub-group was established to consider the impact of interventions and the impacts that lifting them would have: see SAGE 23 (7 April 2020) **[PV2/187 - INQ000061531]**. SAGE also began to receive data on the proportion of people who had generated an immune response to Covid (SAGE 24) **[PV2/188 - INQ000061532]**. The issue of care homes was discussed in April (SAGE 25, 28 and 29) and transmission in children was explored (SAGE 26) as well as the emergence of a Kawasaki-like syndrome in children (SAGE 29) **[PV2/189 - INQ000061533; PV2/182 - INQ000061536; PV2/190 - INQ000061537; PV2/181 - INQ000061534]**.

314. SAGE 38 on 21 May 2020 was of particular importance in the consideration of easing behavioural and social interventions **[PV2/185 - INQ000061546]**. This meeting considered a number of papers, including one prepared by SPI-M in which modelling of various scenarios had been conducted to answer a commission from the Cabinet Office **[PV2/19 – INQ000236965]** As can be seen from the minutes and the graphics they contain, SPI-M had modelled the interaction of various easing measures – increased school opening, increased return to the workplace, increase in leisure contacts – against assumptions of how effective contact tracing would prove to be. It was stressed in the minutes that the results were *"illustrative rather than fully quantitative"* [§13]. The importance of having a very effective contact tracing and isolation system in place was emphasised.

315. While that work was specifically directed to considering the effect of easing NPIs, a much wider range of SAGE's work was relevant to the exit strategy, be it in the short-term (such as the situation updates given at each meeting) or the longer-term (work done on vaccines and therapeutics). All that was learned about the virus and its effects in this period was relevant in one way or another to when lockdown would end and what would follow. An example comes from the SAGE discussion on 5 May 2020, from which it was recorded that: *"The overall epidemic can be considered as three separate, but interacting epidemics: in the community; in hospitals; and in care homes."* As incidence of infection declined in the community with lockdown, hospitals and care homes accounted for an increasing

proportion of the overall number of cases. Those settings could then drive transmissions elsewhere. As a result, SAGE advised that reducing transmission in hospitals and care homes *"will become a prerequisite to any larger changes in NPIs"* **[PV2/191 - INQ000061541, §§7-11]**.

316. From the discussions at SAGE, several central themes emerged about easing the NPIs that were then in place. First, SAGE advised that, *"when measures do start to be released, the lowest-risk changes should be considered first"*, and that the impact of any changes would need to be closely monitored (hence the importance of testing and data): see SAGE 26 (14 April 2020) **[PV2/181 - INQ000061534, §4, §§26-29]**. Second, it was important for prevalence of the virus to be relatively low when the easing commenced, so as to allow for "headroom" and to avoid the test, track and isolate arrangements from being overwhelmed again: see SAGE 38 (21 May 2020) **[PV2/185 - INQ000061546, §3, §§26-31]**. Third, SAGE's clear advice was that *"the timing of any changes to measures should be made based on incidence levels and other relevant data and not on a set predetermined date"*: SAGE 33 (5 May 2020) **[PV2/191 - INQ000061541, §18]**. Setting the tolerable level of incidence and prevalence which allowed for a change in measures was, and was stated to be, a decision for policy-makers [§19]. Fourth, despite the improving position in respect of data availability and analysis (in particular the formation of the Joint Biosecurity Centre which SAGE had pushed for), there was still a wide degree of uncertainty in modelling the effects of easing individual NPIs (see, for example SAGE 38 (21 May 2020), **[PV2/185 - INQ000061546, §19]**). Fifth, it would be critically important to monitor the performance of the UK's test, track and isolate initiative, which formed a central part of the post-lockdown strategy: SAGE 38 (21 May 2020), [§§13-14]. SAGE suggested objectives and targets for good performance of test trace and isolate.

317. During this period, the CMO and I produced a paper on 5 April 2020 outlining the possible next phases of the pandemic and what might be required. This was based on SAGE advice and input from a brainstorming session with a group of scientists. The paper was shared with Cabinet Office, No10 and others to give some overview of areas for consideration **[PV2/192 – INQ000148847 PV2/193 – INQ000230984 PV2/194 – INQ000228985** One of its central conclusions was **[PV2/192 - INQ000148847 §23]**:

> "For the next six months period variations on social distancing, possibly enhanced by track and trace, alongside shielding the most vulnerable provide the most realistic routes to controlling the effects of this epidemic. In the longer run (assume >12 months) vaccines or drugs may provide a technological exit

strategy, but they will take time and should not be relied on as the easy way out. It is a policy choice whether to run R as low as it can be achieved, implying very long-term suppression of the epidemic or running R as near to 1 as it can be managed within the boundaries the NHS can cope with. The latter would imply an ongoing significant direct COVID-19 mortality but potentially with less social damage and indirect mortality, and quicker although still lengthy exit from the epidemic as population immunity accumulates (assuming it does)."

318. The paper also noted the importance to any strategy of the operational deployment of quick and accurate testing at scale, and data systems capable of monitoring the epidemic with regional granularity [§25].

319. In respect of testing, I am asked what advice I gave about the setting of a target of 100,000 tests per day. As I have set out above, SAGE and I both advised that much more testing was necessary, but the decisions on setting a specific daily target and the level of that target were political decisions. We stressed that testing needed to be linked to contact tracing and isolation of infected individuals, and that for many the absence of sick pay or other support would make isolation challenging.

320. I am asked what effect the Prime Minister's illness with Covid-19 had on the ability of the UK Government to respond effectively to the pandemic. As I say elsewhere in this statement, I became concerned that the Prime Minister was not physically able to do his job as his illness progressed. Lockdown was in place and so decisions lacked some of the urgency that had been required in mid-March. The Prime Minister's illness did not cause any change in the science advice or the structures by which that advice was delivered. Mr Raab took over the chairing of COBR (M) and the Cabinet and, from my perspective, introduced a more disciplined and structured way of working for the period in which he was in this role.

321. On 16 April 2020, Mr Raab announced five conditions to be met before lockdown could be eased. These were, in summary: first, that the NHS must be protected so that it was not overwhelmed; second, a sustained and consistent fall in daily death rates; third, the need for reliable data showing that the rate of infection is decreasing to manageable levels; fourth, meeting the operational challenges involved, including in respect of testing capacity; fifth, that the adjustments did not cause a second peak later that would overwhelm the NHS. Neither I, nor SAGE, was asked specifically to comment on these conditions, but

they plainly reflected some of the issues that SAGE had discussed and on which CMO and I had offered advice.

322. The five conditions were referred to in a televised speech given by the Prime Minister on 10 May 2020 in which he set out the *"first sketch of a road map for reopening society"* **[PV2/195 – INQ000053269** The Prime Minister set out three phases to easing lockdown restrictions. The first encouraged those who could not work from home to go to work and allowed the general public to take unlimited amounts of outdoor exercise. This was to be introduced in the coming week. The second phase, beginning at the earliest by 1 June, involved the phased reopening of shops and primary schools. The third phase, starting at earliest by July, was to re-open at least some of the hospitality industry and other public places. The Prime Minister stressed that the decision to take these steps, and the timing of them, would be subject to the five conditions he and Mr Raab had set out and to further science advice. My consistent advice was "data not dates" as the way to determine when to make changes.

323. Some of the measures outlined in the Prime Minister's speech had been considered by SAGE, and modelled by four groups (based at the University of Bristol, Imperial College, LSHTM and the University of Warwick). As the Prime Minister's "three phases" had not been finalised at the time when this work needed to be done, the modellers instead considered different scenarios based on percentage increases in work contacts and leisure contacts brought about by the easing of measures, and the number of children that would be in school **[PV2/196 – INQ000213253**. The minutes of SAGE 33 (5 May 2020) set out the position **[PV2/191 - INQ000061541]**. This was that the measures involving a 20% increase in work contacts and no other changes would have a modest impact on R and would be unlikely to push it above 1 (high confidence expressed in this advice). Measures involving a 30% overall increase in work contacts, a 10% increase in leisure contacts, and the return of transition years to school were also considered unlikely to push R above 1 as long as there was an effective test and trace programme in place (moderate confidence). However, wider easing of NPIs (referred to as Phase 4 in the minutes) *"is highly likely to push R above 1 (high confidence)"* [§§22-23]. SAGE also advised, as set out above, that the timing of any changes to the measures should be based on data and not a pre-determined timetable; its advice was that measures should be eased when the level of incidence was low; but that it was recognised that these were decisions for policy-makers [§§18-19]. SAGE stressed the importance of effective testing, contact tracing and isolation procedures. The expression of advice in terms of work and leisure contacts is an example of science advice that could inform a variety of policy options to achieve reductions.

324. The CMO and I attended the Cabinet on 10 May 2020 to present the SAGE consensus view and its uncertainties. There, we reiterated that the view was that Phase 3 of the proposed roadmap (re-opening some hospitality and other public places) was not possible without pushing R above 1 **[PV2/197 - INQ000062194]**. As I recorded in a file note that day: *"Chris and I have both been very clear that we think the timeline in the document is too fast. I said I thought it very unlikely that phase 3 measures could be released without significant risk and unlikely within the timelines give[n]"* **[PV2/198 - INQ000062188]**.

325. In broad terms, our advice at that time – and later – was that if the aim was to avoid another large wave of infections the behavioural and social interventions comprising lockdown should be eased slowly and that their effect should be measured before further easing took place. We advised that the government should be prepared to change its proposed plan if the data caused concern. We also said that while R was important, it was also important to consider the overall prevalence of the virus at the time when changing measures were proposed. The timing and scale of easing was a matter for politicians to determine.

326. I am asked if it was *"right to ease the first lockdown at the start of July 2020"*, and whether I agreed with how and when lockdown restrictions were eased. These were not my decisions to make, nor should they have been. My role was to provide the science advice discussed above. The risk was clear that R would likely rise to above 1.

327. During the period April-June several academics began to propose letting infections run through either all or parts of the population to achieve immunity. See for example the article by Richard Horton in the Lancet in June 2020 **[PV2/199 – INQ000229346]** or the email sent to me by Professor Sir David King on 20 April 2020 in which he supported an analysis put forward by Professor Anthony Brookes that suggested that the country was approaching herd immunity such that there could be *"an early lifting of lockdown with little or no risk of a second peak"* **[PV2/200 – INQ000229043]**

328. In respect of the July measures (Phase 3), SAGE met on 23 June 2020 (SAGE 43) and endorsed papers prepared by SPI-M and SPI-B in response to a Cabinet Office commission on potential changes to measures **[PV2/201 – INQ000197187]**; **PV2/202 - INQ000074930]**. The SAGE minutes recorded the following **[PV2/203 - INQ000061551]**:

> "9. Releasing a significant number of measures in combination presents a material risk of accelerating transmission and the impacts will need to be

carefully monitored. An increase in local outbreaks is highly likely. Modelling indicates that, in the absence of enhanced levels of immunity provided by vaccination, contact tracing and COVID-secure measures are unlikely to be sufficiently effective to allow a return to 'pre-COVID' normality without increasing infections rates.

10. As previously advised measures should be considered in combination, and cannot meaningfully be assessed individually. There will be trade-offs to be made when considering what measures need to be retained or reintroduced, and equity will be an important consideration in making these tradeoffs given the varying impacts on different sections of society.

11. It will take some time (one month or more) for the impact of changes to measures on transmission to become apparent, due to both the lag in people's response, and the lag in measurement of key indicators such as hospital admissions. Some people's responses will also occur ahead of changes being introduced, and the overall effect is one of gradual change in levels of contact (this is true both when imposing and releasing measures).

12. Reintroduction of measures will need to be considered at a local level in response to outbreaks. Data from contact tracing and outbreak investigations will be essential in informing any decisions."

329. The CMO and I attended a meeting later that day of the Cabinet committee COVID-S, and I produced a note of this shortly afterwards **[PV2/204 - INQ000062348]**. As can be seen from that note, ministers were keen on a package of measures to ease the restrictions then in place, with different ministers keen to add to it. I described the Prime Minister as *"pushing hard to do more and 'get things going again'"*. The CMO and I advised the following:

> "- Every extra bit added is carrying risk and ministers pushing too hard on their own areas.
> - *"this is high risk and you are treading the line between high risk and being foolhardy"* – CMO
> - The combination of opening many things and encouraging travel could turn local outbreaks into a national change
> - Need to know what you would shut again first
> - Room for fully opening schools is being eroded"

330. We were pressed by Mr Cummings to give a percentage of the risk that R would increase above 1. We both thought that the risk would be less than 50% of a rise above 1 in a significant way nationally, but only if the relaxation was *"done very well"* and that measures to make places "Covid secure" were properly managed and enforced. I also said that there would be a need to measure the effects continuously, and to act quickly if things were going in the wrong direction.

Lessons from the first lockdown

331. I am asked what lessons I learned from the first lockdown. As I have already mentioned, the principal lesson was that in a pandemic, behavioural and social interventions had to be introduced "earlier than you would like, harder than you would like, and broader than you would like". These issues of speed, depth and breadth of coverage are important principles for this type of infection. A second lesson was that the policy and operational response needs to be faster than the doubling time of the pandemic. It was also clear that testing, contact tracing (including so-called backward contact tracing to identify the source of any infection) and case isolation needed to operate at scale and to be very efficient **[PV2/205 – INQ000194035 PV2/206 - INQ000061540]**, and that it would be most effective when prevalence was lower. Finally it was very clear that the question of the impact of transmission in children and the consequences of school closures were of major importance for future waves.

332. I am asked whether I advised the UK Government that people had not received the treatment that they needed or deserved during this period and that this had resulted in deaths. This was a matter for the CMO and the NHS and not for me to advise upon. However it can be seen in retrospect that the mortality rates from Covid were higher when the system was stretched and we know that reduced capacity to treat other conditions because of the load of Covid cases has also had an adverse impact **[PV2/207 - INQ000074959]**. As I describe elsewhere in this statement, it was also clear that lockdowns had detrimental consequences to health.

Advice on specific measures

Linked households or "support bubbles"

333. SAGE provided advice on linked households (or "support bubbles"), including by reference to modelling. This was considered in particular at SAGE 33 (5 May 2020) **[PV2/191 -**

INQ000061541, §27], SAGE 34 (7 May 2020) **[PV2/208 - INQ000061542, §§28-34]** and SAGE 36 (14 May 2020) **[PV2/186 - INQ000061544, §§1, 12-25]**. The summary of SAGE's consensus view was expressed in the following terms at SAGE 36 [§1]: *"SAGE advised that social bubbles have the potential to create significant unwanted effects and advised against their introduction in the short term, when other distancing measures have only just been lifted, or in conjunction with release of other measures."* The same minutes referred to SAGE advising *"strong caution concerning the introduction of social bubbling"* and noted that *"SAGE has advised previously against making too many changes at once"* [§12]. It was for the politicians to decide on what action to take, having considered this advice.

Gatherings and the 2 metre rule

334. A restriction was created in July 2020 limiting the number of people who could lawfully gather together to 30. Our advice on this – and other measures – was simple. The spread of the virus occurred when people met in close proximity, particularly when from different groups and different households, and when meeting indoors in enclosed spaces. The modelling described above outlined risks in terms of the numbers of contacts and the links created between disparate groups. The more that was done to limit that social mixing, the less likely the virus was to spread, and vice versa. It was not possible to model accurately the effect of measures such as restricting social gatherings to 30, as opposed to some other number. The advice was that the bigger the groups allowed, the greater the risk. The decision to set the restriction of group size to 30 was a policy decision made by others.

335. A further easing of social distancing took place when the advice changed from leaving 2 metres space in public places to "1 metre plus" (i.e., members of the public could be 1 metre away from each other as long as other measures were in place to limit the transmission of the virus). The 2 metre distance was the result of careful analysis by SAGE of respiratory droplet spread over distance **[PV2/209 - INQ000192100]** The announcement that the government was reviewing and amending its guidance on this aspect of social distancing was published on 26 June 2020,[34] the measure having been announced in the House of Commons on 23 June by the Prime Minister. In the same speech, the Prime Minister announced that two households would be able to meet in any setting from 4 July 2020.[35]

[34] See **[PV2/210 - INQ000086727]**
[35] See **[PV2/211 - INQ000086725]**

336. The published guidance on "1 metre plus" cited a paper produced by the Environmental Modelling Group on environmental transmission of SARS-CoV-2 and mitigating measures **[PV2/212 –INQ000189684**. This was considered and endorsed by SAGE 40 (4 June 2020), which provided the following consensus statement in the minutes **[PV2/213 - INQ000061548, §§32-35]**:

> "32. Risk of transmission varies in a continuous non-linear way with distance of separation and with duration of contact. Physical distancing is an important mitigation measure.
>
> 33. SAGE continues to advise at least 2m separation where possible, given the significant reduction in risk compared to shorter distances. Current evidence suggests that 1m separation carries 2 to 10 times the risk of 2m separation, though there remains significant uncertainty.
>
> 34. Given the continuum in risk, 2m separation should not be treated as an absolute rule, with greater distances presenting lower risk, and shorter distances presenting higher risk.
>
> 35. Other mitigations can reduce risk and should particularly be considered where it is necessary for people to be closer than 2m for a prolonged period, or where someone has multiple, frequent interactions with others at a shorter distance. Selection of measures should be tailored to the environment and activities."

337. A later paper prepared by the Transmission of SARS-CoV-2 in the Wider Environment Sub-Group for SAGE 42 (18 June 2020) endorsed the findings of the Environmental Modelling Group, commenting that **[PV2/214 - INQ000074929]**: *"The highest risk of outdoor transmission is through aerosols and droplets when people are in prolonged close, face-to-face contact within 2m. This is likely to be lower than indoor settings but remains a risk especially in crowded areas, e.g.at major sporting events, festivals and public gatherings."*. SAGE was considering both droplet and aerosol spread.

338. The advice I gave to the UK government on this topic was based on the work done by the Environmental Modelling Group and the consensus view agreed by SAGE. It is clear from the guidance published on 26 June, that the science advice was not the only input considered by the policy-makers: the guidance refers to economic and social analysis that

was carried out, international comparisons and a sectoral analysis. I remember from discussions at that time that the economic arguments for reducing the guidance on social distancing were advanced forcefully and presumably were a powerful influence on the decision that was made. As the 26 June document records: *"There are severe economic costs to maintaining 2m distancing"* **[PV2/210 – INQ000086727]**

Mode of transmission

339. I am asked whether there was an over-emphasis on Covid-19 transmission via fomites over aerosols or droplets in the early months of the pandemic. I don't think there was. From the outset we determined three possible routes of transmission – fomite/touch, droplet and aerosol and we did not know what the relative contribution of each route was. The three routes of transmission are described clearly in early papers from the Environmental Modelling Group. We thought most transmission was likely to be respiratory droplets, some fomite with less aerosol spread at the beginning (aerosol spread viruses like measles and chickenpox tend to have very high R_0 values of 10-18). Much later in the pandemic data emerged that showed that aerosol transmission could be a more significant component of spread (particularly indoors) and there were some spreading events globally that helped identify that, but it is not known whether the virus itself also changed in terms of its transmission patterns over time. Indeed Covid R_0 increased so that Delta and Omicron variants would have been more consistent with aerosol spread. One eminent Professor of Respiratory Medicine emailed me frequently to say he thought there was virtually no droplet or aerosol transmission and that it was all fomite or gastrointestinal spread. He later reversed this position to say that the later variants became aerosol transmitted in part. The Environmental Modelling sub-group of SAGE was clear from the beginning that all three routes were likely and that is why they did work on both distance measures and ventilation as well as face masks. I also commissioned work from the Royal Academy of Engineering on ventilation and infection spread in buildings. Further evidence on what was known, and when, about the transmission of the virus – and in particular the work of the Environmental Modelling Group – is set out in Dr Wainwright's second statement at §§2.18-2.23 and at Annex B **[PV2/4 – INQ000252450 PV2/215 – INQ000298958]**

Local lockdowns

340. I am asked how effective local restrictions were, including local lockdowns, following the end of the first national lockdown in June/July 2020. I am also asked what advice I gave on such lockdowns. I do not think the local lockdowns worked well. I suspect that this is in

part because of the high population density in the UK that meant that people who were (in theory) locked down in their own area, or were facing restrictions on certain social or business activities, found themselves in close proximity to areas that were not subject to such restrictions and spread between the areas was relatively easy. The other problem is that lower prevalence areas were usually just at an earlier stage of an exponential curve and would quickly "catch up". The tiering system that was introduced illustrates the problem. Areas that were in lower tier restrictions rapidly increased in prevalence to reach levels seen in higher tiers. MPs who campaigned to keep their constituencies in a lower tier quickly saw infection rates rise. Local lockdowns coupled with better use of effective testing, contact tracing and isolation (TTI) in lower prevalence areas that were not locked down might have worked. Increased TTI should be deployed more in low prevalence areas and is progressively less effective as prevalence increases. The advice I gave was go earlier, harder and geographically broader with lockdowns. The second piece of advice was to target TTI to lower prevalence areas rather than high prevalence areas where it would become overwhelmed quickly. The third was that rapidly identifying outbreaks and clusters of cases was important and that this should include backward contact tracing.

Schools

341. I am asked what advice I gave in respect of the re-opening of schools in June and August 2020. As I have said earlier in this statement, there was no more difficult issue during the pandemic than the question of school closures, given the uncertain effect this would have in reducing transmission and the obvious, unequal and potentially long-term detriments it would have on children and their parents.

342. The effect of re-opening schools was one of the measures modelled in SAGE when giving advice on easing lockdown in May 2020. SAGE also emphasised the importance of very careful monitoring and evaluation of the effects of re-opening: see in particular SAGE 38 (21 May 2020) **[PV2/185 - INQ000061546, §18]**. In the SAGE meeting on 23 June (SAGE 43), discussed above, in which the July easing measures were considered, the following advice was given **[PV2/203 - INQ000061551, §16]**:

> "There may be a need to change measures at the end of the summer in order to be able to keep R below 1 whilst proceeding with the planned reopening of schools. Planning for safe full reopening should take place now and should take account of the health benefits of reopening schools as well as the educational benefits."

343. On 9 July, SAGE 46 considered and endorsed a paper prepared by the Children's Task and Finish sub-group entitled "Risks associated with the reopening of education settings in September" **[PV2/216 - INQ000074935]**. The sub-group had been established to try to understand as fully as possible the effects of school closures and re-openings and had comprised experts in children's health as well as modellers. In preparing this paper it drew upon input from participants of NERVTAG, EMG, SPI-M and SPI-B. Having discussed the paper, the SAGE minutes recorded the following **[PV2/217 - INQ000061554, §§20-27]**:

> "21. SAGE agreed that there was a low risk to children's health from COVID-19 but significant harms from schools being closed, and that it was therefore strongly in the interests of children for schools to be open.
>
> 22. Decisions on opening schools in the autumn also need to consider the health of adults, including teachers and the wider community.
>
> 23. Emerging evidence suggests that outbreaks in schools are extensions of community outbreaks and comprise small numbers, rather than indicating that schools are high-risk settings. Spread from children to adults appears to be low.
>
> 24. Applying and releasing measures in a way which can be explained to the public logically helps to maintain support and adherence. Given the health and educational benefits of opening schools – and the health and other risks of not doing so – there is strong case for prioritising opening schools over other establishments. Clarity of messaging will be important to building the trust of parents and teachers.
>
> 25. It is important to ensure that there will be enough 'room' in terms of the epidemic to open schools in September.
>
> 26. The surveillance study in schools is underway and will need to be expanded (and modified) by September.
>
> 27. Education policies should consider impacts on and challenges associated with public transport."

344. The reference at paragraph 25 to having enough "room" in terms of the epidemic to open schools in September reflected the advice given at SAGE 43 on 23 June. Opening schools would lead to more contacts between households, which would likely lead to more infections. If this was to be accommodated while keeping R below 1, it followed that other NPIs may have to be retained or reintroduced. This advice applied across all proposed measures and it was for the politicians to decide which they wished to prioritise.

345. Other issues surrounding school closures were discussed on numerous occasions in SAGE and its sub-groups, as is set out in Annex E of Dr Wainwright's second statement **[PV2/215 – INQ000298958]**

Eat Out to Help Out

346. I am asked what advice I gave to core decision-makers about the Eat Out to Help Out scheme that was implemented in August 2020. Neither I nor SAGE were formally asked to give advice on this scheme prior to its implementation. The phrase does not appear in any of the SAGE minutes. It would have been obvious from the previous advice that we had given that any measure that increased social contacts between different household groups, particularly in enclosed indoor spaces, would increase the risk of increasing the rate of infections. I was asked by the House of Commons Science and Technology Select Committee on 16 July 2020 about the economic effects of social distancing, and explained that it was not for SAGE to advise on economic impact. I reiterated that much of the advice we gave was underpinned by a relatively straightforward principle: the more contacts people have at close range, the more likely the virus is to spread **[PV2/218 - INQ000064522, Q1104]**.

347. I cannot now recall any specific occasions on which was directly asked for advice on the policy but I am confident that, to the extent that I was asked for my view after the policy had been announced, I would have given advice along those lines to the core decision-makers involved and these principles were also discussed at the Cabinet meeting referred to above.

348. I am asked if I supported the introduction of the Eat Out to Help Out scheme. It was not for me to support or oppose it – that was a matter for decision-makers. My role was to give science advice. I have no doubt that the decision-makers would have understood from the general advice that I and others had given before the introduction of the scheme that it would increase viral transmission and potentially quite substantially. I have been asked

whether the scheme was consistent with suppressing the number of Covid-19 infections to prevent a large wave. It was not. I am also asked whether, on reflection, I consider it to have been an appropriate policy to follow. Again, that is a matter for the politicians and decision-makers, who had to weigh competing factors. From the perspective of science advice, it was clear that this scheme would increase viral transmission at a time when a number of other NPIs had also been lifted.

349. I am asked of the extent to which I became aware of concerns the Eat Out to Help Out scheme was contributing to rising rates of Covid-19 infections. It was clear that the scheme would, inevitably, increase those rates and we were able to see that happen in the ONS community survey data. The scheme had the effect of bringing people together from different groups (not just the same household, and not just work colleagues) for a prolonged period of social contact in a relatively small space, often in an indoor environment. This combination of factors created a high risk of viral transmission. These principles were clear and had been discussed with ministers and at Cabinet. SAGE did not and could not measure the specific effect of the scheme at a time when other NPIs were released, but it was aware of increased infection in the August and September period, which I discuss in further detail below. The Eat Out to Help Out scheme was one of the measures that contributed to that and it was entirely predictable that it would.

CHRONOLOGY: THE PERIOD LEADING TO AND INCLUDING THE SECOND LOCKDOWN (SEPTEMBER 2020 TO DECEMBER 2020)

The Work of SAGE: September to December 2020

350. SAGE met 18 times between 1 September 2020 (SAGE 54) and 3 December 2020 (SAGE 71). Again, it is unlikely to assist the Inquiry to go through those meetings in detail, but among the topics that were considered were:

a. Tiers
b. Circuit breakers
c. Transmission (routes, settings and in different groups, including children)
d. Higher and further education
e. Ethnicity
f. Care homes
g. Segmentation
h. Celebrations and observances
i. Isolation and testing

j. Immunity and reinfection

351. There were, of course, many other meetings of SAGE sub-groups and other relevant science advisory groups in this period.

The "Rule of 6" and the "Circuit Breaker": July to September 2020

352. SAGE continued to monitor R, prevalence and growth rate estimates, and expressed increasing concern about them in late summer and early autumn. At SAGE 49 on 30 July SAGE considered that R was likely to be above 1 in England, taking into account the lag time involved in the data which it was working **[PV2/219 - INQ000061557, §7]**. At SAGE 52 (20 August 2020), R for the UK was considered to be 0.9 to 1.1, with the daily growth rate estimated as between -3% and +1%; those figures were noted to be based on lagged data **[PV2/220 - INQ000061560, §§8-9]**. The summary warned that, based on all available data, *"it is likely that incidence may be increasing slowly, meaning R may be above 1 in England and across the UK"* [§2]. On 10 September 2020, SAGE 56 recorded the following summary in the minutes **[PV2/221 - INQ000061564, §6 and §8]**:

> "[6] The current situation in the UK is analogous to the one in early February, with rapidly increasing incidence which is concentrated amongst those with most contacts, most notably younger people. There are already indications of increases in hospital admissions in at least some regions.
>
> [7] It is almost certain that increases in infections will lead to increases in hospitalisations and deaths as observed recently in other European countries (high confidence).
>
> [8] The latest estimate of R for the UK is 1.0 to 1.2, while the daily growth rate estimate is -1% to +3%. The latest estimate of R for England is also 1.0 to 1.2, while the daily growth rate estimate is +1% to +4%. As previously noted, these estimates do not fully reflect recent changes such as the reopening of schools in England and SAGE expects growth rate and R to increase (moderate confidence)."

353. SAGE noted that the UK situation was similar to that elsewhere in Europe, where increases were also related to easing NPIs. Different countries had followed different trajectories and

SAGE's consensus view was that *"An earlier and more comprehensive response means that measures have more effect and may be needed for a shorter duration."* [§12]

354. Shortly after this meeting, on 14 September 2020, The "Rule of 6" came into force meaning that any social gathering of more than six people would be against the law unless it fell within a limited number of exceptions.[36] This was a restrictive measure, given that the previous limit had been 30. SAGE gave no specific advice on this rule and it is unlikely that it would have been possible to model the effect of a Rule of 6 rather than a Rule of 8 or some other number. Policy-makers would have been aware both of the general advice – that the virus increased with increased contacts – and the concerns set out above on the general level of R and growth rates in this period.

355. I did not think that the Rule of 6 alone would be sufficient to reduce R below 1. I am confident I expressed this view to the Prime Minister, but it would in any event have been evident three days later from the minutes of the next SAGE meeting (SAGE 57), which I discuss below. A later SAGE meeting, SAGE 62 on 15 October 2020, considered a CoMix social contact study that found that the Rule of 6 and encouraging people to work from home had *"led to the average person reducing contacts, however the magnitudes of these reductions are likely to be small"* **[PV2/125 - INQ000061570, §15]**.

356. SAGE 57 met on 17 September 2020 and the minutes began with the following summary **[PV2/223 - INQ000061565, §1-3]**:

> "1. Incidence across the UK continues to increase rapidly, and data now show clear increases in hospital and ICU admissions. Medium-term projections indicate a rapid increase in hospital admissions in the coming weeks, and in a scenario where there were no interventions, this would have the potential to overwhelm the NHS.
>
> 2. The latest estimate of R for the UK is 1.1 to 1.4. Non-pharmaceutical interventions (NPIs) on local and national scale are needed to bring R back below 1. Individual NPIs are highly unlikely to achieve this, and a package of measures will be needed. In choosing options it is important to recognise that NPIs will likely need to be in place for a significant length of time.

[36] See **[PV2/222 – INQ000212110**

3. A 'circuit-breaker' type of approach, where more stringent restrictions are put in place for a shorter period could have a significant impact on transmission. Modelling indicates that a 2-week period of restrictions similar to those in force in late May could delay the epidemic by approximately 4 weeks."

357. The situation update included further details, based on the latest SPI-M consensus statement **[PV2/224 – INQ000231033]**. This included an estimate that the doubling time for new infections was 10 to 20 days, but could be as short as 7 days nationally and even lower in some areas [§10]. Increases in hospital admissions were being seen with a doubling time of around 7 to 9 days. Medium-term projections indicated a rapid increase in hospital admissions in the coming weeks and, in a scenario in which no interventions were made, there would be the potential to overwhelm the NHS. [§§8-14]

358. Neither I nor SAGE considered that a single circuit-breaker period of more restrictive interventions would, on its own, avoid a serious second wave of Covid-19. Its purpose, as described in the minutes, was to buy some time (estimated to be around four weeks) to *"allow some of the harms to be mitigated … [and] reduce the risk of needing to make similar interventions with less notice (and less opportunity to mitigate harms) at a later point"* **[PV2/223 - INQ000061565, §21]**. It was also understood that it would lower prevalence so that testing, contact tracing and isolation measures could have a bigger impact. If it remained the government's policy to keep R below 1 and avoid exponential growth of the virus that would threaten to overwhelm the NHS there were two broad ways of achieving this. One was to introduce a circuit breaker at an earlier stage, followed by more long-lasting NPIs and/or other circuit breakers, all coupled with an effective test trace and isolate system. The country could be informed, in advance, of when these measures were going to be introduced, so as to allow for planning. The other was to wait and introduce a wider and longer package of NPIs at a later stage when prevalence was higher (up to and including a second national lockdown). SAGE was inviting consideration of the first of these options by the policy-makers.

359. SAGE 58 on 21 September 2020 returned to this advice, repeating it with more urgency **[PV2/225 - INQ000061566; PV2/226 - INQ000075003; PV2/227 – INQ000231035]**

"1. COVID-19 incidence is increasing across the country in all age groups. The effect of opening of schools, colleges and universities has only just begun to affect this increase. Even so, the latest data suggest that the doubling time for new infections could currently be as short as 7 days nationally. COVID-19

related hospitalisations and intensive care bed usage have started to rise. SPI-M has modelled the potential increases.

2. A package of interventions will need to be adopted to reverse this exponential rise in cases. Single interventions by themselves are unlikely to be able to bring R below 1 (high confidence). The shortlist of non-pharmaceutical interventions (NPIs) that should be considered for immediate introduction
includes:

- a circuit-breaker (short period of lockdown) to return incidence to low levels
- advice to work from home for all those that can
- banning all contact within the home with members of other households (except members of a support bubble)
- closure of all bars, restaurants, cafes, indoor gyms, and personal services (for example hairdressers)
- all university and college teaching to be online unless face-to-face teaching is absolutely essential."

360. The meeting noted that all of these interventions would have costs in terms of health and wellbeing, and many would affect the poorest members of society to a greater extent **[PV2/225 - INQ000061566, §5]**. The clear advice was given that: *"The more rapidly interventions are put in place, and the more stringent they are, the faster the reduction in incidence and prevalence, and the greater the reduction in COVID-related deaths (high confidence)"* [§6]. The meeting endorsed a paper on the effectiveness and harms of NPIs **[PV2/226 - INQ000075003]**.

