**Thursday, 19 October 2023**

**(10.00 am)**

**LADY HALLETT:** Ms Cecil.

**MS CECIL:** Thank you, my Lady. Indeed. May I call Professor Catherine Noakes.

**PROFESSOR CATHERINE NOAKES (affirmed)**

**Questions from COUNSEL TO THE INQUIRY**

**MS CECIL:** Thank you, Professor Noakes.

As you will see, we've got a stenographer in the hearing room, and so if we can keep our answers at a reasonable pace, and if we're going too fast it will be my fault, and I'll ask you just to slow down, and if you can keep your voice up so that everybody can hear.

Professor Noakes, you very helpfully prepared a witness statement for the Inquiry. That's dated 20 July of 2023, and it's just been brought up at INQ000236261. It runs from page 1 through to page 89. It's a substantial piece of work, and it's accompanied by a declaration of truth. Is that right?

**A.** That's correct.

**Q.** You will appreciate that we have a limited amount of time, sadly, to go through some of your evidence. As we do with all witnesses, we simply won't be able to go through every aspect of your witness statement but what I do hope to do today is to pull out the most pertinent



aspects as we see them within Module 2.

So what I propose to do is to take you through your involvement in both SAGE, some of the working groups that were set up, and then specifically to deal with your expertise in the areas of transmission in terms of the virus.

If I can just set the background for that, you are a professor of environmental engineering in the School of Civil Engineering at the University of Leeds?

**A.** Yes, I'm actually environmental engineering for buildings.

**Q.** For buildings, thank you.

Your background is as a chartered mechanical engineer; is that right?

**A.** That's correct.

**Q.** In fluid dynamics --

**A.** Yes.

**Q.** -- as a specialism.

You were a participant in SAGE, but your involvement went much further than that, and you were subsequently made the co-chair of a newly-formed group; is that right?

**A.** Yes, that's correct.

**Q.** I just want to go through how that came about, very briefly.



So on 7 April of 2020, you were contacted by SAGE; is that right?

**A.** That's correct, yes.

**Q.** What were you asked to do?

**A.** So I was asked initially to provide a paper that gave some information on the environmental routes of transmission and the current knowledge at that time, and then I was also -- it was indicated to me at that time that they were interested in setting up a subgroup and I might be asked to lead that subgroup.

**Q.** Indeed. So you prepared that paper with the assistance of your colleagues at that point, because of the urgency and the proximity --

**A.** Yes, that's correct.

**Q.** -- of the next SAGE meeting, where it was to be presented, and indeed you attended that subsequent SAGE meeting on 14 April --

**A.** Yes.

**Q.** -- 2020? It was at that point that you were asked to set up what subsequently became the Environment Modelling Group; is that right?

**A.** That's correct, yes.

**Q.** That's typically known by an acronym, we have many acronyms here, but EMG?

**A.** EMG, that's correct.



**Q.** With regard to SAGE, you continued to attend meetings, and I think you attended a total of 71 --

**A.** Yes, I did.

**Q.** -- meetings in the period that you were a member, and indeed, as we've already alluded to, you became the chair of EMG?

**A.** Yes.

**Q.** Now, just dealing with the remit of EMG, in a nutshell, how would you describe it?

**A.** So I would describe it as we focused on how the virus transmits from person to person and the role that the environment plays in that, and then we also focused on the mitigations we could apply. But we focused more on the local mitigations, things like face masks, distancing, ventilation, hand hygiene, rather than the big ticket items like lockdowns or work from home.

**Q.** Indeed. I'm going to come on and ask you about those, firstly about methods of transmission and then secondly about mitigations and how they interrelate, but before I do that, very briefly, EMG was a new group?

**A.** Yes, it was.

**Q.** So it didn't exist pre-pandemic and indeed it no longer exists; is that right?

**A.** That's correct, yes. So we were asked to form this group and had to find a bunch of experts to create that

group in under a week.
**Q.** Indeed, and you set out in detail within your statement -- I'm not going to take you there or go through it now -- the challenges that you faced in setting up a group and the implications that had for diversity, and those mirror themes that we have already heard from other witnesses and that's why I won't go through those in detail now.
**A.** Yes.
**Q.** Dealing with the demand for your group's expertise, that was predominantly, it's fair to say, at the outset of the pandemic and through to the end of 2020; is that right?
**A.** That's correct, yes.
**Q.** What was the position in 2021? How did that differ?
**A.** So by 2021 I think we had a lot more of the baseline knowledge around transmission and it was therefore much more around application, and I think some of the work we did in 2021 sort of fed in to the ways in which we could release from the winter lockdown and to safely manage that. We did also consider, when new variants came along, what the implications of that might be for whether routes of transmission changed or became more prominent.
**Q.** Indeed, thank you. I think you describe it in your



statement, it's at paragraph 5.43 for those following, as a "limbo" period, in short, 2021, before then coming back in to looking at the roadmap out of lockdown?
**A.** Yes, I would agree with that. There was a period where we weren't -- we still had a few commissions but it was much slower and we were not quite sure how much longer we would remain as a group.
**Q.** Thank you. I want to just touch upon one challenge that you faced within the EMG in relation to commissioning, and a very specific point, if I may.

In the earlier stages of the pandemic, you received a question about the application of triethylene glycol, I hope I pronounced that correctly, as a method of mitigating airborne transmission. How did that come about?
**A.** Yeah, so that particular one came about not as a commission to EMG but actually as a question from an adviser in Number 10, I believe that's correct, and it therefore came as an email, and one of the challenges with that one was that that came with some external people tagged in to that email who then said, "Well, we have this technology, would you like to sign a non-disclosure agreement", to which I said no.
**Q.** Why was that in relation to a non-disclosure agreement?
**A.** Because I felt, as a co-chair of EMG, that we should



focus on evidence on peer-reviewed scientific evidence, you know, the scientific evidence that was in preprints, and information from reputable laboratories, national laboratories, et cetera, rather than companies who were trying to sell products.
**Q.** The difficulty there was, of course, they had been copied in to the email chain, and so that took up some of your time, it's fair to say, in dealing with those requests and continued requests?
**A.** It did indeed, and it meant we had to put information into a paper that we wouldn't ordinarily have done so, and respond to those requests. And I think it's worth saying that triethylene glycol was never really going to be considered as a viable option, because the idea of putting something into the air to try to clean the air but you're putting a chemical into the air, you're just creating a new contaminant.
**Q.** Thank you.

Now, as the pandemic progressed, a number of subgroups were set up under the auspices of both EMG, and indeed you participated in a broader range of subgroups in relation to other SAGE mechanisms; is that right?
**A.** Yes, that's correct.
**Q.** I'll just run through those very quickly with you: the



Hospital Onset Covid Working Group, Social Care Working Group, a number of task and finish groups, you were also spent at some SPI-B meetings, and indeed also GO-Science and co-ordination meetings; is that right?
**A.** Yes, that's correct, and I went to the majority of those because I had very specific expertise around transmission and the engineering knowledge that was perhaps not present in those other groups.
**Q.** We also see within EMG quite a broad range of other individuals from different SAGE groups and, indeed, non-SAGE groups such as NERVTAG, in attendance?
**A.** Yes, and when we set it up we deliberately co-opted people from those other subgroups so we could retain -- make sure we kept those connections across the different subgroups.
**Q.** Indeed, thank you.

What I want to go to next, if I may, is the issue of transmission and how the scientific evidence and understanding evolved over the period of the pandemic. To do so, may I just firstly deal with the various routes of transmission. We see that there is fomite transmission, airborne transmission, sometimes known as aerosol transmission, and droplet transmission.

Now, for the assistance of all of us, if I can just run you through what each of those actually means. So

fomite?
**A.** Okay, so fomite transmission refers to -- a fomite is an object, so it refers to transmission that would happen if, say, a surface or an object was contaminated, somebody touched that object with their hand and then they subsequently touched their mucus membrane, so their eyes, nose or mouth.
**Q.** Okay. And airborne?
**A.** So airborne transmission, or, as you said, aerosol, refers to when there are very small particles containing the virus, these get emitted when we -- through our respiratory activities, and these are the particles that can remain in the air and travel over some distance.
Often "airborne" is used to describe longer-range transmission, so to the other side of a room, but actually it also happens when you're close to somebody, because those small aerosols are also present at close range, they don't just sort of magically get to the far distance.
**Q.** So effectively small droplets don't -- things don't get smaller as they go further away, necessarily --
**A.** They do a little bit but that -- they evaporate. But that evaporation happens really very quickly, happens in less than a second.
**Q.** Thank you.



Then droplet?
**A.** So droplet transmission is -- this is a slightly more tricky one, because it tends -- most people think of it as it refers to large droplets, almost like the spit droplets, that then behave like a ball, ballistically, and deposit out on surfaces very close by. Now, in traditional sort of infection control in healthcare, droplets are defined as particles that are above 5 microns in diameter, and that's not correct, because a 5-micron diameter -- well, a 10-micron diameter particle can stay in the air and go to the other side of the room. So there are actually some incorrect definitions used to define the difference between droplets and aerosols that are used very commonly in infection control literature.
**Q.** So it's not an easy distinction, necessarily, to make, owing to those differences in interpretation?
**A.** Correct, it's not an easy distinction to make, and there's no sort of single cut-off between a droplet and an aerosol, we actually all breathe out all of the different sizes of particles. It's not a sort of -- there's no single -- not a cut-off you can put in there.
**LADY HALLETT:** Does it make a difference -- do you need to distinguish between them? Or if you're trying to combat them, supposing you have aerosol transmission, does it



make a difference if you're trying to combat droplet transmission?
**A.** So in some senses perhaps you don't, but actually where it becomes an issue is the sizes of these particles, because if you believe everything that happens when you're close to somebody is droplets, then, for example, you won't take precautions that require masks that will filter out the aerosols. So if people are just wearing a simple face mask or a face shield, which may deal with splashes and very large droplets, those won't filter out the small aerosols that are quite likely to also be present at close range.
**LADY HALLETT:** I follow, thank you.
**MS CECIL:** So the implications essentially for infection control therefore go to barriers or things that you can put in place to mitigate aerosols alongside droplets?
**A.** Yes, so you need to think about both of them, at both short distance and longer distances.
**Q.** Okay. In terms of understanding the transmission of Covid-19, what was the initial understanding at the outset of the pandemic in relation to the nature of the transmission?
**A.** So I think as a new disease it's quite hard to -- it was quite hard to have any good evidence. We were very much reliant on very early information coming out and papers



that were starting to come out from -- initially from China and then from other countries as that data grew. It was fairly clear from early stages that there was -- it was transmitted through a respiratory route, but an awful lot of the focus to start with was on droplets and washing your hands and surfaces, the fomites, rather than aerosols.
**Q.** Thank you.
Were you concerned that the airborne transmission routes in terms of aerosols were being overlooked to some extent?
**A.** Yes, I was.
**Q.** How did knowledge develop in the initial period of the pandemic, from April, in your involvement onwards?
**A.** So in the initial period of the pandemic, we drew on evidence from previous respiratory diseases, including influenza, and other coronaviruses, things like SARS. We drew on our understanding of the basic physics of how aerosols behave and our understanding of how viruses can be carried in those, so there is some science in there.
Then, as the evidence progressed, we -- we could see signals in epidemiological data that allowed sort of more understanding of transmission. So we started to see really quite early on that the vast majority of transmission happened indoors rather than outdoors,

which starts to give you an indication that the environment matters and that how people interact together matters.

You also, I think --

**LADY HALLETT:** You couldn't just slow down, could you?

**A.** Apologies.

**LADY HALLETT:** I'm conscious there is -- it's not me, I can keep up, but I'm not making a full note, unlike our stenographer.

**A.** Apologies. I think that --

**LADY HALLETT:** Sorry, I interrupted you.

**A.** It's also --

**LADY HALLETT:** Environment matters and how people interact together matters.

**A.** Yes. It was also apparent that a lot of transmission happened when people were in fairly close proximity. The other thing that we started to see in perhaps February and into March 2020 was there were what we might term "superspreading events", so where you have a large number of people infected in a short period of time, associated with a single event, and that perhaps is a bit of a red flag for airborne transmission.

**MS CECIL:** Thank you.

Just in terms of those superspreader events, can you give any examples of those?



**A.** So there was -- there were a number that were reported in the -- early on, but there was a restaurant in Guangzhou in China where there were people who were infected who were more than 2 metres apart. There was a -- quite a famous one called the Skajit Chorale Society, which was a choir in America, and again it was a very high number of people, I think it was 87% of the people there were infected in a single two-hour activity.

**Q.** Thank you. And as you say, that causes a number of red flags to go up in terms of looking at transmission routes, but can I just ask you a little bit about the more global picture and the understanding by other organisations.

On 29 March of 2020 the World Health Organisation published a tweet stating that Covid-19 was not airborne. Did that cause concern?

**A.** I think it did. I was concerned by it, and I'm aware that other people were concerned by that as well.

**Q.** Indeed, in your statement, you explain that that prompted the formation of a group that came to be known as Group 36, and that's 36 experts in transmission, essentially?

**A.** Yes, so these were 36 scientists from all around the world who had expertise and had worked in this area



prior to the pandemic.

**Q.** Indeed, you and those individuals signed a petition that was then sent to the World Health Organisation very quickly thereafter, on 2 April --

**A.** Yes.

**Q.** -- 2020. If you forgive me just for summarising, you followed that up with a letter when it was -- effectively fell on deaf ears, initially; is that right?

**A.** Yes, that's correct.

**Q.** And, following on from that, articles. And as you explain at paragraph 10.8, that prompted both media attention and started to change the discussion that took place around airborne transmission; is that right?

**A.** Yes, that's correct.

**Q.** Why do you think there was a reluctance to acknowledge the potential for airborne transmission?

**A.** So it is hard to be sure, but my personal opinions are there may be a number of reasons. So I think it's -- there's something about changing an accepted paradigm, if -- you know, traditionally respiratory diseases have often been categorised as droplet, and to change what people's accepted views are is -- can be difficult, especially if they feel that that challenge is coming from a different -- different field, a different area, aspect of it.



I think mitigating airborne transmission is more challenging, because it involves dealing with the environment, every environment's different, and it's not as easy to put a simple rule like washing your hands.

It also takes the responsibility from the individual to the organisation, because it's the organisation that tends to deal with the environment whereas it's the individual who perhaps washes their hands.

And I think I note in my statement as well that it's possible there may be a fear aspect to it, and you can see this in movies and things where it goes airborne, it promotes a fear. Now, I don't know whether that really was the case, did happen, but I think that may possibly play into it as well.

**Q.** You also touch upon implications for hospital infection control. What implications would those be?

**A.** Yes, so in hospital infection control, you know -- which is a very good field and there are a lot of really expert people who do hospital infection control, but conventionally if something is deemed droplet transmission, then you have relatively simple precautions: you perhaps put somebody in a side room, you maintain a distance, and you would wear relatively straightforward PPE, a simple surgical mask, maybe a visor.

If something is deemed airborne, then, providing you've got the capacity to do it, ideally you put that person into a negative pressure isolation room and you wear full respiratory protective equipment to manage that person.

**Q.** Certainly at the very outset of the pandemic, we'll all recall those images of people in --

**A.** Yeah.

**Q.** -- those sorts of mitigating outfits and so on.

In terms of EMG, it was obviously not established until April 2020, but in your view, was there an evidence base sufficient to operate on the precautionary principle through January through to March of 2020?

**A.** I think there was, and I believe that, prior to my involvement in SAGE, that NERVTAG had indicated the potential for airborne transmission.

**Q.** To your knowledge were there any reasons not to take steps to guard against airborne transmission?

**A.** I don't see that there were, no. I think there was -- although the evidence at the outset was weak, in truth it was weak for all transmission routes. I think there was just a tendency to assume the other transmission routes, and then require the evidence for airborne transmission. So I think from a precautionary basis, it



would have been appropriate to indicate that aspects like ventilation mattered, early on, and as that evidence base built, it was important that that -- those mitigations were more readily applied and people became more -- should have been made more aware of them.

**Q.** If I may move now through spring/summer of 2020, in short there were a number of papers that were published and you were still gathering the evidence; is that a fair summary?