361. On the same day, 21 September, the CMO and I appeared at a press conference at No.10 Downing Street. I believe that this was the only such conference we did without the Prime Minister or another minister being present. We were asked to do the conference by the No.10 communications team. We were not given a clear reason why we would be on our own, without ministers. All involved in the conference understood what its purpose would be: the CMO and I would set out the position about the growth of the rates of infection, hospitalisations and fatalities, and the risk of exponential growth in the weeks and months to come unless further behavioural and social interventions were implemented. We were being asked to lay the ground for measures that would follow **[PV2/228 – INQ000229596**

362. At the press conference I discussed the rise in cases in Europe and in the UK and the way in which cases were rising in difference age groups **[PV2/229 –** INQ000231002 I explained why we were confident that the case numbers were not simply a consequence of increased testing. I went on to talk about the doubling time, which at that point was estimated to be every seven days. I then said:

> "If, and that's quite a big if, but if that continues unabated and this grows, doubling every seven days, then what you see of course, let's say that there were 5,000 today, it would be 10,000 next week, 20,000 the week after, 40,000 the week after. And you can see that by mid-October if that continued, you would end up with something like 50,000 cases in the middle of October per day. 50,000 cases per day would be expected to lead a month later, so the middle of November say, to 200 plus deaths per day. So this graph, which is not a prediction, is simply showing you how quickly this can move if the doubling time stays at seven days. And of course the challenge therefore is to make sure the doubling time does not stay at seven days. There're already things in place which are expected to slow that. And to make sure that we do not enter into this exponential growth and end up with the problems that you would predict as a result of that. That requires speed, it requires action and it requires enough in order to be able to bring that down. One final word on this section. So as we see it, cases are increasing, hospitalisations are following. Deaths unfortunately will follow that, and there is the potential for this to move very fast."

363. I then went on to discuss immunity before the CMO introduced various slides showing differences in transmission rates across the UK, and data about hospitalisation rates. He reiterated the message about the dangers of exponential growth and discussed the challenges that winter would pose. He explained that there was no evidence to suggest that SARS-CoV-2 had mutated to become milder and discussed the risk of secondary deaths being caused by the NHS being overwhelmed by Covid-19. He also stressed the need for collective action as decisions by individuals to increase their risk inevitably increased the risk to society as a whole. The CMO also acknowledged the trade-offs that taking steps to reduce Covid-19 prevalence would involve:

> "[W]e also know that some of the things we've had to do are going to cause significant problems in the economy, big social impacts, impacts on mental health, and therefore ministers making decisions, and all of society, have to walk this very difficult balance. If we do too little, this virus will go out of control

and we will get significant numbers of increased direct and indirect deaths, but if we go too far the other way, then we can cause damage to the economy which can feed through to unemployment, to poverty and to deprivation, all of which have long-term health effects. So we need always to keep these two sides in mind."

364. At the end of the press conference I spoke about the progress that was being made on vaccines and the good position the UK had put itself in in terms of potential vaccine supply. The CMO and I did not take questions. We had decided this in advance, as we considered that the questions would, inevitably raise issues of policy and decision-making that were not for us to answer. The text of the press conference, and the slides and datasets, were published on the government's website.[37]

365. The CMO and I were subsequently criticised for using figures and a slide that was based on a scenario of reported cases doubling each week. I explained at the press conference that this was the assumption that I was using for illustrative purposes: *"If, and that's quite a big if, but if that continues unabated…"* The relevant slide made the same point in its title, "*If* doubling occurred every seven days what would it look like" (emphasis in the original). I also said that the challenge in light of this risk was to *"make sure the doubling time does not stay at seven days."* The press conference was intended to raise public awareness of the risk of exponential growth of the virus if measures were not taken, and thus to prepare the country for the need to take those measures. It was not intended to be a prediction of what would happen. Indeed, the CMO and I wished to avoid the scenario that would arise if doubling time continued unabated. In the event the figures presented turned out to be an underestimate of what subsequently occurred.

366. In the press conference I spoke of the risk, if the doubling time remained at 7 days, of there being 50,000 new cases daily in the UK by mid-October, and 200 plus deaths per day in mid-November. At SAGE 62 on 15 October 2020 it was estimated that there were between 43,000 and 74,000 new infections per day in England alone **[PV2/125 - INQ000061570, §8]**. On 14 November 459 people died whose death certificates mentioned Covid-19; the seven day average as of that date was 443 such deaths.[38] By the time of the press conference, the number of infections, hospitalisations and deaths was probably already higher than when lockdown was implemented in March 2020.

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[37] See **[PV2/230** INQ000070765 and **[PV2/229** INQ000231002

[38] See **[PV2/176 -** INQ000231048

367. The minutes for SAGE 58, which took place on the same day as the press conference, were published on 12 October 2020. This was ahead of some earlier SAGE meetings (the minutes of SAGE 56 were published on 23 October, and those of SAGE 57 on 30 October).[39] My understanding is that this was a consequence of the fact that the press conference was informed by the data from SAGE 58 and hence there was greater urgency to publish those minutes in line with the guidance of the Office for National Statistics. I was not aware of any deliberate attempt to rush out the SAGE 58 minutes to bolster the case for further behavioural and social interventions, something that I understand has since been suggested. The minutes of SAGE 57 would have been just as helpful for such a purpose and they were published 18 days later.

368. SAGE 59 took place on 24 September **[PV2/232 - INQ000061567]**. R was estimated to be 1.2 to 1.5 in the UK [§1], and SAGE warned that [§15]:

> "[15] As previously, non-pharmaceutical interventions (NPIs) on both a local and national scale are needed to bring R back below 1 (high confidence). Unless recently announced measures reduce R to below 1 soon, it is possible that infection incidence and hospital admissions will over time exceed the Reasonable Worst Case Scenario (RWCS) planning levels. Further measures will be needed to bring R below 1 in the event that current measures do not do so. The earlier additional measures are introduced the more effective they will be.
>
> [16] SAGE previously advised that a 2 week 'circuit-breaker', where more stringent restrictions are put in place for a shorter period, could have additional impact. A shorter break of a week or less is likely to be less effective in reducing the number of infections and slowing the growth of the epidemic.
>
> [17] However, while a single circuit breaker has the potential to keep prevalence much lower than no intervention, it is not a long-term solution. Long-term control of the virus will likely require repeated circuit breaks, or for one to be followed by a longer-term period with measures in place to keep R at or below 1. Longer-term sustained measures will also be essential.

[39] See **[PV2/231 - INQ000283938**

[18] Lower prevalence would provide benefits of lower incidence and therefore less pressure on test and trace systems and the reduced risk of having to apply emergency measures.

[19] Long-term management of the epidemic will require a balance between direct and indirect effects on health caused by COVID-19 and the economic and health disbenefits caused by intervention measures.

369. The advice that I gave to the Prime Minister and core decision-makers about a circuit breaker intervention, and the need for other measures if R were to be kept below 1, was as per the SAGE minutes and the press conference on 21 September. I am asked why the Prime Minister did not decide to impose a circuit breaker. That is something that I cannot answer and the question is better directed to him. I am asked if economic factors would have influenced his decision. I am sure that they would have done and the Chancellor and HM Treasury were opposed to further interventions at this time. I believe he also had significant pressure from backbench MPs not to introduce further measures. The economic arguments were not all one way, though, as high prevalence of the virus itself causes economic damage.

370. I am asked whether I believe that introducing a circuit breaker intervention in mid-September would have avoided a second national lockdown. I do not believe that it would have done, at least on its own. As the SAGE minutes describe, a one-off circuit breaker was not a single silver bullet and it would have to be followed by other measures – further circuit breakers or more extensive NPIs. It might have allowed for a more planned imposition of such interventions. If prevalence of the virus had been suppressed and kept low, repeated circuit breakers could – in theory – have been used in conjunction with a good quality track, trace and isolate system to keep on top of the virus until vaccines became available. However, this would only have been possible if all elements of that system were highly effective and could be maintained until the summer of 2021 (when sufficient vaccination had taken place at population level to allow such measures to be carefully eased). At that time the efficacy of the vaccine was not known.

371. I am asked to what extent the science advice to core decision-makers was more certain in this period. We certainly knew much more about the virus and had much better data flows and data analysis. The ONS survey helped us to understand what was happening in the community. I was much more confident that we knew what was going on with the virus in the country than we had been in January to March 2020. We also had the lessons of the

first peak and first lockdown, and in particular the need to go faster, harder and broader with behavioural and social interventions. We had very well-structured SAGE sub-groups undertaking work at speed,

The meeting on 20 September 2020

372. During the summer and early autumn, it became apparent that the Prime Minister and others were increasingly sceptical about the prospect of re-introducing behavioural and social interventions in the event of a second wave of Covid-19. They expressed interest in the ideas of scientists such as Professor Sunetra Gupta (Professor of Theoretical Epidemiology, Department of Zoology, University of Oxford) and Professor Carl Heneghan (Centre for Evidence-Based Medicine, University of Oxford), who had advocated shielding for vulnerable groups and fewer or no NPIs for the rest of the population, and also in the approach taken by Sweden. The CMO, Mr Cummings and I thought it would be helpful for the Prime Minister to hear directly from these people and others with different views, and so we proposed a meeting, which took place on Sunday 20 September 2020 at No.10 in the early evening. Professors Gupta and Heneghan were invited, as was Dr Anders Tegnell, the chief epidemiologist advising the Swedish government. All three were invited to present short papers at the meeting, addressing the question: *"Should the UK Government intervene and if so how?"* Professor Dame Angela McLean and Professor Edmunds were also asked to do the same. CMO and I attended the meeting together with the Prime Minister, Mr Cummings, the Cabinet Secretary and some others from No.10.

373. Dr Tegnell's paper contained the following answer to the question posed **[PV2/233 – INQ000146608]**

> "The short answer to the question above is in my opinion yes. The myth that Sweden did nothing during the pandemic is false. We have initiated a wide range of activities not least in the area of communication. During the last 20 years the public health community has discussed pandemic preparedness extensively and taken aboard experiences from previous events during this pandemic (SARS, MERS, the swine-flu pandemic etc). I believe there is a strong consensus that with a pandemic a government need to be active even if we know that most of the nonmedical measures have comparatively little effect and the evidence for how and when they work is limited. But even so there is a possibility to make a difference."

374. Dr Tegnell then set out the approach that had been adopted in Sweden, which included: breaking chains of transmission by minimising contacts, with a focus on symptomatic people and areas where important transmissions took place (restaurants, big gatherings, long-term care facilities and areas with vulnerable groups); and increasing resources for and the quality of contact tracing, isolation and quarantine. In his paper, and during the meeting, he helpfully dispelled some of the myths that had grown up around the Swedish response to Covid-19. Professors Gupta and Heneghan both argued that Covid was no worse than influenza and that the population should all become infected, but both suggested more interventions of some sort may be required **[PV2/234 – INQ000146606 PV2/235 – INQ000146607** Professors McLean and Edmunds both spoke to their papers **[PV2/236 – INQ000146609 PV2/237 – INQ000108871** I understand that all of the papers prepared in advance of this meeting are available to the Inquiry. Interestingly none of the speakers argued against the need for some further action. The presentations were variable in terms of detail and specific proposals.

375. Professor McLean's paper set out the existing RWCS planning and compared it to the data available on the current situation in the UK. The paper concluded **[PV2/236 – INQ000146609**

> "HMG has planned against a RWCS in which new infections are stable from the second half of September until the end of October. Observed epidemiology is currently in line with the RWCS, but infections are still rising. Without immediate, decisive action we expect COVID epidemiology to breach the RWCS in the next few days. It will then exceed HMG, T&T and NHS planning assumptions. T&T will not function effectively in a large second wave."

376. Professor Edmunds wrote that: *"to meet HMG's aim of keeping R below 1 a large package of interventions will have to be implemented, not just one or two. If educational institutions are to remain open then a very wide package of other interventions will be essential."* He also argued that it was imperative that action was taken quickly and urged decision-makers to learn from what he saw as the mistake of introducing the first lockdown too late **[PV2/237 – INQ000108871**

377. There was some discussion amongst the scientists and the Prime Minister and Mr Cummings asked some questions. My impression was that the Prime Minister found the various contrary views to have been impractical and that he was not persuaded by the "let it rip" approach that some had advocated.

378. Earlier on the same day a Covid-19 Task Force meeting was held in No.10. An email sent that evening contained a readout of the meetings **[PV2/238 - INQ000062662]**. This was to the effect that the Covid-19 Task Force was to be asked to put together a "lead option" paper that would include a package of relatively mild additional NPIs (*"package A"*), a national curfew from 10pm, and options to tighten or more rigorously enforce existing measures. The email also commented that in communications, the government should send *"a clear signal that a wider circuit breaker may be required if behaviours do not improve."* In the meeting I recall that Mr Cummings had argued based on the science advice that stronger measures were needed immediately or a series of circuit breakers.

Measures introduced in September and October 2020

379. On 24 September, the Prime Minister introduced a 10pm curfew on pubs, cafes and restaurants. The CMO, SAGE and I advised that we could not say in advance what impact this would have (including through modelling) but did not think it would be enough to halt the progression of the infection. As is set out above, SAGE had advised that the government should consider an urgent package of NPIs, including in respect of high-risk settings. I did not expect the curfew to have much effect. On 15 October 2020, it was reported to SAGE 62 that CoMix data indicated that the curfew had not, by then, had any significant effect on reducing the mean number of contacts made by participants in the survey **[PV2/125 - INQ000061570, §16]**.

380. In early October, SAGE continued to report increases in R, infection levels and hospitalisations. At SAGE 60 on 1 October it was stated that *"Unless current NPIs reduce R back below 1 soon, it is likely that infection incidence and hospital admissions will exceed scenario planning levels"* **[PV2/239 - INQ000061568, §1]**. R was estimated to be 1.3 to 1.6 across the UK, with a daily growth rate for new infections of +5% to +9% and a doubling time of 8 to 14 days [§9]. The following meeting, SAGE 61 on 8 October, found that in England the number of infections and hospital admissions was exceeding the RWCS planning levels at that time. The number of deaths was expected to exceed RWCS planning in the next two weeks **[PV2/240 - INQ000061569, §2]**. The consensus statement from SAGE was that: *"As previously, a package of non-pharmaceutical interventions needs to be adopted to reverse the exponential rise in cases (see SAGE 58)"* [§4]. For reference, SPI-M was suggesting that there were 27,000 – 57,000 new infections per day in England on 8 October **[PV2/241 - INQ000231036]** and there were 97 deaths in the UK recorded that

day. This compares with a total of 1,543 known cases and 51 deaths per day on 16 March 2020 in the UK.[40]

381. On 12 October the Prime Minister announced a 3 Tier system of local Covid alert levels. This combined a varied approach to the extent of NPIs depending on whether an area was in the "medium", "high" or "very high" tier, with a degree of localism over the choice of which measures to impose (although there was a nationally set baseline for each tier).[41] The system came into effect on 14 October.

382. SAGE was not consulted on this policy before it was implemented. The CMO and I were informed of it in advance and, after discussing the matter between us, we gave our views by email to the Cabinet Secretary on 9 October. The CMO set out our agreed position. There were two options that we considered had a chance of successfully meeting the strategic goals set by the Prime Minister. These were, first, a package of interventions sufficient to reduce R to 1 or below 1 in areas with rapidly rising transmissions, which would likely have to remain in place for five or six months until the end of the winter. The second was a circuit break (or "firebreak"), of very strong measures for two to four weeks. This was intended to push R below 1, *"resetting the clock on transmission,"* and could mean that fewer NPIs would be required in the longer run. Our concern was that the minimum package of measures for Tier 3 areas would fall between those two stools, being neither strong enough to act as a firebreak, nor prolonged enough to achieve a sustained reduction of R to 1 or below. This was because the minimum package was *"at its core pretty limited"* and was only intended to last for four weeks. I added that while local leaders would have the option of implementing fuller packages for longer – which might have a better chance of success – this begged the question of what would happen if they did not, or if some of them did not. My view was that: *"As it stands with this proposal I think we are likely to see increasing numbers of cases, and therefore hospitals will fill up with all the consequences that we know. I fully recognise the difficult decision that ministers face and it is important that they have seen and understood the implications of the choice made."* **[PV2/243 – INQ000229676]**

383. The CMO and I reiterated that advice by emails on 11 October, in response to a draft paper on the 3 Tier policy that was prepared for a COVID-O meeting that day. We both anticipated that some areas in Tier 2 would progress into Tier 3 in the absence of stronger

[40] See **[PV2/176 - INQ000231048]**
[41] See **[PV2/242 - INQ000137280]**

NPIs, and that Tier 3 was likely to prove insufficient to prevent rapid growth of the virus in affected areas. We also questioned the decision to prevent local authorities reintroducing the 2 metre-plus rule. **[PV2/244 - INQ000062726]**. As was the case throughout the response, this science advice was not exclusively communicated in writing, but also in person to decision-makers as required. The CMO and I reiterated on a number of occasions during this period that Tier 3 would be insufficient to bring R below 1, if that was the policy objective, and I have no doubt that the relevant decision-makers understood our advice.

384. In addition to these points, I was concerned about public understanding of an increasingly complicated set of rules. I thought that there were loopholes, for example in allowing pubs to serve alcohol alongside food in Tier 3 (a point I made in my email of 11 October **[PV2/244 - INQ000062726]**). Then there was the problem of introducing local regimes of NPIs in a densely populated and relatively small country, which I have discussed above. I also understand that once the policy was introduced, MPs and ministers lobbied to have their constituencies given a lower tier. However, the main flaw was that the scheme was ill-conceived for the reasons that the CMO and I had set out to the Cabinet Secretary.

385. The government pressed ahead with the 3 Tier policy, which came into effect from 14 October.[42] I am asked how effective I thought the policy was. SAGE 66 on 5 November 2020 recorded the following in its minutes **[PV2/246 - INQ000061574]**:

> "[13]. There is evidence that the introduction of the local COVID alert levels (tiering) has helped reduce contacts, though the effect is modest. Initial analysis from SPI-M shows a greater effect from tier 3 interventions than from tiers 1 or 2. CoMix data also suggest that moving from tier 2 to tier 3 made the largest impact on reducing the mean number of daily contacts. It is not yet clear whether the enhanced tier 3 measures applied are sufficient to reduce the reproduction number below 1 consistently.
>
> [14] If the tiers applied to localities are primarily based on the number of confirmed cases rather than growth rate, and if the highest tier does not reduce R substantially below 1, this would result in all localities rising to the highest tier and remaining at high prevalence. SAGE noted at its previous meeting that this

[42] See **[PV2/245 – INQ000231005**

would result in prolonged periods of high incidence, and consequently high levels of hospitalisations and deaths."

386. Ultimately, the tiering system did not prevent the need for a second national lockdown and hence proved inadequate to meet the situation that we were facing in mid-October 2020.

The second national lockdown: 5 November to 2 December 2020

387. The SAGE meetings following the introduction of the 3 Tier policy continued to report increased incidence and prevalence of cases across the UK. On 15 October, at SAGE 62, R was estimated to be 1.3 to 1.5 and, as I have mentioned previously, SPI-M was estimating 43,000 to 74,000 new infections per day in England **[PV2/125 - INQ000061570, §§1, 6 and 8]**. On 22 October, at SAGE 63, R was estimated to be 1.2 to 1.4 for the UK, and SPI-M estimated 53,000 to 90,000 new cases per day in England **[PV2/247 - INQ000061571, §§1, 5 and 9]**. There was some limited evidence that the rate of growth in new infections may have slowed, but this was not supported by the more reliable data on hospitalisation and death rates, and SAGE noted that, *"A growth rate that is lower but still positive means the epidemic continues to grow exponentially"* [§8]. At SAGE 64 **[PV2/248 - INQ000061572]** on 29 October, the first paragraph of the minutes recorded that: *"Incidence across the UK continues to grow rapidly. The latest estimate for R in the UK is 1.1 to 1.3. Estimates from SPI-M suggest that there are between 50,000 and 63,000 new infections per day in England"* [§1]. SAGE noted particular concerns about fast growth in areas of lower prevalence [§2, §10]. It also reported on work done on the likely effect of easing NPIs over the winter festive season, which was assessed as presenting *"a significant transmission risk"* [§§25-32]. In all of these meetings it was re-emphasised that the data for infection levels was time-lagged, meaning that if transmissions were still growing then the actual numbers of infections at the time of the meetings were likely to be higher. Much of this was anticipated in the Academy of Medical Sciences report "Preparing for a challenging winter 2020/21" which I commissioned in Spring 2020 that was published on 14 July 2020.

388. On 31 October, the government announced a series of strict NPIs that would take effect from 5 November. This has been referred to as the second national lockdown. The official announcement recorded that:[43]

[43] See **[PV2/249 - INQ000075750**

"With the NHS weeks from being overwhelmed, and a higher death toll than the first wave predicted without new restrictions, the Prime Minister, Chief Medical Officer, Chief Scientific Advisor, and Cabinet agreed there was no alternative to tougher national measures."

389. In my view, this is a fair summary of the reason why the Prime Minister and Cabinet decided to introduce the second national lockdown, though others will be better placed to explain their reasons further. Given the situation that the country was in by 31 October, I do not think that they had any choice but to take this step if the aim was to avoid the NHS becoming overwhelmed. The science advice since the start of September had been clear and consistent that the rate of transmission of the virus was growing such that a second very large wave of Covid-19 was inevitable unless extensive measures were taken (either through a combination of NPIs intended to manage the R level at or below 1, or through a circuit-breaker lockdown followed by NPIs). The government had introduced some measures – the Rule of 6, local NPIs, the curfew and the 3 Tier system – but as the science advice had indicated these proved insufficient to avoid the need for a second lockdown.

390. I am asked for my views on the timeliness of the decision to impose a second lockdown and the timeliness of the implementation of that lockdown. I think that both were too slow. The timing of decisions was comparatively far later than in the first lockdown. The science advice that I have referred to above showed the need for more extensive NPIs from early September. As was stated by SAGE on 10 September: *"It is highly likely that further national and local measures will be needed to bring R back below 1 in addition to those already announced. An early and comprehensive response would mean that measures have more effect and may be needed for a shorter duration"* **[PV2/221 - INQ000061564, §3]**.

391. There was, as with the first lockdown, a lag between the decision being taken to introduce the measures and those measures being given full legal effect, on this occasion from Sunday 31 October to Thursday 5 November. As I have said above, one of the lessons from the first lockdown was the need to put in place measures in advance (the "rules of the road") to allow a quicker implementation of interventions when needed.

392. It is informative to compare the position of the UK on 16 March – the day on which the decision was taken to move to extensive NPIs that would form the basis of the first national lockdown – and the position on 31 October. On the former, there were 1,543 known cases

and 51 deaths per day for which Covid-19 was referred to on the death certificate.[44] By 31 October, SPI-M were estimating between 50,000 and 63,000 new infections per day in England, affecting a population that had (on ONS data) well over 500,000 Covid-19 cases in the community (see SAGE 64, 29 October, §§12-13 **[PV2/250 - INQ000061573]**).[45] On 31 October, there were 340 deaths in the UK for which Covid-19 was referred to on the death certificate (a figure in line with the seven-day average).[46]

393. I think there may be two reasons why the decision on the second lockdown was taken at a time when the virus was more prevalent and was causing or contributing to more deaths. The first is that NHS capacity for treating Covid-19 cases had by that time been expanded, meaning that the virus could run at a higher level before it threatened to overwhelm the NHS. The second is that I think decision-makers had to a degree become inured to the virus and its awful effects. The balancing point between keeping society open and minimising mortality and morbidity caused by the disease had shifted in the minds of political decision-makers.

394. I am asked the extent to which lessons were learned from the first lockdown when introducing the second. As I have said, the main lesson I had learned was the need to introduce an effective package of behavioural and social interventions earlier, harder and geographically broader than you would like. That was communicated to decision-makers in the science advice and was understood. The decision-makers were very concerned about economic impacts of restrictions (rather than economic effects of the virus).

395. I am asked what the purpose was of the second lockdown. As with the first, it was to avoid the NHS being overwhelmed. It achieved that objective.

396. The main difference between the first and second lockdown was the decision to keep schools open in November 2020. SAGE had done a considerable amount of work on this issue from the outset of the pandemic, and this is set out in Dr Wainwright's second statement at Annex E **[PV2/4 - INQ000252450]** In the lead up to the second lockdown, SAGE considered the role of children in transmission in consecutive meetings - SAGE 62, 15 October 2020 **[PV2/125 - INQ000061570, §§23-31]** and SAGE 63, 22 October 2020 **[PV2/247 - INQ000061571, §§42-46]** – before a dedicated meeting on the issue on 4

[44] See **[PV2/176 - INQ000231048]**
[45] The ONS infection survey estimated that from 17 to 23 October an average of 568,100 people had Covid-19 in the community in England.
[46] See **[PV2/176 - INQ000231048]**

November (SAGE 65 **[PV2/250 - INQ000061573]**). These meetings considered a number of papers, including one provided by the Children's Task and Finish Group **[PV2/251 - INQ000074948]**. As can be seen from the minutes of those meetings and the papers that informed them, the evidence was complex, uncertain and mixed. Children were known to be less at risk from the virus, but there was evidence that school aged children, particularly older children, played some role in spreading it within and between households. Closing schools also led to changes in adult behaviour which would affect transmission rates. All involved in the discussion were very aware of the detriment to children in closing schools, and the particularly heavy price paid by children in poorer communities.

397. A summary of SAGE's advice before the second lockdown came into effect was contained in the minutes of SAGE 65 (4 November 2020) **[PV2/250 - INQ000061573, §3]**:

> "As previously advised, the opening and closing of schools will have an impact on R and wider community transmission, and infection rates in children and young people; however the evidence on the size of these impacts is mixed. Policymakers will need to consider the balance of risks and harms including the potential direct health risks to children and staff from COVID-19; the wider impact of schools reopening on community transmission; and the direct risks to student mental health, wellbeing, development, educational attainment and health outcomes from school closures."

398. The decision to keep schools open was a policy choice, informed by this mixed evidence. SAGE continued to commission and discuss work on issues relating to schools, as is shown in Dr Wainwright's statement and later in this statement.

399. The laws enacting the second lockdown were limited to a four-week period, ending on 2 December 2020, after which the UK would return to a tiered system of local NPIs. On 12 November, SAGE 67 advised that **[PV2/252 - INQ000061575, §§4-5]**:

> "[4] It is almost certain that prevalence will remain high in some parts of the country at the end of the current national restrictions. When policymakers plan transitions either from national measures to a localised tiered approach, or between tiers, consideration will need to be given to both prevalence and growth rates of new infections. It will also be important to consider a range of restrictions that are more stringent than those in the current baseline package

of measures in tier 3 for potential use in some areas where tier 3 measures are not able to reduce prevalence."

[5] SAGE reiterated that interventions should seek to prevent areas of low prevalence from becoming areas of high prevalence, as well as reducing prevalence where it is high. Evidence shows that the earlier and more rapidly interventions are put in place, and the more stringent they are, the faster the reduction in incidence and prevalence, and the less likelihood for the need for further national measures. Test and trace systems also work best at low levels of prevalence."

400. The same meeting considered an analysis from SPI-M about the 3 Tier system that had been introduced in October **[PV2/253 –** INQ000222005**]**. This found that Tier 1 measures alone were not enough to prevent the epidemic from growing rapidly; that there was some effect when moving from Tier 1 to Tier 2, but in most cases this would slow growth rather than reversing it; and that the effect of Tier 3 measures varied, so it was unclear whether the national baseline measures alone would be sufficient to reduce R below 1 [§§32-34].

401. SAGE 69 on 19 November returned to the question of easing interventions before the festive period. It advised, with high confidence, that such easing would present *"a significant risk of increased transmission and increased prevalence, potentially by a large amount."* Keeping prevalence low before the festive season would reduce transmissions during any period of more relaxation NPIs **[PV2/254 - INQ000061577, §5]**. R was estimated still to be 1.0 to 1.1 across the UK [§8].

402. The meeting endorsed a paper on the 3 Tier policy across the four nations **[PV2/255 –** INQ000231037 **§§17-24]**. This noted the significant heterogeneity in the way that the measures were implemented, which made measurement difficult, but SAGE provided the following summary of the observed effects in England [§21]:

"In England, in tier 1, many Lower Tier Local Authorities (LTLAs) had positive growth rates both before and after the introduction of tiers. In tier 2, the epidemic in some but not all LTLAs was shrinking after the introduction of tiers, with almost all of these areas having a reduction in growth rate as a result of the intervention but with many nonetheless remaining positive. All tier 3 LTLAs (where prevalence was generally highest) had negative growth rates after the introduction of tiers, and in all these areas the growth rate had decreased as a

result of the intervention. SAGE noted that tier 3 restrictions in England were heterogeneous, with most having additional restrictions above the minimum set for this tier."

403. I took from this that only Tier 3 had the effect of producing a negative growth rate, i.e. R below 1, but that in most cases this had involved the relevant local authorities going beyond the national baseline measures. It follows that the advice from SAGE 67, set out above, remained valid.

404. The final SAGE meeting before the easing of the second lockdown restrictions was SAGE 70 on 26 November 2020. This reported that R and growth rates had fallen slightly in recent weeks, with R estimated to be 0.9 to 1.0 in the UK **[PV2/256 - INQ000061578, §§1 and 7-8]**. It was emphasised that: *"R and growth rate estimate rely on lagged data, mask wide regional variety in the number of new infections and cannot fully reflect recent changes in transmission that might have occurred in the past 2 to 3 weeks … The estimates should therefore be treated as an indication of the general trend"* [§8].

405. I am asked whether I considered the decision to ease NPIs on 2 December 2020 to be correct. Again, this was a decision for the politicians (including in this instance, Parliament, and not just the Cabinet). The science advice that SAGE and I provided was to the effect that prevalence of the virus remained high at that time, and the data were uncertain about the extent to which R had been reduced by the various interventions introduced in October and November. It was our collective view that, if NPIs were to be eased, then the new tiered system would need to allow for a package of measures that was stricter than the previous Tier 3 baseline to ensure that R was brought below one in areas of high prevalence. We also advised that it was important to ensure that the virus did not grow too quickly in areas of lower prevalence. In other words, if those areas only had weak Tier 1 or Tier 2 restrictions, then prevalence would increase rapidly necessitating the urgent introduction of much more restrictive measures. It was for this reason that SAGE urged the government to look beyond current prevalence as the trigger point for moving between tiers. Finally, we advised that there would be a considerable risk in easing restrictions over the festive period, particularly if prevalence remained high.

406. I am asked what lessons I learned from the second lockdown. The first, and main one was the reiteration of the lesson from the first lockdown: go earlier, harder and broader on the introduction of NPIs. The second was the need to establish some degree of clarity on the level of mortality and morbidity the government and society were willing to accept for an

epidemic. The overarching goal of preventing the NHS being overwhelmed allowed for a wide range of approaches, from tight control of the virus to relatively loose control followed by the imposition of strict measures to reduce R. The epidemic could be run "cold", "hot" or somewhere between the two (as discussed in the exit strategy paper that the CMO and I produced in April 2020 **[PV2/192** INQ000148847 **§23]**). Greater clarity of which parts of that spectrum were considered acceptable, and which were considered unacceptable, would have allowed for clearer advice and more timely decisions on which interventions would need to be employed and when.

407. The second wave of infection was more deadly and caused even more harm than the first wave. The ONS assesses that of the 260,349 deaths registered in England across all waves of Covid 19 32.8% occurred in the first wave, 38.2% in the second wave and 29.1% in the third wave **[PV2/257 -** INQ000212079 The second wave started once the NPIs were released during the summer of 2020 and were accelerated by increased mixing. Partial and complex NPIs put into place over the course of the following months may have had some slowing effect on the spread of the virus but were never enough to reverse the upward trend. I believe that the science advice was clear throughout this period and that the complex and varying policy choices made illustrate the other factors, including various views on the economy that ministers were taking into account when they reached decisions. The same factors were of course at play in the first wave as well even from the very first decisions to ask infected people to self-isolate.

THE ALPHA VARIANT AND THE THIRD NATIONAL LOCKDOWN

The Alpha Variant

408. The first reference at SAGE to the Alpha (or Kent) variant of SARS-CoV-2 came at SAGE 73 on 17 December 2020 **[PV2/258 - INQ000061581, §1]**. Samples of the variant (B.1.1.7) had first appeared in gene sequencing in September 2020 and this has led some to suggest that there was a delay in providing relevant information to decision-makers about this variant. Professor Sharon Peacock who led the sequencing consortium and led the National Infection Service at PHE at the beginning of the pandemic has previously explained why this is not the case **[PV2/259 -** INQ000231007

409. By late 2020, the UK was in a stronger position than most (if not all) countries to identify variants of SARS-CoV-2. This was a consequence of the outstanding work done by the genetic sequencing network COG-UK, which had been established earlier that year

(something I understand will be considered in more detail in Module 4). Had it not been for the success of COG-UK, the Alpha variant would not have been identified as early as it was. As its name suggests, the Alpha variant was the first occasion on which a variant that altered the behaviour of SARS-CoV-2 had been identified anywhere in the world.

410. While the gene sequencing was important to identify new variants, that information on its own did not assist with establishing how, if at all, any of those variants were affecting the transmission of the virus in the UK. Many many variants were identified, most of which caused no detectable change to the virus and were of no consequence to the epidemic. To bring all those variants to SAGE, or for COG-UK or PHE to have flagged them all to ministers, would have been confusing and of no value at all. The key was to identify any new or unusual outbreaks that were associated with a new variant. That required COG-UK to work closely with the public health bodies in the UK and it is my understanding that, in general, they did so and that the relationship was good.

411. In respect of Alpha, it is my understanding that it became apparent to PHE in late November that parts of Kent were seeing high transmission rates. There could have been a number of reasons for this but later it became clear that one new variant seemed to be overrepresented in that area of Kent. That signalled the potential of a more transmissible variant. This work was undertaken by PHE working together with COG-UK.