**A.** That's a fair summary, and an awful lot of research happened during the pandemic which -- you know, we spent a lot of time sifting that information to put together.

**Q.** Now, come autumn 2020, did you still have concerns in terms of airborne transmission being taken seriously, or did you consider that enough was being done?

**A.** Yes, I did, and one of the concerns which I think you will have identified that I raised in my statement was that the publicly available information that's on the websites of the Public Health England, as it was then, and the NHS, for members of the public who maybe are trying to find information about how to manage the illness if, you know, they have a case in their home, that all still focused on droplets and surfaces and didn't mention airborne. So I emailed Patrick Vallance and Chris Whitty in September to say:



I'm concerned that this information, that we -- you know, the evidence base that we've been collecting and discussing and agreeing is not feeding in to this guidelines.

**Q.** Did you get a positive response?

**A.** So in one sense, yes: I believe Chris Whitty sent the emails on to Public Health England, they actually responded very quickly, they changed the information on their website, and indeed they -- in the process of doing that, they shared it with me, and we -- I helped them put some forms of words together to describe what we knew about transmission.

The NHS, on the other hand, nothing changed, and I believe I raised it in February, and then again at a SAGE meeting in June 2021, and finally, a few weeks after that, their webpages were changed.

**Q.** So quite some time later?

**A.** Quite some time later, yes.

**Q.** Now, you describe that period of autumn of 2020 as being the most frustrating period and -- for you, during the pandemic. Why was that?

**A.** I think it was because we could see cases were rising. We could see there was a desire to try to get back to normal, which is understandable, we can't stay in a lockdown forever, and that's totally inappropriate.



But I think it was that -- seeing cases rising and not very much being really done to try to mitigate them, even when people were interacting together.

**Q.** Now, your frustrations were such that you spoke to the press, is that right?

**A.** Yes. So I spoke to the press on many occasions through the pandemic, almost all of them were to talk about the science of transmission. On that one occasion I expressed a frustration with feeling that the mitigations that were being put in place, I think it was a curfew at 10 o'clock in a pub, that it was not going to make any difference.

**Q.** Indeed. And that was an article in the -- there was an article in The Financial Times in that respect --

**A.** That's correct, yes.

**Q.** -- 23 September. Then subsequently you posted a tweet in October of 2020. I'm just going to ask for that to be pulled up, if I may.

It's INQ000192075.

We see that here, it's dated 13 October 2020, it's 1.56 pm, so the afternoon, it's a cartoon. If we just run through that. It's a cartoon. We see the first -- it goes from left to right, obviously -- the first cartoon:

"Here's the situation ..."

We see a graph.
"This line is here."
"But it's going up towards here."
Effectively pointing towards bad, going from good to bad.
And then a conversation between three individuals:
"So things will be bad?"
"Unless someone does something to stop it."
"Will anyone do that?"
"We don't know."
"That's why we're showing you this."
Ie the graph.
"So you don't know, and the graph says things are not bad."
Response:
"But if no one acts, they'll become bad."
"Well, please let me know if that happens!"
And as we see:
"Based on this conversation, it already has."
So why did you send that tweet?

**A.** So I don't recall my exact feelings at the time but I think it was very much that frustration that we could see almost a repeat of what was -- what had happened the previous winter, that cases were rising and it was almost a case of we had to wait for something really bad



to happen before something did about it. I think it's also fair to say maybe I felt this applied to other things as well, such as climate change.

**Q.** When you refer to the previous winter, that's the January to March period --

**A.** Yes.

**Q.** -- of 2020?

**A.** Yes.

**Q.** Thank you.

Then if I can just take you briefly through winter 2020 to 2021, that was when we saw the emergence of the Alpha variant --

**A.** Yes.

**Q.** -- and cases rising; is that right?

**A.** Yes, that's correct.

**Q.** Now, what implications did the Alpha variant have in terms of transmissibility?

**A.** So the initial indications, which proved to be correct, were that the Alpha variant was more transmissible, so -- and when something is more transmissible, that means that the risk from any of your transmission routes increases. Our one concern there was that potentially the airborne route could become more significant.

So if you imagine at close range you might have already crossed a threshold whereby transmission



happens, so if it's more transmissible it doesn't make that much more difference, but if before you'd not crossed that threshold for airborne transmission to happen but now perhaps you needed to breathe in slightly less of it or perhaps more virus was being emitted, it could become a more important route of transmission.

**Q.** Thank you.

I just want to deal now, if I may, with the implications for physical distancing and the 1 to 2-metre rule specifically. With regard to that, can you help us with the evidence behind what was the 1 to 2-metre rule?

**A.** So I don't know the evidence that was behind its original design, that was before I'd been involved in SAGE. It was one of the very first things EMG were asked to look at, and we looked at where there might be epidemiological evidence, there is very little of that, and then we looked at where there are -- there was evidence from the understanding of the physics of how particles behave and different sizes of particles over distances, and we drew together from what limited evidence there was to indicate that actually, yes, this sort of 1.5 to 2 metres is where things are -- I'm not sure I'd even now go as far as to say safe, but where the risk starts to drop off.



**Q.** Thank you.

Now, during spring of 2020, there was a lot of focus on the 2-metre rule, and it caused a lot of controversy, there was a lot of pressure to reduce that, and in terms of your work, do you recall a situation where a line from one of your reports was relied upon in furtherance of promoting a reduction from that 2-metre rule?

**A.** Yes. So in May 2020 I was asked to give evidence to a select committee --

**Q.** I'm not going to ask you about your evidence or anything in relation to the select committee --

**A.** Okay.

**Q.** I'm not allowed to do that. What I am interested is in --

**A.** Yes.

**Q.** -- that following on from that --

**A.** Following on, yes.

**Q.** -- a letter was sent by Greg Clark MP, the chair of that committee, referencing your work and pulling out a line from one of your reports.

Was that an appropriate use of that line from your report?

**A.** No, it wasn't, because he had taken the line from the report, it's actually the paper from 28 April, and it's paragraph 44 in that paper, and he had taken one

line from it, the second sentence said "however", and described the fact that actually this model that we'd referred to had quite significant limitations. So essentially it was using one part of a paragraph but not the rest of that paragraph.

**LADY HALLETT:** Sounds like a West End review.

**MS CECIL:** So that was on 29 May 2020. In June and July of 2020, with regard to decision-making and the response in terms of mitigations, there was quite significant movement in relation to social distancing, the opening up of restaurants and so on and so forth. Was that in accordance with the scientific principles that you've considered and looked at and the evidence base in relation to distancing?

**A.** A lot of it was, because that 2-metre rule did remain. And I think it's worth saying the 2-metre rule doesn't just describe about your distance from somebody, it actually sets the principles of how many people can go into a different -- in a particular setting. So the more people there are in a setting, the higher those risks go.

**Q.** If I can just ask you specifically about the Eat Out to Help Out scheme. How does that fit with your understanding of transmission at that time?

**A.** So just to clarify, EMG were not asked to consider it.



Had we been asked, I think we would have had a concern that encouraging people to get together indoors, and only on perhaps three days of the week, which perhaps encourages crowding, was not necessarily a well designed approach.

**Q.** Just to round off the 2-metre rule, you've already explained why it's not a hard and fast rule, lots of variables apply to that, but it's still your view that that was not over-precautionary at the time?

**A.** That's correct, and indeed many other countries who did have shorter distances had implemented other measures to allow them to go shorter distances, particularly face coverings, which we didn't have at the time in the UK.

**Q.** Thank you.

Face masks have already been dealt with by Professor Horby, so I'm not going to ask you to deal with that today, but if I can just ask you very briefly to touch upon fomite transmission and the mitigations there. You've already referenced the hand washing campaigns that we're all so familiar with, with the happy birthday and various other things, in that respect.

But in terms of broader challenges in relation to surfaces, what were those?

**A.** So there was -- I mean, I guess any surfaces which are



contaminated, there's a potential risk there, so we're thinking around cleaning of those surfaces. But I think, although that was a key focus early on in the pandemic, really the evidence base to show that hand hygiene and cleaning surfaces reduces transmission for Covid-19 has not grown. I have yet to see evidence that suggests that it plays a major role. At the same time, I don't believe we can dismiss it, and I think we should have a certain amount of precaution there.

**Q.** Thank you.

Then the final topic, please, from me today, and that is the role of socioeconomic inequalities. If I can just touch upon some of the work that was undertaken by you and ask you just to expand on that a little bit.

You explained in one of your papers from the EMG that previous research from the swine flu pandemic, so really contextualising this for a moment, demonstrated that social distancing was effective in reducing infections, but it was most pronounced in households with greater socioeconomic advantage, and you explain that similar findings were emerging for Covid-19.

Why is that? What implications does socioeconomic situation have on the ability to practice social distancing?



**A.** So this was something that was increasingly discussed in the papers that we produced, because we became more and more aware of those inequalities, and in the example you gave there around housing, obviously those who perhaps are more wealthy are more likely to have larger houses, they're more likely to be able to have a spare bedroom for somebody to isolate in, and they tend to be slightly smaller households. If you have people who are living in multigenerational households, they are more crowded, it's very hard, if somebody's sick, to isolate, or, for example, if somebody is working in a higher risk occupation and doesn't want to put their household members at risk, it's much more challenging.

**Q.** Indeed. You also refer to other aspects such as occupation, transport to and from work --

**A.** Yes.

**MS CECIL:** -- those sorts of issues as well.

Thank you very much, Professor Noakes, but if you just pause there, there are some questions.

**Questions from THE CHAIR**

**LADY HALLETT:** Just before we move to, I think it's Ms Shepherd who is going to be asking questions, can I ask you about mass gatherings, Professor Noakes?

**A.** Yes.

**LADY HALLETT:** Given what you've said, where do you stand

on -- I think I have heard evidence that suggested mass gatherings don't of themselves create a greater risk because you're only going to infect the people around you. How does that fit with your --

**A.** Yes, so that's true, so actually a mass gathering -- let's say you go to a football match, it's unlikely that you're going to have transmission from somebody who is sat at the other side of the pitch to you, it's more likely to happen very close to you. I think where mass gatherings perhaps do pose a risk is that people travel to them, so they will travel in coaches or all together, so there's risks in there. They will perhaps stay overnight in places. They will perhaps, as part of that, go and visit pubs and restaurants. So it's likely to be the activities alongside the mass gathering that pose more risk than the mass gathering.

Perhaps the only slightly differently one there is something like a wedding, which is a smaller gathering, but they were -- weddings and parties were associated with quite high transmission, and I think because there lots of people mingle with lots of other people.

**LADY HALLETT:** Thank you.

Yes, Ms Shepherd.

**Questions from MS SHEPHERD**

**MS SHEPHERD:** Good morning, Professor Noakes, I appear on



behalf of Covid-19 Bereaved Families for Justice Cymru, and my questions will focus on the devolved administration angle.

So firstly, did you and your colleagues on the Environmental Modelling Group feel that you had an understanding of how your advice would be used by the devolved administrations?

**A.** So we didn't have a full understanding because, as I say, we were producing advice papers for SAGE and therefore the routes for them to actually get to devolved nations were largely via SAGE. However, I think it's worth noting that on our group we had representation, active representation from NHS Scotland and Public Health Scotland on the group. We did also have observers, as did many of the subgroups, from the devolved nations, so they would hear the discussions that we were having.

**Q.** Did you receive any data from the devolved administrations?

**A.** I don't recall, but as a group, we didn't deal with significant amounts of data, it was many of the other subgroups who dealt with -- particularly SPI-M, who dealt with data more than us.

**Q.** Did you and your colleagues consider that you had a clear understanding of where the dividing line was in



terms of your responsibility to provide advice to the whole of the UK, and the responsibility of the scientific advisers to the devolved administrations to provide advice which concerned their nation specifically?

**A.** I think we ... most of the advice we gave was, I guess, agnostic to a particular nation, so we were giving advice around things like, you know, ventilation or distancing, and therefore really how that advice is acted on is the -- is up to the policymakers in those nations to take on and use.

**MS SHEPHERD:** Thank you, Professor Noakes, and thank you, my Lady.

**LADY HALLETT:** Thank you, Ms Shepherd.

That I think completes the questions for you, Professor Noakes. Thank you very much indeed. Until I started this Inquiry, I confess I didn't realise the extent to which your kind of expertise and skills were required and utilised during the pandemic response, and I should have known, and I'm really grateful to you, obviously unsung heroines and heroes. Thank you.

**THE WITNESS:** Thank you.

**(The witness withdrew)**

**MR KEITH:** My Lady, the next witness is Professor John Edmunds.



**PROFESSOR JOHN EDMUNDS (affirmed)**

**Questions from LEAD COUNSEL TO THE INQUIRY**

**MR KEITH:** Professor, could you commence your evidence, please, by giving the Inquiry your full name.

**A.** Professor John Edmunds.

**Q.** Professor Edmunds, you have kindly provided a substantial witness statement, INQ000273553, we have it there on the screen. We can see from the bottom of the first page that that page is page 1 of 115, in fact, and it's a statement that you signed, certified as being true on 30 August 2023; is that correct?

**A.** Yes.

**Q.** You are an expert in infectious disease modelling, in pandemic planning, by extension, and also, by virtue of your particular expertise, a de facto expert in epidemiology.

You are the chair in infectious disease modelling at the London School of Hygiene and Tropical Medicine?

**A.** I am.

**Q.** Have you been involved in pandemic planning at the United Kingdom level for many years?

**A.** Yes.

**Q.** Were you the head of the Modelling and Economics Unit at the Health Protection Agency? Is that the body now known as the UKHSA?

**A.** Yes, and it is, yes.
**Q.** Were you therefore, in fact, one of the first members of SPI-M --
**A.** I was, yes.
**Q.** -- of which we've heard much? It's the Scientific Pandemic Infections Group on Modelling, of course.
You left the Health Protection Agency in June 2008 when you took up your chair at the London School of Hygiene and Tropical Medicine, but did you carry on working on, in particular, pandemic influenza --
**A.** I did, yes.
**Q.** -- influenza pandemics, over the years, whilst you were still serving on SPI-M? And were you at the forefront of the expert field of modelling in epidemiology in relation to epidemics both in the United Kingdom and abroad?
**A.** Yes, I suppose you want me to say, but yes.
**Q.** All right. You were also a member of NERVTAG, and you I think joined NERVTAG in 2014, and you served on that committee from 2014 through to 2022. So when we confronted the pandemic in the United Kingdom, you continued to serve on all those committees. I think you attended 97 SAGE meetings, 99 SPI-M-O meetings, and 91 other subgroup or related meetings?
**A.** As far as I could ascertain, yes.



**Q.** And I think, in addition, 74 NERVTAG meetings?
**A.** It was busy.
**Q.** It was indeed busy.
You participated in a number of other groups, of which we've heard mention, for example EMG, the Environmental Modelling Group, the Children's Task and Finish Group, the Moonshot Scientific Advisory Group and a number of other bodies or committees set up by the public agencies in the United Kingdom --
**A.** Yes.
**Q.** -- including Public Health England and government departments such as the DHSC.
**A.** I did, yes.
**Q.** To add to your burdens, throughout the pandemic, because of course you are the chair in infectious disease modelling at the London School of Hygiene and Tropical Medicine, you were intimately concerned with the work that continued to be done by the Centre for Mathematical Modelling of Infectious Diseases, which is an integral part of the London School of Hygiene and Tropical Medicine?
**A.** Yes, correct.
**Q.** I think throughout the pandemic, the CMMID, which is what I'm going to call the Centre for Mathematical Modelling of Infectious Diseases, produced a vast amount



of learning and reports and advice for the United Kingdom as well as a host of other low and medium-income countries around the world.
**A.** Yes. It was an amazing effort.
**Q.** I'll turn in a moment to asking you just to give us a flavour of the work that the CMMID did, but before I do, I want to ask you to put your mind back and give the Inquiry, please, a sense of what your understanding was in the middle of January 2020 as to the threat that was by then plainly emerging from China.
You say in your statement it was clear by early to mid-January 2020 that the novel coronavirus outbreak in China was a major public health threat. Did you mean -- do you mean -- by that that it was a major public health threat to the world, to the countries around China, just to China, or to the United Kingdom?
**A.** At that very time, at the middle of January, it wasn't clear whether that was a threat just to China or whether it was a threat to everyone. I think all of us thought it might well be a threat to everyone across the world, but it wasn't clear at that time, because of -- it's a technical issue, but there was -- the way that the data were being reported from China, it looked at the time -- there was only 41 cases that had been reported, they'd all been -- they'd all attended



the seafood wet market in Wuhan, and no other cases were being reported. So it could have been just some odd event, quite a large event, where people got exposed to something in that market. But it might not have been. And when we started to see cases outside China, then it was -- it was very hard to believe that it was just a limited event.
**Q.** Whilst you give your evidence, Professor, could I invite you just to go a little bit slower as well.
**A.** Sorry. Yeah.
**Q.** Just to get our chronological bearings, the knowledge that there were cases outside China, of course, emerged at the end of January --
**A.** No, before then, the first case outside China I think was about the 13th, it may have been 11th or 13th January.
**Q.** But by the end of January, it was clear that it wasn't just one or two cases sporadically in a country outside China, there were multiple cases in multiple countries?
**A.** There were. And by then the Chinese had changed the way that they were reporting their cases, and there were thousands of cases in China.
**Q.** We'll come to this issue later of how it was that the early data grossly underestimated the spread of the outbreak in China.

But you've used the words major public "health threat".
**A.** Yeah.
**Q.** It was clear by mid-January that what China was grappling with was a viral outbreak, a viral pathogen, a disease outbreak based upon a virus?
**A.** Yes, absolutely.
**Q.** And viruses have a tendency, it's what they do, to spread exponentially --
**A.** Not all of them.
**Q.** Not all, but they may do so.
It was clear in mid-January, although nobody knew the extent of the spread in China, that this virus had the capacity to kill, to seriously harm, to hospitalise, and that people weren't becoming infected just because they'd had contact zoonotically with an animal --
**A.** Correct.
**Q.** -- they were becoming infected from human-to-human transmission?
**A.** That was then very clear by -- certainly by the end of, you know, the third, fourth week of January, that was very clear, yes.
**Q.** So if human-to-human transmission was clear, and it was clear that it was spreading, although nobody knew to what extent, was that why you, as you say, appreciated



there was a major public health threat?
**A.** Yes.
**Q.** Because if the virus continued to spread, and its reproduction number was more than 1, that is to say every single infected person would infect more than one other person in an unimmunised population, subject to control measures being applied, the virus would continue to spread forever, until herd immunity?
**A.** Yes. Even after herd immunity of course you get spread, like we have now.
**Q.** So the basic nature of the threat was clear: it was an issue, wasn't it, of seeing whether it would spread significantly beyond China and the countries around China, and therefore, by extension, whether there was a need to apply control measures to stop it?
**A.** Yes, I would agree with that.
**Q.** All right.
If a virus spreads at a rate greater than R larger than 1, then it will spread, we've heard, exponentially, it will grow faster and faster and faster?
**A.** If you don't take measures to stop that, yeah.
**Q.** If you don't take measures. So is that why, in your field of expertise, there is this notion that when dealing with viral epidemics which may become a viral pandemic -- which is just a difference of scale, is it



not, a pandemic is a worldwide epidemic -- a sensible and wise approach is to apply a precautionary approach, that is to say get on top of the problem before it beats you?
**A.** Correct.
**Q.** And in your statement, you refer on multiple occasions to the need for the precautionary principles to be applied; it is at the very heart of epidemiology, is it not, it's how you deal with epidemics?
**A.** Yes, when you're talking about response epidemiology, how to respond, then yes, you do -- it is wise to apply that precautionary principle, because we -- our surveillance systems are never likely to pick up every case, and they're always a bit delayed, and so the epidemic is likely to be more widely spread than you think it is.
**Q.** Was that why you say in your statement that even in the early days or mid-days of January, it was essential for the United Kingdom, as with every other country, to assemble significant data in terms of the epidemiological nature of the virus that had by then already spread outside China, and the modelling data, in order to be able to work out precisely how the virus would spread and how to deal with it?
**A.** That's right. So first of all you try to characterise



what you're dealing with, in terms of -- you mentioned the reproduction number, so what -- if you could try to estimate the reproduction number. And then other critical parameters related to the virus, for instance obviously how -- the infection fatality rate or case fatality rate, which is the fraction of those -- of the infections that might die, for instance. These are sort of absolutely critical numbers that you try to get an early estimate of, as best you can.
Of course you don't stop there, throughout the epidemic you might refine those estimates and they might change a bit, but you spend a lot of your time trying to characterise -- especially with a new disease like this, trying to understand it, how fast it might spread, and then you can start to put together models to play -- you know, to look at different scenarios, as it were, to see whether -- to see how you could, you know, what measures might be effective or most effective against this new threat.
**Q.** In relation to the coronavirus pandemic, that basic data, the reproduction rate, whether the virus killed, whether it hospitalised people, whether it was capable of being transmitted and was being transmitted human to human, and whether or not it was possible to become infected but not show symptoms, asymptomatic

infection --
**A.** Yes.
**Q.** -- whether or not it was possible to become infected and have a period of time during which you showed no symptoms, pre-symptomatic; all that in general outline was known fairly early on, was it not?
**A.** It was. Certainly by early February, or mid-February, I'd have thought, then we had probably reasonable estimates of most of these things. Some of them -- some of these things take longer to estimate. For instance, the infection fatality rate takes longer, because sadly it takes time for people to die if they're infected, and so you have to sort of wait for that. I know it's a dreadful thing to talk about, but you have to wait for that to happen, so you don't know how many people might die until people are dying.
**Q.** Could you keep your voice up a bit more, please, Professor.
**A.** Sorry, yes.
**Q.** So the infection fatality rate is vital, is it not --
**A.** Yeah.
**Q.** -- in terms of assessing what might happen to any particular country's healthcare system? You need to know what proportion of those infected in your population will die in order to know whether you've got



enough beds, whether you've got enough healthcare facilities?
**A.** There's two aspects. So one is the reproduction number, the basic reproduction number, and that gives you an indication of how many people might become infected -- if you do nothing. So if you allow the epidemic just to sweep over the population -- and the population does nothing. So they don't change their behaviour. And that gives you -- so that tells you how many people might become infected. And then, of course, you would need to know, of those who become infected, how many might die, how many might be hospitalised.

And it's not just those crude numbers, you'd like to know it by different groups, like different age groups, which, for Covid, that was -- there was enormous differences in risk by age, for instance.
**Q.** But the reproduction rate was estimated to be between 2 and 3 at a relatively early stage, in fact in late January. The infection fatality rate, in a very broad sense, how many people will die in an unimmunised population that takes no steps to protect itself, was assessed in mid-February preliminarily --
**A.** Yeah.
**Q.** -- to be 1% overall. It subsequently transpired that if you were over 70 -- or for the over 70-year olds the



infection fatality rate, the proportion of over 70-year olds who would die once they become infected was much higher?
**A.** Yeah.
**Q.** Around 7% of them?
**A.** Correct.
**Q.** But the point, Professor, is this: plainly epidemiologists and modellers, to use your words, like to know the precise nature of the virus --
**A.** Yeah.
**Q.** -- the detail of how it will behave, how it transmits, what the particular features are in terms of the impact on segments of the population, how the population might behave, how the virus might respond to self-imposed behavioural changes.

And the models, to use your word, because you used it, can be used to play at the figures, to demonstrate these more nuanced conclusions.

But the basic information about the threat of this virus and its potential fatal impact and the impact upon the healthcare systems of this country were known, was known, relatively early on?
**A.** Correct, yes.
**Q.** It was known, putting together the reproduction number, the infection fatality rate, the knowledge of the size



of the population in this country, the knowledge of --
**A.** Demography, yes.
**Q.** -- how big the NHS is --
**A.** Yeah.
**Q.** -- that was all apparent to those in the know, to the experts, certainly by the end of February?
**A.** Oh, yeah. I mean, earlier than that, really.
**Q.** When earlier than that, do you assess?
**A.** Sort of mid-February, I think, where we had probably a pretty good -- pretty good idea. You get an initial sketch even earlier than that, perhaps, but then -- which might give you, you know, an initial impression, but of course then you improve on that and then you understand some of the nuances, like the -- how risk varies with age and how risk varies perhaps with other -- with other sorts of variables, ethnicity -- obviously those sorts of things came later.
**Q.** So would it be fair to say that when that realisation dawned, perhaps in mid-February, the absolute core consideration then became: how do we control it? How do we stop it? How do we suppress it? How do we mitigate it? How do we do anything --
**A.** I think that had been a core consideration from before then, certainly from January when the alarm first came up: how do we stop this?

**Q.** And unsurprisingly, experts, government officials, scientists, epidemiologists, cast their minds back to what sort of control measures we had utilised in the past?
**A.** Yeah.
**Q.** And of course because of the flu pandemic of 2018, because of swine flu, because of --
**A.** I think 1918.
**Q.** Sorry, what did I say?
**A.** 2018.
**Q.** Thank you very much, Professor.
**A.** Sorry. I didn't mean to put you off.
**Q.** No, no, no, it's quite all right. 1918.
Because of swine flu, because of SARS and MERS and other -- those two particular coronavirus --
**A.** Yeah.
**Q.** -- epidemics, or pandemics perhaps, in the Middle East and Far East, there was a basic understanding of what sort of control measures might work?
**A.** Some, yeah. Almost as well a bit the other way around, what kind of control measures are unlikely to work as well. You know, there's two aspects to that.
**Q.** Thank you.
For flu, there had been quite a prolonged debate about whether school closures, for example --



**A.** Yeah.
**Q.** -- would work, and strategically the government and its advisers thrashed this issue around for a very long time indeed: is it a good idea to close schools in the face of a flu pandemic?
There had been a long running debate, again resolved in the context of flu, whether or not shutting borders would help?
**A.** Yeah.
**Q.** And it was generally understood that it wouldn't?
**A.** There's a difference between absolutely shutting your border, letting no one in --
**Q.** And restrictions?
**A.** And restrictions, yeah.
**Q.** But generally --
**A.** Restrictions were unlikely to buy much time.
**Q.** But we had never -- at least --
**A.** We had never shut our border.
**Q.** We had never shut our borders to deal with flu. And we had never had a sophisticated or put into place a sophisticated system for test, trace, contact, to deal --
**A.** We had at the beginning of the swine flu pandemic, but mostly to understand its transmission characteristics here in the UK rather than as a concerted effort to try



to actually stop it, because there was, you know, widespread recognition that it would be extremely difficult and extremely resource-intensive to actually try to stop a flu pandemic via contact tracing, because it -- it moves so fast that the virus moves between one generation of cases and the next so quickly that it's really impossible to keep up with it with contact tracing.
**Q.** And the contact tracing that was used for swine flu, and is used actually for any new or emerging --
**A.** Oh, and things that have been around forever. You do it for TB and -- well, HIV's not been around forever, but yes, you do it.
**Q.** It's relatively limited. You pick up travellers, you test them, you test and trace, contact, trace index cases, and whether or not you're focusing on people coming in with the infection or you focus on the first few hundred cases or you focus on the first few cases in the hospitals, it doesn't really matter, the system was only designed to deal with the first relatively few cases?
**A.** Yes. So for flu the system was always a first few hundred system and the idea, as I said, is really to understand and characterise the virus here in the UK more than trying to stop it with the recognition



that it was very, very unlikely to stop a flu pandemic.
**Q.** So drawing those threads together, and I should say, can you tell us whether or not there was in January 2020 any system at all, whether by utilisation of past control measures or anything drawn up on paper, any system of quarantining whole segments of society or whole-society, of self-isolation of the whole society or social distancing the whole society?
**A.** In January/February, no, there was no consideration of that. It was concentrating on contact tracing.
**Q.** And you knew that?
**A.** Knew?
**Q.** You knew that there was in place no system at all for social distancing --
**A.** Yeah.
**Q.** -- quarantining --
**A.** Yeah.
**Q.** -- for whole-society response?
**A.** Yeah. I mean, of course at that time, if we're talking about, say, February, there would have been very few cases -- even, you know, looking back at it now, and realising how many cases there were, there were still very few, so you've got to sort of have some sort of proportionate response. You know, do you put the entire country under some sort of restrictions when there's,

you know, perhaps a handful of cases? So the idea is to really try to target it around those cases. I think the issue was we always knew that it was likely that cases would not -- some cases would not be picked up. We were targeting our contact tracing around cases who came in from high risk areas, China being the most obvious, but other places where there was -- cases had been picked up, which were mostly in the Far East. But of course people could come indirectly into the UK via other routes, and of course they did, and so that contact tracing effort, it had -- you know, it had to go really well everywhere in the world for it to be -- for it to stop --

**Q.** For it to work?

**A.** Yeah, exactly.

**Q.** And you knew that?

**A.** Yeah.

**Q.** So you -- and I make it absolutely plain, you are but one of a number of brilliant scientists and advisers who assisted the government and the country in the remarkable way that you did, but there must have been a general awareness, therefore, by February this viral, severe pandemic, this viral pathogenic outbreak is coming, and it can't be stopped, and the measures which could stop it once it reaches the United Kingdom have



either never been dreamt up or never been applied or won't work?

**A.** I mean, you said can't be stopped, I mean, it was worth trying to stop it in those ways. You know, there was a hope but maybe not an expectation that it would be stopped like that. But yes, we knew that there was a very high likelihood -- I mean, you know, I'm a scientist, I'm not going to say there's a -- you know, there was an extremely high likelihood that we would -- that we would face a very, very major pandemic, yes, we knew that.

**Q.** And when you say "we would face a very, very major pandemic", you mean, so that we are clear?

**A.** Something like 1918. That was always -- you know, that would have been -- and of course that's the great -- it was the great influenza pandemic of more than 100 years ago. You know, it's sort of etched in people's -- especially my field, of course, the sort of collective memory has been a horrendous event, and this looked, there was -- it was, you know, every time a new bit of data came in they just sort of confirmed that this was going to be something like that, you know, a once in a hundred years event, horrific.

**Q.** And because there was no sophisticated test, trace, contact, isolate system in place, because such things



weren't generally used for flu, for which we'd been preparing, although this coronavirus had a latency period, a gap between when you become infected and when you can pass on the infection to somebody else, in which gap you can be tested and seen whether you are positive for the disease, until such a system could be developed, designed and put into place, it would be of little practical assistance?

**A.** So by late January, early -- late January, let's say early February, we knew something about the characteristics, you quite rightly say, so there was quite a long period between infection and you becoming ill of sort of five or six days, which is very different to flu, which is sort of one or two days, and so there was a possibility that gave you a bit more time, if you were trying to contact trace -- I mean, if you're trying to contact trace, it gave you a bit more time to be able to do it. In terms of are you infectious before you become symptomatic, with SARS-1 that didn't look like that was the case. So with SARS-1 that time period was a bit longer, it was more like eight days, and it looked like you became infectious when you became symptomatic. And you were very ill with SARS-1 and so most people were in hospital very quickly. And so it was easier to contact trace with SARS-1 and that's how it was stamped



out globally. Flu you just wouldn't be able to do it because of the speed. SARS-2, Covid, was somewhere in between. It gave you a glimpse of maybe that might be possible, but everything had to go really well for it to work.

**Q.** But in practice, whether epidemiologically a test system was possible, it didn't matter, did it, because in January, February, March, beyond the first few hundred cases, before the first few index cases, there was no whole-society test, trace, contact system?

**A.** No. Strictly speaking you don't need to test people, you can isolate them anyway, you know, on symptoms and things like that, so -- obviously it's much better to test them because then they know they have it or they know they don't have it, but strictly speaking you don't need to test people.

**Q.** So, to come back to your earlier answer, by mid-February there was an understanding that there was a major pandemic coming?