412. I understand that the Secretary of State for Health and Social Care was first informed of the Kent variant on Saturday 11 December 2020, the same day on which it was discussed by NERVTAG. This was between SAGE 72 (10 December) and SAGE 73 (17 December) **[PV2/260 - INQ000061580; PV2/258 - INQ000061581]**.

413. I was sent an email summarising the NERVTAG discussion on Sunday 12 December **[PV2/261** INQ000120390**]**, having been alerted to the possibility of an emerging variant of concern by Professor Ferguson the previous evening **[PV2/262 -** INQ000229912 The email included the comment that: *"The committee noted that whilst there are many uncertainties, this virus variant is of significant concern."* In response, I asked for a meeting of relevant scientists, which took place on Tuesday 14 December. This was attended by, among others, the CMO, Professor Horby (the chair of NERVTAG), and several long-standing contributors to NERVTAG and SAGE including Professor Barclay, Professor Ferguson, Professor Edmunds, Professor Screaton and Professor Rambaut. The meeting was also attended by a number of scientists from PHE **[PV2/263 - INQ000063024]**.

414. Between my receiving the email and the meeting, Mr Hancock had informed the House of Commons of the existence of the variant on Monday 13 December. SAGE considered the Alpha variant at its next meeting, SAGE 73, on Thursday 17 December.

415. I am asked whether decision-makers and I were informed in a timely manner of the emergence of the Alpha variant. I think this is question for the PHE and COG-UK team but my understanding is that as soon as it became clear that the variant that had been first sequenced in September was over-represented in Kent and that the infection spread seemed to be faster in that area this information was communicated within DHSC and subsequently to me. It is worth noting that throughout the pandemic those places that sequenced the most identified new variants faster. They often got blamed for the variant, for example the "South African Variant" later in the pandemic, and often had restrictions imposed by other countries. I worry that this will in future lead to the risk that countries will choose not to detect variants and make the data public.

416. I am asked what difference it would have made to my advice to core decision-makers had I been informed of the Alpha variant earlier than I was (i.e. earlier than 11 December). I am not sure. In part, this was because we were still learning about the variant and its properties in mid-December 2020 and just knowing the variant existed was not sufficient information on its own. In part, it is because SAGE was already concerned about cases rising throughout the UK, including parts of the country that were not at that time exposed to the Alpha variant. It was these rises in cases that were already causing concern and we suspected required more intervention. Later in the pandemic scientists got better at linking specific changes in the viral genome to ***potential*** changes in the property of the virus. It was not possible to do that in late 2020 but had it been possible to identify warning signals based on the genome alone in September or October that could have led to early action once it was identified in Kent.

417. At SAGE 72 on 10 December the summary recorded that R and growth rate estimates had increased for Wales and Northern Ireland, decreased in Scotland and remained constant in England, with R estimated at 0.9 to 1.0 for the UK as a whole. However a marked increase of infections in those aged 12 to 16 in London had been noted, and SAGE reiterated its advice about the importance of putting in place rapid and stringent interventions to reduce incidence and prevalence **[PV2/260 - INQ000061580, §1 and §11]**. By SAGE 73 on 17 December, R was estimated to be 1.1 to 1.2 for the UK, and possibly higher in both England (which was affected by the Alpha variant) and Wales (which probably was not at that time, at least to any significant extent) **[PV2/258 - INQ000061581,**

§1 and §9]. SAGE considered that the *"marked increase"* in R in England following the easing of NPIs, *"may indicate that the November restrictions did not interrupt transmission chains to the same extent as measures taken in the first wave"* [§11]. It also expressed concern that cases were continuing to rise in areas that had been in Tier 3 since the ending of the national lockdown, which suggested that *"[a]dditional interventions may need to be considered in such places in order to keep R below 1 as per previous SAGE advice"* [§12]. Decision-makers were reluctant to take decisions to impose the restrictions that SAGE advised but the emergence of a more transmissible variant gave them a reason to do so.

418. I am asked how effective the December tier restrictions were in suppressing Covid-19. As with those introduced in October, it was only Tier 3 restrictions that we felt could be considered effective at reducing R below 1, and only then if the package of measures adopted that went beyond the national minimum. As SAGE 73 recorded, the fact that cases continued to rise in some of the areas that were in Tier 3 was concerning.

419. Two days after SAGE 73, on 19 December, the Prime Minister announced the introduction of Tier 4, which was in effect a stringent set of NPIs comparable to the second national lockdown. It came into effect in a number of areas in southern, eastern and southeastern England the following day. I understood this to have been a response both to the general advice coming from SAGE (as set out above) and a consequence of specific concerns about the Alpha variant and the effect that it might have on transmission and R. The official announcement of Tier 4 stated that the new variant had the potential to increase R by 0.4 or more.[47] Tier 4 did bring down infections and reduce R.

The advice concerning the festive period, 2020

420. I am asked about the advice that I gave to the Prime Minister about restrictions that were put in place over the Christmas period, and in particular the announcement made on 19 December about household bubbles. It is important to see this in the context of the wider work done by SAGE and other groups on the challenges that would be posed by Covid-19 in winter 2020/2021.

421. In May I commissioned an independent report from the Academy of Medical Sciences to inform: an understanding of what a challenging winter in 2020/2021 might look like in light of Covid-19, seasonal influenza and bad weather; what challenges this would present for surveillance, for test, trace and isolate, and for NPIs; and what plans could be developed

[47] See **[PV2/264 - INQ000054363**

to manage the situation. The Academy produced the paper "Preparing for a Challenging Winter 2020/21", published on 14 July 2020 **[PV2/9 - INQ000062402]**. The paper warned of the risks of a large resurgence of Covid-19 in the winter months, when NHS capacity would be most stretched. It recommended the following priorities for prevention and mitigation: minimising community SARS-CoV-2 transmission and impact (primarily through NPIs and test, trace and isolate); organising health and social care settings to maximise infection control to ensure that Covid-19 and routine care could take place in parallel; improving public health surveillance for Covid-19, influenza and other winter diseases; and minimising influenza transmission and impact (in particular by encouraging take-up of the influenza vaccination). SAGE discussed and endorsed the report (though not its illustrative RWCS section) at SAGE 46 on 9 July 2020 **[PV2/217 - INQ000061554, §§28-36]**. It advised that preparations should begin urgently across government [§29].

422. SAGE returned to the question of the need to consider and prepare for the challenges of winter on numerous occasions over the following months: see, among many other examples, SAGE 48 (23 July 2020) **[PV2/265 - INQ000061556, §3 and §35]**; SAGE 53 (27 August 2020) **[PV2/266 - INQ000061561, §21]**; SAGE 55 (3 September 2020) **[PV2/267 - INQ000061563, §15]**, SAGE 56 (10 September 2020) **[PV2/221 - INQ000061564, §4 and §15]**, SAGE 57 (17 September 2020) **[PV2/223 - INQ000061565, §23]**.

423. SAGE turned to consideration of the specific challenges posed by the festive period at SAGE 64 on 29 October 2020 **[PV2/248 - INQ000061572, §§4-5 and §§26-32]**. The meeting considered a paper on the topic prepared by SPI-B **[PV2/268** INQ000197212 and commissioned a task and finish group to develop that work. This resulted in the paper "Key Evidence and Advice on Celebrations and observations during Covid-19" **[PV2/269 - INQ000074992]**, which was discussed and endorsed by SAGE at its next meeting, on 5 November 2020 (SAGE 66) **[PV2/246 - INQ000061574, §§25-35]**. The specific question of household mixing over the festive season was considered again at SAGE 69 (19 November 2020) **[PV2/254 - INQ000061577, §5, §§29-35]**. Thereafter, the question of the effect of the festive period on the epidemic formed part of the general discussions in SAGE: see, for example, SAGE 71 (3 December 2020) **[PV2/270 - INQ000061579, §4]** and SAGE 72 (10 December 2020) **[PV2/271 - INQ000061582, §15]**.

424. The full papers and minutes set out the advice provided to decision-makers about the festive period. The central themes were these. First, there was high confidence that social mixing at this time would increase transmissions. This was an inevitable consequence of

groups coming together from different households, often for prolonged periods in indoor settings. Second, the wider the social mixing, and the longer the period during which it took place, the more transmissions would increase. Third, some mitigation could be achieved at a population level by increasing the strictness of NPIs either before or after the festive period, and by seeking to drive the virus down to a lower prevalence before that period began. Fourth, a degree of mitigation was also possible on an individual or household level, for example by increasing ventilation, or adopting alternative ways of marking occasions, or managing the order in which socialising took place (e.g. seeing older relatives before mixing with a wider group). However, both at a population and an individual level, these mitigations would lessen and not eliminate the increased level of transmission that was expected to be caused by people gathering over the festive period. Fifth, consistent, clear and early messaging was needed to inform the public on relevant measures and to improve compliance with them (and with the existing NPIs). Sixth, allowing households to "bubble" together during the festive period was of lower risk than allowing an individual a particular number of contacts. Seventh, SAGE acknowledged the importance of social and religious gatherings in this period and emphasised the importance of seeking to design interventions in collaboration with the relevant communities and religious groups.

425. SAGE also emphasised the degree of uncertainty that was involved in advising on festive measures. It was not possible to model precisely and prospectively the effect of individual or collective NPIs, particularly as much would depend on the prevalence of the virus in the country at the time when the proposed relaxation of NPIs began. In the event, the emergence of the new variant in the weeks before Christmas 2020 exacerbated that uncertainty. At SAGE 73 on 17 December it was recorded that: *"Scenario modelling for the weeks either side of the festive period show great uncertainty in the medium-term trajectory of the epidemic. The full effect of the festive period will not be apparent until January. Even a short period of epidemic growth could lead to the number of new hospital admissions in early January 2021 exceeding the peak of the first wave"* **[PV2/258 - INQ000061581, §13]**.

426. The Prime Minister and Cabinet decided to scale back the planned relaxation of NPIs for the Christmas period in 2020. I am asked why the Prime Minister did not make this announcement before 19 December. That is a matter for him, though I understood at the time that he was anxious not to be seen as "cancelling Christmas", and that he wished to give the population hope for recovery at this time. I consider that the science advice had been consistent since October, which was in turn building on and consistent with the work

done over the summer. The emergence of the Alpha variant increased the risks involved in relaxing NPIs, but the nature of those risks had been identified by SAGE for some time.

427. Vaccination has started by this time but only at very low levels. The Prime Minister called for an acceleration of the pace of vaccine rollout.

THE THIRD NATIONAL LOCKDOWN AND SUBSEQUENT EVENTS

The third national lockdown

428. Despite the introduction of Tier 4 and the scaling back of the Christmas easing of measures, the number of cases, hospital admissions and deaths all continued to rise. At SAGE 74 on 22 December 2020, it was recorded that R continued to increase and was clearly above 1 in London, the Midlands, the South East, East and South West of England **[PV2/271 - INQ000061582, §1]**. For the UK as a whole, R was estimated to be 1.1 to 1.3, based on lagged data [§1]. There was high confidence that the new variant was spreading faster than other variants of the virus [§3]. SAGE advised that [§11]:

> "[11] It is highly unlikely that measures with stringency and adherence in line with the measures in England in November (meaning with schools open) would be sufficient to maintain R below 1 in the presence of the new variant. R would be lower with schools closed, with closure of secondary schools likely to have a greater effect than closure of primary schools. It remains difficult to distinguish where transmission between children takes place, and it is important to consider contacts made outside of schools.
>
> [12] It is not known whether measures with similar stringency and adherence as Spring, with both primary and secondary schools closed, would be sufficient to bring R below 1 in the presence of the new variant."

429. In other words, measures akin to the second lockdown would be highly unlikely to control the virus, and it was not known whether a return to the first lockdown, with school closures, would be sufficient to do so.

430. Many meetings were held throughout the period of Christmas and New Year. More information became available on the variant and there was new work on transmission in children **[for example PV2/272 - INQ000230152 PV2/273 - INQ000230007** The science advice

was clear and consistent that without further action the infection would spread. On 29 December I wrote that the question for ministers was whether they wished to continue to play catch up or to try to get ahead of the spread **[PV2/274 - INQ000063113]**.

431. On 4 January 2021, 13 days after SAGE 74, the Prime Minister announced a third national lockdown.[48] The official announcement recorded that on that day there were 26,626 Covid patients in hospital in England, an increase of 30% in one week (and 40% above the April 2020 hospital admissions peak that occurred several weeks after the first lockdown). The case rate in England at the end of December was three times that at the start of the month. According to the announcement, *"454 deaths were reported"* on 3 January. Using the same measure and source as I have used elsewhere in this statement, there were 896 deaths on 4 January in respect of which Covid was mentioned on the death certificate (with a seven day average of 913).[49] As can be seen, these figures were higher than those at the time of the announcement of the second lockdown, and far far higher than those at the time of the first lockdown.

432. I am asked why the Prime Minister decided to impose a third national lockdown. While this is a question better directed to him and his Cabinet colleagues, it seems clear to me that the answer is the inexorable rise in infections, hospitalisations and deaths, as had been foreseen in the SAGE advice.

433. I am asked what lessons from the first two national lockdowns applied when considering whether to impose a third. I refer back to my previous answers to this question. In my view the decision to impose a third lockdown was taken too late. I understand from the official announcement that the lockdown was to come into effect from the following day, 5 January. This demonstrates a much speedier approach to implementation once a decision had been made.

434. The third lockdown saw primary and secondary schools closed. This was in line with the advice given by SAGE 74 on 22 December 2020. There was a high rate of cases, hospitalisations and deaths, and the Alpha variant transmitted more readily. The increase in R seen in late December and early January had taken place during the school holidays. Returning children to school in January would have increased contacts and viral transmission, at a time when the most stringent measures were required to bring R down.

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[48] See **[PV2/275 - INQ000065415]**
[49] See **[PV2/176 - INQ000231048]**

It was a very difficult decision to take given the obvious detriments involved that had previously been discussed at SAGE, but given the state of the epidemic in the UK at that time it is my view that it was the right one given the policy objectives.

435. The purpose of the third lockdown, as with the previous two, was to reduce R in order to prevent the NHS from becoming overwhelmed. It succeeded in that goal.

436. I am asked about the decisions that were taken to ease the third national lockdown, and the Spring 2021 Roadmap. I think on this occasion the lifting of restrictions worked well. The Roadmap was a good approach and was scientifically informed, with clear criteria on when to move from one step to the next. The process was done gradually, with careful surveillance, and with a willingness to delay relaxations or reintroduce restrictions when that proved necessary. I think this was one area in which policy learned from the lessons provided by the first and second lockdowns.

437. SAGE gave advice, informed by SPI-M modelling, on the easing of restrictions at SAGE 79 on 4 February 2021 **[PV2/276 - INQ000061587, §§34-42]**, SAGE 80 on 11 February 2021 **[PV2/277 - INQ000061588, §§23-37]**, SAGE 81 on 18 February 2021 **[PV2/278 - INQ000061589, §§15-27],** SAGE 85 on 31 March 2021 **[PV2/279 - INQ000061593, §§7-20]**, SAGE 87 on 22 April 2021 **[PV2/280 - INQ000061595, §§31-41]**, SAGE 88 on 5 May 2021 **[PV2/281 - INQ000061596, §§10-29]** and SAGE 92 on 8 June 2021 **[PV2/282 - INQ000061600, §§9-19]**. This emphasised the need for a cautious, incremental and monitored lifting of restrictions, beginning at a time when prevalence was relatively low and allowing for the retention of a baseline set of mitigation policies (some or all of which could be voluntary – e.g. hygiene measures, mask wearing, continuing test, trace and isolate). SAGE advised that changes to restrictions should be made on the epidemiological data rather than being based on predetermined dates, and that sufficient time be left between the steps of the lockdown to monitor the effects that they were having. This advice was followed, including by delaying Step 4 (the lifting of remaining restrictions on hospitality, nightclubs and large events) in light of the emergence of the Delta variant. In line with SAGE advice (SAGE 92, §§9-17), Step 4 was put back by four weeks to 19 July 2021 **[PV2/283 - INQ000230771]**

438. The Roadmap allowed for the public and for business to plan ahead, albeit in the knowledge that the data may mean that some measures were delayed. The contemporaneous roll out of the vaccine helped in that people could see that we were close to achieving a significant level of population immunity. The accelerated vaccine

rollout was a very important part of the response. However, the CMO and I still had to make the point repeatedly that "we were not there yet", and that the prospect of future population immunity did not mean that all of the brakes could be rapidly released. In essence, the advice given in respect of easing the third national lockdown was not very different from that given in respect of ending the previous two. Policy was more closely aligned to that advice on this occasion.

439. Pupils had returned to school in March 2021 and were advised to wear face masks. On 14 January 2021, SAGE 76 had considered and endorsed a paper on the use of face coverings in various settings **[PV2/284 - INQ000061584; PV2/285 - INQ000074962]**. The minutes recorded that widespread application of face coverings was *"likely to have a small put significant impact on population level transmission, though the benefit is difficult to quantify"* [§31]. They were likely to be most effective in indoor and outdoor settings when people are likely to be close together (a finding given with high confidence). The return of children to school was considered by SAGE 78 (28 January 2021) **[PV2/286 - INQ000061586, §§24-31]** and SAGE 80 (11 February 2021) **[PV2/277 - INQ000061588, §§48-64]**. No reference was made to face coverings in the minutes of those discussions, though the latter referred to the importance of *"appropriate mitigations"* [§53]. Ultimately, decisions on whether school pupils should wear face masks were matters of operational policy and we were unable to provide a confident prediction as to what effects they would have. The decision as to whether to recommend or mandate the wearing of face masks in schools was for decision-makers within the Department of Education and the wider educational community, including the unions. It is worth noting that there was an example here of how advice from the so-called "Independent SAGE" caused confusion with many in the educational world, including the unions, confusing it with SAGE advice **[PV2/287 - INQ000230014]**

440. I am asked if I agreed with the decision to recommend that face coverings be worn in schools. It was a very difficult decision, given the unquantified benefits in preventing transmission and the detriments that face coverings might cause in educational settings. We were unable to give definitive quantitative scientific advice. I am asked if advice should have been given earlier to use face masks in schools. This was an area in which the evidence accumulated and changed during the course of the pandemic and which drew on international practices and studies. Masks in schools probably had both positive and negative effects (including on behaviours and teaching) and this is an area that needs research to determine advice for any future situation. I discuss the science advice on face coverings generally in more detail below.

441. I am asked what lessons I learned from the third lockdown. It reinforced the learning from the previous iterations, in terms of going early, hard and broad with interventions when they were imposed, and being led by the science and data when easing restrictions, incrementally, at the end of the lockdown. It reinforced the extreme difficulty in knowing how best to advise on schools.

Omicron and Plan B restrictions

442. Between the imposition of the third national lockdown in early January and the end of 2021, SAGE met on 27 occasions. Among the matters considered (in addition to the easing of the third lockdown) were:

a. New variants and viral evolution
b. Immunity and vaccines
c. Easing and reimposing restrictions
d. Universities and schools
e. Transmission in different settings
f. Masks in healthcare settings
g. Travel and borders
h. International issues
i. Long Covid
j. Ethnic minority groups

443. In September 2021, the UK government published its Covid-19 Response Autumn and Winter Plan **[PV2/288 - INQ000065168]** This set out two approaches. Plan A was the policy that it hoped to follow. This sought to control the virus through a combination of: pharmaceutical interventions (vaccines, antivirals and other therapeutics); the ongoing test, trace and isolate programme; supporting the NHS and social care during the winter; advice to the population; and efforts to help increase vaccinations in other countries. Plan B was a series of NPIs that were intended to be deployed *"if the data suggests the NHS is likely to come under unsustainable pressure."* Given the widespread vaccination that had taken place or was anticipated, these were relatively modest measures, including warnings to the public to act with caution, the introduction of a requirement to show a vaccination certificate in certain settings, and legally mandated face coverings in certain settings. The government would also ask people to work from home. These measures were intended for

use in England, and I understand that the Devolved Administrations were responsible for planning in Scotland, Wales and Northern Ireland.

444. The Inquiry has concentrated its questions of me on the emergence of, and response to, the Omicron variant, which was first identified in South Africa in November 2021.

445. SAGE 96 took place on 14 October 2021 and was the last SAGE meeting before the emergence of Omicron **[PV2/289 - INQ000061604]**. The summary at the start of the minutes began with the following warning [§1].

> "[1] There should be no complacency around the risk posed by further viral evolution. Emergence of a variant of Delta or a variant from a different lineage that becomes dominant globally is a very real possibility. Ensuring sufficient capacity to monitor for variants, and capability to characterise new variants and conduct predictive vaccinology, is crucial."

446. Delta had, by that time, become the dominant variant, but SAGE was concerned about the opportunity for viral evolution. Variants were emerging that not only affected transmissibility but looked as though they would affect immune recognition (in other words could lead to reduced effectiveness of vaccination). SAGE reviewed the government's Plan B and advised that policy work on the reintroduction of NPIs *"should be undertaken now so that it can be ready for rapid deployment if required."* The meeting advised that such measures would be most effective if deployed early, in combination and if there were clear triggers for deployment. The measures should be accompanied by clear communication and should be consistently implemented [§4, §32]. As can be seen, these were common and repeated themes of SAGE advice which had been reinforced by the experience of previous waves of infection.

447. The CMO and I reiterated this advice in an email to Simon Ridley, the Head of the Covid-19 Task Force at the Cabinet Office, on 25 October 2021. The email reflects our understanding of the *"main ministerial objective … to prevent the NHS from being overwhelmed."* We warned that pressures on the NHS from respiratory infections (Covid-19 and non-Covid infections) were likely to get worse, as they did every winter. The second winter report from the Academy of Medical Sciences emphasised this point. At that time, our view was that the measures in Plan B, combined with good immunity from ongoing vaccination, would *"likely be enough to take the edge off things and allow numbers of*

infections to decrease." We advised, as we had done before, that the earlier action was taken, the less severe the measures would need to be. **[PV2/290 - INQ000064175]**

448. By the time of the next SAGE meeting, SAGE 97 on 29 November 2021, Omicron (B.1.1.529) had been identified and had led to a rapid increase in infections in South Africa **[PV2/291 - INQ000061605]**. Data suggested that it was present in the UK, though it was not by then in widespread transmission [§4]. The minutes record the high degree of uncertainty that surrounded Omicron at that time. The manner in which it had spread in South Africa suggested it could be more transmissible than Delta, or that it had a degree of escape from natural immunity, or that it had a degree of escape from vaccine-induced immunity, or that it had a combination of any of these three advantages [§6]. Many of the virology experts were very worried that the mutations looked as though they would cause immune escape and that this might mean less protection from vaccines against severe disease [§8]. SAGE advised that booster vaccinations were likely to provide some protection against severe disease [§10]. It was stated to be too early to have robust data about the severity of the disease caused by infection with Omicron [§11]. SAGE advised [§12 and §13]:

> "[12] Even if there continues to be good protection against severe disease for individuals from vaccination (including boosters), any significant reduction in protection against infection could still result in a very large wave of infections. This would in turn lead to potentially high numbers of hospitalisations even with protection against severe disease being less affected. The size of this wave remains highly uncertain but may be of a scale that requires very stringent response measures to avoid unsustainable pressure on the NHS. If vaccine efficacy is substantially reduced, then a wave of severe disease should be expected.
>
> …
>
> [14] It is important to be prepared for a potentially very significant wave of infections with associated hospitalisations now, ahead of data being available."

449. SAGE invited the South African scientists who had identified Omicron to attend the meeting on 29 November 2021. They also attended the regular meeting of European science advisers on 9 December 2021 **[PV2/292 –** INQ000230835 There were also contacts with clinicians and public health doctors in South Africa led by CMO and Jeanelle de Gruchy (Director of Public Health for Tameside and President of the UK Association of Directors of Public Health), and I met with these contacts on 14 and 17 December 2021. On 6

December I also organised a small group science meeting outside SAGE where scientists considered the biology of the variant **[PV2/293 - INQ000064245]**. We were particularly interested in understanding issues of disease severity, inherent transmissibility and immune escape. There were worries from vaccine manufacturers that the vaccines seemed less effective against Omicron, worries from virologists that the virus seemed to escape immunity and worries that Omicron was being transmitted by long range airborne spread **[PV2/294 -** INQ000230814 **; PV2/295** INQ000230792 **PV2/296 -** INQ000230793 **]**.

450. SAGE considered possible response measures. Border controls could not completely prevent the introduction of variants, but might delay them [§15]. Past SAGE advice on possible NPIs was said to *"remain highly relevant"*, with various NPIs listed in the minutes [§17]. It was reiterated that: *"The earlier measures to reduce transmission are introduced, the more stringent they are, and the wider their geographical coverage, the more effective they will be (high confidence – see previous SAGE advice, including on Plan B)"* [§19]. It was noted that, as with previous waves of infection, some settings would require particular consideration, with the example of care homes given [§19]. SAGE also advised that the situation was fast-moving, such that decision-makers may need to act while there was still a high level of uncertainty [§20].

451. SAGE met again on 7 December 2021 (SAGE 98 **[PV2/297 - INQ000061606]**). Omicron infections were increasing rapidly, with the number of suspected cases identified in England already in the hundreds [§3]. The doubling time was suspected to be 3-5 days [§4]. It was not known how many Omicron infections were resulting in hospital admissions, and considerable uncertainty remained, but preliminary modelling suggested that there may be 1,000 hospitalisations per day (or more) in England by the end of the year [§9]. Omicron was expected to account for the majority of the new SARS-CoV-2 infections in the UK within a few weeks [§15]. SAGE also warned that the generation time for Omicron was not known, but was possibly shorter than for Delta. This would mean that case-based interventions, through test and trace, would be less effective as people became infectious sooner. This in turn pointed to the importance of population-based measures – i.e. national (or at least local) NPIs [§17].

452. Plan B restrictions were introduced in England from 10 December when face coverings became compulsory in indoor venues (except when they were impractical). People were encouraged to work from home from Monday 13 December, and the NHS Covid Pass App

became mandatory for nightclubs and large gatherings from 15 December. These changes were announced on 8 December 2021.[50]

453. SAGE 99 took place on 16 December 2021 **[PV2/299 - INQ000061607]**. The minutes recorded that:

> "[1] The number of Omicron infections in the UK has continued to increase very rapidly with the doubling time in England currently around 2 days. This is faster than the growth rate seen in March 2020.
>
> [2] In England it is almost certain that there are now hundreds of thousands of new Omicron infections per day.
>
> [3] Currently observed numbers of Omicron infections admitted to hospital in the UK are probably around one tenth of the true number because the data lags of hospital reporting. The observation that there are apparently not many people being admitted to hospital because of an Omicron infection is therefore misleading. It is currently very unclear how many such people there are.
>
> …
>
> [5] It is still too early to reliably assess the severity of disease caused by Omicron compared to previous variants … Even if there were to be a modest reduction in severity compared to Delta, very high numbers of infections would still lead to significant pressure on hospitals.
>
> [6] As a result of the very high number of current infections, hospitalisations in UK will reach high levels in about 2 weeks even if transmission is reduced soon, because there are lags between infections, symptoms appearing, and hospitalisation (high confidence). There are likely to be between 1,000 and 2,000 hospital admissions per day in England by the end of the year."

454. This was a deeply worrying development. It is easy with retrospect to dismiss these concerns as being overblown, primarily because we now know that the disease caused by Omicron in those with Covid-19 immunity proved to be, for most, relatively mild in a well

[50] See **[PV2/298 - INQ000086632**

vaccinated population (it is not that the case that virus itself was much less dangerous as was seen in unvaccinated populations elsewhere around the world). However, as the SAGE minutes show, this was not known at the time, and nor was there good reason to assume that this would be the case. Our South African colleagues were not certain that it was less dangerous and were concerned that in some areas Omicron seemed to be causing major problems. Laboratory studies were consistently showing a degree of potential immune escape by Omicron. Given our experiences of the previous peaks, and the tens of thousands of deaths caused by them in the UK, there were good reasons to take a cautious and precautionary approach. As SAGE had warned in October 2021, there should be no complacency around the risk posed by further viral evolution.

455. This was the context in which SAGE gave the following advice:

> "[7] Without intervention beyond those measures already in place ('Plan B'), modelling indicates a peak of at least 3,000 hospital admissions per day in England. Some scenarios have significantly worse outcomes during the first few months of 2022 but there are many uncertainties. If the aim is to reduce the levels of infection in the population and prevent hospitalisations reaching these levels, more stringent measures would need to be implemented very soon.
>
> [8] The earlier interventions happen the greater the effect they will have (high confidence). This may also mean that they can be kept in place for a shorter duration. Illustrative scenarios from SPI-M-O suggest that measures equivalent to those in place after Step 2 or Step 1 of the Roadmap in England, if enacted early enough, could substantially reduce the potential peak in hospital admissions and infections compared with Plan B alone (medium confidence). The timing of such measures is crucial. Delaying until 2022 would greatly reduce the effectiveness of such interventions and make it is less likely that these would prevent considerable pressure on health and care settings.
>
> [9] Slowing the wave of infections would also allow more people to receive boosters before they are potentially exposed to Omicron. This would prevent (not just delay) some hospitalisations and deaths."

456. SAGE's advice was not, therefore, that an immediate "lockdown" was required. It was that, based on the data then available, measures beyond Plan B may be required *if* the policy goal was to reduce the levels of infection in the population and prevent the risk of very high numbers of hospitalisations. SAGE emphasised the *"many uncertainties"* involved, but our experience during Covid-19 had shown the importance of early intervention, even on imperfect data. It was, as ever, for the politicians to make the decision on whether to proceed with such interventions, based on all of the evidence and advice available to them. As SAGE acknowledged: *"Policymakers will need to make difficult decisions … about the implementation of measures and the allocation of resources which incorporate factors beyond scientific advice"* [§25]. Both Professor Dame Jenny Harries and the CMO gave important public warnings about the risks and indicated the need for behavioural change. Although Professor Harries was widely criticised for doing so, the effect of them both issuing warnings was that behaviours did change and social distancing occurred. This almost certainly reduced the damaging effects of the new wave of infections.

457. SAGE met again on 20 December 2021 (SAGE 100) **[PV2/300 - INQ000061608]**. It reported that the number of Omicron cases continued to rise very rapidly [§1], and that hospitalisations were increasing in the UK. The number of infections and hospitalisations in Gauteng, South Africa, where Omicron was most advanced, were noted to be declining, but the reasons for this were not clear and following discussions with colleagues in South Africa SAGE considered that it could not be assumed that this would be sustained [§4]. The minutes discussed the uncertainties surrounding the disease, and in particular its severity. A number of scenarios had been modelled, ranging from Omicron being 10% as intrinsically severe as Delta to it being 100% as severe. It was only at the lowest end of those scenarios (where Omicron was 90% less intrinsically severe than Delta) where hospitalisations did not reach the levels of previous peaks unless the wave peaked early [§8]. SAGE also noted that data flows would be disrupted over Christmas [§3]. SAGE gave the following advice [6]:

> "There remain several important uncertainties in the parameters used for modelling, including biological parameters for Omicron as well as behavioural changes. Policy decisions (either to do nothing or something) will need to be made sooner than these uncertainties can be resolved. There is already evidence of behavioural change over the past week with increased mask wearing, reduced social mixing (although this varies across age groups) and a change in testing patterns."

458. Those changes in behaviour were, in part, a response to the public messaging that had been given about Omicron and were enough to have an effect. In a No.10 Press Conference on 15 December 2021, the CMO had spoken about how people were prioritising the social interactions that mattered most to them and deprioritising others. He thought this was both sensible and would be increasingly important going into the Christmas period. He also said that it was *"exactly right"* that people were taking a lot of precautions when meeting (such as testing and meeting outdoors) and he encouraged everyone to do so.[51] On the same day Professor Dame Jenny Harries, by then head of the UKHSA, told the House of Commons Transport Select Committee that Omicron represented probably the most significant threat we have had since the start of the pandemic in light of its rate of growth. She stressed that the risk was a potential one, as there was still so much that was unknown about the variant.[52] She had given a warning about the risks a few days earlier.

459. The final SAGE meeting before Christmas 2021 took place on 23 December (SAGE 101) **[PV2/303 - INQ000061609]**. This reported a slowing of the growth rate of Omicron, though the variant continued to grow quickly across the country [§1]. There was considerable uncertainty about why the growth rate was slowing, including whether it related to behavioural change (both spontaneous and due to the imposition of Plan B restrictions in England), or other factors [§2]. Multiple analyses had, by then, suggested that the intrinsic severity of Omicron was lower than that of Delta (a finding reported with medium confidence), and there was evidence of a decrease in realised severity (i.e. severity in the vaccinated population). However, there remained a high degree of uncertainty as to the extent of the difference (with estimates ranging from a 15% to an 80% reduction in the risk of hospitalisation) [§5]. SAGE advised that: *"The peak in admissions is highly uncertain but, even with a reduction in severity, may be comparable to or higher than previous peaks in the absence of significant behaviour change or further interventions"* [§13]. Again, it was noted that earlier and more stringent interventions were more likely to be effective [§16]. In respect of older people, SAGE advised that behavioural interventions made after the wave of infections was well underway would be *"too late to make a significant difference to the numbers of infection, hospitalisations or deaths"* [§15].

460. The CMO and I provided further advice by email to Mr Ridley on 30 December **[PV2/304 - INQ000230887]** This set out the new data that were available to us, but concluded that the

[51] See **[PV2/301 INQ000231045]**
[52] See **[PV2/302 INQ000231026 Q255]**

advice given by SAGE in the last meeting, SAGE 101, remained the formal advice to ministers. Among the data to which the CMO and I referred were the following:

- Around 1:25 of the national population and 1:11 of London's population currently had Covid-19 (based on ONS data),[53] almost all of which was the result of Omicron. These figures were *"by far the highest levels seen yet in the pandemic."*
- *"Hospitalisation data showing there is now a rapidly growing pressure on the NHS. This is now no longer a theoretical, modelled, outcome but based on observed admission data."*
- The likely magnitude of severity reduction of Omicron compared to Delta was in the region of 50% to 70% in a population with high immunity.
- Vaccine efficacy, after booster, against severe disease and hospitalisation was estimated at around 90% but with wide confidence intervals, though it was possible that this would wane. We considered this a *"reasonable first approximation."*
- Omicron was replacing Delta rather than being additional to it, which was good news.
- We did not know where and when the peak would occur, something that we considered to be a key point. It was not safe to assume, for planning purposes, that Omicron would peak early.

461. We concluded the email by emphasising several points from the SAGE advice. First, it was not (at that stage) too late to act if the ministers wished to do so, and any action that reduced the peak would be useful in reducing total disease burden, the pressure on the NHS, and – probably – mortality. Second, it was not an "all-or-none" decision. Any additional measures were likely to reduce the peak, though the earlier and more comprehensive the changes the greater their effect. Third, the purpose of those interventions was not to reduce R below 1 (as it had been in previous periods), but to reduce the peak and buy time to expand the reach and effect of the vaccine booster campaign. This would, in particular protect those people in high-risk groups and would also be likely to have a positive effect on mortality, morbidity and NHS pressure. We commented that:

> "Some commentators imply that any new measures equate to 'lockdown', but this is a rhetorical device rather than the reality that measures are incremental

[53] The ONS data was contained in the Covid-19 Infection Survey of 30 December 2021 **[PV2/305 – INQ000074642]**

and nobody is suggesting the kinds of real lockdown measures like stay-at-home regulations previously needed."

462. The CMO and I were anxious at this time to ensure that the decision-makers had properly understood the data and the potential impacts. The CMO discussed this with the Cabinet Office and an additional meeting was arranged. The following day, 31 December, I sent an internal email within GO Science as a file note following that further meeting, which was attended by the PM and No.10 staff, Cabinet Office and HM Treasury. I wrote that I thought there was *"huge resistance to any further measures … PM and Cx [the Chancellor] do not want to move on anything more at the moment."* There was, however, agreement to continue with cautious messaging and I suspected that Plan B measures would be retained. **[PV2/306 - INQ000064366]**

463. SAGE next met on 7 January 2022, for SAGE 102 **[PV2/307 - INQ000061610]**. The situation update was that the number of infections continued to increase nationally but had levelled in London [§1]. SAGE noted that the peak in infections would not be known for sure until after it had passed. The modelling suggested that NPIs implemented in the near future would have little effect on the peak but could affect overall hospitalisation levels (though the reduction was unlikely to be large, and was much less than it would have been had stricter NPIs been implemented earlier) [§4]. SAGE advised that [§6]:

> "The increasing evidence of lower severity, accumulating evidence on vaccines' effectiveness against hospitalisation, and the likelihood of Omicron's generation time being shorter than Delta's,[54] mean that of the various scenarios previously considered the most pessimistic scenarios are now unlikely (high confidence). It remains likely based on the scenarios that hospital admissions in England will remain high for some time as a result of the very high number of infections and the continued risk of hospitalisation for the elderly and unvaccinated adults in particular."

464. The trends identified in SAGE 102 were confirmed in SAGE 103 on 13 January 2022 **[PV2/308 - INQ000061611]**, where it was noted that a decreasing proportion of those in hospital required ICU admission, suggesting that the reduction in severity when measured by ICU admission risk was even greater than the reduction when measured by hospital

[54] A shorter generation results in an earlier and lower peak in infections for a given growth rate and probably a greater impact of interventions: see SAGE 103, 13 January 2022 **[PV2/308 - INQ000061611]**.

admission risk. This was particularly identified in the highly immunised population [§3]. The minutes record, however, the uncertainties in the data and the regional variation in hospitalisation trends and pressure on NHS services [§§1-7].

465. At SAGE 103 the number of hospitalisations across England was level [§2]. By the following meeting, SAGE 104 on 28 January 2022, the number was declining **[PV2/309 - INQ000061612, §1]**, though in both cases regional variations were noted.

466. The advice that I gave to decision-makers during the Omicron wave was as per the SAGE minutes and other documents set out above **[PV2/310 - INQ000064303]**. I think that advice was valid, particularly in light of the following factors.

467. First, Omicron became the dominant variant very rapidly and at a time when there were many uncertainties about its properties. It later emerged that the disease caused by Omicron in a population with high levels of immunity was less severe than earlier variants, this was not known in December 2021, and was certainly not a safe assumption on which to plan policy. The devastating effects of Omicron subsequently seen in an inadequately vaccinated population in China show that the this was not a variant to be taken lightly.

468. Second, and related, while the situation in South Africa provided some guidance, it was difficult to assess how closely trends there would be followed in the UK. Most obviously, Omicron affected South Africa during its summer and its holiday season, whereas it was growing in the UK during the winter when the NHS was already under considerable pressure. The demography was also very different and varied between regions. Our South African colleagues were very concerned about Omicron and had seen significant clinical disease and deaths.

469. Third, the CMO, SAGE and I all drew on the knowledge and experience we had gained over the course of the pandemic, and in particular emphasised the principal lesson that we had learned, which was that earlier interventions were more effective. We acknowledged that acting early would mean acting on limited and incomplete data, in a period of considerable uncertainty. That, unfortunately, is the reality of decision-making when faced with an emerging, highly transmissible virus or variant.

470. Finally, the discussion was not, as some have claimed, a choice between doing nothing and a return to a full national lockdown. The measures that were being discussed were considerably more nuanced, as was their intended goal, as the CMO and I set out in our

email of 30 December and covered in a discussion with the PM on 16 December **[PV2/310 - INQ000064303]**. Measures were introduced, in the form of the Plan B interventions. In addition to those, and as SAGE 100 noted on 20 December, after the warnings from Jenny Harries and the CMO many people spontaneously adopted protective behaviours, which helped to lessen infections. For many, Christmas 2021 was similar to Christmas 2020 despite the differences in the government's policies and guidance.

471. This concludes my chronological account of this period. The following sections of this statement are directed to specific questions I have been requested to address on a number of issues relating to the events I have described. However, before leaving the chronology, I wish to provide some context and explanation in relation to a set of private, handwritten notes I made during this period.

472. The role of the Government's Chief Scientific Adviser during the Covid-19 pandemic was of course stressful and demanding. The advice I was asked to provide and communicate to ministers had the potential to affect the lives of a great many people, and I also found myself having to deal with difficult and unfamiliar aspects of the role, including appearing at press conferences. This was a public profile that I never sought.

473. One consequence of the public profile and the government's mantra that they would 'follow the science' in formulating their response to the pandemic, was that advisers were subject to intense public scrutiny by mainstream and social media. Some of that scrutiny was critical and some of it was personally abusive and threatening. Whilst I did my best to ignore the personal abuse and threats and get on with my job, it was impossible not to be aware of some of it. Some of the abuse and threats were directed at my family.

474. The nature of the role meant that there was very little respite from work or pressure for many months on end, indeed for more than two years. To maintain some form of inner calm, protect my mental health and keep my family out of the pressures I faced, I got into the habit of quickly jotting down some reflections and observations at the end of each day. These notes were made solely for my own benefit and acted to reduce stress. Writing them down was a form of release that helped me to focus on the challenges of the next day rather than dwelling on the events of the last. It was my way of creating some space for myself in what could have become an overwhelming situation.

475. These handwritten notes were never intended to see the light of day or to be read by anyone. Prior to this Inquiry I have not mentioned them or shown them to anyone else, and I would never have done so. I have never had any interest in publishing any form of account of my involvement in the pandemic, and since coming to the end of my tenure as GCSA I have not sought any public profile beyond giving occasional talks and interviews on science or aspects of natural history. I understand and welcome my obligations to the Inquiry and am keen to help to ensure that lessons are learnt for future pandemics. I have sought to discharge these duties by providing very extensive and detailed witness statements in response to the requests that I have received. Those witness statements and the exhibits contain my carefully considered account of the matters identified by the Inquiry as relevant to its terms of reference and constitute the only public account of those matters that I intend to give. The science advice given is in the public domain in the form of SAGE minutes and papers.

476. The Rule 9 request for evidence that I received from the Inquiry in respect of Module 2 asked me, amongst other things, to disclose to the Inquiry *"any contemporaneous diary, notes or voice memos that you made relating to your involvement in the UK Government's response to Covid-19"*. In light of that request, I disclosed a full and unredacted copy of my handwritten notes to the Inquiry along with an explanation of the circumstances in which they were written and the purpose for which I wrote them. In particular, I made clear that they were intensely private, a spontaneous "brain dump" and never intended to be seen by anyone else. I explained that I wrote them primarily as a means of protecting my mental health during a stressful and demanding period.

477. I understand that the Inquiry has determined that at least some of my handwritten notes constitute relevant evidence for the purposes of the Inquiry and that it intends to disclose those parts of my handwritten notes to the core participants and refer to them in the Module 2 public hearings during the course of my evidence and, potentially, the evidence of other witnesses.

478. I do not intend to use this statement to comment on the Inquiry's handling of this issue and its decision to disclose parts of my private handwritten notes. However, in light of the decision that has been made by the Inquiry I consider it to be important that anyone reading any part of those notes should be aware of the circumstances in which they were written and the purpose for which I wrote them. It is also important to make clear, not only that they were never intended to be read by anyone else, but that they were written quickly, usually at the end of a very long and stressful day. They were not intended to represent

my considered analysis of the events that I was describing. I took no steps to check their accuracy and I undertook no editing process to correct them in the event that I changed my mind or became aware of additional information that was not available to me when I wrote them. I did not ever re-read them. They were simply a day-by-day release valve.

479. To a very significant extent, the matters covered by my handwritten notes are also addressed in this witness statement. I consider that the contents of this witness statement are consistent with my handwritten notes, but to the extent that there are differences of emphasis or tone that is result of the different purpose of the two documents, the different circumstances in which they were written, and the fact that, in preparing this witness statement, I have had the opportunity to reflect on the events that I have described including by reference to material that may not have been available at the time, and to refresh my memory by reference to contemporaneous documents. There have been instances where the opportunity to consider additional information and reflect has enabled me better to understand other perspectives and has cast new light on events in respect of which there was an incomplete picture at the time.

480. There were inevitably moments during the pandemic when I was frustrated about a behaviour or what I perceived to be the inability or unwillingness of others to grasp the scientific advice being given, or often about my own inability to communicate it well enough. I have no doubt that other people would have had similar thoughts about me for similar reasons from time to time. Everyone was working under enormous stress and felt the intense strain of our responsibilities. To the extent that some of these thoughts come through in my handwritten notes I would repeat what I have sought to make clear above. These notes were not carefully considered, objective reflections written in the cold light of day, of the type that I have set out in this witness statement. They were hastily written, subjective, reflective of my mood at the time of writing, and were often partially informed thoughts, which I put down on paper simply as a means of clearing my head and enabling me to focus on the challenges of the next day. They were placed in a drawer at my home and that is where they would have remained had the Inquiry not requested their provision and decided to disclose them. I ask that if they are to be read by others then they should be read with that context in mind and that my privacy should be respected.

GENERAL QUESTIONS CONCERNING ADVICE AND DECISIONS ON NON-PHARMACEUTICAL INTERVENTIONS

General questions

481. I am asked whether, with hindsight, my advice on NPIs should have differed in any respect. I have identified above specific points in the chronology in respect of which I have reflected on the advice I gave. In general terms, I would repeat the central lesson that I learned over this period, which is the need to introduce behavioural and social interventions earlier than you would like, harder than you would like and broader than you would like. In terms of easing restrictions, I think the lesson was that this should be done carefully, incrementally and with close monitoring. It should be based on data and not dates. It should be informed by science, with metrics identified for when the next relaxation should take place, as opposed to dogmatically following a fixed timetable. I remain uncertain about how best to deal with spread in school children.

482. I am also asked for a view on whether, with hindsight, the government's approach to NPIs should have differed. This is a question about policy- and decision-making, rather than science advice, and for that reason it is better directed to those who had to make the decisions, based on the evidence and advice that they received. I think we were probably a little too slow in strongly recommending NPIs early in the first wave. I do think, however, that it would be helpful to reflect on how advice and decisions were put into operation. One aspect of this was the speed with which a lockdown decision was implemented – as I have said above, I thought the operational implementation of a decision once it was made was too slow in respect of both the first and second national lockdowns. I am asked whether NPIs needed legal enforcement rather than strong guidance. I do not know the answer to that question.

483. More generally, the UK's response was of course dependent upon how well any interventions could be operationalised and implemented. In some aspects this was impressive, notably in respect of vaccines and clinical trials. In others, it was not, for example in terms of the early efforts to obtain, share and analyse data. The UK took too long to develop a scaled and effective test, trace and isolate system, and did not introduce incentives for people who could not afford to self-isolate. In addition to considering advice (including science advice) and policy (including ministerial decisions), the Inquiry will want to consider the operational elements of the response, particularly during the first wave of infections. As I have stated in my Module 1 evidence some of these operational matters

are ones that can be planned for in advance and some are dependent on industry and require an effective domestic industry base.

484. As I have discussed, I think using NPIs to drive prevalence down followed by use of mass testing and an effective test and trace system may well have avoided further national interventions. This approach would require a significant scalable infrastructure that did not exist. Finally on this topic I will point out that economic considerations often swayed decision-makers and it would be useful to have the economic evidence and advice made transparent so that trade-offs are clear to all.

485. I am asked about the extent to which the prospect of an effective vaccine affected the strategic response to Covid-19 and the use of NPIs. I can only answer this from my perspective of providing science advice, and I am conscious that this is a topic that will be considered in detail later in the Inquiry. In broad terms, during 2020 there was no guarantee that an effective vaccine would be available, still less a likely timetable for when it would provide for population immunity. There are many infectious diseases for which there is no effective vaccine (for example, HIV, the last pandemic to significantly affect the UK), and there are instances where attempts at vaccination have had negative effects. Early in the pandemic many scientists were worried that a vaccine for Covid would cause a phenomenon called antibody-dependent enhancement which would make the disease worse (it did not). Even where it is established that a vaccine is safe and provides some benefit against infection, there is a question of how effective it will be. I do not think anybody expected the Covid-19 vaccines to be as effective as they proved to be, with around 90% protection against serious disease.

486. The prospect of getting a vaccine increased over the second half of 2020 but it was not until the first clinical trial read out that an effective vaccine was assured. During clinical trials, everyone (except a very small confidential safety monitoring group) is blind to the data until the trial is complete and so there were no clues along the way about whether we had an effective vaccine or not. Although I was a very strong proponent of the need to pursue vaccines it was not safe to base science advice on an assumption that an effective vaccine would become available at a particular point in time, or at all.

487. The position was different in late 2021 when I was advising on Omicron at a time when mass-vaccination was already well underway. The uncertainty at that time was how effective the vaccine would be at preventing infection and severe disease against the new variant, and the degree to which there had been vaccine-escape. As can be seen from my

account above, the effectiveness of the vaccine and the prospect of boosters was one of the (many) factors that influenced my advice.

488. I am asked about what advice I have about levels of compliance with NPIs and the importance of financial support to those who were self-isolating. Throughout the pandemic SAGE addressed questions of how the public would respond not just to NPIs, but also to general public messaging and the evident impact of the pandemic on those around them. SPI-B produced several important papers on this topic and it was discussed at many SAGE meetings. SAGE advised that support for people isolating would likely increase compliance and that many of the lowest paid in society would find it difficult to take time off work.

489. In terms of financial support, this was a matter of policy for HM Treasury and the Cabinet. I gave advice that financial and other support for self-isolation would be important to improve compliance on several occasions, including but not limited to SAGE 32 (1 May 2020) **[PV2/206 - INQ000061540, §§21-22]**, SAGE 52 (20 August 2020) **[PV2/220 - INQ000061560, §14]**, and SAGE 57 (17 September 2020) **[PV2/223 - INQ000061565, §6]**. The relatively low level of statutory sick pay in the UK was also considered a factor that lessened the likelihood of people complying with advice or requirements to self-isolate.

490. I am asked the extent to which advice on the type and duration of NPIs took account of, or was influenced, by the potential wider health, social and economic impact of NPIs. In general terms, there were four harms that decision-makers were advised to consider: the direct health effects of the virus in terms of the morbidity and mortality that it causes; the indirect effect on wider mortality and morbidity of the NHS being overwhelmed or of health resources being diverted to concentrate on the virus such that other treatment was not available; increased ill-health through the postponement of important but non-urgent medical care and the effects of NPIs on mental health, in particular through isolation and loneliness; and the economic effect of NPIs on society as a whole (which would in turn have health and social effects): see, for example, the paper the CMO and I produced in April 2020 on the lockdown exit strategy **[PV2/192 -INQ000148847]**. These were well described by the CMO and others and acknowledged by SAGE participants and in SAGE advice, for example SAGE 23 **[PV2/187 - INQ000061531, §25]**, SAGE 57 **[PV2/223 - INQ000061565, §16]** and SAGE 64 **[PV2/248 - INQ000061572, §19]**. SAGE also commissioned task and finish groups on specific topics to seek to provide decision-makers with a broad perspective on the factors that would need to be considered when formulating policy: see, for example the July 2020 paper on reopening of education settings by the Children's Task and Finish Group **[PV2/216 - INQ000074935]**. However, SAGE was

convened to provide science advice and this is what it did. While it could identify other issues, particularly economic issues, that may be relevant to forthcoming decisions, it could not advise on them. Such advice would have to come from elsewhere and the trade-offs were for ministers and not for unelected scientists or economists to make.

491. During Module 1, the Inquiry considered the structures of science advice. My evidence then was that SAGE was and should remain a body for science advice. Other bodies could provide advice on other matters, including economics. I can see advantages in those bodies being as transparent as SAGE and publishing their evidence. But I think it would have been, and would be, a mistake for SAGE to try to provide economic advice as well as science advice. It is better, both in principle and practice,[55] for distinct bodies to provide the evidence and advice that is within their remit to decision-makers, and for the decision-makers then to consider the trade-offs before determining the policy. I have however argued that an academic Centre for Pandemic Preparedness should involve all disciplines and could usefully consider how to integrate economic and epidemiological approaches.

492. I do not know the extent to which having an expert group on the social and economic impacts of NPIs would have changed or improved decision-making during the pandemic. Others would be better placed on the extent to which decision-makers were provided with economic and social advice, the processes by which that occurred, and the strengths and weaknesses of those processes. I can say that whatever those processes were, they were less transparent and less open to public debate than the science advice provided through the CMO and me by SAGE.

493. I am asked the extent to which advice on the type and duration of NPIs took account of, or was influenced, by views as to the period with which the country would comply with them. I have given evidence earlier in this statement about this question in respect of advice given prior to the first lockdown. More generally, SAGE did consider and commission a great deal of work on compliance with NPIs, in particular material that was produced from the behavioural scientists on SPI-B. This was central to the discussion at SAGE and the advice that it gave.

494. I am asked whether, on reflection, it was necessary to implement attendance restrictions at schools in England as part of the response to Covid-19. I have described above the

[55] I agree with the CMO's evidence in Module 1 that including two economists on SAGE would result in a competent scientific body that also had the involvement of two economists, not an expert group balancing science and economics. **[PV2/16 INQ000230999 pp.89-90]**

science advice given at various points on school closures, and more information is contained in Annex E of Dr Wainwright's second statement **[PV2/4 - INQ000252450** These were exceptionally difficult decisions to make. There was good evidence, at the time when the decisions on the first and third lockdowns were taken, that school closures would help reduce R. At those times, the risks of continued exponential growth of the epidemic and the NHS being overwhelmed as a consequence were very real. SAGE was conscious of the detriment that school closures would cause to children and the unequal distribution of that detriment, which would fall heaviest on children in lower socio-economic groups. We were also aware that the disease was less severe for children than it was for other demographic groups, such that children were suffering a detriment in order to benefit society as whole rather than to protect themselves. That said, collapse of the NHS and the higher mortality and morbidity across society had the virus continued to grow exponentially would have affected children both directly and indirectly. Closing schools was a measure of last resort and, as can be seen in the papers, considerable work was done to establish the best information we could obtain on the effects it would have. While the decisions on whether to pursue school closures were ultimately for politicians, I think that there was evidence to support those decisions at the time when they were taken, regrettable though they were. It could be argued that had some measures been taken earlier and if there had been an effective testing and isolation scheme at scale school closures might have been avoided.

495. I am asked the extent to which science was used to monitor the effectiveness, impacts and compliance with NPIs. We tried to do this, and I have provided examples above on where SAGE commissioned and considered the outcome of monitoring on particular NPIs or (more usually) packages of NPIs. As I have said in my Module 1 evidence, it has proved very difficult (internationally, as well as in the UK) to assess the impact on the virus of individual NPIs: see **[PV2/2 - INQ000147810]**. This is a consequence of the amount of variables involved – the general "noise" making it difficult to identify the effect of a particular measure. Even when a small package of NPIs were introduced at a particular time, the behaviour of the population was still being influenced by a wide range of factors, including spontaneous behaviours in response to news about the spread of the virus. I suggested to the Royal Society that they should undertake work to explore the effects of specific NPIs and this is underway and due to report shortly. I also think there is a need to look at methodologies to assess behavioural interventions as I discussed in my first statement.

Testing and Contact Tracing

General points concerning testing

496. As had been widely discussed in Module 1 of the Inquiry, testing capacity is a critical capability in a response to a pandemic. It is essential for accurate diagnosis and clinical practice but it is important in many other areas.

497. First, testing helps to provide data about what is going on with the virus in the population. It can determine prevalence of the virus at any given point in time and identify patterns of transmissibility. It allows accurate determination of hospitalisations due to infection, and the proportion of patients requiring ICU treatment. The more data from testing that are available, the stronger the evidence base for analysis and advice.

498. Second, testing helps individuals make decisions about their own behaviour. Testing positive for Covid-19 may lead an individual to self-isolate voluntarily or may be the trigger for a legal obligation to self-isolate. The advent of Lateral Flow Tests that were easy to use meant that people were much more able to identify when they had Covid and were at risk of infecting others.

499. Third, and crucially, testing is the first stage in the test, trace, isolate process that is intended to limit transmission of the virus in the community. SPI-M and SAGE emphasised the importance of test, trace and isolate and the need for a highly effective process (metrics of success were suggested). SAGE reinforced the need for test, trace and isolate when discussing how NPIs could be relaxed in an effective and sustainable way, and how to use it to keep incidence and prevalence low.

500. Fourth, testing allows for control measures to be put in place in specific environments, for example before allowing a person entry to a venue, event or workplace, or before discharging a patient from a hospital to a care home.

501. Finally, there is the possibility of mass testing of the population. Such an approach was trialled in Slovakia and in parts of the UK. Mass testing programmes took place during the pandemic for example in Liverpool and there are data showing a positive effect. **[PV2/311** INQ000230538 **PV2/312** INQ000074953 My understanding at the time was that mass testing was more effective if repeated, rather than being a one-off event. During 2020 there was

optimism in some quarters that mass screening could have been a way of learning to live with the virus, but the implementation of mass screening programmes proved difficult.

502. Effective use of testing is not just a question of creating a test, something that was achieved quickly in the UK in response to Covid-19. Capacity for producing the test must be scaled up so sufficient numbers are available. Account must be taken of how reliable the test is; I discuss below the measures of specificity and sensitivity. The test must also be linked into a system that allows for communication of the test result to those who need to know it, including the person tested, his or her GP, the public health services responsible for contact tracing, and the regional and national bodies that are collecting data about the progress of the pandemic. Distributed individual testing capacity without the connecting processes is of limited value.

503. SAGE repeatedly advised decision-makers about the importance of testing (among other measures for gathering data) during the pandemic. I am asked specifically about the advice given on community testing. SAGE 15 was informed on 13 March 2020 that community testing was ending that day **[PV2/131 - INQ000061523, §33]**. This was a policy decision, and I understand that the purpose was to prioritise the UK's limited supply of tests for hospital patients. It was not a matter on which SAGE was asked for advice. On 23 March, SAGE 18 advised that increased community testing and surveillance would be *"invaluable to measure the effects of interventions taken"* **[PV2/173 - INQ000061526, §9]**. PHE, SPI-M and Professor McLean were tasked with reviewing how the true infection rate in the community could be ascertained. At SAGE 21 on 31 March 2020 the SAGE secretariat was tasked with updating a paper on future questions for SAGE, which were to include community testing strategies and options. At the same meeting DHSC and PHE were asked to define future UK testing requirements at an upcoming meeting, including in respect of community testing **[PV2/179 - INQ000061529]**. The following meeting, SAGE 22 on 2 April 2020 tasked SPI-M to advise on volumes for community testing **[PV2/313 - INQ000061530]**. LSHTM provided an initial assessment by the time of SAGE 23 on 9 April 2020 **[PV2/187 - INQ000061531, §20],** which was reviewed at SAGE 26 on 16 April 2020. That meeting advised that "sufficient testing capacity needs to be reserved for repeated large-scale community testing" **[PV2/181 - INQ000061534, §1]**.

504. Until that meeting, on 16 April 2020, the expectation had been that PHE would take responsibility for such a community testing programme. However, as the minutes of SAGE 26 record **[PV2/181 - INQ000061534]**:

"[9] PHE confirmed it was unable to deliver a community testing programme. SAGE agreed that if PHE is unable to undertake the programme then this should be undertaken within a repeated ONS-led household survey programme."

505. This was an example of a problem that I identified in my first witness statement, namely the question of how advice is operationalised **[PV2/2 - INQ000147810, §61]**. In this instance the problem was that PHE was simply over-run with other work and did not have the capacity or capability. Once it was identified that they were not in a position to take on the community testing and surveillance programme, the ONS stepped in to do so. This was the origin of the hugely successful ONS Covid-19 Infection Survey, which came to be a vital source of data for the UK response (and which was also used and admired internationally). It is worth noting that the ONS survey was supported by a private sector workforce from a contract research organisation IQVIA. This again speaks to the importance of a strong industrial biomedical science base.

506. I am asked if I was aware of the WHO's advice as to the importance of testing and whether I considered the WHO advice applied to the UK. I was and I did consider it applied to the UK. I have set out above why and in what circumstances testing was important.

507. I am asked specifically about my understanding of and involvement in Operation Moonshot, which I understood to be a mass testing programme designed to allow for same-day results. This kind of mass testing programme was distinct from the community testing that contributed to the ONS survey, and the more targeted NHS Test, Trace and Isolate programme.

508. Operation Moonshot was principally an operational and policy issue and I was not greatly involved in it, though I gave specific science advice when asked. Several pilot studies were established including the one in Liverpool referred to above. Before the policy was announced, SAGE commissioned work on mass testing from the multi-disciplinary Mass Screening Task and Finish Group. This was considered and endorsed at SAGE 53 on 27 August 2020 **[PV2/266 - INQ000061561; PV2/314 –** INQ000213316 The relevant sections of the minutes are set out below [§§18-27]:

"[18] The effectiveness of mass testing will depend on several factors including the proportion of the population tested; the frequency of testing; the ability of a test to identify true positives and negatives; the speed of results; and adherence

to isolation. It is important to recognise that testing is one part of a system leading to isolation of infectious individuals and the whole system needs to work in order to achieve the desired aim (which would be to identify as many infectious people as possible and isolate them from contacts during the infectious period).

[19] Any testing programme should have clear and specific aims, this could include reduction of R or risks of larger outbreaks. Separate testing objectives could relate to economic or social objectives such as re-opening venues, workplaces (it is important to recognise these as different objectives).

[20] A mass testing programme designed to reduce R should be designed to find as many cases as possible and have minimal detection of false positives. It would need to be linked to an effective system for isolation of cases (this will require incentives and intervention to increase both uptake of testing and adherence to isolation). Even if well designed and implemented, it may not be as effective at finding cases as a well-functioning Test and Trace system, especially at low levels of prevalence or if it requires the use of tests with low sensitivity or specificity.

[21] SAGE strongly supports increased scale of testing and the associated system. As per previous reports it was noted that multiplex testing[56] would be beneficial in some situations for winter.

[22] With mass testing, it will be most efficient and effective initially to concentrate increased testing capacity on high risk groups and settings where transmission is likely to be greatest. Priority groups for mass testing should be identified according to the risk of individuals being infectious, and the potential consequences if they tested positive. For the system to work social and economic factors will need to be considered, including incentives and interventions to enhance adherence.

[23] Mass testing is most likely to be successful in well-defined higher-risk settings (for example care homes, meat processing plants) where it is more

[56] Multiplex testing is testing for multiple pathogens simultaneously e.g. Covid-19, influenza and other respiratory viruses in one test.

feasible to detect and prevent large outbreaks early, and compliance can be measured and moderated.

[24] Tests used for mass population testing particularly in low prevalence settings and populations could result in higher false positives than symptomatic testing using lab-based PCR tests, which could reduce public confidence in testing. Double testing may be required to reduce false positives (with PCR as the gold standard).

[25] Separately, and with a different objective, it would be possible to use a wider testing approach to detect and stop infectious individuals from entering specific venues (for example theatres, workplaces). This would reduce the chance of contact with an infectious person in such screened environments, but it should be recognised that this is a different objective to reducing R overall.

[26] There are several barriers to symptom reporting including a lack of knowledge; concerns about stigmatisation; and financial disincentives such as loss of earnings. There are also barriers to self-isolation. These all need to be considered in any system.

[27] SAGE agreed that clear communication and public engagement is needed to improve understanding of testing programmes and prevent stigmatisation of communities. Structured financial support for disadvantaged groups may be particularly important.

509. Notably, SAGE 53 also advised that the speed and coverage of the NHS Test and Trace system needed to be optimised **[PV2/266 - INQ000061561, §5]**:

> "[I]t will be important to ensure that a general mass testing project does not have any negative impact on this approach. Effective test and trace can have a significant effect on R and this should remain a priority."

510. The Task and Finish Group had given similar advice at the start of its "Key Recommendations" **[PV2/314 - INQ000213316 §3]**:

> "Mass testing is a different strategy for finding infectious people from contact tracing, however any mass testing system should be a carefully designed

counterpart to the NHSTT [Test and Trace] contact tracing system. It will be important that the two systems are complementary and linked-up and that all infectious people found through mass testing are reported to NHSTT."

Advice on the reliability of testing asymptomatic individuals in and around March 2020

511. As I have set out above, as early as the first formal SAGE meeting (SAGE 2 on 28 January 2020) it was recognised that there was some evidence of asymptomatic transmission **[PV2/29 - INQ000061510, §16]**. The meeting anticipated a specific test for Covid-19 being available by the end of that week, but in low numbers, and advised that: *"Currently it would not be useful to test asymptomatic individuals, as a negative test could not be interpreted with certainty"* [§8]. This did not mean that the test would not work on asymptomatic people, it meant that a negative test result could not be safely interpreted as evidence that an individual was not infected. It was a question about test sensitivity and not using it to assure non-infectiousness.

512. Specificity refers to the ability of a test to determine who does not have a disease. A highly specific test will have few "false positive" results. Sensitivity refers to the ability of a test to detect an individual who does have the disease as positive. A highly sensitive test will have few "false negatives." The concern of SAGE 2 with a very early untried test was about sensitivity – would the new test be sufficiently sensitive to identify an asymptomatic patient with a low viral load as being positive, or would there be a high proportion of false negatives? A positive result in an asymptomatic person would indicate that they were infected but we didn't know whether a negative test gave reassurance that they definitely were not infected.

513. As the pandemic progressed and data increased, the evidence of asymptomatic transmission became clearer, though the precise ratio of symptomatic to asymptomatic cases and infections remained uncertain. There was also a debate among scientists as to whether there was true asymptomatic transmission, or transmission by pauci-symptomatic people (i.e. those with few or mild symptoms). Early CRIPs for COBR, which at that time was chaired by Mr Hancock, noted the likelihood of asymptomatic transmission **[PV2/45 - INQ000056166, p.7].** On January 30 a case of asymptomatic transmission was described in an article in the New England Journal of Medicine **[PV2/52 -** INQ000230995

514. On 11 February, SAGE 6 recorded that *"Peak infectivity is probably around the start of symptoms onset,"* and that *"Virus shredding may reach significant levels just before onset of symptoms and continues for 1-2 days after (wide uncertainty)"* **[PV2/55 -**

INQ000061513, §14 and §19]. The revised RWCS discussed at SAGE 11 on 27 February 2020 stated that: "*80% of the UK population may become infected, with an overall 1% fatality rate in those infected. Only a proportion of those infected will experience symptoms*" (emphasis added) **[PV2/78 - INQ000061519, §1]**. On 13 March in my interview with the *Today* programme on Radio 4, I said that: *"It looks quite likely that there is some degree of asymptomatic transmission. There's definitely quite a lot of transmission very early on in the disease when there are very mild symptoms"* **[PV2/120 - INQ000064580]**.

515. At SAGE 16 on 16 March 2020 it was noted that: *"Antibody testing is particularly vital to address the central unknown question of the ratio of asymptomatic to symptomatic cases."* **[PV2/153 - INQ000061524, §20]**. This was in the context of a discussion on the importance of scaling up diagnostic testing to manage the epidemic. I made a similar point the following day in evidence to the Parliamentary Select Committee on Health and Social Care **[PV2/315 - INQ000064519 Q78]**.

516. I am aware that there appears to have been some confusion about the efficacy of testing people without symptoms. On 11 March 2020 a WhatsApp exchange took place about a public statement concerning the Prime Minister's contact with Nadine Dorries MP (then a junior minister at DHSC), who had tested positive for Covid-19 **[PV2/316 - INQ000102697]**. The proposed draft circulated at 10.15am contained a line saying that the Prime Minister did not have symptoms and would not be taking a Covid-19 test as *"there would be no point in testing as it does not work on people with no symptoms."* I intervened to say that this was wrong: *"Not correct that the test does not work on people with no symptoms. It does and that's why we contact trace. In this case it is the contact tracing that is the key to who gets tested."* The line about the test not working was subsequently removed.

517. Mr Hancock responded to my message saying: *"Having spoken to Chris Whitty and PHE ppl I'm with now, Patrick what you've said is not right. The clinical advice I've had is that the test is NOT reliable on people without symptoms. The reason is that there are so many false negatives when there are no symptoms that testing is counter productive. Can the scientists please clear this up urgently."* [message at 10:28am]

518. The CMO replied: *"Not reliable is correct. It can pick up some asymptomatic cases. But not advised."* [messages at 10:36am and 10:37am]

519. I replied to say that I agreed with the phrase *"not reliable"* but not with the phrase *"does not work"*. This was for the reason that the CMO gave – the test did pick up some

asymptomatic cases but may not have been particularly sensitive. Again it is the point about not relying on a negative test as evidence that someone is definitely not infected.