**A.** Yes.

**Q.** And so again so that we are clear, a major pandemic means tens of thousands of hospitalisation cases?

**A.** And more.

**Q.** And more. Hundreds of thousands perhaps. It means tens of thousands, perhaps more, of deaths?

**A.** Oh, yes, and again more.
**Q.** It means the country being overwhelmed by disease?
**A.** Yes. It's more than that. You know, once -- the reason why the flu pandemic was at the top of the National Risk Register, it was always known that an event like that would affect every aspect of society, every aspect of government. So it wasn't just that it would overwhelm the health service and cause, you know, a huge amount of disease, but also it would affect people's lives in other ways -- and society quite fundamentally in other ways. That was always known for these major, major events.
**Q.** As you've said, by mid-February there was only the hope, not the expectation, that it might be stopped?
**A.** Yes.
**Q.** Why, then, as a country, did we not apply the precautionary principle to which you have already referred and do something about it then?
**A.** I think the risk then was still low to a person --
**Q.** Sorry, please speak more slowly. It's very important that we record your answer.
**A.** I apologise.

So I think the risk for an individual in this country in February was very, very low -- of Covid was very, very low. So could you take national restrictive



measures, would people come along with that? You know, I think -- I think that would be difficult. I think it would be a hard sell.
**Q.** But that, Professor, was surely a matter for our politicians and our decision-makers? That was for them to decide, was it not?
**A.** Yeah, it was, of course. I think there are other things in between. You're going to -- you're kind of jumping to the nuclear option, I think there are other things in between that perhaps could have been done. I've thought about it later, I thought, you know: what could we have done? What would be more proportionate? I think things like advice to work at home we could have perhaps done that. Yes, it would have had an impact on the economy, but -- and, you know, I regret that we didn't look at that at that time.

And there are things -- there are other things like we could have given -- we gave public health advice, that was being given, to wash your hands and things like that, which are sensible, but we could have perhaps made it really clear that people should stay at home if they had any sort of symptoms. Despite the fact that almost all of them wouldn't have had Covid. Almost all of them would have had flu or coughs and colds, whatever. You know, because Covid was vanishingly rare even at that



time. So I think maybe there are things that we could have perhaps emphasised in February that might have slowed things a little bit. They weren't going to stop it, but they might have slowed things a little bit more than they did.
**Q.** We're going to come, of course, to the detail of the advice that you and SPI-M-O and SAGE gave to the government, but the nature of the response was, you accept, a matter for government.

What I'm asking you, though, is why was that terrible conclusion, that dawning realisation that the virus was coming, it was a fatal pathogenic disease, and there was in practice, you understood, not much more than a hope that it could be controlled, why was that warning, why was that realisation not made more apparent to government in the middle of February, to the public --
**A.** Yeah.
**Q.** -- to the United Kingdom --
**A.** Yeah.
**Q.** -- that this pathogenic tsunami was coming?
**A.** So I distinctly remember my feeling at the time. I assumed that the government did know all of this. I mean, you know, I can't believe that they didn't, quite honestly. I still can't believe that they didn't.



So I assumed that they did know all of this, and that actions were being taken.

I -- the messaging at the time was very reassuring, and I assumed that there was a plan: let's not concern people and bother people now, because we'll have to -- we'll have to get people prepared, and do it in the right way. That was my assumption at the time.

Afterwards, I look back on it and think: actually, really, you know, was there a plan? I'm not sure. But I'd assumed that there was. I assumed that the messaging being quite reassuring was there for a reason.
**Q.** I'm not asking you to speak for the government, and we'll come later to how much the government responded to the advice you actually did give. I'm asking you and, through you, vicariously SAGE and SPI-M-O and SPI-B and all the august, brilliant advisory committees, the epidemiologists, the modellers, the virologists, why was that warning not being shouted out from all of you --
**A.** Yeah.
**Q.** -- from mid-February?
**A.** Yeah. So I didn't think we had to shout it. You know, in terms of the government, I -- you know, something of this magnitude you'd have thought the government should

have all its attention paid to it, you'd think. So there's that.

Secondly, yeah, I kind of just assumed that there was some reason for not shouting it out. I remember quite distinctly -- I remember Neil Ferguson gave a -- did say something on Radio 4 and I remember Chris Whitty also saying something. There was this kind of funny period where people would talk about, as you're talking about, the -- you know, the reproduction number and the implications that would mean for how many people might get infected in an unmitigated wave, and there was talk about the infection fatality rate, and so, you know, you could easily just multiply those two numbers together and get a very big number for deaths. But people didn't. I was ... you know, people avoided multiplying, you know, in public utterances.

And I felt that -- I honestly thought -- I mean, it sounds really naive and silly, I think, but I honestly thought there was a plan. I didn't want to be the person who multiplied those two numbers together and -- I thought that should come from someone central in a kind of organised -- in an organised comms plan way to prepare the country for what was going to happen. And I didn't want to get -- I didn't want to mess that up in any way.



**LADY HALLETT:** I appreciate you're mid-flow, Mr Keith.

**MR KEITH:** May I ask one more question and there will be a very natural break?

**LADY HALLETT:** Very well.

**MR KEITH:** Your statement makes plain, Professor, how much work was done by the CMMID working group at the London School of Hygiene and Tropical Medicine, you describe it as brilliantly led and organised by your colleagues, in particular a doctor Rosalind Eggo.

You describe how over those three months, January, February and March, you undertook -- or rather the London School of Hygiene and Tropical Medicine undertook a huge range of work, right from the early days --

**A.** Yes.

**Q.** -- assessing the nature of the initial outbreak, accumulating data, analysing the spread of the virus, looking at the reporting delays from China, how difficult it was to get a handle on the nature of the spread. You looked at airport screening, methods of transmission, rates of testing, contact tracing, isolation, the case fatality ratio, then latterly, in March, the effect of non-pharmaceutical interventions which, let's just speak it out, how to control the virus, whether it would be a wave or a second wave, what was herd immunity, whether we should be suppressing



or mitigating, whether we should have an episodic lockdown process.

But this vast learning nowhere says, at least until March, there is a pathogenic tsunami coming and it can't be stopped.

**A.** You know, I think that was clear to all of us. Yes, it wasn't me who raised that alarm to the public. I deliberately didn't. As I've explained to you, I didn't want to. I didn't think -- I didn't think it was for me to do that, I thought it was for someone with more authority to do that, and to prepare people for what was likely to come.

**MR KEITH:** Thank you.

My Lady.

**LADY HALLETT:** Thank you very much.

I hope you were warned, Professor, that we take regular breaks, so I shall return at 1.40.

**(11.25 am)**

**(A short break)**

**(11.40 am)**

**LADY HALLETT:** Mr Keith.

**MR KEITH:** Continuing, Professor, with the theme of the generic understanding in the scientific community, the scientific advisory community in January, it is absolutely vital, I make plain and put to you, that you



of course, Professor Edmunds, had absolutely no personal responsibility for having to stand up and tell the government what it should be doing, what was going to happen, because you were part of SAGE, SPI-M-O, all the many bodies, and it was those bodies which had been constituted in order to give government advice; that's a fair summary, is it not?

**A.** Yes, but it doesn't stop me feeling that I had some responsibility.

**Q.** Well, if I may say so, that is very much to your credit.

And the way in which the structure worked was that these many august and brilliant bodies were constituted to assemble information, assemble data, give advice, and then that advice -- and it was very clear how it could be done and should be done -- was routed to government through the CMO, the Chief Medical Officer, the Government Chief Scientific Adviser --

**A.** Yeah.

**Q.** -- through the minutes, through the papers which were given to the committees, through the documents that you produced --

**A.** And can I say I'm absolutely sure that the CMO and the Government Chief Scientific Adviser both raised this. There is no way that they didn't.

**Q.** Yes. And we'll come to it, in a moment, your own

emails, personal emails to Professor Ferguson, Professor Sir Chris Whitty, Sir Patrick Vallance, raise the issue of urgency and the need to act. We'll come to those in a moment.

But the point, we'll also look at SAGE, though is this, isn't it, that systemically or systematically, there was a structure in place to give the government advice, to warn it, to tell it what might happen and to give it the information to enable it to decide to respond rapidly, proportionately, effectively, but that system doesn't appear to have worked?

**A.** Clearly not. I mean, if you think about it, though, SAGE is -- only sits in an emergency, and it was called to sit in -- somewhere around the 20th, you'll know the date exactly, but, you know, the 20-something of January. So somewhere someone in government thought that it was sufficient -- you know, it was sufficiently -- there was a sufficient emergency to call SAGE. SAGE doesn't -- only sits very seldom in these kind of situations. So someone thought that it was worthy of calling SAGE together.

**Q.** Before we leave the subject entirely of the working group at the London School of Hygiene and Tropical Medicine, and the issue of the vast amounts of work that were done, can I ask you to look at one particular paper



dated from 7 February 2020, which is INQ000092645.

**A.** You can carry on, I know which paper it is, yeah. Yeah.

**Q.** Yes, we need to get it up on the screen, Professor, for everybody else.

So this is a paper dated 7 February. It's called *"Feasibility of controlling 2019-nCov outbreaks by isolation of cases and contacts".*

So at a relatively early stage, 7 February, the London School of Hygiene -- and this isn't a SAGE paper, it's a paper done by your research institute's working group, was on to the issue of how easy or difficult or effective controlling the virus by isolation of contacts and cases would be.

**A.** Yeah.

**Q.** Hence your evidence earlier about the very early understanding of how difficult it would be to control the virus by isolation and contact trace.

The summary of the findings in the bottom half of the page are these, or the summary is this:

"The percentage of contacts traced is critical to achieving control in all scenarios.

"Higher transmission (higher R0) makes outbreaks more difficult to control."

By this time you did have some basic understanding of the likely --



**A.** Yeah.

**Q.** -- reproduction number. What was it?

**A.** You know, it -- there was still -- estimates varied between about 2.5 and 3.5 at the time.

**Q.** So not as high as some other or some high-consequence infectious diseases, but --

**A.** Higher than most high-consequence infectious diseases. That -- 2.5 or 3 doesn't sound bad, but it's bad.

**Q.** Yes. Not as high as some, but higher than many.

"30% transmission before symptoms makes control less likely in all scenarios."

By that were you saying, was your working group saying: if you've got a high number of people who are asymptomatic, who --

**A.** Pre-symptomatic, that's about pre-symptomatic --

**Q.** Okay.

**A.** So if you are infectious before you become symptomatic and we had different scenarios for that, so different assumptions -- because we didn't know that very well at that time, although that was becoming clearer --

**Q.** My mistake, the asymptomatic bullet point --

**A.** Is a bit lower down, yeah.

**Q.** Let's have a look at that.

"Presence of subclinical (asymptomatic) cases has an outsize and negative impact on probability to achieve



control."

By that were you saying if a large proportion of infected people are asymptomatic, that is to say they don't show symptoms, then your ability to achieve control is hindered and the probability that you will be able to achieve control goes down?

**A.** Correct.

**Q.** You also say:

"60-80% of contacts must be traced (and transmission stopped) in order to achieve control in most scenarios, and more for some characteristics."

So you've got to, practically, be able to stop a very large number, a very large percentage of contacts for transmission chains to be broken?

**A.** Correct, so you have to -- you have to quickly isolate -- contact trace a large fraction of the contacts, and effectively quarantine them.

**Q.** Was it these findings in early February which led you to conclude that, as you began to appreciate, the asymptomatic, pre-symptomatic nature of the viral epidemic and the transmission rates, that effectively contact trace control was going to be extremely difficult?

**A.** I think it's a little bit more nuanced than that. This paper was a little bit of a -- one of those --

the results here are a little bit of one of those -- is the glass half full or is a glass half empty? It said it was possible to do it, potentially, to -- but things had to go very well for that. Yeah, that's really a summary.

**Q.** All right.

I want to ask you now about SAGE and functionally how SAGE operated vis-à-vis the government. You had attended earlier forms, emanations of SAGE, because I think you'd been on SAGE during the Ebola crisis?

**A.** Correct.

**Q.** So you were very familiar with the workings of SAGE?

**A.** Familiar. I wouldn't say "very familiar", yeah.

**Q.** When the virus began to emerge from China, SPI-M -- of which we've heard a great deal -- alongside SAGE being brought together was also put into place, was brought together, and changed its focus to looking specifically at Covid-19?

**A.** Yeah.

**Q.** NERVTAG, we've heard, continued to operate, it was a standing statutory committee to the DHSC, it deals with new and emerging viral threats, but it also looked at Covid-19, of course.

When you were on SAGE, were you attending as a representative of the London School of Hygiene and



Tropical Medicine, or do you and all your colleagues attend in a personal capacity?

**A.** I was just there in a personal capacity.

**Q.** It's self-evident, there were a very great number of experts on SAGE. You describe the level of advice and the level of understanding on the part of the attendees at SAGE, as being very high. SAGE was very, very well informed, was it not?

**A.** Absolutely.

**Q.** All of you were experts in your own fields, but you were obviously capable of opining on related subjects, and the evidence is that a great deal of information was culled by members of SAGE from their contacts and their professional colleagues abroad?

**A.** Correct.

**Q.** So in summary, do you agree that SAGE, in terms of its ability to locate, consider and report on data and on information and on this field of expertise, was very high indeed?

**A.** Yes, absolutely.

**Q.** The papers produced by SAGE, in particular the minutes, weren't really minutes, though, were they, they were more of a consensus document bringing together a final concluded position?

Do you think that worked? Do you think having



a consensus document was a good thing, because it gave the government a clear understanding of a final position, or perhaps was undermined by or flawed by the tendency of such an approach to conceal nuance, to conceal the width of debate?

**A.** I think that -- you know, I think you could probably have done both, have a consensus statement and then have maybe fuller minutes or something, so if you were interested you could see the -- how the debate went. But as it was, it was just this very terse, short document with a consensus.

**Q.** Was the information flow with government one-way or two-ways?

**A.** No, it was one-way. It came from us, through Patrick and Chris -- sorry, Patrick --

**Q.** Sir Chris Whitty and Sir Patrick Vallance.

**A.** Yeah, Sir Chris Whitty and Sir Patrick Vallance to -- to central government. We didn't have any -- we didn't play any role in that.

**Q.** So that there is absolutely no question about it whatsoever, there is nothing to suggest that they conveyed the information from SAGE to the government other than properly, faithfully, and --

**A.** Oh, I'm absolutely sure they would have done. And it didn't come back. I mean, they're consummate



professionals, of course, and so they -- we didn't know what the government was discussing -- you know, they didn't report on that, of course they didn't. So it went one way. That's how it was.

**Q.** Did you understand on SAGE that they were conveying the consensus position which SAGE had reached or that they were conveying the whole range of debate, the issues which had been explored, and perhaps the divergence of views which had been apparent in argument?

**A.** I don't know, of course, because I wasn't there. But we did used to try to include a statement about certainty or uncertainty in everything -- I say everything; I would hope just about everything -- so when there was a statement made then it was -- there would be a very broad indication of how certain that statement was.

**Q.** You, or rather SAGE, is a scientific advisory committee. Did you see the role of SAGE as properly extending to giving the government policy advice or making specific recommendations as to what it should do?

**A.** I didn't. I viewed the process in sort of three steps. I thought that there was the sort of evidence synthesis step, which was SAGE -- and obviously there could have been evidence syntheses in other aspects, economic aspects, social aspects, that we weren't covering, but

I felt that we were involved in evidence synthesis, trying to summarise the evidence, and then that went forward to central government somehow, to the policymakers, who I -- in my view are the senior civil servants who weigh up those -- put that aspect of the evidence together along with the other, because of course any policy would have huge implications for society, you know, beyond the epidemiology or the health implications and so --

**Q.** Could you just slow down a little bit, Professor.

**A.** Apologies.

**Q.** You're running away from us.

**A.** So I felt that then that second step was being done by the policymakers, the senior -- the civil service. And then the final step, you know, they would come up with -- this is my mental model, I don't know whether it's accurate, but -- and then the final sign-off on which of the preferred options would of course be made by our elected representatives.

**Q.** Was it the role, do you think, of individual members of SAGE to publicly advocate for particular measures to be taken or for policy, to go to the press and say, "I think this should be done, why isn't the government doing that?" or "We, SAGE, aren't doing enough"?

**A.** I think it was difficult. So my -- I think the answer



to that is -- should we have that sort of thing -- probably no, because that didn't necessarily help the government make its -- I thought that -- and we were -- you know, Chris and Patrick both made this clear to us, that it didn't necessarily help the government consider the evidence in a cool and calm way, if they were getting pressure from senior -- from senior advisers, I have to say, so I tried to stick to that in the early part of the epidemic. Later in the epidemic, at times I struggled with trying to stick to that, and I don't think I always did. I -- I did -- yeah.