520. Following this exchange, I sent a message to the CMO asking if he could draft something on testing: *"It's not true to say it doesn't work. It can detect cases but would miss a lot and so isn't recommended."* Again this refers to using a negative test result to assert that someone is definitely not infected. The CMO expressed his agreement and commented that this was *"A classic example of why government by WhatsApp is not the way to deal with these kinds of things."* **[PV2/317 - INQ000228750**

521. The issue arose again in April 2020, when I became aware that Mr Hancock had been saying that PCR testing did not work on asymptomatic individuals and that policy was being based on this. I exchanged an SMS message about this with the CMO on 13 April. I wrote that while the test was likely to be less sensitive in asymptomatic people it was not correct to say that it did not work. I added that while it was not known whether it was helpful or not to test asymptomatic people, South Korea was doing so. The CMO expressed agreement and said that he had changed a document to reflect this **[PV2/318 – INQ000228994**

522. The following day, 14 April, I sent an email to others in GO Science asking for some work to be done on this topic. I was unsure where Mr Hancock was getting his advice from on this and I wanted a definitive position documented. This led to an academic secondee to the SAGE Secretariat producing a rapid review paper, which laid out the evidence. It concluded that *"PCR screening of asymptomatic individuals is not only possible, but useful and being employed elsewhere."* I subsequently provided the paper to the CMO, saying that I thought it was important that Mr Hancock see it as *"He is firmly under the impression that tests don't work in asymptomatic people and this is clearly wrong."* In a later email I added that I thought that there was a *"pretty high rate"* of asymptomatic infection in older people, and that this meant that *"testing was important and that isolation on return from hospital should probably be for all, not just the symptomatic."* The CMO took the matter forward and I understood that the relevant policy, the social care plan, was changed as a result so that everybody leaving hospital for a care home would be tested **[PV2/319 - INQ000228994 PV2/320 - INQ000087177]**.

523. I am asked about the extent to which concerns about the reliability of testing of asymptomatic people affected the response to Covid-19. What was evident from an early stage, and was made apparent in the science advice to ministers, was that asymptomatic infection and transmission were possible and even likely but we did not know the proportion

of asymptomatic infection. As described above, I sought to correct a misapprehension on Mr Hancock's part that the PCR test *"did not work"* on asymptomatic patients. I do not know where this incorrect advice came from or why it was so firmly adhered to.

Testing and infections in care homes

524. Care homes were, from an early stage, a source of concern for me and for SAGE. Technically, the policies and practices to be adopted in care homes, and the guidance to be issued, were operational matters for DHSC, the public health bodies and the care home operators. Those policies and practices would be informed by general advice given in SAGE about the virus – for example modes of transmission and the period of time for which someone was infectious – it was not SAGE's role to take operational lead on such matters.

525. However, as can be seen by the evidence that follows, SAGE did find itself more involved in providing specific guidance than was the case in other areas. The simple reason for this was that we were concerned that no-one else was taking the lead.

526. The potential concern about infection in care homes had been raised in February including in the note from Professor Willett of NHS England that identified the need to consider care homes and prisons as *"closed communities"* to avoid inbound infection **[PV2/67 - INQ000229869]** As I have said earlier, SAGE had already given advice about infection risk in prisons, and it was understood that this would be applicable to care homes as well **[PV2/64 - INQ000061515, §§17-20; PV2/66 - INQ000221781]**. A separate paper from PHE on 24 February indicated that there should be no discharge to care homes from hospitals that had a nosocomial outbreak **[PV2/75 - INQ000074910]**.

527. By early March, I was becoming concerned that insufficient work was being done in this area. I sent a message on 8 March to Mark Sweeney in Cabinet Office saying*: "The more intensive cocooning for the especially vulnerable still needs work. Care homes need a special consideration and I haven't seen anything from them yet"* **[PV2/107 - INQ000061651]**. Later that month I raised concerns with the CMO **[PV2/321 - INQ000228868]**

528. Testing incoming residents and other issues concerning care homes became an increasingly common topic at SAGE meetings in April 2020 as we considered this to be such a pressing problem. A SAGE Care Homes sub-group was established in April/May 2020 and, as I discuss below, it was tasked with establishing data sources, identifying testing strategies, and collaborating with DHSC on drawing up infection protection and

control guidance. This was work that I initially expected DHSC to be undertaking but they were not, or were not able to do so with sufficient urgency. SAGE stepped in with a sub-group to try to help. I recall that when Mr Cummings returned to work in mid-April following his illness, he noted that CMO and I were very worried about three separate epidemics, one of which was in care homes and he helped raise the concerns. Mark Sedwill also noted this point and emailed on 15 April saying he was *"was very struck by the "three epidemics" point from this week's SAGE analysis"* **[PV2/322 - INQ000343991]**

529. I am asked a number of questions about what I knew of the policy on whether individuals would be tested for Covid-19 before being admitted into care homes. This was a matter of operational policy for DHSC and those operating care homes and I was not directly involved in formulating it. However, as I have mentioned above, I corrected what appeared to be a misunderstanding on the part of the Secretary of State for Health, Mr Hancock, on reliability of testing in March and April 2020. My position at that time was that while the PCR test may have had reduced sensitivity in those with no symptoms, it was not correct to say that it did not work. The safest policy to be adopted at a care home would be to keep new residents in quarantine for a period of time, after which if they were asymptomatic there could be a degree of confidence that they were not infectious with Covid-19. Testing would have been helpful to identify infected individuals but not definitive in confirming individuals who were free from infection.

530. During April 2020, SAGE repeatedly emphasised the importance of testing in infection control in hospitals and care homes, for both patients and employees. On 9 April 2020, SAGE 24 advised that planning should be done for the introduction of blood tests in care homes to determine who had antibodies **[PV2/188 - INQ000061532, §31]**. On 14 April 2020, SAGE 25 noted that: *"Care homes … remain a concern. There are less data available from these. SAGE advises that increased testing in these settings [hospitals and care homes], supported by modelling, is important"* **[PV2/189 - INQ000061533, §§10-11]**. On 16 April 2020, SAGE 26 advised that: *"Testing is an important part of controlling transmission in hospitals and care homes"* **[PV2/181 - INQ000061534, §31]**. A week later, SAGE 28 (23 April 2020) noted that a *"small but significant proportion of deaths relate to deaths in care homes"* and advised that a testing strategy to reduce spread in care homes was required **[PV2/182 - INQ000061536, §4 and §8]**. Professor Charlotte Watts, the CSA at DfID undertook to lead a working group on this and other topics relating to care homes. This group was set up to provide focused scientific advice to operational and policy owners in DHSC and acted as a scientific resource that policy owners could turn to as needed. The subsequent report of what became known as the Care Homes Group was presented

to SAGE 35 on 12 May, where it was concluded that: *"Extensive testing of both residents and staff is crucial both in care homes which have reported cases and those which have not."* **[PV2/184 - INQ000061543; §1, PV2/323 -** INQ000215643

531. I am asked whether Mr Hancock provided me or core decision-makers with an assurance that testing would be in place for those being admitted to a care home. He did not give me any such assurance, but nor would I have expected him to do so. I do not know what assurance, if any, he provided to decision-makers.

532. I cannot comment on what advice Mr Hancock was given in April 2020 from DHSC, PHE and other sources on testing those to be admitted to care homes, whether he followed that advice or, if he did not, why he did not follow it. I have set out the SAGE advice from April 2020 in the paragraphs above.

533. I cannot now recall when I became aware that people had been discharged into care homes without being tested for Covid-19. I am asked what steps I took to address this. Ultimately this was a matter for ministers and DHSC; I continued to provide science advice consistent with the view of SAGE and the Care Home sub-group. I was clear that infections in Care Homes were a major problem, that testing was important and that staff movement between Care Homes was a potential source of spread of infection.

534. I am asked what advice I gave to core decision-makers in this period on the need to free up hospital beds by way of discharging patients to care homes. I am also asked about my involvement in the UK government's March Discharge Policy and subsequent Action Plan for Social Care. These were operational matters and matters of policy for DHSC and the NHS and I was not involved.

535. I am asked whether I was aware of any issues concerning measures to limit the spread of infection within care homes, for example the availability of PPE, the use and testing of agency staff and staff moving between care homes. I am also asked what I or others did to combat these issues, and whose responsibility it was to do so.

536. Whilst these were matters for DHSC some of these issues were the subject of advice from SAGE and were included in the Care Home Analysis undertaken by Professor Watts' group **[PV2/323 -** INQ000215643. As can be seen from that paper, detailed work was done on (among many other things) the social and economic backgrounds of care home workers

and the practice of rotating care workers between multiple homes. The consensus view of SAGE 35 (12 May 2020) was **[PV2/184 - INQ000061543, §20]**:

> "[21] Workforce management and behaviours are key factors in transmission. SAGE reiterated the need to minimise, and ideally avoid completely, staff moving between homes. This presents a challenge to the operating model of many care home providers.
>
> [22] Working conditions in the sector similarly present challenges, including disincentives to self-isolate. Addressing these issues is critical to reducing transmissions."

537. SAGE 35 recommended that DHSC and the Care Homes Group draw on infection protection and control guidance from hospital environments to inform care homes guidance by 14 May **[PV2/184 - INQ000061543]**. The SAGE action tracker recorded that this was completed.

538. Data were also a concern, as can be seen from the SAGE minutes on 14 April 2020, SAGE 25 **[PV2/189 - INQ000061533, §§10-11]** and 5 May 2020, SAGE 33 **[PV2/191 - INQ000061541, §§12-13]** The detailed work done by Professor Watts' group improved the situation, and following consideration of the group's paper, SAGE 35 (12 May 2020) tasked it with seeking *"to agree with ONS, PHE and DHSC and other relevant groups or partners what additional data sources could be used to monitor care home infection and how this can be provided."* This remained a difficult area to get data throughout the pandemic. PHE witnesses will be able to provide more information than I can.

539. I am asked to comment on Mr Hancock's comment that *"right from the start we have tried to throw a protective ring around our care homes."* I think it is clear that whatever efforts were made in this regard, and it will be for Mr Hancock to identify the measures to which he was intending to refer, they were not successful. As SAGE 33 on 5 May 2020 found: *"The overall epidemic can be considered as three separate, but interacting, epidemics: in the community; in hospitals; and in care homes"* **[PV2/191 - INQ000061541, §1]**. By that time, the concern was that infections in care homes and hospitals were so prevalent that they could drive transmission elsewhere [§§10-11].

540. I am asked what, in my view, was the dominant way in which Covid-19 entered most care homes, particularly during the first wave. It is difficult to be sure but the Technical Report

assesses that both community transmission and discharge from hospitals were routes of ingress and that hospital discharge whilst important was unlikely to have been the dominant route **[PV2/7 - INQ000130955]**.

Contact tracing

541. Contact tracing is a well-established and standard response to outbreak of an infectious disease and as such it was considered by PHE from the start of the pandemic in the UK. I have discussed above the approach taken in January, February and March 2020 to contact tracing, and the advice that was given on when the limited resources then available ceased to be effective in light of the growing prevalence of SARS-CoV-2 in the UK. In this part of my statement I address questions asked of me about the attempts to rebuild a contact testing capacity, and in particular the NHS Test, Trace and Isolate programme.

542. My role, and that of SAGE in respect of contact tracing and the NHS Test, Trace and Isolate programme, was limited to providing science advice. As was recorded in the minutes of SAGE 21 (21 March 2021) **[PV2/179 - INQ000061529, §17]**: *"It was agreed that SAGE will not consider operational questions, but rather clarify the scale and requirements from the testing programme — the scale of testing required to manage the next phase."* We also gave advice on how speedy and complete contact tracing needed to be in order to be effective (SAGE 32, 1 May 2020 **[PV2/206 - INQ000061540]**). We suggested that this advice could form the basis of performance metrics for any test trace and isolate system.

543. SAGE provided initial science advice on the proposed NHS app at SAGE 23 (7 April 2020) **[PV2/187 - INQ000061531, §§15-23]**, emphasising the importance of integrating the app with existing testing and contact tracing approaches. At SAGE 24 (9 April 2020) **[PV2/188 - INQ000061532, §22]**, SAGE 26 (16 April 2020) **[PV2/181 - INQ000061534, §10]**, SAGE 27 (21 April 2020) **[PV2/324 - INQ000061535, §30]**, and SAGE 29 (28 April 2020) **[PV2/190 - INQ000061537, §20]** the minutes again highlighted the importance of considering an expansion of testing and contact tracing together, noting that an effective contact *testing, tracing and isolation* system would require testing capacity running into the hundreds of thousands even at low incidence of infection.

544. SAGE undertook a review of the principles that would be involved in a test and trace system, and the challenges involved, at SAGE 30 (30 April 2020), which tasked a sub-group to conduct further work on specific questions and principles **[PV2/325 -**

INQ000061538, §§31-35]. That group reported back to SAGE 32 on 1 May 2020, a meeting that was dedicated to the issue of contact tracing **[PV2/206 - INQ000061540]**. The summary of the meeting was as follows [§§1-4]:

> "[1] SAGE discussed the test and trace system in development. It agreed that at least 80% of contacts of an index case would need to be contacted for a system to be effective.
>
> [2] SAGE had high confidence that isolation of contacts of individuals who have COVID-19 within 48 hours of identification of an index case was desirable (but the practicality of this will be checked against international experience).
>
> [3] Ideally, testing should be so rapid that contacts of an index case are only asked to isolate on the back of a positive test result in the index case.
>
> [4] There is currently insufficient evidence to determine whether the testing of index case contacts would significantly impact the epidemic compared with isolation alone (nor is it clear when to test to avoid false negatives).

545. Further details of the discussion and the evidence on which it was based is available in the minutes and the papers that were discussed at that meeting **[PV2/206 - INQ000061540]**. Those papers included the minutes of a specially convened meeting of NERVTAG and SPI-M on contact tracing **[PV2/326 - INQ000074968]** and two papers from the LSHTM modelling the estimated impacts of contact tracing in different scenarios **[PV2/327 – INQ000206672 PV2/328 – INQ000206673]**

546. SAGE 37 (19 May 2020) considered the Royal Society DELVE report on Test, Trace and Isolate, which reinforced existing SAGE advice **[PV2/183 - INQ000061545, §§14-22]**. The central piece of advice from this meeting was:

> [15] An effective Test, Trace and Isolate system will be necessary (but not sufficient on its own) to allow further adjustments to distancing measures without pushing R above 1. It is a consensus view of current SPI-M modelling that high-quality contact tracing will be needed to keep R below 1 under any substantive adjustments to distancing measures.

547. SAGE commented on aspects of the DELVE report, including maintaining its advice that isolation of contact within 48 hours of identification of an index case was desirable (DELVE had given longer timelines). SAGE undertook to incorporate its views into advice for the Joint Biosecurity Centre, and did so through the minutes.

548. I have discussed above the importance attached to an effective system of testing and contact tracing in SAGE's advice about easing the measures that formed the first national lockdown. This can be seen in particular in the minutes and papers of SAGE 38 (21 May 2020) **[PV2/185 - INQ000061546]**, where SAGE received an update on the Test, Trace and Isolate scheme, the NHSX contact tracing app and the Joint Biosecurity Centre. One of the points made by SAGE at that meeting was the importance of the Test, Trace and Isolate scheme beginning at a time of low incidence and prevalence of the virus to avoid it becoming very rapidly overwhelmed.

549. SAGE conducted further work and provided further science advice on aspects of contact tracing at various points during the summer of 2020: see, for example, advice on the importance of cluster tracing and backward contact tracing considered at SAGE 40 (4 June 2020) **[PV2/213 - INQ000061548, §1, §§9-10]**, SAGE 41 (11 June 2020) **[PV2/329 - INQ000061549, §§22-24]** and SAGE 42 (18 June 2020) **[PV2/330 - INQ000061550, §§26-31]**; the relationship between quarantine of incoming travellers and contact tracing at SAGE 42 (18 June 2020) [§22]; the challenges around contact tracing in Leicester at the time of enhanced NPIs in the city at SAGE 48 (23 July 2020) **[PV2/265 - INQ000061556, §27]**; the importance of contact tracing systems to the re-opening of higher and further education institutions at the start of the 2020/2021 academic year SAGE 54 (1 September 2020) **[PV2/331 - INQ000061562, §§4-16]**. SPI-B was also tasked to provide advice directly to the relevant NHS team on behavioural science aspects of the design of the Test, Trace and Isolate scheme: see the List of Actions at SAGE 38 (21 May 2020) **[PV2/185 - INQ000061546]**.

550. I am asked for my views on the efficacy and usefulness of the NHS Test and Trace service. I think that it got much better as time progressed but it was very difficult to get it started. One repeated problem was the way in which the service was deployed in areas and at times of high prevalence, which led to it becoming overwhelmed and being much harder to operationalise. As SAGE had advised in May 2020, a contact tracing system will work best when incidence and prevalence is low. This is the approach that worked effectively in South Korea, but it only did so because it was deployed early, and with sufficient resource and capacity, to allow the authorities to stay on top of the virus and identify outbreaks. Had

the South Korean system proved insufficient for that challenge, and had prevalence grown in the way that it did in the UK, then it too would have become overwhelmed and ineffective.

551. I am asked when and why Operation Moonshot was subsumed into NHS Test and Trace. I was not involved in that decision and so I do not know.

Covid-19 Disparities

552. I was aware that the pandemic, and the measures required to tackle it, would have an unequal impact. As I stated at more than one press conference, the virus fed off inequality and drove inequality **[PV2/332 - INQ000064608]**. It was entirely foreseeable that pre-existing structural and health inequalities within ethnic minority and other vulnerable groups would result in disparities in risk and outcome.

553. The data from the UK and abroad provided evidence of the effect of those disparities at different times. I knew about age and co-morbidities as factors associated with higher mortality from an early stage and some of these were identified directly as a result of the work that fed into SAGE. Worse outcomes associated with ethnicity became evident to me within a month or so of the effects of Covid-19 becoming felt in the UK, though the cause was not at that time clear. As we learned more of the transmissibility of SARS-CoV-2, the importance of socio-economic factors and work environments became apparent. It was not always easy (or possible) to disaggregate different factors associated with higher mortality; in particular, whether the higher mortality rates in certain ethnic groups was related to biological or social factors (including the greater proportion of such groups in public-facing roles in industries that remained open during the pandemic). Considerable work was done to try to improve understanding. To give one example, we became aware of high rates of Covid-19 among those working in the meat-packing industry. This led to consideration of whether this was linked to the handling of meat and hygiene standards. Further work suggested that it was more likely to be connected to other factors such as that in some cases employees shared cramped accommodation, with beds being used by different occupants as they alternated between shifts.

554. SAGE commissioned research from an early stage on disparities in outcome and risk to various groups, including those identified as vulnerable. This work included the following during the first months of the pandemic:

a. SAGE 7 (13 February 2020) discussed how to limit spread in prisons. **[PV2/64 - INQ000061515, §§17-20]**.

b. SAGE 11 (27 February 2020) identified that one of SAGE's eight priority areas would be to *"understand risk factors around demographics, geographies and vulnerable groups (for example age)."* **[PV2/78 - INQ000061519, §5]**

c. SAGE 12 (3 March 2020) considered the impact of social distancing for the over-65s and recognised the challenges this would pose in communal settings such as care homes **[PV2/99 - INQ000061520, §6]** and multigenerational households. There were many other discussions around measures to be taken to protect those in later life and those with co-morbidities, including social distancing, cocooning, shielding and specific advice on spread in hospitals and care homes. I have touched on many of these elsewhere in this statement.

d. SAGE 12 (3 March 2020) also recorded that many of the proposed measures to prevent the transmission of Covid-19 *"will be easier to implement for those on higher incomes. Government should address this to avoid tension within communities and detrimental effects on compliance"* **[PV2/99 - INQ000061520, §13]**. Equity was recognised as one of the keys to facilitating compliance with NPIs [§10].

e. SAGE 14 (10 March 2020) repeated the difficulties that would be faced in particular by poorer households in complying with the NPIs then under most active consideration (self- and household isolation and social distancing for those over 70 and vulnerable groups) **[PV2/113 - INQ000061522, §34]**. The same point was made at SAGE 15 (13 March 2020) **[PV2/131 - INQ000061523, §32]**.

f. SAGE 16 (16 March 2020) recognised that school closures could increase rates of transmission for more vulnerable groups, which contributed to the decision to commission further work on this intervention **[PV2/153 - INQ000061524, §17]**. That work was discussed at the next meeting, SAGE 17 (18 March 2020) **[PV2/23 - INQ000061525, §§20-25]**.

g. SAGE 18 (23 March 2020) advised that: *"Given the clear links between poverty and long-term ill health, health impacts associated with the economic*

consequences of interventions also needed to be investigated" **[PV2/173 - INQ000061526, §4]**. The meeting discussed actuarial analysis to estimate the number of deaths caused indirectly by Covid-19 (including by NPIs) and identified the need for *"data on patient backgrounds and risk factors"* [§40].

h. SAGE 19 (26 March 2020) reconsidered SAGE's priorities in the expectation that R would reduce below 1 as a result of the lockdown. Among the priorities identified was that SAGE should consider how to minimise harms from NPIs, and in particular health impacts on poorer people **[PV2/180 - INQ000061527, §19]**. The same meeting referred to CO-CIN data that were allowing for a picture to begin to develop of the most serious co-morbidities affecting mortality [§18].

i. SAGE 25 (14 April 2020) advised that it was difficult to obtain good data to assess the impact of measures on shielded and vulnerable groups, but a better understanding was needed. **[PV2/189 - INQ000061533, §34]**

j. SAGE 26 (16 April 2020) discussed CO-CIN data that were *"giving a signal that black people have a higher risk of being admitted to hospital and of death, when adjusted for them having fewer comorbidities."* The CO-CIN data would become clearer over the coming weeks. The Royal College of GPs Research and Surveillance Centre data were producing a similar signal. The meeting also noted that investigation was underway to understand why relatively more BAME healthcare workers were dying. There was also discussion of PHE data that had identified a signal (from weak evidence) of South Asian communities disproportionately testing positive and experiencing severe symptoms. Professor Calum Semple, Professor Andrew Morris, Professor Van-Tam and Professor Watts were tasked to develop a robust study on ethnicity in mortality data. **[PV2/181 - INQ000061534, §§11-14]**

k. Further discussion on this work took place at SAGE 27 (21 April 2020), where it was noted that use was being made of multiple datasets to better understand socioeconomic and other factors. NHSX was asked to confirm that it was *"placing a high priority on collecting data to understand ethnicity and mortality."* The CSA of the FCO was tasked with investigating differences in mortality rates in Germany and other countries with reference to demography, ethnicity and other factors **[PV2/324 - INQ000061535, §8 and List of Actions]**.

l. SAGE 29 (28 April 2020) considered a CO-CIN analysis that suggested that difference in admissions to ITU and mortality by ethnicity could be explained by comorbidities and were unlikely to be the result of management pathways in hospital. It was noted that other studies were underway and would be considered when the results became available. **[PV2/190 - INQ000061537, §15]**

m. SAGE 39 (28 May 2020) considered a paper entitled, "Preventing outbreaks in forgotten institutional settings: What are we missing?" This looked at the homeless sector and other vulnerable populations **[PV2/333 – INQ000230985 PV2/334 - INQ000061547, §§15-20]**

n. A summary paper entitled "Ethnicity and COVID-19" was presented and discussed at SAGE 40 (26 June 2020), along with several other pieces of work on this topic.[57] The summary paper was prepared by the SAGE secretariat. It noted the non-uniform risk among BAME groups of catching Covid-19, which was potentially linked to economic inequality amongst other factors. The paper also identified increased risk of ICU admission and death among BAME groups compared to non-BAME groups, and raised the possibility of the contribution of biological factors (including cardiovascular disease) to the in-hospital differences in outcome. Further discussions took place within the meeting on (among other matters) ethnicity and deaths of healthcare workers, differences within ethnic categories as they were then defined, and sociological factors that may have contributed to the observed increase in risk. It was agreed that both social science research and bio-medical research were urgently needed **[PV2/336 INQ000223042 PV2/213 - INQ000061548, §§22-31].**

o. Following the meeting, the SAGE Secretariat were tasked with circulating the "Ethnicity and Covid-19" paper (and supporting papers) to the Cabinet Office and DHSC for onward dissemination to the Cabinet Secretary, Heads of Departments and all relevant leads. Among the other actions arising from the meeting was a commission for SPI-B to provide advice on targeted messaging for BAME groups, and a request that UKRI consider priorities for social and biomedical research on ethnicity and Covid-19. PHE were to lead on

[57] See **[PV2/335 – INQ000283939**

implementing strategies to mitigate ethnicity as a Covid-19 risk factor, working with HSE and the Faculty of Occupational Medicine.

p. Many other SAGE papers and discussions touched upon Covid-19 disparities, as can be seen from the public repository of SAGE materials. For example, a SPI_B paper entitled "The impact of financial and other targeted support on rates of self-isolation or quarantine" was considered at SAGE 57 (17 September 2020). This discussed ways to increase the rates self-isolation, which were particularly low among the youngest and the poorest **[PV2/337 – INQ000231034**

555. A SAGE Ethnicity Sub-group was established in August 2020 and was chaired by Professor Kamlesh Khunti of the University of Leicester **[PV2/338 INQ000074981]**. The full scope of its work can be seen from its published papers (available via the SAGE repository). One that is of particular note is "Interpreting differential health outcomes among minority ethnic groups in wave 1 and 2", which was considered at SAGE 84 (25 March 2021) and which draws on qualitative and sociological evidence to conclude that *"that all minority ethnic groups in the UK have been at higher risk of mortality throughout the Covid-19 pandemic (high confidence)"* **[PV2/339 - INQ000231046**

556. The summary above does not contain a full chronology of the work done by SAGE on Covid-19 disparities, and it focusses on what was done in the early months of the pandemic. Thereafter, SAGE and its sub-groups continued to contribute to the research and understanding on how Covid-19 affected different sectors of society in different ways, including through the unequal impact of NPIs. The advice that we gave to core decision-makers on these matters is contained in the SAGE minutes and papers (for example the "Ethnicity and Covid-19" paper that was circulated to the Cabinet Secretary and Heads of Department). Significant work was undertaken by ONS and PHE to document and understand the effects of ethnicity and inequalities on Covid-19 outcomes.

557. The understanding of disparities in Covid-19 outcomes was intrinsic to a clinical understanding of the virus. This improved as time progressed and more data were received. As can be seen from the summary above, various data sets and studies were used to increase knowledge, including clinical data from CO-CIN and studies on admissions into ICU. These were designed to allow for analysis by reference to various factors including age and ethnicity. SAGE also considered external research, including a paper by the ONS on Covid deaths and ethnicity in 2020 **[PV2/340 INQ000223073**. The

issues were known to and discussed at all levels. At data meetings attended by key decision-makers including the Prime Minister, issues such as the effects of crowded housing and its apparent disproportionate impact on certain ethnic minorities was explored. The issue of multigenerational households in relation to proposals for shielding was raised frequently, including with the Prime Minister **[PV2/341 - INQ000102219]** I am asked if the data about disparities was adequate. At first it was not and as a result SAGE suffered from similar gaps in knowledge as it did in other areas. As in other areas, the data improved markedly for the reasons discussed elsewhere in this statement. Others, such as the ONS, will be able to provide more information on how data on disparities, were captured (including retroactive collection).

558. I am asked why there were disparities in relation to Covid-19 for certain groups, including ethnic minorities. This is a very broad question and experts from numerous fields would be required to answer it. What I would say is that SAGE looked carefully and in depth at evidence of biological, institutional, healthcare, economic and various other factors that may have caused or contributed to disparities. ONS and PHE also did so. My understanding is that, in general, the evidence at a population level pointed more towards social, economic and inequality rather than biological factors, though it is clear that specific biological factors and co-morbidities in individuals were a major determinant of the effects of Covid-19. Others will be better placed to answer more specific questions about particular points of disparity.

559. I am asked what role I had in two PHE reports on Covid-19 and disparities that were published in June 2020 ("Covid-19: review of disparities in risks and outcomes" and "Beyond the Data: Understanding the impact of Covid-19 on BAME groups"). I cannot recall exactly, although I suspect they came about as a result of the discussions at SAGE. The work was done by PHE and I read the reports. The first of the papers was among those discussed at SAGE 40 (4 June 2020).[58] I do not think I was involved in the PHE Covid-19 Health Disparities Monitoring for England (CHIME) tool or the QCovid Tool.

560. I am asked if I was aware of the high percentage of ethnic minority staff in public facing roles who were likely to be put at higher risk of exposure to Covid-19. I was aware, and this work informed SAGE and its advice. This was an important topic that SAGE identified data on and identified as a problem.

[58] See **[PV2/336 - INQ000223042]**

561. SAGE provided advice and reports, regularly, about disparities and inequalities in the effect of Covid-19. I do not think that the awareness of issues of inequality translated quickly or effectively into policy or operational action. Nor am I sure that enough was done during the pandemic to monitor the unequal outcomes that were resulting from the virus and the NPIs. This is beyond science advice but I think there is merit in exploring the idea of a high priority "red team" convened to consider inequality and to inform and challenge advice, policy and operations.

562. I am asked about the Equality Impact Assessments. These Assessments were matters for the policy departments that were tasked with the operational implementation of measures. I would expect them to draw on the SAGE minutes and papers when compiling them. Beyond that, I was not involved in the Assessments.

Face Coverings

563. The initial advice on the face masks and coverings came from NERVTAG **[PV2/342 – INQ000119615** and was endorsed by SAGE 4. This was to the effect that:

a. There was limited to no evidence of the benefits of the general public wearing face masks as a preventative measure.
b. Face masks and other PPE was, at that time, only advised for health and social care workers visiting individuals who may be infectious.
c. There was *"some evidence that wearing face masks by symptomatic individuals may reduce transmission to other people"* and thus it was recommended that such people should be encouraged to wear face masks as a preventative measure.

564. In effect, the evidence at that time suggested that face masks might stop infectious people from spreading the virus, but little or no evidence that wearing the type of mask that was widely available offered any protection from catching an infection.

565. Face coverings were also considered by SPI-M in a modelling paper on NPIs that was considered at SAGE 4 and SAGE 7 (13 February 2020) **[PV2/64 - INQ000061515]**. This concluded that, *"The wearing of face masks by the general population is unlikely to meaningfully reduce transmissions."* **[PV2/65 - INQ000087430**

566. The next minuted discussion at SAGE on the use of face masks by the general population took place after the first lockdown had been imposed on 7 April 2020 (SAGE 23) **[PV2/187 - INQ000061531, §8]**.

> "NERVTAG concluded that increased use of masks would have minimal effect (in terms of preventing the uninfected general population from becoming infected), based on a review of the available evidence. Questions were raised about whether this would change if it were found that individuals have high levels of pre-symptomatic and asymptomatic infectiousness (in which case could masks reduce early pre-symptomatic spread)."

567. In response to this discussion, NERVTAG was commissioned to produce a paper within a week. They did so **[PV2/343 - INQ000074913]** and it was considered at SAGE 25 on 14 April 2020 **[PV2/189 - INQ000061533]**. The minutes of that meeting recorded the consensus view that emerged:

> "[15] Evidence does not currently support use of face masks to protect the wearer in the general population.
>
> [16] There is mechanistic evidence for efficacy of face masks in reducing transmission when used by someone who is infected with (a source of) the virus. Direct trial evidence does not support effectiveness in practice in other diseases. The fundamental difference with COVID-19 is the shedding of virus during asymptomatic and pre-symptomatic infection.
>
> [17] There are theoretical drawbacks to increased use of masks in the population. However, the evidence on these drawbacks may not be applicable to the current situation, particularly evidence around compliance.
>
> [18] Overall, the evidence that masks could prevent spread is weak, but probably marginally in favour of a small effect. If there are benefits, these are only likely in specific circumstances.
>
> [19] Circumstances where there may be benefits included enclosed environments with poor ventilation, and around vulnerable people. Conversely, there are unlikely to be any significant benefits in use of masks outdoors.

[20] There are communication considerations around any change in advice on masks. Communications are likely to be required around fitting and usage as well as on the importance of maintaining the other, more effective, measures in place.

[21] Other operational considerations include supply chain and distribution impacts but these were not considered as part of this review.

568. NERVTAG was commissioned to produce a shorter paper to inform ministers, alongside policy and operational advice from the CMO's office and DHSC. This was requested by the following meeting on 16 April.

569. At that meeting, SAGE 26 **[PV2/181 - INQ000061534]**, SAGE agreed to produced further advice on the use of face masks in the community. However, this was intended for consideration as part of the measures to be implemented when lockdown was lifted and social distancing measures were eased. It was not intended to be relevant to the then current situation where lockdown remained in place. [§23]

570. SAGE accepted the NERVTAG position that the evidence about the use of masks outside of healthcare settings was *"weak … but marginally positive"* [§24]. The minutes reflect some of the potential detriments to a change of advice on whether and when masks should be worn. Masks should not be used to allow symptomatic people to leave their houses – they should self-isolate [§25]. Any change of advice should not be linked to or confused with a lifting or easing of other restrictions [§26]. Advice would need to be integrated with other considerations, such as availability [§28]. If the use of masks in the community were to threaten stocks of masks for use in medical, nursing, social care and other high-risk environments then *"this would be a net increase in risk in public health terms"* [§24]. The CMO undertook to produce a summary of recommendations drawing on evidence from the Royal Society's DELVE initiative,[59] SPI-M and NERVTAG.

571. SAGE returned to the topic at its meeting on 21 April 2020 (SAGE 27) **[PV2/324 - INQ000061535]**, where it was agreed that there was enough evidence to support recommendation of community use of cloth face masks, for short periods in enclosed spaces where social distancing is not possible, in the context of releasing lockdown

[59] Data Evaluation and Learning for Viral Epidemics.

measures [§1, §13]. It was noted that the evidence base for this recommendation was weak [§§9-11].[60] The advice came with the following caveats.