**Q.** Professor, it's fair to say that you gave a number of interviews to the press, you spoke to Reuters in April, on 8 April, I think, The Sunday Times in May, the Andrew Marr programme in May, you went on the Robert Peston programme I think at a later stage, perhaps Andrew Marr as well?

**A.** Yeah.

**Q.** Was the tendency of some members of SAGE to speak to the press and to talk about the guts of what had to be done and what was being done or not being done, do you think that helped this process of giving scientific advice to the government?

**A.** So possibly not. I tried not to give -- to make statements about what the government should or shouldn't



do, in any of those interviews. Sometimes it's -- they're very eloquent, they're very clever at their art and they get things out of you that perhaps you didn't want to divulge. So I tried not to.

What I tried to do, because I did think it was -- well, I always thought that it's important, that we should explain to the public -- you know, science generally I think -- you know, outside of a pandemic I think we should explain our work to the public, who are ultimately funding it in most instances. And in this particular case, of course, they were being directly affected by the measures that were being put in place or not being put in place, and I felt that it was -- there was a responsibility on us to try to explain the science. And also I tried to explain -- I mean, if you saw my interviews on wherever, I tried to explain that this was not easy, that there was never an easy solution to any of this, and this was difficult, and the government were having to make really difficult decisions, having to trade off different aspects of, you know, health and wealth and whatever. I tried to explain that this was a very, very difficult thing. Because it was. They were dreadful decisions that they were having to make.

**Q.** Indeed.



More on SAGE. The Inquiry has heard evidence from a number of attendees on SAGE that because the government never told SAGE what its strategies were, what its overall objectives might be or, in essence, what it wanted to achieve, when providing advice SAGE was to some extent shooting in the dark, would you agree?

**A.** Yes, I think -- I think I said in my statement it's very -- it's very difficult to plot a course when you don't know what the destination is.

**Q.** In terms of the membership of SAGE, the membership of SAGE grew enormously, not least because it was able to go online and did go online --

**A.** Yes.

**Q.** -- at the onset of the pandemic. It was obviously a scientific committee, and it had a number of august biomedics, epidemiologists, modellers, public health experts. It was attended also, wasn't it, by representatives of NHS England, Public Health England, and of course the CMO and the Government Chief Scientific Adviser, who are well renowned experts in their own right?

**A.** Yeah.

**Q.** Would it have benefited from a greater input from frontline organisations?

**A.** I thought -- I personally felt that that would have helped at times. I thought that there were times, particularly at the beginning, when our data were terrible, that our situational awareness of what was really happening wasn't as good as it could have been. And so I would have -- I would have preferred to have -- yes, I thought -- I would have liked to hear a little bit more from the frontline.

In fact, with NERVTAG, I knew that PHE, for instance, used -- had started to do somewhat they called a sitrep, and this was a large number of slides, you know, there was -- it was huge, it was like 50, 60 slides, that they were putting together every week which gave a summary, of -- well, a situation report. I sort of -- I asked on NERVTAG whether we could see that at the start of NERVTAG meetings, so that we could get a little bit better, a bit more holistic understanding of what was really happening. And that did happen, so that was accepted, and PHE used to start NERVTAG with a brief sitrep.

**Q.** What did SAGE make of the government's mantra that it was, at crucial times, "following the science"?

**A.** Well, you know, the government couldn't and shouldn't ever have just followed the science. That was only one aspect of the -- it's only one aspect of the epidemic.



And so they had to weigh advice or -- you know, on various aspects, whether it was economic or social or, of course, operational, as well as the scientific aspect.

So I thought that that was always, I could see why they were doing it, they were doing it so they could hide behind us, I think, so when difficult decisions had to be made, they could hide behind us.

**Q.** Is science ever certain?

**A.** No.

**Q.** Can it ever be?

**A.** No.

**Q.** Is there ever one piece of science which can be followed?

**A.** No. That's the -- so that was -- exactly -- so that's why we tried to represent the level of uncertainty in the statements we were making at these sorts of meetings. Because, of course, especially at the beginning of a pandemic, of a completely novel disease, I mean, uncertainty is huge.

**Q.** Why did SAGE, or perhaps you, feel the government was trying to hide behind you?

**A.** It's what they do. It's convenient, isn't it?

**Q.** Was SAGE enormously assisted by, well, a great deal many other unsung heroes? I think a secretariat, you



received enormous assistance from something called the Department of Health and Social Care Health Protection Analytical Team?

**A.** Yeah, they were amazing. The secretariat for -- it's hard to describe the -- how much work was being done. And to bring that together, you know, and to make sense in -- say if we think of the SPI-M work, enormous amount of work that was being done every week, technical, difficult, not something that lay people would necessarily be able to get a grasp of, and the secretariat, importantly, with SPI-M, included modellers. There's a Health Protection Analytical Team within -- it's a small team, but within the Department of Health and Social Care. And they formed part of the secretariat for SPI-M, and -- so then the discussions that we were having, they were following them, they were understanding them, so they could -- because these discussions were technical, far ranging, difficult. And to summarise that in these consensus statements that they did was an amazing piece of work. And similar work was being done by civil servants, GO-Science and others.

The secretariat support was spectacular.

**Q.** To be clear, SAGE and SPI-M and NERVTAG weren't just responding to particular commissioned requests from



government, every week or perhaps every meeting these committees would have presented before them, because they had been prepared since the last meeting, round-up of information, updated projections, rolling charts, voluminous papers on what the position was --

**A.** Correct.

**Q.** -- that you could consider as part of your -- then your analysis?

**A.** Yeah, correct. So it's probably worth -- I don't know whether you want to get into the details, but there was different ways of working on the different committees. SPI-M -- or SPI-M-O more correctly at the time was a little different from the others, in that it had some routine tasks it did every week, which was short-term projections, medium-term projections, estimation of the reproduction number, and so on, and they were done by many groups contributing to that every week. So there was a kind of routine piece of work. There were the commissions that came to us from central government, asking us to do some work on a particular aspect. And they came most weeks, from recollection.

Then on top of that there was work that we did off our own bat, because we felt that it was important. Like, for instance, the work that you just highlighted earlier, nobody asked us to do that, we got on with that

in January and then brought it to SPI-M, you know, at the appropriate time.

**Q.** Now can I turn, please, to modelling, which is, of course, your speciality.

Shortly, can you explain the difference, please, between scenario modelling and forecasts?

**A.** So forecasts are what we think will happen, and scenarios are what might happen under certain circumstances, and they're usually run, those scenarios, over a longer period of time, so you could see the impact of those different circumstances.

So if I could give an analogy --

**Q.** Please.

**A.** -- from the ... so we have a weather forecast, and that tells us -- that tells us -- it gives a probabilistic statement about what the weather might be tomorrow or the day after or whatever. So it might say there's a 80% chance of rain tomorrow.

There's nothing you can do about that. It's going to rain probably, there's an 80% chance, or not. The only thing you can do is take an umbrella or a mac or something. Yeah?

So a scenario is something quite different and it runs over a much longer period. So the scenario models for looking at climate change, for instance, so looking



at what might happen over the long term, over, you know, 10, 20, 30 years if we do something: if we take certain action to, say, reduce our CO2 emissions, for instance, this might happen to the climate.

Now, those are obviously very certain, they're run over a very long time period, but you have the decision-makers, and in this case it's sort of the -- all of us, I guess, have some ability to change the future. So on the basis of these scenarios you could say, well, really we ought to be doing this to, say, reduce our carbon dioxide output, for instance, which then might change the future, we might have less of an increase in global temperatures.

It's the same sort of thing for epidemiological forecasts, which are very short term and just say things like how many beds might there be required next week or perhaps the week after. They're very short term, just like the weather forecast is very short term. Versus these longer-term scenarios: okay, if we put this policy in place, what might happen? If we put that policy in place, what might happen?

Now, they're, of course, played out over a much longer period. They're much more -- because they're going over a much longer period they're not going to be right. The actual -- the actual -- "The epidemic will



really be exactly like this in two or three months" is -- the chances of that are very low, of course.

**Q.** Right.

**A.** They sketch out possibilities, just like the climate change modelling --

**Q.** Versus --

**A.** -- sketching out possibilities.

**Q.** All right.

In the context of Covid, the forecasts therefore focused, did they not, on fairly -- it's no less important, but fairly basic information like how many people will die if you do nothing, how many beds will need to be occupied, how many hospital cases are there likely to be, and so on. Those are examples, fairly basic --

**A.** Yeah, and they were very short term, so it's sort of looking ahead just one or two weeks.

**Q.** In order to be able to forecast in that way, as you've explained, a modeller needs to have an understanding of the reproduction number, the infection fatality rate, the hospitalisation rate, that sort of basic data?

**A.** Strictly speaking -- yes, you certainly need the data, of course you need the data. But strictly speaking, you don't necessarily need to know the reproduction number to forecast how many hospital beds you might need the



next week. You need to look at the trends and you could just -- so there are simple ways you could do it just looking at trends and projecting forward.

**Q.** All right.

**A.** And what happened was that there were a large range of different methods that were used by the different groups around the country, and brought together in a -- and then combined in a statistical way to come up with a -- what's called an ensemble forecast.

**Q.** Even a forecast of a fairly basic type, perhaps based on fairly basic information like taking a percentage of how many people in the population might die or how many might be hospitalised, requires the modeller to have a good understanding of the underlying data. So if there is a delay in people being tested, or there's a delay in getting the results of those tests to the modeller, or if there is an unwillingness on people who are infected to be tested at all, or if there aren't any sophisticated surveys or blood tests which have been carried out in order to see how many people are infected if they're not prepared to be tested, a lack of data of that type makes the modellers' life very difficult indeed?

**A.** Of course. In fact, actually one of the things that we are -- one of the roles in the -- is to understand those

delays. And so it's not just -- it's not just a matter of forecasting into the future, but there's this dreadful term "nowcasting", which is how many cases there actually are now, because that's not -- because the reported cases won't be reflecting the actual infections occurring on that day, they're reflecting something that happened perhaps weeks earlier. So we can take -- with understanding of these delays, then we can actually get a better idea about what's actually happening now. It's a dreadful term, but it's quite explanatory, "nowcasting".

So that was one of the roles that we were of course doing.

**Q.** So for SAGE and the modelling experts on it, there was a very real problem in February and early March, was there not, because you couldn't be sufficiently precise in even these basic forecasts until you had the right data and you were receiving the data in good time?

**A.** We weren't doing forecasts in February, there wasn't really sufficient data to do it. We started doing it in March.

**Q.** Right. In terms of the scenario modelling, that is to say "what might happen if we do this", do you think that that distinction between forecasting and the contingent possibility, "what might happen if we do or don't do



this", do you think that distinction was properly understood by the government and the public?

**A.** No. I think sometimes at times it may have been deliberately misunderstood. So we were -- so very frequently our scenarios about what might happen were afterwards treated as a forecast, when we'd changed the -- the government had taken action to avoid that scenario. A classic example would be, I mean, the work on looking at the first wave and how many deaths there might happen in a first wave and a scenario that -- that -- you know, we were working on and Neil Ferguson's group at Imperial was working on, would be -- you know, there were many scenarios but one of which would be: what happens if we take no action and nobody changes their behaviour? That would be the kind of absolute worst-case scenario. And of course we took action, you know. And both my group and Neil's group, the work suggested that that scenario would be devastating, there would be hundreds of thousands of deaths, hospitalisations way above what the NHS could cope --

**Q.** All right.

**A.** But we took action to avoid that, so the government took action to avoid that. So to compare then what happened with that scenario is actually meaningless really.

**Q.** I want to ask you about two particular examples. You've



mentioned one of them indirectly already.

The Report 9, so-called, by Imperial College on 16 March I think --

**A.** Yeah.

**Q.** -- was actually part of a wider body of material. You had drawn up, I think on 3 March, learning from a meeting on 1 March that also looked at how many deaths might occur or would occur if there was a failure to take control measures and what the impact would be on the NHS. And Professor Steven Riley, from whom my Lady heard, also gave evidence about his own work, a series of papers between 3 and 10 March.

Professor Ferguson's work, or rather the work of Imperial College London, that Report 9, was met with a storm, really, of reaction and, in some places, criticism, and he was accused of being outrageously alarmist.

Were these scenario modellings, particularly of March, which set out what would happen if steps weren't taken, in fact unduly alarmist?

**A.** I don't think so. You know, we were, as you -- we said before, from early on you could see that this had the -- this was the -- you know, this had all the characteristics of being a nightmare.

In terms of epidemiologically, it was a respiratory



infection, so very easy to spread. Clearly very transmissible in the community. And although an infection fatality ratio of 1% doesn't sound like a lot, when of course you match that with, if no action is taken, a large fraction of the potential will become infected very rapidly, that then -- that then leads to a huge number of deaths.

**Q.** A second example, so moving forward, in fact, to the autumn, the government gave a press conference where some particular documents were used to -- not directly used, I think, to justify the lockdown but they were certainly put into play, and they were documents which had been produced some weeks before by a number of modelling groups, so your own London School of Hygiene, I think Imperial, Warwick --

**A.** PHE in Cambridge.

**Q.** PHE, Cambridge, thank you. And they were work done at the request of the Cabinet Office to point out what the very worst or one of the worst or maybe even the worst, the reasonably worst-case scenario might be.

**A.** Yeah, there were -- it was an early step to try to work up a new reasonable worst-case scenario. These reasonable worst-case scenarios were used for government planning. And it was an early step, actually at the request of SPI-M-O secretariat initially --

**Q.** All right.
**A.** -- to come up with some ... so to come up with some scenarios what might happen over the next few months.
**Q.** All right.
Weeks later --
**A.** Yes.
**Q.** -- they were relied upon.
**A.** They were.
**Q.** The extent to which they were relied upon needn't detain us, but there was a massive reaction in the press, was there not, because the press were saying: well, look, these documents appeared to show X number of deaths but they haven't happened, or they won't happen.
**A.** Yeah.
**Q.** The short answer was they were only scenario models, and they were reasonable worst-case scenario models to boot, and they were draft documents --
**A.** Correct.
**Q.** -- and they were being prepared for a different purpose?
**A.** Correct. And it was worse than that, in fact, because every week we were doing medium-term projections, so, again, the various groups contributing to SPI-M-O were doing medium-term projections over a period of six weeks, I think is -- four to six weeks is what we were doing, and every -- and each of those groups were



contributing to an ensemble estimate of what we thought would happen if nothing changed, and then every week we would look at how well we did last week and learn from it. So we would look at each individual model, how well that had projected what had happened in the coming week, and also the ensemble estimate, how well that had done, how well that had performed in the coming week, and the whole process would move on.

So since the date when those reasonable worst-case scenarios were generated at the beginning of October, there were three weeks or more of these more -- what we think are more likely to happen, you know, and that had -- those estimates had been validated by looking at what actually did happen. And they were doing -- and they were actually capturing the trends really rather well.

So the government could have used that much more accurate -- those much more accurate scenarios, medium-term projections, to -- it didn't matter, in a way. They were all still saying: unless action is taken, the NHS will come under severe -- will come under severe stress very shortly.

But the way it was done and the way it was -- to use the reasonable worst-case scenario, it reflected very badly on us, it made us look like we were, well, we were



called doom --
**Q.** That you were being alarmist?
**A.** Yeah.
**Q.** All right. We'll just have a quick look at some of the reaction, INQ000212171.
**A.** Yeah, yeah.
**Q.** "Apocalyptic forecast of 4,000 coronavirus deaths a day could be FIVE TIMES too high and had already been proved wrong when government revealed it at the weekend."
**A.** Yeah, well, we would have said the same thing.

And the -- of course the whole point of getting this ensemble estimate together is that it would downplay, downweight the more extreme estimates. Just the same way with sort of climate change, you know, some models might give a higher estimate of what the impact might be and some lower, and it's the same thing here. And then by bringing many, many different models together, you'd get a consensus. And so what was done here was pick the worst -- the worst -- the most alarmist bit of the -- of that -- so of those four reasonable worst-case scenarios, the Daily Mail here is picking the worst one, and we would never have presented -- we would never have presented it like that. We were presenting these consensus estimates, which of course would downplay the extremes and focus on the most -- you know, where



there's most support from the different statistical -- the different models.
**Q.** All right.
**A.** So it's very ironic, really.
**Q.** You say in your statement that --
**A.** It's them being alarmist, not us.
**Q.** All right.

You say in your statement, Professor, there are some lessons which can be drawn.
**A.** Yeah.
**Q.** Firstly, the limitations of models needs to be more clearly, widely understood?
**A.** Yeah.
**Q.** These are scenario models, they are all contingent, what might happen if we don't do something. Secondly, government in future needs to be much clearer and more straightforward in the way in which it will rely upon such models and use them and --
**A.** It needs them, of course, it needs to have those forward looks, and -- but it needs to be treated with some care.
**Q.** And also, thirdly, I think you would suggest that the way in which this valuable work was treated in some parts of the press was very unpleasant --
**A.** It was indeed, yeah.
**Q.** -- as well as being wrong?

**A.** Exactly.
**Q.** All right. I now want to come, please, to discuss some of the particular measures that SAGE debated during the course of February and early March.
On 29 January, you were party to an email string with Professor Chris Whitty.
Could we have that up, please, INQ000212194.
We can see at the top of the page that the final email is from Chris Whitty, "Thanks that lot ..."
Further down the page, on 29 January you've written to him saying:
"We are going to have a go at looking at the potential impact of mass school closure over the next few days."
Obviously closing of schools was an important issue that was being looked at?
**A.** Yeah.
**Q.** But if we go further down to the -- nearer the origin of -- the beginning of the string and over the page, we can see that you've written a fairly lengthy email to Sir Chris Whitty:
"My comments are:
"1. Given the apparent speed of spread, it seems unlikely that contact tracing and isolation is going to be effective at buying us much time."



Is that a reflection of the debate in fact -- or the evidence you gave earlier, which is it was apparent this was the --
**A.** Yeah, so that work was being finalised at the time. I mean, this is 29th, I think we put it on our website --
**Q.** Yes.
**A.** -- one week later.
**Q.** So you were clear and you told obviously the recipients of this email that your view was that contact tracing and isolation would be unlikely to be effective at buying much time?
**A.** I was taking the glass half empty view of it, of the results.
**Q.** But you were right.
**A.** Yeah.
**Q.** In relation to --
**A.** Unfortunately.
**Q.** In relation to travel advice, and exit screening, you've already given some evidence about that, was the position that the World Health Organisation had beforehand generally advised that screening and restrictions short of complete closure of a border were unlikely to be efficient or effective?
**A.** Correct, yes. They'd done a review of all of the global



literature on it and come to that conclusion.
**Q.** And so --
**A.** That was for flu, of course, it was concentrating on flu, but it wouldn't be very -- very -- different, but we did look at it.
**Q.** If we could have INQ000212206, did you enter into, again, another email string with, I think this time, Sir Patrick Vallance, Sir Chris Whitty, Professor Sir Jonathan Van-Tam, Dame Jenny Harries and Charlotte Watts at the Home Office? You say in this email at the top of the page:
"A concerted travel ban with our closest neighbours, from whom indirect travel from China would be expected, is going to be far more effective than us going it alone. However, even that is likely to have relatively limited impact, buying a few weeks at best. The question is what you could you achieve in this time? Very little in terms of ... vaccines ... [but it might] give the Chinese enough time to bring the epidemic under control."
**A.** Yeah, well, I thought if they could bring it under control, they were under lockdown then, then maybe we might get away with this.
**Q.** And SAGE around the same time, the next day in fact, 3 February, INQ000212208, concluded, based upon a paper



with which it was provided, if we could go to page -- I think the second page, please, of this document, 3 February:
"1. On the expected impact of travel restrictions, SAGE estimates -- with limited data -- that if the UK reduces imported infections by 50%, this would maybe delay the onset of any epidemic in the UK by about 5 days; 75% would maybe buy 10 ... days; 90% maybe ... 15 additional days ..."
**A.** Yeah.
**Q.** SAGE considered a report, we won't need to get it up, in which I think the London School of Hygiene perhaps, rather than ICL, had concluded that tests or modelling had shown that 46% of infected persons would never be detected by screening at a border?
**A.** This was looking at temperature screening, symptom screening, which is usually done with temperatures. The problem is, of course, if you -- it takes a few days for you to develop a temperature, you know, five or six days, so if you travel on day 0, day 1, day 2, day 3, day 4, you don't get picked up.
**Q.** Contact tracing.
Professor Sir Chris Whitty asked in January for an investigation to be carried out into whether or not that would be effective. The London School of Hygiene

produced a number of papers which they put online and then they published, I think, in *The Lancet*.

**A.** Yeah.

**Q.** Let's have a look at that Lancet health article, INQ000212222.

**A.** I think this is the same one as before, with Joel Hellewell, is it?

**Q.** It's the one to which you were a contributor. 212222. *"Feasibility of controlling Covid-19 outbreaks by isolation of cases and contacts".* The findings, if we could scroll in -- thank you very much.

There is a description of the consequences or the analysis of simulated outbreaks, but essentially, without going into the detail of that paragraph, what that data or what that analysis showed is that in order to be effective, contact tracing has to pick up a very large percentage, an overwhelming percentage of the people who are the contacts in order to work?

**A.** Correct.

**Q.** Was the fraction of contacts which have to be picked up to make it work as high as 70% to 80%?

**A.** It's very difficult to tell, because of course, almost by definition, you don't pick up the contacts you didn't pick up. Yeah?

But there are clever ways that you can get to that,



and actually later in the epidemic, when Test and Trace was launched, it was one of the things we -- I myself kept raising with Test and Trace was to try to put these measures in, to see whether -- to see what fraction of the contacts were being missed. But at that time it was impossible to tell.

**Q.** Sporting events. This was analysed by CMMID, the London School of Hygiene research institute or centre, as well as SAGE. Could we have INQ000212210.

This is dated 11 March, on page 1, *"The impact of banning sporting events and other leisure activities on the COVID-19 epidemic",* prepared on behalf of the CMMID Covid modelling team.

Did it essentially conclude that banning mass gatherings would be unlikely to have a great deal of impact?

**A.** When looked at in the whole of the epidemic. So we were -- we were -- I think this is a kind of example of where there was a kind of over-reliance on modelling. So, yes, attending a sporting event would be, you know, more risky than staying at home, of course, but actually if it's outside that risk was probably quite low, although we didn't know it.

But at the population level, stopping sporting events is not really going to do very much, because we'd



found, or I'd found on a Google, I'd found some attendance data, how many -- how many times -- what the global attendance -- or the entire attendance of sporting events in the UK in, I think, 2018 or 2019, I can't remember. And it was something like 75 million ticket holders, as it were, 75 million attendances at sporting events of every type, whether it's the cricket or the football or Wimbledon or whatever it might be. And if you think about it, there's 67 million of us, roughly, so that means on average -- on average -- we attend about one sporting event per year. And so if you stop the sporting events, is that going to stop the virus? Well, no, because it's going to make a tiny impact on the total number of impacts that we make. So that --

**Q.** Throwing, it's been described as, a lit match on a raging fire?

**A.** Yeah. So -- but that's looking at it at the population level, so -- and of course that's what we do, we are modelling things at the population level. Whereas actually at the individual level maybe it's not a good idea to go to a sporting event in a pandemic. So for an individual, you know, sensible public health advice might be to say, well, "Don't go". But that doesn't mean to say it's going to have a big impact on



the epidemic. It wouldn't.

**Q.** So if answer to a question that in fact my Lady put to an earlier witness, if you attend a mass gathering event, there is a risk you will become infected and it's a risk that you wouldn't otherwise have run?

**A.** Yes and no, depends what you would do if you hadn't have gone to the event. So if you'd have gone to the pub instead, then maybe the risk in the pub was greater than being at the event, if the event is outside.

**Q.** All right. But at a micro level there is obviously a risk for the individual?

**A.** Yes.

**Q.** But if you look at it on a population modelling level, there is a tendency, isn't there, to overlook the significance of that risk?

**A.** Because of the population level, it's tiny. It makes a tiny contribution to the entire -- yeah, your analogy is a very good one.

**Q.** So, in truth, by relying upon modelling in order to answer the question, should we ban mass gatherings --

**A.** It's the wrong -- you're really -- you're asking the wrong group of people, you should just take a decision about it. And, you know, there's a lot -- this is -- you know, there's lots of reasons why you might -- might -- why you might want to do it even

though it might not have an effect or a very small effect at a population level. One we just talked about, an individual risk. Two is the optics, it doesn't necessarily look good. You know, imagine the situation if we'd had our schools closed and the football was still going on. I don't think anybody would have accepted that. It would have looked a bit strange.

**Q.** And in terms of the precautionary principle to which you referred earlier, there was obviously a good argument for banning mass gathering events?

**A.** Yes, even though I think, and we did work on it later, actually, it's something we did some work on later in the epidemic, and it did show that actually the risk is really quite small.

**Q.** You've referred to the fact that modellers were handicapped to some extent by the delays in, originally or initially, receiving data from China, and understanding that data, and then towards the end of February and the beginning of March the delays of which you spoke in relation to the delays between testing and getting the data to you in terms of delays in people getting tested or testing the right number of people or getting an understanding of who was infected.

You raised with SAGE, didn't you, on 13 March your concerns about how the significant delays were impacting



your ability to model efficiently?

We'll just have a look at that. INQ000212212.

Page 1 shows 13 March, the second page, paragraph 1, this is the date on which --

**A.** Yeah --

**Q.** -- SAGE says: we now believe there are more cases in the United Kingdom than SAGE currently expected.

Paragraph 7:

"... we may be further ahead on the epidemic curve ..."

**A.** Yeah.

**Q.** "The change in numbers is due to the 5-7 day lag phase in data availability for modelling."

So you in essence said to SAGE, "We've been undone, there has been a delay in getting data to us, but now that we've got a better understanding, our situational awareness is better, we can now see we're further ahead on the curve than we thought we were"?

**A.** We always thought there would be a delay, because of course there is, nothing's -- you know, it takes time for the data to come in, of course. But that was the first time we'd been able to estimate it. And that was the average delay. Some individuals on the database, the delays between them was up to three weeks. And so, yes, with having estimate -- it



was two bits of work that we were doing that week. I don't know if you want the details or not.

**Q.** I don't think we need trouble you for the detail of the work. The main point is you were working very hard on the modelling, but the output --

**A.** It was much worse. There was two bits, there was this -- and we used to start SAGE meetings with a quick update, like a one-minute update from Chris Whitty or Jonathan Van-Tam on -- just on the numbers of cases that had been reported. And of course those cases -- because of this delay, those cases hadn't actually been -- become a case on that day that we were getting reported. They'd actually become a case a week earlier. So what, you know, Chris was reporting on was what was happening a week earlier.

And it's worse than that, if you think about it, because it takes about five or six days between getting infected and becoming a case, and so actually we were being -- you know, I thought that we were being lulled into a bit of a false sense of security here, in that actually the numbers of cases -- because what was being reported on was infections that had happened perhaps two weeks earlier.

**Q.** All right.

**A.** And that's just the ones we knew about.



**Q.** Because for all the asymptomatic infections --

**A.** Or even just the cases that had come through different routes, because we were still -- to be tested you had to -- there had to be a reason for you to be tested and to become a case, as it were, and that was you had to have symptoms but you also had to have come from a high-risk area, China, Singapore, mostly other places in the Far East initially. And so we weren't testing people who had symptoms that hadn't come from there initially.

That did -- we did put systems in place at the end of February that would give an idea of infections in the community, infections in the community, and they immediately picked up a case -- cases. So that --

**Q.** Sporadic?

**A.** These were the sporadic ones.

**Q.** All right, I'm going to pause you there, because we've got to move on to other topics.

So in summary, Professor, by this time, the beginning of February --

**A.** No, this is March.

**Q.** Well, sorry, I meant to say March. In fact 13 March.

**A.** Yeah.

**Q.** You've told us that by the end of January, the broad nature of the threat was known. By February,

mid-February, the broad nature of the possible fatalities and hospitalisations and infections were known. The modelling process and the enormous amount of work dedicated to trying to bottom out the figures and get a proper handle on the nature of this pandemic continued. And then at the beginning of March SAGE was blindsided by the discovery that not only, as you've described, was there no effective means of containing the virus, and not only the virus was as deadly as it was, but that it had spread through the United Kingdom far further than anyone had realised?

**A.** Yeah. By picking up these sporadic cases they were not linked to importations or anything like that. So hopefully we'd have seen no -- none of them. And this -- by no means were we picking up every sporadic case. It was -- this was like a sieve with huge holes in it. But there was two systems, if you think of two sieves, mostly holes and very little ...

**Q.** Professor, I'm --

**A.** But at this point, so we should have seen none and of course we did start to see them, so -- and we were trying to work out from the growth of those -- so at this point it really was apparent that there was far, far more -- not just had the -- was the infection spreading but it was spreading much more widespread than



all of us hoped.

**Q.** All right.

**A.** So it was -- we were in big trouble.

**Q.** Would the full application of the precautionary principle in February, based upon the understanding of how fatal or damaging the virus was, have allowed the government, the country as a whole, not to have to wait to find out how far the epidemic had spread before realising that action and severe action was absolutely necessary?

**A.** Yeah, I'm not sure exactly what we -- what would have been a proportionate response in February. That's --

**Q.** All right.

**A.** Of course I wish we had taken more action in February, but I'm not sure -- I'm not sure what would have been proportionate when the cases would have been very, very, very low.

**Q.** But in reality, nothing was done in February, other than a fairly low level surveillance on travellers --

**A.** So we were concentrating on kind of trying to pick cases up coming from overseas and we were concentrating of course on the places where we knew there was transmission, and there was always a risk that transmission was happening somewhere else, which indeed it was. In fact we imported most of our cases from



Italy and France and Spain in the early parts and we were not looking there, initially at least.

**Q.** Was that predominantly also the half term --

**A.** This was after --

**Q.** -- break --

**A.** Exactly, skiing holidays and the like. And just because of the -- just the travel, how much travel there is between -- between our countries.

**Q.** On 3 March, a report was prepared for SAGE, INQ000212223 by the LSHTM CMMID team.

**A.** Yeah.

**Q.** Which set out in very clear terms what the likely deaths would be?

**A.** Possible. I mean, this is -- these are possibles and these are scenarios.

**Q.** Professor, forgive me, I hadn't finished -- I'm afraid I was just taking my time in formulating the question. What the likely deaths would be if social distancing measures were not applied. It was a classic scenario model: what might happen if something is not done or only something else is done.

The report showed to SAGE, did it not, we can see from the results in the middle of the page:

"The unmitigated epidemic is expected to result in 570,000 deaths ... in England and result in a peak



demand of [almost a million] non-ICU beds ... 130,000 ICU beds ... at peak. Closure of schools is estimated to be the least effective of these policies ... Cocooning of the elderly, general social distances, and case isolation are all estimated to reduce deaths by about 25% ... social distancing reduces peak demand on hospital services more than the other strategies. The combination of school closure and social distancing ... [a reduction] of about 75% [in beds] ... 32% [in deaths]. The combination [that's to say all of them] would reduce demand by about 75% and reduces death by about half.

So, again, this was not an alarmist production, was it?

**A.** No, this was just what you would get from those scenarios. I mean, obviously the worst case -- the unmitigated one, I can't imagine it would ever have happened, we must have -- we must have taken action at some point, but ... and of course it doesn't take into account -- and this is important -- it doesn't take into account spontaneous behaviour change, because we had no way of estimating what that might be, what that might -- we'd never done anything like that before. And in previous epidemics, because I did measure contact patterns in the 2009 pandemic, people didn't change

their behaviour at all. Obviously it was low risk. So it doesn't take into account spontaneous behaviour change, which would have probably happened, but there's no way we could predict that.

**Q.** Estimate that. And it didn't take into account, of course -- well, it didn't say -- it projected one outcome of what might happen if these steps were taken individually or in combination?