> "[21] This advice does not replace or change existing advice on other measures — such as hand washing, 2-metre distancing and self-isolation — which remain more important (because of stronger evidence and larger effects).
>
> [22] Negative behavioural impacts cannot be ruled out, for example those with symptoms who should isolate instead choose to break quarantine wearing a mask or repeated handling of the mask could increase hand to face contact.
>
> [23] Equally, wearing masks in the context of lifting NPIs could reduce anxiety about release of measures, or reinforce the need for distancing measures.
>
> [24] Clear public guidance would be needed on mask design or construction, wearing, handling, cleaning and disposal."

572. This advice was to be summarised in a submission for ministers to make a policy decision on whether to recommend to the public that masks were used. As I understand it, the decision was taken to make the recommendation on 11 May 2020. Later, in light of further evidence, a decision was taken to make face coverings mandatory on public transport from 15 June 2020 **[PV2/344 – INQ000053428]**

573. I am asked what advice I gave on face coverings in February and March 2020. The advice that I gave is that contained in the SAGE minutes. I am also asked why *"a precautionary approach"* was not taken. That question rests on the assumption that there was no perceived detriment to advising the wearing of face masks, while there may have been some benefit. I do not think that assumption is correct. As the SAGE minutes in April show, there were concerns from a number of experts about face masks having detrimental effects. They could lead to a false sense of security, including in symptomatic people. There was a perceived risk that the advice could cause confusion or lessen compliance with other behavioural and social interventions. People touching their masks could increase hand to face contact which could risk increasing transmission. There were practical concerns that members of the public buying masks could threaten the supply to

[60] See also the clarification of the SAGE 27 minutes at SAGE 28 on 28 April 2020 **[PV2/182 - INQ000061536, §6]**.

health and social care workers, who needed them more. These concerns were raised by scientists in the relevant disciplines, including behavioural science. It was reasonable to weigh them against the (then limited) evidence of the benefits of encouraging the general public to wear masks.[61]

574. More generally, I return to what I said in my first witness statement **[PV2/2 - INQ000147810, §108]**.

> "In any pandemic there will inevitably be pressure to introduce interventions that are not supported by proper clinical evidence (for example proposals to introduce Vitamin D for the whole population in the hope that this would increase protection against Covid-19, or to use hydroxychloroquine or ivermectin for treatment). It is vitally important that such pressure is resisted and that proposed pharmaceutical interventions are tested in well-designed clinical trials. History tells us that many interventions that appear useful in small trials or anecdotes turn out not to be effective or even to be harmful when tested in larger scale trials."

575. While it was not practicable during the pandemic to carry out a controlled trial on the use of face masks, I think that it was proper for SAGE and other science advisory groups to interrogate the available data and literature in order to provide robust, evidence-based science advice on the benefits and disadvantages of taking the proposed step. Ultimately it was for the politicians to decide what the policy and public advice should be. Had they wished to proceed without science advice they could have done so. The advice from April 2020 was that face coverings produced a marginally positive benefit so from that time any decision to use them would have been in line with SAGE advice.

576. The debate about face masks was an international one and, in general terms, the UK was ahead of the WHO advice on this point. On 6 April 2020, the WHO published provisional advice that *"the wide use of masks by healthy people in the community setting is not supported by current evidence and carries uncertainties and critical risks."* **[PV2/345 – INQ000229333]** This advice was not updated until 5 June 2020, when governments were advised to encourage the use of masks by the general public where social distancing could not be maintained. Even then the WHO acknowledged that the evidence base in support

[61] I am also aware that other social arguments were raised against face coverings, including by members of the deaf community who would be unable to lip read.

of this measure was weak and that there were a number of potential harms and disadvantages associated with it **[PV2/346 –INQ000229307**

577. Further details on SAGE advice on face masks during the remainder of the pandemic is contained in Dr Wainwright's second statement **[PV2/4 INQ000252450 §§3.9-3.12; PV2/215 INQ000298958 Annex F]**. On January 30 2023 a systematic review was published by the highly respected Cochrane reviews organisation. It concluded that "*we are uncertain whether wearing masks of N95/P2 respirators helps to slow the spread of respiratory viruses based on the studies we assessed*". However this work has been heavily criticised and it will definitely not be the last view on the subject **[PV2/347 –INQ000231028**. I asked the Royal Society to undertake work looking at the impact of individual NPIs including the effects of masks and this is due to report soon.

578. I am asked why the position on face masks changed during the course of the pandemic. The short answer is that the advice changed when the evidence changed. In April 2020 we concluded that on balance masks produced a beneficial effect. Earlier wearing of masks from the beginning of March may have been helpful and I hope that the ongoing reviews will answer this question for the future.

Advice concerning mass gatherings

579. I am asked what advice I gave to core decision-makers between January and March 2020 about whether large public gatherings should be restricted in order to limit the spread of Covid-19, in particular in relation to the Cheltenham Festival, which opened on 10 March 2020, and a Champions League football match in Liverpool on 11 March 2020.

580. The advice given to ministers on large public gatherings is contained in the SAGE minutes, and the reasons for it are set out in the minutes and supporting papers.

581. SAGE first expressly addressed large gatherings on 4 February 2020 (SAGE 4), where it was recorded that: *"Measures within the UK – such as shutting down public transport and suspending public gatherings – would probably be relatively ineffective in [limiting] the spread of [SARS-CoV-2]"* **[PV2/31 - INQ000061512, §40]** This advice was specific to that point in time, before there were any reported cases of the virus being transmitted within the UK. It drew on a SPI-M statement on the impact of possible interventions dated 3 February that had found that *"little direct evidence is available on the effects of cancelling large public events"* **[PV2/65 - INQ000087430**.

582. SAGE revisited this conclusion on 13 February 2020 (SAGE 7), where it found that **[PV2/64 - INQ000061515, §8]**: *"There is no current evidence to suggest prevention of mass gatherings is effective in limiting transmission. Public actions in the absence of mass gathering could have comparable impact (for example watching a football match in a pub instead of a stadium as likely to spread the disease."* This is the key point. Numerically the risks were far greater for the multiple interactions occurring indoors rather than a single outdoor gathering and the worry was that cancelling attendance at large outdoor events without stopping indoor gatherings would be largely ineffective or worse.

583. On 27 February SAGE 11 gave the following science advice: *"On the risk posed by national and international travel associated with large events (for example sports), SAGE advised that the additional number travelling are not significant relative to overall numbers, but that this question should be further investigated. On large events, SAGE noted that alternative or replacement behaviours (for example going to the pub instead of a stadium) would pose comparable risk."* **[PV2/78 - INQ000061519, §§14-15]**

584. SAGE considered the position again at its next meeting on 3 March 2020 (SAGE 12) and found that there *"is currently no evidence that cancelling large events would be effective"* **[PV2/99 - INQ000061520, §7]**. That meeting also considered the latest paper from SPI-B on behavioural and social interventions, which contained the following advice **[PV2/101 - INQ000129014** *"If government advises against certain behaviours or prevents people from doing different activities, supporting alternative means of social engagement may mitigate against unintended consequences, e.g. gatherings in alternative locations or negative impacts on health and wellbeing."* This was reflected in a comment in the SAGE minutes that, *"Unintended consequences should be considered – including potential alternative behaviours (for example people congregating elsewhere when events are cancelled)"* [§13]**.**

585. The following day the SAGE secretariat produced a paper on the potential impact of behaviours and social interventions **[PV2/106 –** INQ000129014 Among the interventions considered was, *"stopping large events such as concerts and sports,"* which was thought to have *"very little effect"* on delaying, suppressing or reducing the peak of the outbreak, or in reducing the number of cases and fatalities. This conclusion was expressed to have *"low confidence,"* reflecting the limited evidence base. From the behavioural science perspective, the paper concluded: *"If events are cancelled, compliance will be high.*

However, displacement is also possible (e.g. football supporters congregating away from stadiums to watch matches).”

586. SAGE met again on 5 March 2020 (SAGE 13) and at that time advised the following **[PV2/102 - INQ000061521, §14]**:

> “SAGE agreed there is no evidence to suggest that banning very large gatherings would reduce transmission. Preventing all social interaction in public spaces, including restaurants and bars, would have an effect, but would be very difficult to implement.”

587. As is set out above, the context of this advice was the epidemiological and modelling data that supported implementation of some NPIs within one to two weeks, and the associated advice that a combination of measures would be more effective than implementing them individually [§2 and §10].

588. At SAGE 14 on 10 March 2020 **[PV2/113 - INQ000061522]**, the group noted that: *“public gatherings pose a relatively low but not zero public risk. People are more likely to be infected by people they know, not strangers. But it acknowledged the importance of advice in this area and agreed to review it and to look at different types of gatherings or meetings.”* [§37]

589. This led to the production of a paper by the modelling team from LSHTM, and consensus statements from SPI-M and SPI-B. The LSHTM paper, dated 11 March concluded that: *“Banning sporting events has a negligible impact on the epidemic. Reducing all leisure contact, which mainly occurs in pubs/bars, restaurants and cinemas would have a much larger (though still modest) impact on the epidemic. Many individuals are likely to choose to avoid such settings anyway, as they perceive them to be risky.”* **[PV2/348 - INQ000212210]**

590. SPI-M’s consensus statement, also dated 11 March, included the following **[PV2/349 - INQ000229241]**

> “The direct impact of stopping large public gatherings on the population-level spread of the epidemic is low, because they make up only a small proportion of an attendee’s contacts with other people. However, stopping them would have effects on their other behaviours, which could have a larger impact on the epidemic spread. On one hand, stopping some public gatherings could mean

people replace this with other activities (i.e. playing football behind closed doors could mean fans watch the match in the pub), potentially slightly accelerating epidemic spread. On the other hand, the message sent by stopping them would be expected to change people's behaviour in other ways, potentially slowing epidemic spread. It is not possible to quantify either of these effects.

The impact of stopping all leisure activities, including public gatherings such as at bars and restaurant, would be expected to have a much larger effect on the population-level spread of the epidemic. Smaller gatherings happen more frequently than larger ones so the cumulative effect is larger.

The risk of infection to an individual from attending public gatherings depends on the length of time they spend in close proximity to other people. The key factor isn't the size of the event, but the number of people to whom you come into close contact; duration of those contacts; and how close these contacts are. In general, contacts tend to be less intimate and shorter at public gatherings than in other settings such as contacts with family members and co-workers.

The risk to an individual from attending large events is generally no higher than in smaller events. In most larger events, such as sports matches, attendees will come into close contact with at most a handful of people, so the risk to attendees is low."

591. The SPI-B consensus statement **[PV2/350 - INQ000214048]**, dated 12 March, noted the expectation among the public that large gatherings would be banned, particularly as they had been in other countries, and the risks to public confidence if that expectation were not met. SPI-B repeated their advice about the risk of unintended consequences through displacement activity (e.g. watching games from a pub).

592. These papers were due to be considered at the next SAGE meeting, SAGE 15, which took place on Friday 13 March **[PV2/131 - INQ000061523]**. As is discussed previously, that meeting focussed on the assessment that the UK was further along the epidemic curve than had been previously thought, and the consequent need for the early introduction of the planned NPIs (individual and household isolation, and social distancing by high-risk groups). The events of the weekend of 14 to 15 March, and the week that followed and which led to the full lockdown on 23 March, are considered in some detail above.

593. As can be seen from the SAGE minutes and papers, the issue of large gatherings, including sporting fixtures, was considered and reconsidered over the course of February and the first half of March 2020. That consideration was done by experts in epidemiology, virology, public health, modelling and behavioural science. The consistent view was that there was little or no evidence that, on a population wide level, banning large gatherings on its own would significantly stop, slow or lessen the effect of the virus.

594. A retrospective study done by COG UK, dated 11 June 2020, mapped the origin of viral growth across the UK based on genomic sequence. It showed that the volume of introductions of the virus from European countries following the end of the half-term holidays was highly significant but that *"the impact of any individual event (e.g. sports matches or conference) on the number of cases introduced to the UK as a whole was likely negligible."* **[PV2/351 - INQ000230987** There was also little or no evidence of disproportionate spread of the virus around such events.

595. In terms of behavioural science, a repeated concern was raised that if sporting events were cancelled without other measures being put in place, there was a risk of unintended displacement activity, such as people gathering inside in a pub to watch football matches. This risked doing at least as much, and possibly more, to spread the virus. On the other hand, papers in March 2020 suggested that cancelling sporting fixtures might influence behaviours in ways that would lessen transmissions. Neither of those effects could be quantified.

596. From the perspective of science advice, the position was that there was little evidence that cancelling sporting events in isolation would have a significant effect. However, in the days and weeks that followed the SAGE meeting on Friday 13 March it became clear that a combination of measures would be required to slow transmissions in order to avoid the NHS becoming overwhelmed. Cancelling large public gatherings were one such measure, though it was thought to be less effective (and thus less urgent) than other measures, including individual and household isolation, social distancing and shielding, and reducing indoor gatherings.

597. I have reflected on whether the advice I gave, which arose from SAGE and its sub-groups, was too purist as we compared the effects of mass gatherings with the effects of mass spreading through smaller gatherings. We were aware that there was public disquiet about such events and, as SPI-B reported, there is a risk of losing public confidence if measures

that are expected to be put in place are not implemented. I am also aware of the enduring loss suffered by those whose loved ones attended sporting events and other mass gatherings in this time, for whom population-level analysis will seem remote and detached from their experiences. I think that large events should have been stopped earlier together with instructions about smaller indoor meetings and gatherings in pubs and clubs.

Borders

598. Historically, the spread of pandemics has been accompanied by calls to close borders. In his Gresham Lecture of 10 October 2018, Professor Whitty challenged this intuitive belief that viruses can be stopped by preventing travel. He commented that: *"The global spread of epidemics can be rapid and even in preindustrial times when transport was very slow diseases such as plague and syphilis moved very rapidly across continents."* Airborne diseases, in particular, were much more difficult to interrupt than other transmission routes. He noted that the 1918-1920 H1N1 influenza pandemic took place in a period of very restricted travel, yet still killed between 50 and 100 million worldwide. It was characterised in the United States by a sudden onset leading to a massive increase in mortality, *"demonstrating the speed at which serious pandemics can hit humankind."* In respect of the H1N1 pandemic in 2009, he recalled that the popular press had called for screening at airports and banning travel, though this would have *"limited or no effect."* **[PV2/352 - INQ000228602** Throughout the pandemic the science advice was based on the principles and assessment of magnitude of impact on viral spread and epidemic growth rather than specific policies.

599. SAGE considered measures that could be put in place at ports of entry from its first meeting on 22 January 2020 (SAGE 1, the precautionary SAGE). It noted and agreed with NERVTAG's position, which did not advise port of entry screening or the use of screening questionnaires. It should be remembered that at this point in time there was no test for SARS-CoV-2. SAGE stated that it would review its position only if a simple, specific and rapid test was available and was deployable across the UK. Temperature and other forms of screening were considered, but it was thought they would be unlikely to be of value given the high false positive and false negative rates. **[PV2/32 - INQ000061509, §§16-20].** This was subsequently shown to be correct as importation evaded these measures in Italy and the USA. The WHO view on travel restrictions has been described elsewhere and was broadly in line with SAGE advice.

600. On 2 February 2020, the CMO sent an email to me and a number of SAGE colleagues, including Professor Neil Ferguson and Professor John Edmunds. Sir Jeremy Farrar was later added to the discussion. The CMO wrote ahead of a SAGE discussion on travel restrictions, as he thought he was likely to be asked for a provisional view on this matter before SAGE met. He asked us to focus narrowly on epidemiology, rather than wider social, political and other factors. The CMO set out four measures, two dealing with flights to China, and two concerning returning flights. On the latter, the CMO considered, first, the effect of stopping all travellers from China to the UK for 14 days and, second, the effect of all G7 / trade partners (by which I took him to mean the EU) banning flights and travel from China. The consensus of the discussion was that these measures would at best delay but would not prevent the importation of the virus, and that a ban by the G7 / EU would be more effective than a UK-only ban. Professor Ferguson thought that the latter may lead to a delay of *"up to 3 weeks maximum"*. He also commented that it was *"quite likely"* that there were already a number of undetected cases in the UK; if this was right, it would change the cost/benefit analysis of measures to restrict travel. Professor Edmunds agreed that at best restrictions would buy *"a few weeks"*. Without signs of a slowdown in the epidemic in China (of which he saw no reliable evidence), Professor Edmunds' view that was *"there seems little point in trying to put in place very restrictive measures."* The CMO thanked those involved for their input and listed potential benefits of delaying the epidemic, including in buying more time for organisation. **[PV2/353 - INQ000228638]**

601. The SAGE discussion that the CMO had referred to in his email took place the following day, 3 February 2020, at SAGE 3. A series of estimates were given on the expected impact of travel restrictions: a 50% reduction in imported infection *"would maybe delay the onset of an epidemic by about 5 days; 75% would maybe buy 10 additional days; 90% maybe buys 15 additional days; 95%+ maybe buys a month."* Only the latter was considered to be *"meaningful"* in assisting NHS preparation. To achieve that level of prevention, *"would require draconian and coordinated measures, because direct flights from China are not the only route for infected individuals to enter the UK."* The meeting noted that there were gaps in the data about the numbers of people entering the UK from China, and that the figures cited had *"considerable uncertainty"*. More work was requested from the DfT, the Home Office and SPI-M, with the issue moving from the science advice to the operational stage **[PV2/30 - INQ000061511, §1-3, §§16-20]**.

602. The meeting also noted that, *"Ongoing transmission of [SARS-CoV-2] in other countries would negate the effectiveness of travel restrictions on passengers coming directly from China – as might other international travel restrictions which force travellers from China to*

use alternative means or routes to travel" [§20]. This was intended to reinforce the point that once the virus had escaped China, it would be much harder to establish effective travel restrictions. There was a strong argument for China stopping travel. Unfortunately, by late January the virus had already escaped from China and most cases that subsequently entered the UK did so from Europe, not China.

603. Among the papers considered by SAGE 3 was a 2006 journal article, produced by a team that included Professor Edmunds, which modelled the effect of international travel restrictions in the context of concerns about avian influenza. The paper found that "*unless almost all air travel from affected cities (i.e. greater than 99%) was suspended, the potential for delaying the pandemic was limited … Even when 99.9% of air travel was suspended, most cities had a low probability of ultimately escaping the pandemic … and delays large enough to be of clinical significance (6 months or more) were common only if interventions were made after the first few cases."* **[PV2/354 -** INQ000228600

604. At a meeting the following day, SAGE 4 on 4 February, SAGE stated that it remained content with the validity of the statement it had issued the previous day on the impact of international travel restrictions. **[PV2/31 - INQ000061512, §34].**

605. It is worth noting that at the very early stages of the pandemic all individuals entering the UK deemed to potentially have Covid were put into isolation facilities. At risk countries were identified (and that list was the expanded) and special attention was paid to these. At a meeting with the Prime Minister and others I recall the CMO stating that containment in China (i.e. closure of Chinese borders) or closure of EU borders presented the best option of reducing spread.

606. On 7 February 2020, a paper was published, jointly authored by biostatisticians and modellers. This considered the use of domestic and international travel restrictions. Its principal finding of note so far as the UK was concerned was that while travel quarantine restrictions would have a marked effect in reducing case importations (by an estimated 80% to the end of February), *"Modelling results also indicate that sustained 90% travel restrictions to and from Mainland China only modestly affect the epidemic trajectory unless combined with a 50% or higher reduction of transmissions in the community."* **[PV2/355 –** INQ000228649 I received this paper from Professor Watts, CSA at DfID, on 9 February.

607. The question of UK borders was returned to on 23 March 2020, at SAGE 18, in response to questions posed by the Home Office **[PV2/356** INQ000052671 On the advice of SPI-M,

SAGE reconfirmed its previous advice that the effect of closing borders would have a negligible effect on overall spread once the virus was in the UK. The numbers of imported Covid-19 cases were assessed to be an *"insignificant"* 0.5% of the total number then present in the UK (i.e. 95.5% of cases were the result of infections within the UK).[62] Control of domestic spread was the essential issue at that stage **[PV2/173 - INQ000061526, §§27-28]**

608. On 18 June 2020, SAGE 42 considered the position of travellers who had been asked to quarantine when entering the UK. It reiterated previous advice that quarantining of travellers was most effective when those travellers came from a country with higher incidence of the virus than the UK and that the overall effect was highly dependent on the prevalence in the UK. **[PV2/330 - INQ000061550, §19]**. The CMO and I had given advice to that effect in a Cabinet meeting on 10 May 2020 **[PV2/198 - INQ000062188]**. Advice was also given on testing regimes [§§20-22].[63]

609. These minutes were the formal science advice that was given on border controls during the first stage of the pandemic, which was to the effect that shutting the UK border or taking other measures to quarantine travellers would at best delay but not stop the virus from entering the country; that the delay would be short unless draconian steps were taken; and that draconian steps would buy only a limited period of time, possibly up to a month. If border restrictions were put in place across the G7 or the EU they would be more effective than unilateral measures taken by the UK, but even then the effect would likely still be to delay case importations and not to prevent them. After the initial wave of Covid-19, the advice was that quarantine measures would be more effective when put in place on travellers coming from countries with a higher prevalence of Covid-19 than the UK, but still the overall effect on the pandemic would not be large unless the UK could drive down domestic spread.

610. This advice was repeated on various occasions, as border controls were an issue to which the Prime Minister and other ministers regularly returned. They would question and challenge the science advice, but my impression was that they understood it and recognised the limitations of border controls in preventing pandemic spread. This was an intensely political area, particularly when other countries adopted more stringent measures

[62] Similar advice was given later in the pandemic, at SAGE 55 on 3 September 2020. **[PV2/267 - INQ000061563 §8]**
[63] SAGE gave further advice about testing of retuning travellers under quarantine restrictions on 3 December 2020 at SAGE 71. **[PV2/270 - INQ000061579, §§21-23]**

than the UK. Ultimately, policy decisions were for the policy-makers, not for the science advisers.

611. I am asked if I witnessed the Prime Minister expressing the view, *"aren't people going to think we're mad for not closing the borders."* I do not recall him saying this in my presence.

612. I am asked a number of questions about policy decisions, including on whether the borders should have been closed before March 2020, on the "enhanced monitoring" that was put in place on 22 January 2020, on the approach taken to direct flights from Wuhan, on decisions on quarantining incoming travellers, on the FCO advice on travel that was issued on 28 January and 17 March 2020, and on the 12 March 2020 guidance on self-isolation. These are matters concerning the choices made on policies and their implementation, which were for the relevant ministers and Departments and not for SAGE. Our science advice, as set out above, informed those decisions but was not the only input.

613. In terms of the land border with Ireland, this too was a policy matter rather than the subject of science advice and others will be better placed to say how it affected the UK's approach. However, as I have said elsewhere in this statement, the UK was in a highly vulnerable position. It is not self-sufficient in food and other vital materials and so had to maintain a degree of openness in its borders. It is geographically close to its near neighbours and is highly inter-connected with the wider world (London in particular). Any policy choices had to contend with those realities.

614. I am asked about why testing of passengers was not introduced in January to March 2020. That was an operational question but it is important to reiterate that the UK had insufficient tests. As is discussed elsewhere, the limited testing capacity that we had was, in March 2020, focussed on hospital testing. Had more tests been available, then it could have led to different policy options being considered. The minutes of SAGE 1 on 22 January 2020 recorded that SAGE would review its position if a simple, specific and rapid test became available *"and was deployable at scale across the UK"* **[PV2/32 - INQ000061509, §20]**. That position was not reached in the period from January to March 2020.

615. I am asked about the policy of travel corridors, which was implemented from July 2020, and which ended the need for self-isolation for travellers from specified countries **[PV2/357 INQ000086694]**. The science advice had not changed from that set out above. The introduction of travel corridors was a policy decision.

616. SAGE discussed testing and quarantine regimes for travellers entering the UK at SAGE 71 (3 December 2020) **[PV2/270 - INQ000061579, §§21-23]**, before returning to a wider consideration of travel restrictions at SAGE 77 (21 January 2021) **[PV2/358 - INQ000061585, §§26-33]**. The context in which this advice was given was different to that in January to March 2020. Mass testing was now available, a vaccine was in sight, and the principal concern was the risk of new variants of concern. The principles of the advice remained the same – that only draconian interventions could get close to fully preventing importation of cases, that such interventions were most important when domestic prevalence was low and case importation from higher prevalence areas could raise R above 1, that geographically targeted travel bans could not be relied upon to prevent new variants entering the country, and that travel restrictions were likely to delay and not stop importations. SAGE acknowledged that the emergence of new variants of concern around the world presented a rationale for attempting to reduce importation of even small numbers of infectious cases, and that the rationale would strengthen if variants emerged that were capable of immune escape. It also noted that any interventions would have *"social, economic and political implications which policymakers will also need to consider alongside epidemiological considerations"* [§33].

617. A further discussion took place at SAGE 84 (25 March 2021) **[PV2/359 - INQ000061592]**, in light of the concerns about the possibility that vaccines were less effective against the Beta variant (B.1.351), which was then more prevalent in Europe than it was in the UK. SAGE advised that using border measures would likely provide some delay in importation of variants that were not then widespread in the UK (medium/high confidence), which might prove valuable to allow more time to understand the risks involved and take measures such as updating vaccines [§14].

618. I am asked what advice I gave to the government on the "traffic light system", which was introduced in May 2021. This was a question of policy and I did not advise on it directly. The science advice from SAGE was that set out above.

619. Further evidence about SAGE's advice on border controls is contained in Dr Wainwright's second statement **[PV2/4 INQ000252450 §3.13; PV2/215 – INQ000298958 Annex G]**.

620. It is worth noting that in relation to new variants there were several examples in which rapid identification of a new variant with worrying properties led to international action to the detriment of the country that identified the variant. This is a concern and may have the

effect in the future of deterring rapid communication of important new information during a pandemic.

COVID-19 SEQUELAE

Long Covid

621. Long Covid is, primarily, a clinical issue. Although, as I note below, SAGE discussed and considered matters relating to Long Covid, questions of research and treatment were, in the first instance, issues for DHSC. Important work was also done by the National Core Study on Longitudinal Health and Wellbeing. While I played a role in establishing the National Core Studies programme it worked independently of SAGE. The DHSC and National Core Studies groups were more significant actors in considering Long Covid than SAGE was.

622. SAGE 34 (7 May 2020) referred to the *"existence of longer term health sequelae … and the importance of monitoring these impacts through longer-term cohort studies"* **[PV2/208 - INQ000061542, §20]**. This recognition of the long-term health sequelae was also manifest in the 7 workstreams of the National Core Studies that were set up over summer and formally established in October 2020. One workstream was "Longitudinal Health" which covered Long Covid. The first discussion of Long Covid as an agenda item came at SAGE 79 on 4 February 2021 **[PV2/276 - INQ000061587]**, where the symptoms and prevalence of Long Covid were discussed. The meeting advised that longitudinal studies would be required to better understand related issues, and NERVTAG was tasked with considering case definitions and liaising with the National Core Studies leads to ensure that research questions were being considered. I understand that the National Core Study on Longitudinal Health and Wellbeing has since produced further work on the longer-term impacts of Covid-19, including Long Covid, though others will be better placed to give evidence about that than I am. Getting a clear clinical definition of Long Covid versus was difficult.

623. SAGE returned to the issue on 25 February 2021 (SAGE 82), when an ISARIC[64] study on the long-term effects of Covid-19 on a cohort of hospitalised patients was considered **[PV2/360 - INQ000061590; PV2/361 –** INQ000230233 The point was made there that: *"The most effective was to reduce prevalence of these syndromes is to reduce the prevalence*

[64] International Sever Acute Respiratory and Emerging Infection Consortium.

of Covid-19 (high confidence)" [§14]. In other words, keeping prevalence low would reduce long-term sequelae.

624. I am asked a number of questions about Long Covid. Others will be much better placed than I am to comment on the issues raised, in particular clinicians and researchers who specialise in related areas. From my perspective, I was conscious that long-term sequelae were a possible outcome of Covid-19 from early in the pandemic, though it took time before the extent of those sequelae became apparent. Any virus can have long-term consequences, as can ICU treatment and these general concerns were understood from early on. I cannot now recall how my understanding of the more specific syndrome of Long Covid developed, other than by reference to the SAGE discussions noted above. I am sure that I, and other participants, would also have been informed by our general reading of relevant reports and studies in this period and by our contacts with colleagues in other countries. I am not in a position to set out how understanding of Long Covid developed in the UK and internationally.

625. I think the principal role and contribution that I made in this field was the establishment of the National Core Studies programme from June 2020. I have discussed the importance of this programme in my first witness statement **[PV2/2 - INQ000147810, §74]**, which also refers to the evidence of Dr Wainwright in his fourth statement **[PV2/6 - INQ000187618, §§28-29]**. As I have mentioned above, the National Core Study on Longitudinal Health and Wellbeing has considered Long Covid among its work.

626. I am asked about the interrelationship of the SoS DHSC Long-Covid Task Force, the Long Covid Oversight Board, the Long Covid Research Working Group and the national consortium PHOSP-Covid. These were, I believe, DHSC bodies and I do not know how they related to one another.

627. I am asked the extent to which the risk of long-term sequelae affected my advice to core decision-makers about Covid-19. As I and others participating in SAGE became increasingly aware of Long Covid this was another factor that influenced our assessment of the evidence and advice. As SAGE 82 advised, it was a further reason to seek to reduce the overall prevalence of the disease. This was discussed with decision-makers but the overall policy aims remained related to the NHS.

628. I am asked the extent to which data on long-term sequelae was captured from the outset of the pandemic. Again, others would be better placed to answer this than me. The SAGE

minutes refer to some studies on the topic, but I do not know the extent to which clinicians and others were ensuring that relevant data were captured. One of the reasons for establishing the National Core Studies programme in October 2020 was to seek a cross-disciplinary approach to population-based studies, including in respect of long-term sequelae of Covid-19. UK Biobank also undertook work looking at long-term effects and I interacted with them.

629. I am asked about the nature of advice and briefings I provided to inform core decision-makers on how emergency response measures, including NPIs, would impact upon those likely to suffer from long-term sequelae (including Long Covid). I have set out above the approach that SAGE took to providing science advice on specific NPIs at different points in the pandemic. As part of that advice, SAGE considered the impact of NPIs on those with health conditions. This would have been relevant to those suffering with sequelae of Covid-19 at the relevant times, as well as to other conditions. The advice was, and had to be, broad in nature and so did not (in general) go into detail about the effects of individual NPIs on specific medical conditions. That would be a matter for clinical teams within DHSC. Advice for clinicians came through CMO and the Medical Director of the NHS, not SAGE or the GCSA.

630. I am asked what lessons I would take from the response to the long-term sequelae of Covid-19, and in particular Long Covid. The main one is that it is important to set up structures at an early stage to capture and measure data relating to such sequelae. The National Core Studies programme allowed for this kind of work to be done from October 2020 and – importantly – to allow for it to be done on a cross-disciplinary basis. I would recommend maintaining this, or an equivalent structure, into the future. Knowledge of an emerging condition or set of conditions that result from infection by a virus can then help form policy. If there had been a clear policy goal to decrease prevalence to the maximum degree possible in order to reduce infections and prevent long-term sequelae, then science advisory bodies (including but not limited to SAGE) could have re-orientated their work to provide the necessary evidence and advice to support that policy.

Covid-19 Death Rates

631. I am asked a number of questions about the approach to reporting and measuring the number of Covid-19 deaths. I was not involved in determining how Covid-19 deaths would be reported, so cannot assist on those points. In terms of what the best measure is for assessing the number of deaths, I think others would be better placed than me to answer;

the ONS in particular has done a lot of work on this question and I would defer to their expertise.

632. What I would say is that this is an extremely complicated and difficult area, and all should be wary of making comparisons between different data sets and between different countries. Great care needs to be taken when identifying which measures have been used, their strengths and weaknesses, and how up to date they are.[65] In very general terms, excess death rate may be expected to be a more robust measure, but it is a measure of the integrated effect of both the virus and the response to that virus.

633. Death rates alone are a blunt measure of a nation's response to a pandemic. Some nations will be more vulnerable than others by reason of chronology, geography and demography.

GOVERNMENT STRUCTURES AND PERFORMANCE

The Structures of Science Advice and Decision-Making

634. I have been asked to comment on the effectiveness of the governmental structures during the pandemic.

635. In the meetings that I attended of the groups set out above – including COBR, the dashboard and Quad meetings, and those meetings of COVID-S and COVID-O that I attended – I was able to present science advice appropriately. By this I mean that my comments, and those of the CMO, DCMO or other scientists from PHE or DHSC were listened to and prompted questions and challenge. Where ministers said things that revealed a mistake or misunderstanding of the science, the CMO and I were able to interject and correct matters. It was common for us to have to return to a point to clarify it, or to return to an issue even when the underlying science advice had not changed. This need for reiteration was also common when presenting to select committees or briefing the media.

636. In terms of lines of accountability, my position was clear. I was accountable to the Cabinet Secretary, and through him to the Prime Minister. This did not change during the course of the pandemic. SAGE was accountable to deliver work first to COBR and then to the Covid-19 Task Force.

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[65] For example, I understand that Germany does not reconcile its excess death data for a number of years.

637. Beyond these observations, I do not think that I am well placed to comment on how the Cabinet Office structures performed during the pandemic or how they can be improved. I would expect other witnesses to be able to assist the Inquiry on those matters. One point that I do think will be important to consider is how those structures would cope with concurrent or cascading emergencies. Fortunately, during the Covid-19 pandemic this was not tested, although at one stage it seemed as if extreme weather might create such a situation. The simple point is that there needs to be sufficient capacity within the central government structures to cope with two or more emergencies, and their interaction, at the same time.

638. In terms of DHSC, this was the lead department for pandemic planning and pandemic response. I think that the concept of having a Lead Government Department for a given emergency is reasonable and allows expertise to be developed. For example DHSC has many specialists and expert executive agencies. The alternative would be to centralise all emergency planning, but this has two potentially significant drawbacks. The first is a lack of expertise in the central government department that would be responsible for matters ranging from the effects of volcanic ash cloud or space weather to the threat posed by an emerging virus. The second is that it may disempower the department that will be most needed during the emergency response and which has the most resource and access to specialist bodies such as PHE or now UKHSA. While I see and agree with the value of there being a single minister with overall responsibility for national resilience and emergency response, I believe that there is still an important role for Lead Government Departments that can be called upon by that minister depending on the nature of the emergency or for preparation for prevention and response.

639. It is vital to consider how to operationalise the policies that are agreed. I think that this was a critical lesson during the pandemic. No matter how clear the structures that allowed science advice to flow through SAGE to inform evidence-based government policies, these will not produce an effective outcome unless the policy can be put into operation effectively and efficiently on the ground. Operational expertise is different from policy expertise and emergencies require both. As discussed in Module 1, the challenge is to build structures that provide sufficient operational capacity to respond to whatever crisis emerges. That includes rapid scaling of functions such as testing and tracing of contacts or ensuring that there is sufficient capacity within the health care sector to respond to an emergency situation in which large numbers of people require treatment or admission. This is difficult to achieve if the NHS is running at or near to 100% capacity even in “normal” times.

640. I refer back to my Module 1 evidence in respect of other suggestions that I would make to improve resilience and preparedness in government structures.

641. I am asked about the use of informal means of communication, such as WhatsApp, in the decision-making process. All formal science advice was contained in the SAGE minutes and papers, and I spoke to those minutes and papers during the relevant meetings. There were occasions when I would communicate with colleagues and ministers by WhatsApp or by text especially as many were not meeting face to face, but when I did so it would be a reiteration of what had been said in SAGE, or in the papers that informed the work of SAGE. Whilst ideas may have been exchanged I did not see any decisions being made and agreed outside the formal meeting structures. I do not know the extent to which government ministers and their other advisers used informal means of communication as a way of making decisions.

Decision-Makers, Science Advice and Policy

642. I have set out above the way in which I sought to communicate science advice to decision-makers and the four questions that guided my approach. I am asked whether I consider that I was effective in harnessing and distilling the advice from SAGE to core decision-makers. I think those decision-makers and others would be better placed to answer that question than me, but I am not in doubt that CMO and I gave advice from SAGE repeatedly and that it, together with the uncertainties, was usually understood by decision-makers. However it was often necessary to explain scientific concepts on many occasions. In my view, it is entirely appropriate for decision-makers to challenge science advice and of course on some occasions the preferred policy view of a minister would influence their line of questioning or their acceptance of the evidence.

643. I am asked a number of questions about whether the science advice I provided to the Prime Minister and core decision-makers was understood. Others will be better placed to assess their own understanding of the advice. However, I believe that the CMO and I consistently took care to explain scientific concepts in a way which was comprehensible to non-scientists and which was appropriate and relevant to the matters on which advice had been sought and was required. Both the CMO and I tried to test the level of understanding whenever we gave advice. Some points had to be explained repeatedly and some areas proved more difficult to get across than others. We took steps to present data in as comprehensible a way as possible, in order that important matters such as the impact of

interventions on infection rates could be understood. Some concepts were particularly challenging, for example absolute and relative risks in relation to comorbidities. I am aware from colleagues in other countries of similar challenges in providing advice, for example, the realities of exponential growth was one that leaders in many countries struggled with, especially the concept that slow growth from a very low baseline could still be exponential and would turn into what would be seen as rapid growth.

644. Core decision-makers would ask questions and offer robust challenge to the science advice during the meetings I attended with them. There was a lot of discussion about the evidence base for the science advice, especially from HM Treasury but also from cabinet ministers and others. Occasionally a minister would ask for a private session with CMO and me. Mr Cummings and Mr Gove were particularly effective in posing questions and challenging what they were being told. On occasions questioning would be heavily influenced by minister's particular policy preferences.

645. In terms of transparency, the SAGE minutes and papers were published, but it is my view that formal science advice papers that inform policy decisions should be made public (subject to national security considerations). There is a reasonable argument to delay publication for a short period, to allow decision-makers the time and space to form policy and make decisions. These comments apply to formal papers, not to discussions that might take place between a minister and a science adviser that are intended to provide background information or answer immediate specific questions. To give an example of the latter, Mr Johnson has faced criticism in the press following the publication of WhatsApp messages in which he confused a probability figure for a percentage when discussing a *Financial Times* article **[PV2/362 –INQ000346271**. Mr Cummings, and I corrected this and provided further explanation in response to a question from Mr Johnson. It would be highly detrimental to good government if politicians were discouraged from asking what may seem basic questions of their science advisers for fear of public embarrassment if the exchange were made public. In this specific example, I recall that the article itself was not particularly clear. The Prime Minister asked for advice, we provided it, and he understood the explanation. There were other occasions when repeated explanations were necessary.

646. I am asked if the science advice was provided to core decision-makers in a timely manner. I believe that it was, even when the evidence was changing rapidly. We did not wait for certainty before communicating information. I am also asked how I ensured that the advice was relevant to policy discussions. It helped that the CMO and I would be in the room with

the politicians and decision-makers so that we could often get a feel for what policy options were being considered and which science advice was needed to inform them. Officials from GO Science also attended regular meetings with policy officials from across government. I have discussed above the process by which work from SAGE was commissioned and how that process was refined over time, including by GO Science officials working with the policy departments to help them frame questions to obtain the science advice that they needed.

647. I am asked how important it was that I had a close working relationship with the CMO during the pandemic. It was important and we spoke a lot, many times each day. We would work through the evidence together to ensure that we were giving ministers consistent advice, including by showing the uncertainties, assumptions and range of opinions involved. We had different areas of expertise and experience, and this would be reflected in who took the lead on different points. Professor Whitty had a clinical perspective and, as CMO within DHSC, he was able to speak more to matters relating to public health, the NHS and hospitals. He also has a strong epidemiological background. I was better placed to talk to matters such as the work done on the virus itself, or ventilation in buildings, therapeutics, or the development of vaccines. We both covered other areas that were discussed at SAGE including behavioural and social science.

648. I am asked if there were any instances on which we were not asked to provide science advice when I would have been expected to be asked. There may have been, but in general we tried to make sure we provided advice wherever we saw policy development being considered or needed. As I have discussed, SAGE was not asked to provide advice ahead of the Eat Out to Help Out scheme being introduced, but I think it would have been obvious to all involved that our advice would have been that this was likely to increase transmission of the virus.

649. I am asked if the distinction between scientists providing advice and politicians making decisions remained clear throughout the pandemic. I was always conscious that the science advice was only one of many inputs into policy, and that it was right that the trade-offs involved in policy decisions were made by the elected politicians. The science advice was given in relation to policy objectives. For example, when considering responses to Omicron in December 2021, SAGE 100 advised that population-wide measures would be more effective than those aimed at vulnerable groups *"**if** the aim is to reduce overall hospitalisation rates"* (emphasis added) **[PV2/300 - INQ000061608, §11]**. At times the science advice was written forcefully but as advice that could assist in achieving an

outcome rather than as a policy to do so. In my experience the Prime Minister was clear that decisions were for him and his ministers and that what he required from the scientists was evidence and scenarios that would inform decision-making. At the regular press conference I commented on evidence and science and tried not to answer questions about policy or politics.

650. I am asked about a particular paper from SPI-B entitled 'Sustaining behaviours to reduce SARS-CoV-2 transmission'. This paper was brought to SAGE 87 marked 'draft' on 22 April 2021 **[PV2/363 – INQ000137814]** It was standard practice for sub-groups to bring draft papers for discussion at SAGE, where following discussion suggestions would be made for amendments, in order that the final paper would be SAGE approved. The draft version brought to SAGE contains science advice and also policy proposals. Following discussion at SAGE, the minutes note **[PV2/280 - INQ000061595]**:

(i) A request that SPI-B review the paper to ensure it was accurate, evidence based and accessible and to include risk and confidence statements against the various points made. This was important as there was a risk that absent this standard SAGE approach, it might be perceived as a series of assertions and that would diminish its impact and usefulness.

(ii) A request that SPI-B consider whether the ONS survey should be amended to include questions relevant to the points raised in the paper so that the evidence base could be enhanced.

(iii) A proposal that the paper should be effectively shared with the Devolved Administrations (i.e., beyond the science community) and that seminars within the Cabinet Office might be needed so that the content could be fully understood.

651. The final version of this paper was dated 30 April 2021 and was made publicly available in the usual way **[PV2/364 - INQ000224428]**. I do not recall the specific decision to remove the section setting out policy options, or the extent of my personal involvement in that decision, but I consider that it was appropriate that this was removed from the draft. As I have set out elsewhere in this statement, it is not for SAGE or the sub-groups to propose individual policies, and any papers that contained policy proposals were often less well received than those that stuck to science advice . The distinction between the provision of science advice and the formulation of policy was regarded as fundamental by SAGE and removal of the section of the paper which identified policy options was consistent with that principle. Presumably that is what SPI-B concluded when it revised the paper and sent in a new

version. My view is that there was an appropriate and robust process by which draft papers were submitted to SAGE, discussed and amended, then approved and released. As Lord May, a previous GCSA, said in 2014 "*Science frames the stage for political decision making. It must provide the evidence, not the answer*" **[PV2/365 – INQ000252497]**

652. I am asked the extent to which I was asked not to express publicly any aspects of the advice that I gave to the Prime Minister and other core decision-makers. The normal civil service rules applied and I was not given, nor did I need to be given, any further instruction on this. As I discuss elsewhere, I was asked to attend press conferences where I would explain to the public the science advice emerging from SAGE, which was the same science advice I provided to core decision-makers.

653. I am asked if the decision-making was sufficiently robust and effective, whether there were shortcomings, and whether they were taken in a timely way after a proper process of advice and consultation. It is difficult for me to comment on this beyond the aspect of science advice. I have discussed above the process by which some of the key decisions during the pandemic were made. I would add that these were extremely challenging decisions that were being made with often very uncertain information, and under extreme pressure, particularly in the early stages of the pandemic. Many involved were working seven days a week and for very long days. Often new staff were being co-opted into policy and delivery teams at short notice.

654. There was, at points, a tension between the politicians' imperative to be seen to take some action, and the scientists' imperative of seeking an appropriate evidence base to inform an intervention. This was particularly pronounced in the search for drug treatments that might make a difference. Around the world several treatments were proposed on the basis of scant evidence or anecdotes, and these would sometimes be seen by ministers as an opportunity to make a difference. The CMO and I were clear that the correct way to proceed was through properly organised clinical trials, and that to act otherwise would risk detriment to health and undermine the international knowledge base required to establish what worked and what didn't. This point was accepted by ministers and the successful and robust RECOVERY trial was able to identify that dexamethasone, an inexpensive and widely available steroid, reduced mortality in patients hospitalised with Covid-19. The study made this observation 138 days after the WHO declaring the pandemic and it is estimated that this saved a million lives worldwide **[PV2/69 - INQ000231012]** Just as importantly the RECOVERY study showed what didn't work and was able to prevent the inappropriate introduction of potentially harmful medicines based on wishful thinking. Pressures to

introduce Vitamin D supplementation for the entire population were resisted in favour of a clinical trial.

655. I am asked if there were meetings between core decision-makers that I would have expected to attend and to which I was not invited. In general, I do not think so because my role was to provide science advice and not make policy. I am sure that there were many meetings between politicians where policy options were discussed and agreed, and there would have been political meetings at which no civil servants were present. In general science advice was heard and understood by decision-makers but there were some policy developments that did not include science advice directly, and of course examples of where other considerations led politicians to make decisions based on factors other than science or public health. Some of these are discussed in this statement.

656. I am asked if I had any concerns regarding the performance of the Prime Minister, any minister, senior civil servants, special advisers or other individuals in charge of a significant aspect of the Covid response. From my perspective as a science adviser, the key decision-makers sought science advice, listened to it, and I took steps to ensure that they understood it, even if on some occasions it needed to be repeated on multiple occasions or was rejected in favour of other inputs. The decisions that they made were of course influenced by many other factors. Shortly before he was hospitalised with Covid-19 and before Mr Raab took over I was concerned that the Prime Minister physically could not do his job, but this was for a relatively short period.

657. I am asked if others expressed concerns to me about the performance of key decision-makers, and in particular whether between January and July 2020, it was suggested to me that Mr Hancock should be removed from his position. It is a matter of public record that Mr Cummings did not think that Mr Hancock was up to the job and he would have expressed that view at the time. I do not think the Prime Minister or any Cabinet minister would have commented on that matter in front of me nor would I expect them to do so. The CMO and I were advisers and civil servants and not included in those types of discussions.

658. I am asked if I considered resigning during the pandemic. I certainly found the pressure on my family, and on me, to be difficult, particularly the intrusion into our lives from both mainstream and social media. Like many others I received abuse and threats and I was concerned for the well-being and safety of my family. At times those factors did lead me to question whether I should continue. I also found people breaking the lockdown rules very difficult and considered what I should do in response, but decided that I would help most

by continuing with my job. On wider policy questions, and in respect of the choices that were being made by the decision-makers, I was focussed on giving science advice and believe that democratically elected politicians have a right and a duty to make the trade-offs and decisions. Of course it could be frustrating at times but I was determined not to get dragged into the politics or be buffeted by external events. I felt determined to continue to try to provide the best science advice I could.

Science Advice and the Four Nations

659. My role as GCSA was a UK-wide role. The Devolved Administrations adopted different structures to in terms of their science advisers. My understanding of those is as follows:

a. In Scotland there was an overall government CSA. Professor Sheila Rowan held this role until June 2021, when she was succeeded by Professor Julie Fitzpatrick. There is also a Deputy CSA and CSAs in some ministries (e.g. Health).
b. In Wales there was a similar structure to that in Scotland. Professor Peter Halligan held the role of overall government CSA until the end of February 2022. There were also some departmental CSAs (e.g. Health).
c. In Northern Ireland there was no overall CSA but a CSA for the Department of Health and a CSA for the Department of Agriculture, Environment and Rural Affairs. The Northern Ireland Executive Office has since decided to appoint an overall government CSA. Dr Rob Grundy has held this post in an interim capacity since September 2021 and continues to hold it until a CSA is recruited permanently.

660. Not as part of the pandemic response nor related to SAGE, I had regular 1:1 meetings with the government CSAs for Scotland, Wales and (when in post) Northern Ireland as I did with departmental CSAs for the UK government. I also held meetings with the Devolved Administrations government CSAs as a group quarterly. They were of course members of the CSA network and met with that group weekly. As I explained in my oral evidence in Module 1, I had a good working relationship with these Devolved Administrations government CSAs **[PV2/16 - INQ000230999 p.148]**. I believe that the CMO also had regular meetings with the CMOs from those nations.

661. SAGE is a body tasked with providing scientific advice to the UK government through established structures. It is not a representative body, but is constituted to bring together

the requisite scientific expertise that is needed to provide advice. The first meeting included Dr Jim McMenamin from Health Protection Scotland ("HPS") but at that stage other officials from the Devolved Administrations and many UK government departments were not invited and did not attend. The first three SAGE meetings were attended by a number of experts chosen because of their expertise in the fields most directly relevant to the questions SAGE had to address, as well as some officials from DHSC, PHE and some CSAs. Those first meetings were primarily concerned with the nature of the virus and its origins (including spread from animals), what was happening in China, the clinical picture, and the possible routes by which the virus might spread through travel routes. This explains the inclusion of CSAs with expertise in those areas, from the FCO, DfID, Defra, and DfT. Unfortunately the records of attendees at the initial meetings is known to be incomplete.

662. The SAGE secretariat circulated the minutes to CCS, various departments and to the CSA network, which included the Government Chief Scientific Advisers from the Scottish and Welsh governments. At that time, despite advice that all departments and Devolved Administrations should appoint CSAs **[PV2/17 - INQ000061614]**, Northern Ireland did not have a CSA and hence the Northern Ireland Executive did not receive the SAGE 1 minutes through the CSA route. From SAGE 2 onwards, a summary of SAGE output was included in CRIPs, which I understand would have been circulated to the DAs by CCS as part of the COBR mechanism. There were other means of communicating science advice to all four governments through the CSA network and the CMOs, which have been discussed in Module 1.

663. The Devolved Administrations were invited to every SAGE meeting from SAGE 6 (11 February 2020) and each nation chose their attendee for each meeting. Often more than one representative attended, sometimes a health CSA and a CMO or DCMO or a representative of public health. Unfortunately the early SAGE minutes did not record all those who were present but by March all the DAs were listed as regular attendees. The SAGE meetings became very large with many officials and others listening in. It is also worth noting that at the beginning there was no provision for video conferencing set up in the SAGE or COBR rooms, only a teleconference facility.

664. I think there is a good case to be made for representatives of Devolved Administrations being invited to SAGE discussions that concern their countries from the first meeting.

665. During Covid, and in addition to SAGE, GO Science organised meetings specifically designed to discuss pandemic requirements of the DAs; these were started in August 2020.

666. The Scottish Government established the Scottish Covid Science Advisory Council under Professor Andrew Morris. Professor Morris first attended SAGE on 29 March 2020 (SAGE 20), and he attended regularly thereafter. He and the Advisory Council had an excellent working relationship with SAGE and with me. In very broad terms, the Advisory Council took SAGE output and considered how it could be applied to the circumstances in Scotland and where additional work would assist. The Advisory Council would feed its work back into SAGE, which helped to develop our understanding of the position of the virus in Scotland. The relationship was mutually beneficial and I would recommend that consideration is given to adopting it (or a suitable equivalent) in future emergency responses.

667. The Welsh Government established an equivalent body, the Technical Advisory Cell (TAC). Its Terms of Reference stated that its purpose was to ensure that scientific and technical information and advice, including from SAGE, was developed and interpreted for purposes relating to the Welsh response to Covid-19. The TAC was also tasked with relaying scientific questions from the Welsh Government to SAGE, and to contributing relevant scientific papers, advice and data. This it did through Dr Orford and Dr Bennee, who regularly attended SAGE. Northern Ireland established the Strategic Intelligence Group, with Dr Young as the main point of contact with SAGE.

668. I am asked whether SAGE considered the specific circumstances of each individual devolved nation when providing advice. I would like to distinguish between policy advice and science advice. SAGE provided the latter, which for the most part did not rely on the particular circumstances of any of the four nations. As can be seen from the minutes, SAGE did consider differences between nations, regions and localities when considering infection rates, outbreaks and the possibility imposition of behavioural and social interventions. The Devolved Administrations had and set up their own structures to take SAGE advice and apply it to local circumstances or policy choices. They also fed information into SAGE. Additional science meetings were held by officials in GO Science, including a regular one with the DAs to try to ensure that all the processes were joined up and it was clear who was doing what: further details are contained in Dr Wainwright's first statement **[PV2/3 INQ000252449 §2.26 and 6.6]**.

669. I am asked if I ever communicated to anyone that I considered that the advice I had given to the UK government was not suitable to be followed by one or more of the Devolved Administrations. I cannot think of a time when this happened.

670. I am asked a number of questions about the interaction between decision-makers in the UK government and those in Devolved Administrations. I cannot assist with those matters. It is important to note that Health is a devolved matter and that the CMO/medical advice and the health science advice systems in DAs would report and link within the DA rather than into a Whitehall Department. I believe that the relationships between the science advisers who attended SAGE were good and that the four nations co-operated well in terms of science advice (for example **[PV2/366 – INQ000228968**

SAGE and its structures

671. I have been asked a number of questions about SAGE, its structures and its composition. In general, I believe that the structures in place were effective and helped to provide high quality science into SAGE. I have discussed in my first witness statement some areas of weakness that were exposed by the pandemic, and in particular by its scale and duration, and I have also set out the steps taken to address those weaknesses. I would add that I think we could have been better at feeding back to the sub-groups how their work had been used by SAGE and how it had been communicated to policy-makers. Some participants have suggested that they would have been helped by an understanding of why the government's policy sometimes did not seem to reflect their advice. I think this last point relates to the relative lack of transparency on other non-scientific advice that decisions-makers considered. It is of course the right and duty of ministers to take decisions that take into account factors beyond science advice.

672. I am asked how effective SAGE's structures are in providing scientific advice during an ongoing emergency. This question has been addressed in evidence heard in Module 1. It remains my belief that the structures are effective, though they must be maintained and subject to review and challenge to ensure that this remains the case. I identified areas in which work has been undertaken or identified to improve them in my first witness statement.

673. Both Dr Wainwright and I have given evidence about the way in which SAGE participants were selected and the changes that have been made to that process **[PV2/2 - INQ000147810, §57(4) §64**; **PV2/3 INQ000252449 §2.11]**. In 2020, the decisions on who to

invite to the initial SAGE meetings were taken by the CMO and me in consultation with the GO Science secretariat, though I cannot remember the detail of how this was done. An improved process has been outlined in the SAGE development programme described in my first witness statement.

674. I am asked if SAGE contained participants with a sufficient spectrum of scientific opinion. Again, this is a matter that has been addressed in evidence to Module 1. In general, I believe that it did, though as I have identified in my first statement there were some areas that I think could have been improved, particularly in respect of ensuring a diverse breadth of experience and expertise from across the country. I also think (as I discuss above) there is a good case for ensuring that all Devolved Administrations affected by an emergency should have a participant at SAGE from the first meeting. It will be important, though, not to have a list of mandatory participants for SAGE rather than being able to assemble the experts required to deal with the particular emergency.

675. I am asked if SAGE had sufficient public health and clinical input during the pandemic. In my view it did although of course the CMO also had other meetings with clinicians and public health doctors. SAGE was co-chaired by the CMO, a practicing clinician, epidemiologist and expert in public health. The first meeting was attended by others with public health and clinical experience, including the DCMO, Professor Jonathan Van-Tam, representatives from PHE, Dr Jim McMenamin of Health Protection Scotland, Professor David Lalloo (Professor of Tropical Medicine), and Professor Peter Horby (Professor of Emerging Infections and Global Health, Oxford). They, and other experts in clinical medicine or public health, participated in and attended many other SAGE meetings. Later in the pandemic we had a representative from the group of local and regional directors of public health (Dr Jeanelle de Gruchy). I also consider that SAGE had a suitable representation from clinical fields. The CMO continued to work clinical shifts during the pandemic and he and others were well informed of the clinical pressures within the NHS. Professor Steve Powis the Medical Director of the NHS was a participant in SAGE. The public health and clinical representatives on SAGE would be suggested by CMO and PHE.

676. I am asked if I think that SAGE's advice was too heavily influenced by any particular scientific discipline at the expense of others. I do not believe that it was but there is no doubt that as data became more reliable and real time, modelling became less relevant.

677. I am asked if SAGE took sufficient account of the international perspective and experience of other countries in the early months of the pandemics. I think that it did, for reasons I have given when dealing with the events of those months.

678. I am asked if SAGE participants were sufficiently diverse in their representation of different ethnic minorities and other groups facing pre-existing inequalities. I don't think we were at the outset and I have referred to issues concerning the selection of SAGE participants, and the work being done to widen the pool, in my first statement **[PV2/2 - INQ000147810]**. SAGE is not a representative group for particular disciplines or professional bodies, it aims to bring together the relevant experts in the relevant fields to deal with the specific emergency for which it has been convened. However, I think there is a danger that under pressure there is a tendency to reach for advisers that are known and that poses a risk to diversity. I think that did happen at the beginning of the pandemic and we have formalised mechanisms to guard against that in the future.

SAGE, Dissenting Voices and Scrutiny

679. In my evidence above, I have explained the way in which SAGE operated, and the efforts that I and others made to encourage rigorous and open discussion and guard against groupthink and optimism bias. I think that, in general terms, we achieved those goals.

680. I am asked whether the minutes, and my advice, reflected any dissenting opinions. The way that SAGE worked was to include in the minutes the uncertainties in the science and the range and differences of opinion about what the science was showing at the time. It did not present one opinion as the majority opinion and another as a minority opinion. Expressing scientific uncertainty to non-scientists is not easy and is a matter that would benefit from more research **[PV2/2 - INQ000147810, §§78-79]**, but I tried to reflect accurately the full and open discussions that we had in SAGE. I feel we improved as time went on, not least as working relationships developed with senior policy officials and ministers. There remains, however, a fundamental difference between politicians and the scientific method that I referred to in my oral evidence in Module 1. Science is self-correcting and evidence-based. Scientists welcome new evidence that challenges previous positions and leads them to change their views. This is the process by which science advances. For politicians, such changes get characterised as U-turns **[PV2/16 - INQ000230999 p.4-14 and 137]**.

681. I am asked whether I consider that the work of SAGE and its sub-groups was subject to sufficient scientific scrutiny, internally and externally. I think that it was, both because of the huge breadth and high quality of the scientists who participated in SAGE work, and as a result of the publication of the minutes and papers. I also received many emails and inputs from scientists from around the world. The same was true for the CMO and for most participants in SAGE.

SAGE and Policy-Makers

682. I am asked to what extent SAGE confined its advice to policy options which it considered would be palatable for policy-makers, particularly in the initial months of the pandemic. The short answer is that it did not, but we would not give science advice that was totally impractical. First, SAGE gave science advice that informed policy, we did not give policy advice. The science advice did not have any areas that were off-limits. As can be seen from the evidence set out above, from February 2020 SAGE was advising on the effects of various behavioural and social interventions that – when combined and imposed stringently – amounted to what became known as a national lockdown. The political decision-makers who were receiving this advice were reluctant to make interventions, for understandable reasons given the detriments that they would have, but SAGE continued to model them and provide advice on how they would be likely to affect the epidemiological curve. Similarly, from late summer and early autumn 2020, SAGE gave unwelcome advice about the rise in infection rates and hospitalisations, and about the measures that would be required to get R below 1. Our approach was straightforward. We sought to provide decision-makers with an independent, co-ordinated, comprehensive and comprehensible statement of the evidence and science advice as one of the inputs into policy-making. It was for the politicians to decide on which policy to adopt, having taken into account other evidence and advice as well.

683. I am asked about the 'public alignment' between myself and the CMO with the Prime Minister and other politicians in public briefings and broadcasts, and the extent to which I consider this caused problems, in particular in relation to the government's decision to reduce distancing guidance from 2 to 1 metres. The CMO and I always tried to stick to matters of science advice at all public briefings and avoided discussion of policy choices. From my perspective we were generally successful in doing so, although I recognise that maintaining a clear distinction between policy and advice can be difficult. As part of the on-going SAGE development work, I have suggested that work is needed to create an evidence base on how to communicate science advice most effectively. The specific issue

of the move from 2 to 1 metres is dealt with above, and it is clear that SAGE considered 2 metres to be considerably safer than 1 metre. This is the advice that was given to ministers, and it was in the public domain in the form of SAGE minutes and papers from SAGE.

684. I am asked whether core decision-makers relied too much on SAGE, particularly in the early stages of the pandemic, and whether scientists were *"inappropriately empowered"*. The Inquiry attributes these words to Mr Sunak, which I take to be a reference to his interview with the Spectator during the Conservative Party leadership contest in August 2022 **[PV2/367 – INQ000280042]** Mr Sunak is quoted as saying: *"We shouldn't have empowered the scientists in the way we did … And you have to acknowledge trade-offs [of a lockdown] from the beginning."* It is unclear to me what empowerment is being referred to.

685. Science advisers advise and ministers decide. We provided science advice and it was for ministers to take policy decisions. As will be seen from the events that I have described, SAGE scientists very clearly identified that there would be detriments to imposing stringent behavioural and social interventions, including economic detriments. SAGE did not have the expertise to quantify those detriments, which is why I was among those who suggested forming an equivalent group to provide independent economic advice (discussed further below). My understanding is that HM Treasury did not wish to do that.

686. In the same interview Mr Sunak is quoted as saying that: *"The SAGE people didn't realise for a very long time that there was a Treasury person on all their calls. A lovely lady. She was great because it meant that she was sitting there, listening to their discussions."* I think this refers to Ms Vanessa MacDougall, Director Economics and Deputy Chief Economic Adviser at HM Treasury, and it might be helpful to clarify that she attended SAGE meetings regularly from March after I had actively encouraged it in my correspondence with Sir Tom Scholar, Permanent Secretary at HM Treasury (again, discussed in more detail below). Ms MacDougall was listed as attending in SAGE's published minutes. The presence of departmental officials listening to SAGE discussion is well established, helpful and welcomed.

687. I am asked if SAGE's membership and minutes should have been made public earlier than May 2020. I think that they should have been, and I pushed for this to happen, as I describe elsewhere in this statement and my first witness statement.

688. I am asked if I consider that the SAGE minutes were sufficiently detailed. This is a difficult balance but I believe that they were. These were documents that were produced for the practical purpose of summarising science advice for politicians and civil servants to read and digest ahead of meetings. The minutes were succinct to meet this purpose and we got them out quickly. For those who wanted more detail, the papers that informed the minutes were published, and were available to those within government who wished to see them. Officials observing the meetings would have known which papers had been discussed and of course there were discussions of details in meetings when science advice was presented. We also arranged teach-in sessions and seminars for policy-makers for topics that were particularly difficult. The minutes provided the "unified, rounded statement of scientific advice" as suggested in the Hine review.

689. I am asked whether I was aware of frustration by SAGE sub-groups (SPI-B in particular) regarding a perceived lack of adoption of their advice. The question of what happened after advice had been provided came up frequently at SAGE and its sub-groups. I attended sub-groups from time to time to answer questions and to hear feedback from members. For the reasons set out in this statement it was usually not possible to draw a direct and simple line between science advice provided and the precise policy decision. This is because other factors were taken into account by officials and ministers when deciding policy. We increasingly used the method of offering a seminar to Whitehall officials to give an opportunity for officials to understand the papers and ask questions about the science advice. These would usually be led by experts from the sub-group. Both the CMO and I reported to SAGE when policy was developed and the Chairs of SPI-B attended these discussions. Chairs of sub-groups would be expected to provide feedback from SAGE to their sub-group at a subsequent meeting. I cannot recall any specific comments made at a SPI-B meeting I attended, but if asked whether any SPI-B advice had influenced policy, I would have tried to explain how policy took science advice into account alongside other considerations.

690. I am asked about any issues faced by SAGE in relation to resources and funding during the pandemic, and in particular in the initial period of the pandemic. I have set out in my first witness statement the difficulties GO Science and SAGE faced in scaling up the secretariat and sustaining it at a high level of work over an extended period of time **[PV2/2 - INQ000147810, §43, §57(1) §115]**. I also referred to the steps subsequently taken to address that vulnerability. I think this was a question of organisation and planning rather than of insufficient funding. We were given additional resource when we requested it, and

received great support from the public sector research establishments and other members of the Government Science and Engineering Profession. The process of getting help and scaling up resources should have been simpler and there should be mechanisms in place to allow this to happen in the event of an emergency.

SAGE and Economic Advice

691. I am asked the extent to which economic analysis played a role in SAGE and its sub-groups and whether it would have benefitted from having an economist as a participant. SAGE was a group for science advice and while it identified where particular interventions would have an economic effect it was not in a position to quantify or analyse what that effect was. For reasons that I have given elsewhere in this statement, it is my firm view that SAGE should remain a science group.

692. In late March 2020, I received an email from Sir Tom Scholar, the Permanent Secretary at HM Treasury. He wanted to explore the possibility of a senior economist sitting on SAGE in order to provide expert input in the event that the discussion engaged economic issues. I replied saying that while I tried to steer SAGE away from economics, there was a tendency from participants to want to go there. I wrote that I did not favour bringing economics formally into SAGE, but thought that it might be bolstered by the presence of a senior economist *"with a remit to say this is being considered elsewhere and steer people away from inaccuracies."* I also thought that this might help link SAGE discussions and economic discussions and would allow the HM Treasury official to hear the debate on the science **[PV2/368 - INQ000228941**. As a result, Ms Vanessa MacDougall began to attend SAGE meetings from SAGE 21 on 31 March 2020 as an observer **[PV2/179 - INQ000061529]**. She attended regularly until November 2020, after which other HM Treasury officials took her place.

693. Before SAGE 21, HM Treasury would of course have been aware of SAGE's output through its minutes and the briefings that the CMO and I provided at COBR and other meetings.

694. I had encouraged the idea that a economics advisory board was needed, either a SAGE like body or a SPI-M type group, "SPI-E" **[PV2/369 - INQ000228978** At my suggestion a board was convened by Mr Case on 5 June 2020 **[PV2/370 - INQ000229297; PV2/371 - INQ000229296** and was considered again in early October 2020 at a time when a "circuit breaker" lockdown or other forms of behavioural and social interventions were being

discussed **[PV2/372 - INQ000229665 PV2/373 INQ000229673]**. While I was keen on pursuing such approaches, ultimately, they came to nothing although both the CMO and I continued to work with the Chief Economist at HM Treasury, Clare Lombardelli. I remain of the view that an external advisory group on economics that published its advice would be helpful in a future pandemic. I have also suggested that a national pandemic preparedness centre based in academia would be a good place to explore the interface and interaction between science advice and economic advice. Ultimately though the trade-offs will be for ministers.

Further Questions on Modelling

695. I am asked a number of additional questions on modelling and models, including in respect of which elements were included within them. They included factors such as population age and structure, different mixing patterns between different parts of the population, scenarios based on the characteristics of the disease and its transmissibility, and sometimes the effects of behavioural change. Others will be able to explain this in more detail, but these were sophisticated and complex pieces of work produced by academics of international standing.

696. SAGE had little access to modelling from the private sector unless it was published but we did engage with the Institute and Faculty of Actuaries, who attended SAGE 48 (23 July 2020). I also engaged a mathematical modeller from GSK who would provide his outputs to SPI-M. From the time we got agreement to publish the SAGE minutes and papers it was our position that anything that was used by us would be published; I do not know if this deterred companies from sharing material. Some individuals did send modelling output directly to us.