**A.** And, you know, I regard these as -- as I said before, I think these are broad sketches of what might happen rather than precise ... but they were huge numbers, you know, that was the --

**Q.** Huge numbers. And this report set out in clear terms, did it not, that the NHS would be overwhelmed if certain measures --

**A.** There's no way you can cope with that sort of level of demand, you know.

**Q.** This was plainly brought to the attention of SAGE, of course, it was consistent, wasn't it, with the outcome of Professor Riley's reports and also Professor Neil Ferguson's reports of a few days later?

**A.** Yeah, Professor Riley's were less detailed than this, so I would say that it's more consistent with Neil Ferguson's estimates. And if you compare the two, there are differences, but broadly they're kind of in



the same ballpark.

**Q.** Your report notably, or rather the CMMID report notably doesn't get into the conceptual debate of suppression or mitigation. Professor Riley's and Professor Ferguson's do. There are references to that --

**A.** They were done later -- they were done later, those. This was very early March as opposed to sort of mid-March.

**Q.** To what extent did any debate about reasonable worst-case scenario, whether a response was mitigation or suppression, whether or not herd immunity was good or bad, assist in understanding these basic thoughts, which is unless practical measures are taken, the deaths are going to be huge?

**A.** Yeah. That's the simple message.

**Q.** Do you --

**A.** And we were not alone in this. So Neil and Steve, their work was similar. And other people were doing similar things elsewhere, not just in the UK, but we were all -- it all pointed to extremely -- you know, the sort of situation that I don't think anybody could possibly just let happen.

**Q.** Did those debates about what was a reasonable worst-case scenario, was it going to happen, are we suppressing or mitigating, need to be resolved in order for SAGE to be



able to say to the government, "There is this massive problem coming"?

**A.** I guess if there is one thing saying there is a problem, it is better to come with a solution. And I don't think we had the solution -- I don't think we had the solution at that time, so we were looking at these sort of measures -- you can see, I mean, even with these measures and combinations of these measures, it still looked horrendous. The --

**Q.** I'm sorry to interrupt you, but you were looking at measures, you weren't engaging here in a polemic about whether it's suppression or mitigation or a reasonable worst-case scenario; you were focusing on what practically needs to be done?

**A.** Yeah.

**Q.** All right.

**A.** And it was more than this, in my view.

**Q.** As proved to be the case.

The government had already produced a report on 3 March, a *Coronavirus: action plan*, of which a major part, the first stage, was contain.

Was that a publication of which you had become aware prior to its publication?

**A.** No, I mean, those sorts of strategy documents that the government published periodically over the course of



the epidemic, of which that was the first one, we didn't see those before they came out.

**Q.** What was your reaction on seeing that the government's future strategy, because it was a document produced for what should happen going forward, what was your reaction on seeing that an element, the first element was containment?

**A.** Yeah, I ... I mean, it would have made more sense for that to have come out a month earlier. At that time, I know we were officially still in the containment phase, I think, but, you know, the -- as I say, from these sporadic cases you could see, there was -- we hadn't contained the virus, you know, at that point. So there was that.

There isn't a lot of detail in that document as well, so it is very general, it doesn't really say what really we would do. And maybe that was fine, because I don't think that had been worked out, but it was a very kind of high level document.

**Q.** Bluntly, Professor, the ship had sailed. There was and could be no containment, the virus was rife in the population?

**A.** Rife I don't think is right, yet. I mean, are we talking about 3 March? It was certainly here, it was certainly spreading, and this was the work that we were

trying to do. Actually later than this, it was around 8 March when we were looking at these sporadic cases and trying to work out how many -- what was the scale of the epidemic, because the reported cases was not reflecting that by any means.

**Q.** All right.

**A.** So we didn't really know the scale of it although the very fact that we picked up these sporadic cases was an alarm bell.

**Q.** In your statement you say, recognising that some observers have indicated that SAGE appeared to be too slow to recommend action during the early weeks of the epidemic, that you have some sympathy with this view and that you had become increasingly anxious yourself?

**A.** Absolutely.

**Q.** Is that because you say that this understanding of the sheer number of deaths and hospitalisations and the impact on the healthcare system in the United Kingdom should have been understood earlier or --

**A.** I mean, it was, I mean, everybody, I mean, I saw you inter -- well, Mark Woolhouse's evidence from a few days ago, and, you know, he did this sort of simple back-of-the-envelope calculation based on the reproduction number -- and he had done it back in



January, based on the reproduction number and guestimates of case fatality ratio and come with very big numbers. We'd all done the same calculations back in January and early February. This was the -- this and when -- and Neil's was -- and Neil was -- Ferguson was doing the same, you know, in parallel doing -- looking at similar things. This was when we had kind of -- it had gone through the formal modelling kind of process and those numbers were coming out and they were -- they were truly horrendous.

**Q.** And that should have been understood earlier, is what you're saying in your statement?

**A.** So I think our broad -- if you want -- so we didn't know -- the last piece of the jigsaw was related to hospitalisation. It was difficult to understand exactly what fraction of people would be hospitalised, because in the early days, particularly in East Asia, and even here as well, early cases were hospitalised whether they needed it or not. So they were hospitalised for public health measures -- reasons, so that they wouldn't spread. This was in the containment phrase. Yeah?

**Q.** All right.

**A.** So it was difficult then to know exactly what fraction would need to be hospitalised for clinical -- on clinical grounds, and how long they would have to be



hospitalised for and what fraction might need intensive care. So that was the last bit of the jigsaw. I mean, you could get a guesstimate at it, and a reasonable -- and as February moved on that became more clear, but we didn't have a -- I would say we didn't have a solid estimate of it until really that meeting on 1 March, on the Sunday, 1 March, when we really -- we had a meeting with colleagues at Oxford, Imperial obviously, and the NHS, and then we got a much clearer idea. So that was the final bit of that jigsaw. But you didn't really need the whole jigsaw, I mean, you could see the picture was pretty obvious from -- from, you know, much before then.

**MR KEITH:** It's the perfect moment.

**LADY HALLETT:** I'm afraid going to complete you today -- sorry, today we'll complete you, but this morning. I hope you were warned that you might go over lunch.

**THE WITNESS:** Yeah, that's okay.

**LADY HALLETT:** Thank you very much indeed, I will return at 2 o'clock.

**(1.00 pm)**

**(The short adjournment)**

**(2.00 pm)**



**CASE DIRECTION**

**LADY HALLETT:** If Professor Edmunds will forgive me, I'll just deal with a case management matter. Forgive me, Professor Edmunds, it won't take long.

At some stage I have to decide the issue of whether to publish the notes made by Sir Patrick Vallance, Government Chief Scientific Adviser, and one of the two main scientific advisers to the government during the worst stages of the pandemic.

To date, the extracts from his notes put to witnesses have been read into the record, and not brought up on screen in the hearing or published as extracts. For other documents the whole page has been displayed and then published, even if the extract referred to is only a small part of the page.

Lawyers representing Sir Patrick have objected to a proposal from the Inquiry team to adopt the same process as is adopted for other documents in relation to Sir Patrick Vallance's notes, and to publish the whole of the relevant page or pages on screen.

They claim that this would be a breach of his Article 8 rights and of his legitimate expectation of privacy. Eight media organisations, supported by some of the core participants, argue that it is in the public interest to publish the whole page and that

restricting publication of the notes would breach Article 10 of the European Convention.

Issues arise in relation to Sir Patrick Vallance's notes said to be of an entirely private nature that do not arise in relation to other documents provided to the Inquiry, and I must consider those issues very carefully.

Further, I note that I may well face calls for publication of all the notes at some stage, if I haven't done so already.

The issues of publishing the whole page upon which an extract appears and publishing the whole of the notes are inextricably linked. In my view, therefore, it would be premature to decide the first issue now. I wish to see how the notes are used and the extent of the use. I also wish to hear much fuller submissions on the principal issue of conducting the difficult balancing exercise of Sir Patrick's Article 8 rights and the rights under Article 10. The time for preparation and presentation of submissions at the short hearing on Monday was extremely limited, and therefore the advocates did not have, in my view, sufficient opportunity to address the principal issue in much detail, if at all.

I have decided, therefore, that for the time being



we shall adopt the practical approach of bringing up the relevant extracts being put to a witness on screen but not the full page. The extracts will then be published following the day's hearing. We shall proceed on this basis until the resolution of the substantive issue. For documents other than Sir Patrick Vallance's notes, we shall continue to display and publish the whole page or pages, subject only to redactions for sensitive and/or irrelevant private material.

I acknowledge the concerns expressed by some about ensuring that all the most significant passages in the notes are put to witnesses where necessary and I rely on Counsel to the Inquiry and the core participants to ensure that that happens. I too shall be monitoring the situation.

I shall also keep under review whether or not the passages upon which the advocates wish to place reliance should be put into greater context by publishing larger sections of the text.

Thank you.

**PROFESSOR JOHN EDMUNDS (continued)**

**Questions from LEAD COUNSEL TO THE INQUIRY (continued)**

**MR KEITH:** Thank you, my Lady.

Professor, during the course of the morning, you mentioned the reassuring nature of the messages being



put out by government, particularly in late February, early March. Did you attend a NERVTAG meeting, I think on 21 February, where there was a debate about whether or not the risk assessment from Public Health England should be elevated from moderate to high?

**A.** Yes, it was on Skype for Business, and for some reason I couldn't make myself heard, and --

**Q.** All right.

**A.** But I heard the discussion and afterwards I emailed my points to the secretariat.

**Q.** Could we have, please, INQ000119469, paragraph 5 -- page 5, paragraph 2.4.

"PH ..."

Is that Peter Horby?

**A.** Yes.

**Q.** "... asked the committee if anyone thought that the [Public Health England] risk assessment should change. No objections were raised however after the meeting, [John Edmunds] emailed to say that he was online but for some technical reason could not be heard. [He] believes that the risk to the UK population (in the PHE risk assessment) should be high, as there is evidence of ongoing transmission in Korea, Japan and Singapore, as well as in China."

You needn't deal in detail with how the PHE risk



assessment process works, because the Inquiry has already heard evidence about that. In short, however, at that stage it was at moderate, and it indicates, does it not, what the exact risk is on that day? It's not a prospective forward-looking exercise, it's at that time, and you believe that as at that time, on 21 February, the risk was high?

**A.** I thought the risk was high. I thought there was a little bit of -- I thought the risk was about to be very high and I just didn't think -- I thought this was sending out the wrong message if we said that it was -- that it was moderate.

**Q.** Around this time, in fact about a week or so later, we will see your emails at the beginning of March, you began to form the view, did you not, that we, SAGE, had to take much more radical measures -- or perhaps the government had to take much more radical measures to mitigate the epidemic?

**A.** Yes.

**Q.** Could we have, please, INQ000212036 on the screen. It's a 12 March email. If we can go down to the -- if we can go to the next page, and an email at -- I think maybe one more page, to 22.22. Yes, thank you very much. Towards the top of the page, at around about 10.30 on Thursday 12 March from John Edmunds:

"1. The data are crap and hopelessly out of date, so we have little situational awareness. The daily figures are a joke and the [guesstimate] of 5-10,000 cases is probably too low.

"2. The measures just announced ..."

Were those the measures announced by the government?

"... will do very little. Not quite sure just how many cases will escape, but I suspect a fair few.

"3. We will have to do a lot more to manage this epidemic. The current plans will overwhelm the NHS almost straight away. We need much more stringent control measures if we want to slow it down. Not necessarily now, but soon. Very soon."

We will come back to the issue about waves and autumn and winter epidemics and lowering the peak in a moment.

So you plainly raised the alarm there. And if we look, please, at INQ000212 -- sorry, no, perhaps if we could go back to the second page, we can see that the debate develops between yourself and Professor Ferguson, and Professor Farrar, Jeremy Farrar.

You debate what NHS England is likely to say on the issue of whether it can cope, and then if you go back, please, to the first page -- this is the email that, my Lady, Professor Ferguson was asked about.



"I think the message got across. I still think part of the issue is Chris hoping it won't be as bad as we say."

So, between you, you're essentially debating the emergency, whether or not the government understands the position, and of course what can be done.

If we look at INQ000212037, you debate, right at the top of the page, it commences with the same email string, but it is a different string.

**A.** Apologies.

**Q.** Don't apologise. If we could scroll back out, perhaps, and go to the second page, we will see there an email from Jeremy Farrar:

"Are you both comfortable with the plans [the UK Government] have [got] ..."

It says "not", but we think it's "got".

"... in place, the pace of actions and the changes they are making?

"Good if we could talk again before SAGE."

Back one page, please. John Edmunds:

"NO I AM NOT."

Jeremy Farrar:

"Main concerns?"

Then the "data are crap" email. Then back up the page. Neil Ferguson emails about the "actual surge



capacity of the NHS", and is that to the point that you were addressing earlier about what the impact would be on the NHS of these figures and of course whether there was a surge capacity to be able to deal with it?

**A.** It was never very clear what the surge capacity was, but in my mind, whatever it was, it wasn't going to be able to cope with the kind of numbers we were talking about.

**Q.** Is that why you therefore say at the top of the page:

"The potential surge capacity is absolute bollocks. The level of demand at the reak, even with the mitigations planned, are an order of magnitude higher than the NHS can cope with."

**A.** Yeah.

**Q.** In this trilogy of emails, all with the same genesis, INQ000212038. The debate continues between the three of you, about whether or not:

"... the [Prime Minister and Health Secretary] are ... more aware of what's coming. But there is [still] a lack of urgency in some quarters ..."

Professor Ferguson says:

I think we might push for rapid contingency planning for potential escalation of social distancing -- likely cessation of all out of home leisure activity, working from home where possible, school closure.

"Oh and surveillance is a mess. So we don't really



know what is happening."

That's a fair summary?

**A.** That's what we were talking about time, yeah.

**Q.** The debate between yourselves and also at SAGE at that point focused to some extent also on what the consequences would be of trying to completely suppress what you knew to be the first wave of the pandemic; is that right? And on what the dangers would be thereafter of suppressing a wave, whether it would come back as an uncoiled spring --

**A.** Yeah.

**Q.** -- and so on.

SAGE debated whether or not the measures which would have to be contemplated would have the result of completely suppressing a wave in a way which meant that it would bounce back later. I've mixed my metaphors, but you understand the point?

**A.** That was the concern, yeah.

**Q.** Mr Halpern, who is the director of the Behavioural Insights Team in the Cabinet Office, at INQ000188731, page 16, paragraph 73, comments on the nature of that debate. He says:

"... during the meeting [and he is referring to a meeting of SAGE] Stephen Powis and Patrick Vallance questioned the modellers on why they were so sure that

suppression of the virus ... was not viable. The response from Graham Medley and John Edmunds was that suppression was not viable because as soon as a lockdown was lifted the virus would spike back up, implying there was no point. Graham Medley and John Edmunds, both stated that they were 100% sure about this. This gave me great concern ..."

He expresses the observation that this may have indicated an over-confidence in the model, and so on.

Was SAGE clear that if the first wave was to be suppressed, inevitably there would be a second wave, it would re-emerge like an uncoiled spring and have the obvious consequences?

**A.** Yes, because there was no -- if you just, you know, stopped the circulation of the virus for a while and then stopped doing that, of course it would come back. There was no kind of magic about it. Especially if we implemented a lockdown relatively early, which is what we were talking about here, then you wouldn't have a lot of immunity in the population, it would be very few in the population who would be immune. So the -- when the epidemic came back, which it surely would -- yeah, it surely would -- then it would increase then at more or less the same rate as before because there would be very few people who would be immune.



What we didn't anticipate was the huge changes in behaviour that -- we couldn't predict the huge behaviour changes, so were we right that it would bounce back? Well, clearly we were, because it did. And not just did it do it here, but it did it everywhere, because, you know, everyone who did it and then eased the restrictions, it came back.

So were we right in the big picture? Yes. I think it came back slower than I was anticipating, I think possibly many of us, because we didn't know how behaviour would change when restrictions -- I think everybody expected when, you know, the pubs were opened again, they would be packed, and they weren't.