697. I do not think that there was an over-reliance on modelling at SAGE or more generally in the science advice. It was an important part of our work and, perhaps significantly, it was sometimes an eye-catching part of it. But it was only part of the work, as SAGE was fortunate enough to be able to draw on great expertise in a wide range of relevant disciplines. As data quality and availability increased and improved, greater reliance could be put on what we knew had actually happened or was likely to be happening imminently. It was the case that individual model outputs or parts of individual model outputs would sometimes be cherry picked by others who wished to make a particular point.

698. I am asked if the modelling employed was biased towards specific outcomes, for example, lockdowns. It was not. Those who worked on SPI-M did so to help the national response

to a pandemic that would kill hundreds of thousands of people worldwide. They were expert and professional and took this responsibility seriously. Their work was published and was subject to extensive scrutiny across the world by their peers and by the media. The insertion of bias to achieve a favoured outcome would have been identified and would have damaged their professional reputations. There was no incentive for them to do this and they did not do it. It is worth noting that models also looked at the effects of mass testing, the requirements of a test and trace function and in some cases presented an easy way for options to be compared.[66]

699. I am asked if the models underestimated the spread of the virus early in the pandemic. I think that they did, at least in terms of speed until shortly before the four day period of 13 to 16 March, which I discuss above. This was a function of poor and time delayed data and a consequent under-estimation of the virus' doubling time. As a result we thought we were not as far advanced along the epidemiological curve as we were.

SAGE, CSAs and the CSA Network

700. I am asked about the role of the CSA network during the pandemic. The CSA network is an informal network of departmental CSAs and Government Chief Scientific Advisers from the DAs. CSAs are appointed by and report into Departments or DAs. All Departments and DAs are encouraged to have a CSA. The network exists to create a community, share information, discuss areas of common interest and provide support for science across government. The network usually meets weekly. A recent House of Lords report highlighted how effective this has become over the past few years **[PV2/374** **INQ000230977**

701. During Covid many CSAs attended SAGE and it was there that pandemic-related science advice was discussed. Individual CSAs were also involved in their own departments or DAs on various aspects of the response to the pandemic and the CSA network was helpful to share what work was being done in a department, or what problems had been encountered, sometimes of a more operational nature. However, mainly during the pandemic the CSA meetings were important to discuss other matters of science that government continued to need advice on, including but not limited to climate and environment, COP26, biodiversity, computing infrastructure, space, nuclear, and European science programmes. Sub-groups of CSAs would often form to address specific

[66] See, again, the SPI-M "Comments on Social Distancing Measures" dated 20 May 2020 **[PV2/19 - INQ000236965** and 22 June 2020 **[PV2/20 - INQ000074930]**.

areas and this may include departmental CSAs from DAs and CSAs from other bodies such as the NHS.

702. In my Module 1 evidence I spoke about the approach I had taken to the CSA network, and why I had not invited health CSAs from the Devolved Administrations to attend **[PV2/16 - INQ000230999 p.150]**.

> "I have to say one of the unexpected consequences of getting a very functioning CSA network going is that everyone wants to join it, and not everybody can, because it will become overwhelmed, and the reason that we've stuck with a single Government Chief Scientific Adviser from each of the devolved administrations is (a) they are the people who then can connect their own CSAs in those nations and (b) it allows for, for example, the health CSAs from the four nations to join up as a group, and I believe they've now done that, they've joined up as a group. I think it would be inappropriate to start having all of those people in the overall scientific network, otherwise it's going to become very skewed by health, and topics we discussed ranged from cyber security to climate to biodiversity to marine laws and so on. So, I mean, there are all sorts of areas which are far away from pandemics and health."

703. It was SAGE and not the CSA network that was the critical forum for science advice relating to the pandemic. I do not think it would have made any difference to the DAs' understanding of the pandemic had their health CSAs attended the CSA network.

International Co-operation

704. I have set out above and in my first witness statement some of the contacts I had with international colleagues during the course of the pandemic **[PV2/2 - INQ000147810, §37 and §§68-69]**. Dr Wainwright has also provided evidence on this point in his second witness statement **[PV2/4 – INQ000252450 §2.3-2.8]**. I liaised extensively with those in roles equivalent to mine in different countries. The CMO and individual SAGE participants did the same. This international perspective informed our work and the science advice that we provided to core decision-makers in the UK. The formation of the International Comparators Joint Unit within Cabinet Office was helpful and I have referred to it elsewhere.

705. Different countries had different structures and many did not have an equivalent to SAGE, at least at the start of the pandemic. The importance of a SAGE-type body was emphasised in the paper written with European colleagues entitled "The use of Scientific Advisory Councils in the COVID-19 response, a view from Western European Science Advisers" **[PV2/372 - INQ000229665]**. An abridged version of this paper is due to be published in The Lancet shortly.

706. I am asked why I did not have meetings with international colleagues between March 2020 and November 2020. This is a misunderstanding of the evidence contained in Dr Wainwright's second statement **[PV2/4 INQ000252450 §2.8]**. I continued to have meetings with international colleagues throughout all of these months. The reference to November 2020 is to when I established a regular meeting to bring together a group of European government science advisers who up until that time were all speaking to us and each other on a bilateral basis. This was a particularly helpful forum, as I have said in my first statement **[PV2/2 - INQ000147810, §68]**.

707. I am asked about the formation of the International Comparators Joint Unit. Others will be better placed to speak to how this was formed as I was not involved in that process. The Unit was principally concerned with providing information about what other countries were doing in their responses to the pandemic, with some information about how infection rates were changing as a consequence. This was helpful information although it was not directly concerned with the science advice that was being provided.

708. In respect of WHO advice, the CMO was the UK representative at WHO and he brought WHO advice to the attention of decision-makers as required. DHSC has a team that deals with links to WHO. I was aware of the WHO advice and it was taken into consideration, where relevant, by SAGE. WHO advice tended to be policy advice, with some explanations of the underlying science, and thus it was for the policy-makers to determine what use should be made of it. The WHO advice was addressed to all countries, and as a consequence was often given at a high level of generality.

709. I am asked whether I, and core decision-makers, learned sufficient lessons from the experience of other countries throughout the pandemic. In general, I think that I did, for example speaking to colleagues in Singapore early in the pandemic and sharing the output with DHSC and the NHS **[PV2/86 – INQ000228659 PV2/87 – INQ000228668** sharing information from South Korea from the regular International Science Advisers meetings, looking at mass testing programmes in Slovakia, learning directly from South Africa about

Omicron, discussing vaccines with Dr Anthony Fauci in the United States and with science advisers in Israel. The meetings with European colleagues were particularly useful. In the early months of the pandemic, I had informative one-to-one discussions with colleagues in Japan, Singapore, Hong Kong, Canada, New Zealand, the United States and Ireland. Many SAGE participants used their own networks to obtain data and information which they then fed into SAGE. However, it was not the case that the UK could simply adopt an approach that was being pursued elsewhere. It did not have the geographical isolation and self-sufficiency of New Zealand, or the public health infrastructure of South Korea. It is also worth noting that science advisers in other countries were busy.

Public Health England and the Joint Biosecurity Centre

710. I am asked a number of questions about the effectiveness of PHE during the pandemic, and about how that related to the creation of the Joint Biosecurity Centre and the UKHSA. I was not involved in advising on decisions concerning the future of PHE, including its disbanding and replacement (in part) with UKHSA. I have dealt elsewhere in this statement with specific issues that arose during the course of the pandemic and which involved PHE. As context, I repeat what I said in my first statement **[PV2/2 - INQ000147810]**.

> "The decisions taken over a number of years to reduce the science budget of PHE must have had an effect on its ability to perform at scale during the pandemic. The outsourcing of research to universities left PHE with restricted internal science and operational capability. These decisions are of course difficult ones for any administration but in my opinion it is important to view public health science funding as a resource that is required for the future, much in the same way as the army is required to be ready for action even when there is no war."

711. From the early stages of the pandemic, SAGE and I identified the need for increased and improved data to inform science advice and decision-making related to the pandemic. It was not for SAGE nor me as GCSA to determine how this was best achieved or how it should be structured within government.

712. On 12 April 2020 I wrote an email to Mark Sweeney, Director General, Cabinet Office, raising two concerns **[PV2/376 - INQ000061841]**. The first was about how to operationalise testing across the country, and how to link that to enhanced contact tracing and case isolation (what would later become the test, trace and isolate system). The second was

how Covid-19 was going to be monitored across the UK, including in respect of test results and data flows. These were operational matters, and strictly outside the remit of science advice, but I was concerned to ensure that work was done on these matters in order to avoid the situation that I felt had been reached with testing – "i.e. it had been agreed that it was needed but without the vehicle to make it happen." My view, for what it was worth, was that it would be better to set up a dedicated unit with clear accountability and empowered leadership following the principles that we had outlined in the "How to run a mission" paper in 2019. By April 2020 I was concerned that PHE was severely overstretched.

713. I returned to this theme in an email on 28 April 2020 to Tom Shinner in Cabinet Office saying that: *"A key area that we need to get on top of is surveillance/monitoring … It is not clear who is really in charge of this area."* This prompted an email exchange between Mr Shinner, Mr Sweeney, and I. I wanted to convey the point that this went beyond the plans for what was then referred to as a test, track and trace programme and should cover *"real time data flows for absentee rates from schools and workplaces, data from hospitals and GPs, population sampling, sentinel sampling at high-risk individuals/nodes, possible environmental monitoring etc etc all with an integrated data flow."* I noted that while this would, traditionally, be something for PHE what I was proposing had a *"totally new scale and level of granularity."* **[PV2/377 - INQ000062035]**

714. Others will be better placed to assist on how the JBC came into being, and the effect (if any) that my emails and prompting played in that. The announcement of the JBC was welcomed by SAGE 35 on 12 May 2020, with the minutes recording that the meeting *"agreed on the value of integrating data from multiple sources and being able to identify and respond rapidly to local outbreaks (in line with its previous advice)"* **[PV2/184 - INQ000061543, §8]**. The JBC became a command and control centre for the data received from the NHS, the ONS and technology companies (among other sources). It helped to develop the data visualisation dashboard that was developed and used by the No.10 team (Mr Shinner), and which replaced the unwieldy packs of slides that we had to rely on before. The dashboard was a useful way of presenting and communicating data and thereby informing decision-making. The creation of the JBC was, in my view, an example of a successful initiative that occurred during the pandemic. It would, of course, have been better had it (or an equivalent) been in place before the pandemic (or at least had it been available to be scaled up at the start of the pandemic). In addition to JBC there is now a Data "Situation Centre" within Cabinet Office designed to assist in the transfer, collation, analysis and presentation of relevant data during emergencies (health or other).

715. I am asked whether the JBC will function as a replacement for SAGE in the longer-term. The short answer is no, it is a completely different thing, serves a very different purpose and is now part of UKHSA. I think the confusion relates to a BBC News story that appeared during the pandemic to the effect that the JBC would take on a more prominent role and SAGE would be "slimmed down" to concentrate on longer-term concerns **[PV2/375 – INQ000142170]** I do not know where this story came from and it is incorrect.

716. I am asked why the JBC merged with UKHSA in October 2021. I was not involved in that decision and so I am unable to assist the Inquiry as to the rationale for the merger.

717. In terms of transparency, some of the dashboard material was published, but not all. I argued from May 2020 that it should all go into the public domain but I did not persuade everyone, notably CCS **[PV2/379 - INQ000062216]**. I think that the UK government should be transparent with its datasets and would point to Iceland (as I did in May 2020) as an example of where this was done well.

718. I am asked about certain operational issues concerning specific data-sharing arrangements. Others would be better placed to answer these specific questions, but I will reinforce the point I made in my Module 1 evidence about sorting out the "rules of the road" in advance. Data collection, access, sharing and interoperability are administrative matters that can be foreseen for emergencies and could be resolved in "normal" time in order to facilitate the prompt flow of useful data during an emergency.

Communications with the Public

719. I am asked a number of questions about the UK government's public health communications during the pandemic. This was not an area I was involved in, other than giving science advice via SAGE (including in respect of behavioural science) and presenting that science advice in No.10 press conferences. Others will be better placed to explain how wider public health communications strategies were developed and how effective they were.

720. My role did not include any specific attempt to counter disinformation, other than through providing accurate information myself. As I have said in my first witness statement, I provided regular background briefings for the press in order to assist and encourage

accurate reporting of science and encouraged liaison between journalists and the Science Media Centre **[PV2/2 - INQ000147810, §82]**.

721. During the pandemic, some SAGE participants gave interviews or wrote articles for the media. As I have said in my first statement **[PV2/2 - INQ000147810, §81]**, they were free to speak publicly about their own research and area of expertise, but they were asked not to comment on the details of discussions that took place within SAGE meetings or seek to draw policy conclusions from the SAGE minutes. Specific comments from SAGE meetings were not attributed to individuals. I am asked if I consider this to have been desirable and appropriate. In broad terms, and as long as the scientists followed our request to stick to their areas of scientific expertise, I think that this was both helpful and appropriate. For example, public knowledge and debate were enhanced by having modellers discuss and explain epidemiological concepts, or by experts such as Professor Catherine Noakes discussing the airborne transmission of viral particles. There were some occasions when members of SAGE sub-groups wrote about areas outside their expertise, commented on the meetings themselves, became campaigning on policy, or undertook paid journalism. I do not think that should happen.

722. It is important to recognise, however, that hundreds of scientists were involved in work for SAGE and its sub-groups and only a very small proportion of these were active in the media. Most were not.

723. I do not recall many problems arising from SAGE participants appearing in the media, and I was able to deal with any concerns by providing advice. The media interventions of members of "Independent SAGE" were more problematic. I did not have any difficulty with an external group of scientists being established and providing their own thoughts and comments on science matters relevant to the pandemic. Indeed, I thought that might be helpful. However, I did ask the Chair of Independent SAGE, Sir David King, to refrain from using the word SAGE in the group's title, as I was concerned that this could lead to confusion. Unfortunately having agreed not to use "SAGE" they did. This caused confusion as expected including in relation to measures in schools and was particularly problematic as they tended to make policy recommendations.

724. I have been asked in particular about my contact with Professor James Rubin. As noted above, Professor Rubin was a Chair of SPI-B and therefore I spoke to him on a regular basis, I cannot recall every discussion that took place but do recall three discussions I had with Professor Rubin in relation to the operation of SPI-B. The first was in spring 2020 after

the so-called "Independent SAGE" was set up, and two or three SPI-B participants declared themselves as members of that group. Professor Rubin and I discussed how to handle this and agreed that they should continue to contribute to SPI-B but that there was a risk of confidential information being shared and of potential confusion between policy positions and science advice. Professor Rubin discussed this with those individuals. A second discussion came a bit later, when Professor Rubin was concerned that some SPI-B participants felt worried about speaking openly in SPI-B because of the risk that their comments would then be repeated to members of "Independent SAGE" or elsewhere. We discussed that SPI-B Chairs should remind participants that discussions within the meeting were confidential, that everyone should be free to speak openly, and that the outputs of SPI-B were all published and this was the formal route for communication. The third occasion I recall was in relation to journalism. A small number of SPI-B participants were appearing very frequently in the media and were writing articles discussing policy and other matters, sometimes well beyond the area of behavioural science. I understood that this again caused a problem for some of the other participants within SPI-B and the Chairs of SPI-B undertook to remind participants again about the duty of confidentiality and respect towards all members of SPI-B.

725. As I have said in my first statement, I pushed for the minutes and papers of SAGE to be published and, after some delay and further pressure, this was agreed **[PV2/2 - INQ000147810, §§40-52]**. This was an important measure both in terms of communicating the science evidence and advice and allowing for discussion and challenge of it. I strongly recommend that this model is followed in any future pandemic and the system should be made operational from day one. I was also strongly in favour of the Covid-19 public dashboards as a means of communicating the data underlying the government's policies and work **[PV2/379 - INQ000062216]**. I would urge this to be used again in equivalent emergencies in the future.

726. I am asked for my views on the UK government's assertions that it was "following" or was "guided by" the science. If this was intended to convey a sense that government policy was slavishly following ideas put forward by scientists, then this was misleading, unhelpful and incorrect. My understanding at the time was that these slogans were supposed to mean that decision-makers – ultimately the politicians – were listening to the evidence and advice provided to them by scientists, in a way that would mean that policy was properly informed and was based on evidence. Looking back, I think that "following the science" was not a good choice of words as it elided the advice with the policy. That phrase also failed to make clear that science was one of many inputs into decisions.

727. I am asked to what extent I consider that the phrase was deployed by core decision-makers to shift accountability for decisions about Covid-19 from politicians to scientists. I do not know the answer to that question. I was always conscious of the distinction between science and policy and took pains at No.10 press conferences not to answer questions about policy.

728. I am asked if I consider that the boundaries between science advice and decision-making were adequately communicated to the public, including the presentation of data and statistics. I always sought to make those boundaries clear and have given examples in this statement of some of the instances in which the CMO and I made the relevant distinction. I believe that the presentation of data and statistics by SAGE, and by the CMO and me in press conferences, was neutral and was as clear as we could make it under the pressured circumstances in which we were working.

729. I am asked a number of questions about the accessibility and clarity of the government's public health communications to vulnerable and minority groups. I think that is primarily a question for those responsible for those communications in PHE, DHSC and elsewhere. SPI-B did make a number of recommendations on the need for local leadership in communicating health messaging and increasing compliance, and on different ways of engaging different communities. I cannot say, though, how these affected the strategies employed. It is an important area and it would be helpful to identify where improvements could be made.

730. I am asked whether UK government public health communications sufficiently explained the territorial extent of decisions on NPIs. Again, I think this is something for those responsible for UK government communications to address. When presenting the science evidence and advice, I usually did so on a UK-wide basis, identifying where necessary when data were obtained from or relevant to only one country or area.

731. I am asked if the UK government adequately communicated changes in approach to the public as scientific understanding evolved. This was a very difficult thing to do, particularly in respect of communicating scientific uncertainty, and I am sure things could be done better. As I set out in my first statement, work in this area is being undertaken as part of the GO Science review and I suggest that further research should be conducted on how best to improve such communications **[PV2/2 - INQ000147810, §§78-79]**.

732. I am asked if there was an over emphasis on surface transmission and handwashing in the UK government public health communication, particularly in the initial period of the pandemic, and an under emphasis on airborne transmission and the importance of ventilation. I do not think so and respiratory droplet transmission was considered important from the outset. The Environmental Modelling sub-group were also very clear about both aerosol transmission and the need for ventilation. Initially we were not sure of the relative proportion of transmission by fomites, aerosols and respiratory droplets. Advice about handwashing is an important part of a public health response to an infectious disease by PHE. This issue of airborne transmission is dealt with in detail elsewhere in the statement.

733. I am asked about the advice I gave on various slogans that were employed during the pandemic. I was not involved in devising those slogans and did not give advice on specific public health communications.

734. Others will be better placed than me to comment on the extent to which UK government public health messaging was effective, consistent, clear and understood by the public (including over relevant legislation).

735. I am asked whether the UK government's public communications concerning Covid-19 were characterised by a "fear" narrative. I recall a discussion early in the pandemic advising against adopting this approach, and instead suggesting that communications focussed on practical actions on what could be done by people to help themselves and others. This was reflected in the minutes of SAGE 7 (13 February 2020) **[PV2/64 - INQ000061515, §§21-32]**, and many of those involved later published a paper entitled, *"Harnessing behavioural science in public health campaigns to maintain 'social distancing' in response to the Covid-19 pandemic: key principles"* **[PV2/380 - INQ000197095]** This paper explicitly cautioned against adopting messages based on fear or disgust in relation to other people.

736. I am asked what impact, if any, I consider alleged breaches of social restrictions and lockdown rules by ministers, officials and advisers had on public confidence and compliance with rules on NPIs. I do not have any data on these matters and would not want to speculate about the effect. Any breaches of the rules by prominent individuals were disappointing and – based on the work of SPI-B – were likely to be detrimental to compliance. The rules were intended to encourage a collective response that would keep others safe, as opposed to an approach where individuals weighed up their personal risk and decided on their own actions. Any departure from the collective approach was

regrettable, and highly publicised breaches by those in positions of responsibility and influence were important and regrettable.

737. I am asked in particular to comment on the actions of Professor Ferguson in May 2020, Mr Cummings in April 2020, and Mr Hancock in June 2021. As Chair of SAGE I was involved in the first of these, in the sense that I accepted Professor Ferguson's resignation. I note that he resigned from SAGE as a result of those actions. It is not for me to comment on the actions of Mr Cummings and Mr Hancock other than to reiterate that the rules only worked when everyone stuck to them, and that breaches were damaging and regrettable.

738. I am asked to comment on the impact of the Eat Out to Help Out scheme on the effectiveness of the UK government's public health communications. I have commented above on the scheme as a whole, and the context in which it took place. In my view it must have contributed to the message that it was acceptable for people from different households to circulate with one another, including in indoor spaces for extended periods of time. This, inevitably, led to an increase in infections.

739. I am asked about data that the CMO and I presented at a press conference on 31 October 2020, which was only made public three days later and which was criticised for being out of date. The background to this was a leak from someone inside government – referred to in the press as the "chatty rat" – to the Times which published a story on Friday 30 October that the Prime Minister was considering imposing a national lockdown **[PV2/381 - INQ000231013]** The leaked data were work from SPI-M that had been taken directly to the PM by an adviser in No.10. In response, a press conference was hastily convened on a Saturday at which the CMO and I presented various slides and data sets, some of which were not published until 3 November 2020 **[PV2/382 - INQ000198164]** This led the Office for Statistics Regulation to put out a statement emphasising the importance of publishing data and the sources of data at the same as use is made of it in any press briefing **[PV2/383 - INQ000231014]** I spoke to the Chair of the UK Statistics Authority, Sir David Norgrove about this and exchanged letters with Ed Humpherson, the Director General for Regulation on the matter.

740. In my letter to Mr Humpherson, dated 6 December 2020, I expressed agreement with the principle of timely publication of data and wrote of the importance that I attached to openness and transparency (something he had acknowledged in his letter). I pointed out that SAGE had published over 400 items on the government website, including its minutes and supporting documents. However, I explained that we were bound to work within

existing legislation on data ownership and approval and as GO Science did not own all of the data this sometimes caused delay **[PV2/384 - INQ000229804**. I added:

> "Our publication record is a significant and public demonstration of our commitment to openness, and has allowed the public easy access to the science advice we have given since January in support of the government's response to the COVID-19 epidemic. All of this advice and the underlying papers are available for public scrutiny and scientific challenge and has been used by groups across the world. SAGE advice is of course just one input into the decision-making process, and ministers will rightly draw on other sources of evidence and information when making decisions.
>
> Openness is one of the guiding principles of science and we plan to continue being an exemplary branch of government in this respect, publishing our work on the epidemic with the same regularity going forward as we have to date. I will continue to make every effort to ensure that our work is understandable and presented as clearly and simply as we can."

741. In its statement, the Office for Statistics Regulation wrote that: *"It is clear that those working on the pandemic face significant pressures. But full transparency is vital to public understanding and public confidence in statistics and those who use them."* I agree with both of those statements and statistics that we used on 31 October 2020 should have been published at the time of the press conference. The reason that they were not was because the press conference was convened at short notice in response to the leak and the newspaper story and the system just didn't catch the publication issue.

742. I am asked various questions on how effective I consider the UK government's communications to have been. I think others will be better placed to answer those questions.

743. In terms of the use of the CMO and me at press conferences, I think there was a purpose to having us present to present the data and the evidence about the virus. We did not seek this role, but were asked by the UK government communications team to do it, and we agreed on the basis that they and the Cabinet Secretary considered it would be helpful. Others including the NHS and PHE were also often included in conferences. The CMO and I were civil servants and our role was to provide advice to the government and to explain science advice in relation to policies that the democratically elected government

had decided to implement. It would not have been appropriate for us to express personal views on policy choices. We emphasised the distinction between science advice and policy and explained what our role was.

744. The public understanding of the science advice would also have been improved by publication of the SAGE minutes from the start of the pandemic. I pushed for this at an early stage, and continued to do so following an initial refusal.

745. I am asked if there were any instances in which public health communications departed from the advice I had given. Public health communications are led by PHE and I think this question may slightly misunderstand the processes involved. Science advice informed government policy. Once that policy had been decided, taking into account other advice as well as the science, it was for the government's communication teams and PHE to decide how it should be best communicated. As such, I would not have expected the public health communications to have followed the science advice in a linear fashion, though some aspects may be more directly relevant than others. Public health communications departed from science advice when policy departed from science advice, for example in its response to the second wave of SAR-CoV-2 infections.

746. I did not receive explanations as to why public health communications had been done in a particular way, nor would I have expected this.

Questions specific to events in January and February 2020

747. I am asked what, if any, scientific articles and reports published in January 2020 I brought to the attention of decision-makers. The minutes of SAGE were the output that was intended to inform central decision-makers of the science, together with the medical input from the CMO and the experts in PHE. The outputs from WHO and other bodies were channelled through DHSC and PHE.

748. I am asked to what extent the infection fatality rate for Covid-19 was properly understood in January and February and whether the mortality rate was considered to be low. There are two relevant measures: the infection fatality rate (the number of deaths per infection) and the case fatality rate (the number of deaths per confirmed case). They rest on the ability to identify the relevant variables: infections, confirmed cases, and deaths resulting from the disease. In the early stages of a pandemic these will, inevitably, be uncertain. This uncertainty is increased where data are scarce or unreliable. All of this was

understood by those at SAGE. The minutes for SAGE 2 stated that the case fatality rate was *"currently estimated to be lower than SARS, but many uncertainties remain"* **[PV2/29 - INQ000061510]**. That was the best statement of what the available data told us at that time, but it was recognised that the position would change as time progressed and evidence accumulated. It was also recognised that mortality rates would vary between demographic groups and would be affected by co-morbidities. By February 11 SAGE estimated a case fatality rate of between 2-3%. This stood the test of time.

749. I am asked if I consider whether I properly understood the essential features of the virus and disease in January and February 2020, in particular its asymptomatic nature and means of transmission. My knowledge was, of course, imperfect given the data available, but I do not think the scientists contributing to SAGE and the various sub-groups missed any key elements of the relevant science about the disease that was in existence at that time. More would be learned as the pandemic continued. I was aware, by that time, that there could be asymptomatic or pauci-symptomatic infection and transmission, but the proportion of infections that were asymptomatic was not known. Similarly, I knew that the mode of transmission was respiratory, but the relative contributions of touch, fomite, droplet and aerosol spread were not known.

750. I am asked if it is correct that the plan for the response to Covid-19, as of 3 February 2020, extended to 50 specialist beds with a further 500 available for isolation. This is a matter for DHSC and I am unable to answer the question. The SAGE advice was that the pandemic influenza plans would give an indication of the likely scale of need.

751. During the Inquiry's hearings in Module 1, it has been suggested on several occasions that there was a failure to stockpile drugs against a coronavirus. There are many coronaviruses and there were no effective drugs that had been discovered at this stage of the pandemic. Furthermore different coronaviruses would need different drugs. Stockpiling drugs (or vaccines) that don't exist against an unknown pathogen is not possible. They have to be discovered first. The 100 Days Mission outlines a plan for how the world could be better prepared with building blocks from which new specific drugs could be rapidly discovered and tested **[PV2/385 - INQ000064653]** and I think it will be important not to adopt unrealistic assumptions about the ability to stockpile as yet undiscovered drugs.

752. More generally, I am asked whether I consider the initial policy planning undertaken by DHSC and the Cabinet Office to have been sufficient. I think there were both policy and operation deficits. I am not an expert in this area but it seems to me that policy and planning

in January and February 2020 was limited by the UK's level of operational resilience and capability, matters that have been considered in Module 1. Some of the observations from Exercise Alice would have been helpful to create a more robust test trace and isolate system as well as a surveillance plan.

753. I am asked what precautionary measures were taken by the UK government during February and early March 2020, such as the issuing of respiratory and hand hygiene behaviour guidance. These were operational matters for PHE, DHSC and the NHS and other witnesses to the Inquiry will be better placed to answer them. I have set out above the work done by SAGE and its sub-groups on NPIs during this time, which would have informed that advice.

754. I am asked if the beginning of the roll-out of PHE tests to laboratories across the UK on 10 February 2020 affected the advice I offered to core decision-makers. The fact that the test had been distributed did not change the science advice as the need for a test was clear. The information obtained from the results of testing informed the work of SAGE and its sub-groups.

755. I am asked what key preparations were made in January and February including, for example, the testing and tracing of infected persons. This was a matter for PHE, who will be in a better position to answer this question.

756. I am asked about surveillance measures that were in place in the period from January to March 2020 and how well the First Few Hundred (FF100) programme worked. I have noted, above, some of the discussions in SAGE about the level of testing capacity at that time. We were able to understand something of what was happening with the virus, but our knowledge was limited and the actual number of cases was significantly higher than the recorded number. With test numbers being constrained testing patients in intensive care units who had unexplained pneumonia would have been very helpful as an early warning signal. A wider random community survey such as the one that was subsequently established by the ONS would have been very valuable during March and April. However, even had these been in place it is still possible that they would not have detected many more cases in this early period of the pandemic. As of 28 February it is estimated that there were 68 cases, some of which would have been asymptomatic, in a population of 67 million **[PV2/84 - INQ000231043 p.3]**. It would be unrealistic to expect any surveillance system to find all of these. Perhaps more importantly, a robust and large testing system linked to contact tracing and isolation would have allowed the "contain" phase to continue for longer.

However it is unclear whether it would have coped with the big influxes of cases from Europe in February and March.

Questions Concerning Specific Comments

757. I am asked whether, on or around 12 March 2020 I heard the Cabinet Secretary, Sir Mark Sedwill, advise the Prime Minister that he should tell the country to have *"chicken pox parties"* for Covid-19 so as to achieve population immunity by September 2020. I do not recall hearing Sir Mark advise this to the Prime Minister.

758. I am also asked if I ever heard the Prime Minister say that he should be injected with Covid-19 on television to show that it did not pose a threat. I did not.

759. I am asked a number of questions about comments made by the Prime Minister during some of the press conferences that we gave in March. On 19 March, he said that the UK would *"turn the tide"* of Covid-19 in 12 weeks. The CMO and I had advised the Prime Minister that the pandemic was like a series of waves (or indeed like tides that come in and go out repeatedly), rather than a single tide. Even if the first wave had passed in 12 weeks, the virus would not have disappeared and would come back once restrictions were lifted. I cannot comment on what effect, if any, the Prime Minister's words had on public behaviour.

760. On 20 March, the Prime Minister is reported as having said, in answer to a question, that he *"hope[d] to get to see"* his mother on Mother's Day. From memory, when asked about this the CMO commented that it was probably best not to kill your mother on Mother's Day. I cannot recall what advice, if any, we had given to the Prime Minister about Mother's Day before his press conference, but it would have been in line with the social distancing messaging that was in place at that time. The Prime Minister had given that advice before adding his own comment about his own hope.

761. I am asked whether I witnessed the Prime Minister ever express the view that he had been pushed into imposing the first lockdown, or that he had been *"gamed on the numbers."* I did not.

762. I am asked whether, in autumn 2020 or at any point I heard the Prime Minister express the view that there should be *"no more fucking lockdowns – let the bodies pile high in their thousands"* or words to that effect. I do not recall the Prime Minister using these words in

my presence. I do recall that the Prime Minister tested a number of different hypothetical positions, which might have ranged from wishing to discuss a "*let it rip*" approach to a desire for *"no deaths at all"* or indeed a desire to see *"no deaths and no restrictions"*. In terms of the specific language I am asked about, I got the impression that the Prime Minister was more guarded in what he said when the CMO and I were present.

PUBLIC HEALTH AND CORONAVIRUS LEGISLATION AND REGULATIONS

763. I am asked a number of questions about my role and advice on the legislation passed during the pandemic. I was not asked about these matters and I did not have any role in passing the legislation.

LESSONS LEARNED AND RECOMMENDATIONS

764. I am asked about the lessons learned reviews that were carried out during the pandemic. I have discussed these in my first statement **[PV2/2 - INQ000147810, §§53-72]**, and further information is contained in Dr Wainwright's fourth statement **[PV2/6 - INQ000187618, §§11-33]**. I have also identified lessons throughout this statement, including in the crucial area of diversity, inclusion and issues on inequality. The Technical Report published on 1 December 2022 contains many detailed lessons learned and recommendations for science and medical advice and operations and I will not repeat them here **[PV2/7 - INQ000130955]**. The SAGE development programme has brought together the process lessons for SAGE **[PV2/386 - INQ000142161]**.

765. I would like to reiterate a point I made in my first witness statement. Each pandemic is different and sometimes in very unexpected ways. Therefore it is important that preparation is broad and built on capabilities and flexible building blocks rather than highly specific solutions, but the response itself by definition needs to be highly specific. These twin challenges need to be taken into account. For example lockdown measures would be totally inappropriate for a disease like HIV, and medical counter measures such as vaccines and therapeutics need to be designed and invented for a new infection as it reveals itself. I think capability building holds the best chance of avoiding the need for something like a lockdown in the future. This is particularly relevant in relation to testing, contact tracing and isolation procedures.

766. In the 100 Days Mission we identified three needs: (i) restock the armamentarium (i.e. building blocks for vaccines, therapeutics and diagnostics for pathogen classes), (ii) make the exceptional routine (i.e. embed in everyday practice what you would need to scale in

the event of a pandemic – clinical trials or testing for example), (iii) define the rules of the road in advance (i.e. don't leave things to be negotiated in the middle of a pandemic, sort out transfer of samples, funding schemes and regulatory approaches in advance). Whilst the 100 Days Mission was very specifically and deliberately focused on the narrow question of vaccines, therapeutics and diagnostics I think that points 2 and 3 are relevant for all aspects of pandemic planning.

767. My final point is that clear and simple lines of accountability and responsibility are important during an emergency and that all systems came under immense pressure during the pandemic. Some buckled, others needed to evolve. Implementation needs to be faster than the doubling time of the pandemic and this requires very straightforward lines of command and empowered leadership.

Statement of Truth

I believe that the facts stated in this witness statement are true. I understand that proceedings may be brought against anyone who makes, or causes to be made, a false statement in a document verified by a statement of truth without an honest belief of its truth.

Signed: Personal Data

Dated: 14 August 2023