**Q.** Is it out of this debate about what the consequences would be of suppression of the first wave that the debate on herd immunity emerged, because another way of going about it would be not to completely suppress the wave in a way that allows it to spring back up, but to manage it, so that some part of the population might, have become infected, have immunity, and therefore the consequences would be less severe in terms of the magnitude of the second wave?

**A.** I mean, obviously these are related issues and we would have discussed them together. I don't -- yeah, I don't see the exact link between those two things, but yeah.



**Q.** It's --

**A.** We were discussing these things, of course, yeah.

**Q.** Was it your view, and Sir Patrick Vallance in his evening notes believes that it was, that you were saying: but if you mitigate, if you don't completely suppress, there is this possibility of some degree of herd immunity; it is a byproduct of mitigation?

**A.** Exactly. So eventually then people will become immune through those mitigation policies, which is what we were concentrating on at the time.

**Q.** In the event, the impact, the likely impact upon the NHS required of course the full maximum lockdown?

**A.** Yes. We were -- it was so urgent, you know, the pressure. Projecting forward, you could see that the NHS would come under severe strain very quickly, and so action had to be taken. And although it's an extreme action, you know, in many respects regrettable, I think it was a necessary evil.

**Q.** In order to be able to answer the conundrum as to how, if you imposed a complete suppression, you would have a wave which would then re-emerge later --

**A.** If you just released that --

**Q.** If you released it?

**A.** Yeah.

**Q.** And because there was a recognition that it would be



extremely difficult to maintain a full suppression lockdown for any real length of time, as you describe in your statement, the SAGE and the London School of Hygiene team and yourself came up with a potential solution, which was to have or try to put into place a series of background social distancing measures which would, over time, dampen down the level of incidence, and have periodic lockdowns to try to bring the top level, the peak, down whenever it was required?

**A.** Yeah, that was the -- I thought -- I thought we were kind of in a -- we were stuck between two dreadful alternatives, one being this sort of mitigation policy that would still result in a huge wave and huge numbers of deaths, versus the other one, which -- you know, these things were talked about rather -- in a very polar way at the time, and actually still are -- versus the other one, which was we just go into lockdown and we stay there. And of course, until when? So you had to do that until you -- you were gambling then on a vaccine being available, so it was a kind of open-ended -- open-ended lockdown. Both of those seemed to me pretty dreadful alternatives, but for very different reasons.

**Q.** Just focusing on --

**A.** So this was, I thought, one way of trying to manage the epidemic that wasn't in either of those two

extremes.
**Q.** Just dealing with one of those options, the herd immunity issue, in outline, is one of the marked downsides of a herd immunity approach, or rather an approach which has herd immunity as a byproduct, that (a) if you allow the virus to flood through any part of the population, there will be deaths --
**A.** Absolutely.
**Q.** -- secondly, practically, it's extremely difficult to hermetically seal off that other part of the population who you don't wish to be infected?
**A.** Yeah. I thought that segmentation time of approach, which I can't remember was discussed -- yeah, it had been slightly, I didn't think that was ever, ever going to be reasonable.
**Q.** All right.
We therefore come, of course, to the decision of the government to lock down. I'm not going to ask you for your views on the government's decision-making, because that was a matter for government and, as you've rightly said, bar raising the warnings and raising the alarm and telling it how it was, telling the government how it was, it wasn't SAGE's role to say: this is what you must do, balancing all these terrible factors.



But as a matter of scientific analysis, do you say in your statement that 16 March was the first feasible date that a decision to go into lockdown could have been announced in a way that was consistent with the scientific knowledge that had then emerged and could have been justified by virtue of that knowledge?
**A.** I thought that that was the date -- by that time we had enough data to -- we knew -- we had seen a glimpse at how bad it was in terms of the cases -- you know, so I think it was the first date where you could have made a -- it could have been backed up by the evidence.
You could of course have made a decision before. Many countries did go into lockdown without reams of epidemiological data and modelling advice and so on. But I think -- so it's certainly possible to do that. Many countries did. But I think if you wanted to make evidence-informed decision-making, I think it took us to about that time, about that meeting of 13 March, to have the evidence to say, "This -- you know, this is where we are".
**Q.** There was, after the first wave, in fact in the autumn, a meeting of SAGE, I think a "What did we get wrong, if anything?" meeting. To use a terrible modern expression, a wash-up. And at that meeting did you say to your colleagues that perhaps too much time had been



spent by SAGE worrying about the second peak and the debate about the flattening strategy?
**A.** Yes. I felt there was a huge wave of infections just around the corner, and that's what we needed to deal with, not worry too much about what may or may not happen in the winter.
**Q.** Turning to the aftermath of the lockdown and the exit, rather, from it, I want to ask you some questions about the position in the care home sector.
The epidemic in the care home sector was obviously recognised at the time, and rightly so. To what extent was the risk to the care home sector, and also actually hospitals, obvious to SAGE as it deliberated on what measures, control measures, might be necessary in order to control this incipient wave of infection?
**A.** It was very clear from early on that the most elderly and most frail members of our society were the most -- were at most risk. So it was obvious that there needed to be measures to somehow protect them, whether it was care home residents or people in the community. I was extremely worried about people who were very old and frail and living in the community as well. But also, you know, hospital patients who were also very vulnerable, often. So, yeah, all of this was known, was a major concern.



**Q.** In April, on 20 April, were you party to an email string from Professor Medley, from whom the Inquiry has heard, to Sir Patrick Vallance, in which concern was expressed about the care home sector and the possible need for some dramatic measures? And was there at the same time active consideration by NERVTAG of what measures might be necessary in order to better protect the care sector?
**A.** We were discussing it, yes. You know, in reflection, I really wish we'd discussed some of these matters before. How much -- how much of it was a -- we were scientific committees, how much of it was scientific and how much of it was operational? So I think most of it was operational really. But there were issues -- there were scientific issues around, for instance, testing, you know, would that -- would that offer -- how much better protected would different testing regimes be, and so on. So there were things for us to consider and to go through, which we were working through.
**Q.** In general terms, did you believe that the easing of restrictions, which took place, of course, over a matter of weeks, May, June and July, occurred too early?
**A.** I was very concerned around that time, around the end of May, partly because of what I explained before, we didn't know how quickly this, what you called a coiled spring, would bounce back, and we were relying very

heavily on an organisation that hadn't -- was being created at the time, Test and Trace, and I thought -- I was very worried that it wouldn't be able to -- that it -- it had -- it had to work so perfectly so -- you know, straight away from day one, that that -- that worried me. At the time I think we had wonderful data by then. The ONS survey had been set up so we knew the level of prevalence in the community. And I think in my statement I said that around that time, around the end of May, it was about one in 600, and so that amounts to about 100,000 people who would test positive in the country. I thought that was an awful lot of people to test and trace potentially.

So, yes, I was very nervous that -- that by opening up then that Test and Trace might get overwhelmed and cases might start to climb quickly. As it turns out, they climbed much more slowly, thankfully.

**Q.** The way in which restrictions were lifted and their timing was, of course, a decision for the government, but did it become apparent from the end of July that there was a trend upwards in the cases, so --

**A.** Yes.

**Q.** -- the incidence, the level of incidence, the spread, the number of infections, had been brought right down by the lockdown, it was at a relatively low level at



the end of the restrictions, but it wasn't low enough to stop the trend and the level coming back up?

**A.** Well, you only need one case. And, you know, we didn't -- we brought it down to a very low level, it was about one in 3,000, if I remember rightly, something around that, which is very low, so many communities would have had zero cases, for instance. Many at that point. And we never -- we have never, even to this day, got the incidence or the numbers anywhere close to that level. So we had pushed it to a very low level, and -- but then of course it did start coming -- it started increasing straight away, as it were. The -- I was watching the case numbers, as you can imagine, this was my job, and the final -- it was 4 July, there was this sort of -- "freedom day" was 4 July, you know, and the cases starting coming up on kind of 5 July.

**Q.** At the end of July did you write to the Government Chief Scientific Adviser?

**A.** I did.

**Q.** INQ000228590. I may have unfairly called for a document which I hadn't in fact told our brilliant support staff that I was going to. In any event, you wrote to the Government Chief Scientific Adviser on 27 July, essentially saying the trend is back up --

**A.** Yeah.



**Q.** -- cases are rising.

In August -- don't worry, you can take it off the screen, thank you -- the Treasury launched the Eat Out to Help Out campaign. I'm not going to ask you questions about the overall merits of it, the Treasury has a number of points and issues and arguments that it would probably deploy in support of that scheme. But in terms of the public impact of that scheme, in terms of the overarching necessity to apply a precautionary approach of the type that you described earlier, were you concerned about that scheme?

**A.** To be honest, it made me angry. And I'm still angry about it.

It was one thing taking your foot off the brake, which is what we'd been doing by easing the restrictions, but to put your foot on the accelerator seemed to me to be perverse. And to spend public money to do that when 45,000 people had just died. I couldn't -- you know, I don't want to blame Eat Out to Help Out for the second wave, because that's not the case, but just the optics of it were terrible, I just thought -- and really my feeling was, yes, I -- the pub and restaurant sector really needed support, I wasn't against that at all, they did need a great deal of support, but this was not really just



supporting them, they could have just given them money, this was a scheme to encourage people to take an epidemiological risk. It only applied if you went into the restaurant and ate in the restaurant --

**Q.** It didn't apply to takeaway --

**A.** It didn't, no.

**Q.** You have now mentioned the issue of whether or not epidemiologically it contributed to a rise in infection in the areas where people were taking up the scheme in large numbers.

And to make it clear, there is very little or there is only weak epidemiological evidence to show that infections in the areas in which people took up the scheme went up significantly. Your point is about the optics of it.

**A.** Exactly.

**Q.** And why --

**A.** -- change people's behaviour. And we were measuring people's behaviour at the time, and there was a change in people's behaviour in August, and I don't -- I wouldn't say that it was Eat Out to Help Out but it was contributing, it was all part of -- I mean, government messaging more generally was about getting back to normal and getting -- going back to work and so on.

**Q.** On 10 September you were asked by SAGE to chair a working group to review where essentially we'd got to in terms of the reintroduction of possible further new non-pharmaceutical interventions. Did you report to SAGE and produce a paper on basically what might need to be done to try to re-reduce, to lower the level of incidence, which by then had gone up?

**A.** Yes, the incidence was going up very clearly, hospitalisations had started to go up, unfortunately we were starting to get outbreaks in care homes again, and so, you know, something needed to be done, in the classic phrase, and I remember Chris actually initially saying, "Come up with a batting order", I remember his very phrase, and so I was asked to put this report together on -- I was asked on the 10th, I brought it back to the SAGE meeting a week later, where we got a lot of discussion and input from many SAGE members, and then further discussion and input over the weekend of -- around the 20th, and it went back to SAGE as a sort of -- for final sign-off. There was a special SAGE actually just to look at this on the 21st, on Monday, the 21st.

**Q.** Let's have a look, INQ000212102, please. The heart of it is in paragraph 2. In essence, because "COVID-19 incidence is increasing across the country in all age



groups", that's paragraph 1:

"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 [back] ..."

I interpose that word:

"... [back] below 1 ... The shortlist of ... (NPIs) that should be considered for immediate introduction includes:

"a. A circuit breaker ...

"b. Advice to work from home for all those that can.

"c. Banning all contact within the home with members of other households (except members of a support bubble).

"d. Closure of all bars, restaurants, cafes, indoor gyms ..."

And so on.

"e. All university and college teaching to be online unless face-to-face teaching is absolutely essential."

So a relatively stringent package. You make it absolutely plain that it was for immediate introduction, and single interventions are unlikely to work on their own?



**A.** Correct. There's two aspects to this.

**Q.** Please.

**A.** So, one, the circuit break, this all got -- this got -- came just with the circuit breaker. The circuit breaker was about reducing the prevalence and bringing it to a low level, because the only way that we'd -- you know, when we had been in the lockdown in March/April then we'd reduced the incidence, reduced the prevalence, and that's what that was designed to do, to bring the incidence right down again. And the other measures which were for a longer term were to slow the growth. So that was -- there's two aspects to it, is what I'm trying to say.

**Q.** It's very well known that of course very little of this happened or at least --

**A.** Yes.

**Q.** -- happened in the immediate future after that meeting of SAGE. Around about the same time, about -- well, in fact, the day before SAGE signed off on this -- and this is an extract from the minutes of that 58th meeting of SAGE on 21 September, the day before you had been asked to attend a meeting with the Prime Minister, on that Sunday. You were invited to attend in order to address a particular question that the Prime Minister wished to be debated. I think in email INQ000212107 you were told



that there would be a balanced group of views presented.

**A.** Yeah.

**Q.** So there's a --

**A.** It's from Julian Fletcher at the bottom, I think.

**Q.** Yes, he is the official in the Cabinet Office, and then you received the invitation, and you forward it to Sir Patrick Vallance, talking about the main SAGE paper that was due. Of course it was due the following day, on the Monday. And then he replies this at 11.16 on the Saturday:

"John

"The meeting is for him to hear a range of views on the forward look (mainly from the 'let it rip' brigade). We have tried to put together a balanced group across views and so I think what he needs is your view on future direction of the epidemic rather than policy options."

What did you understand his reference to the "'let it rip' brigade" to be?

**A.** Well, of course there were many people -- well, not that many but there were vocal people who took the view that we shouldn't have locked down in the first place and we shouldn't be considering that again. So, yeah.

**Q.** You attended the meeting, together with Professors Gupta and Heneghan, we will hear from Professor Heneghan next,

as well as a Swedish expert epidemiologist, Dr Anders Tegnell, and also Dame Angela McLean, who was then or was to become the Deputy Chief Medical Officer?

**A.** No, she was then the Chief Scientist at the Ministry of Defence.

**Q.** Thank you.

**A.** She was also co-chair of SPI-M-O.

**Q.** At the meeting, which was attended by the Prime Minister and the Chancellor, as well as other officials, the debate of whether or not to essentially put into place a package of relatively strict non-pharmaceutical interventions, as opposed to allowing the virus to re-emerge and to re-wash through the population whilst segmenting or hermetically sealing off parts of it, to the extent that that might have been possible, was had in front of the Prime Minister.

During the course of that debate, I think you and Dame Angela McLean WhatsApped each other.

Could we have, please, INQ000207199.

We are only concerned with the WhatsApps at the top of the page, dated 20 September, because that's the date of the meeting, of course, and they commence about 5.30 and the meeting was in the afternoon, so, Professor, these are plainly WhatsApps sent during the course of the meeting.



Dame Angela McLean refers to:

"Are we going to bring up the Seattle fishing vessel."

Was that a reference to data gleaned from a fishing boat where a number of seamen had been shown to have antibodies --

**A.** And were protected, were well protected.

**Q.** Earlier infected.

"Angela McLean: Who is this fuckwitt?

"John Edmunds: Every statistic is wrong.

"...

"Angela McLean: Patrick and Chris will discount him later."

Were those all references to the proponents of the contrary side of the debate, in particular --

**A.** I'm pretty sure it's the next witness.

**Q.** Professor Heneghan. All right.

During the course of this WhatsApp string, we can also see a reference to "Dr Death the Chancellor" and Dame Angela McLean saying, "In [ONS] you'd see it".

Did you understand that those were references to the Eat Out to Help Out campaign of which you've spoken about in moderately --

**A.** Honestly it's so long ago I don't know.

**Q.** All right.



**A.** But it could well be.

**Q.** After the meeting, I think Professors Heneghan and Gupta tried to re-engage battle and to write to say that they had not had a fair hearing and there was further information they --

**A.** Well, I mean, I had interrupted Professor Heneghan at one point because he was making some really basic epidemiological errors, the sorts of ones that we teach our students on day one, and I couldn't let it go after a while. And so I did interrupt, and so -- and that slightly put the wind out of his sails, and -- so, yes. And he hadn't interrupted me, so, you know, it was fair enough that they complained.

**Q.** I think you described his arguments as half-baked in that email string, but in any event, your argument, your views did not, to use your own words, find favour with the Prime Minister?

**A.** No, I didn't manage to persuade them.

**Q.** As we all know, there was a rule of six, a rule of group of six put into place. Was that something that was discussed with SAGE, do you recall?

**A.** No.

**Q.** There was a tier structure put into place in October. Was the tier structure something that SAGE had positively recommended?



**A.** No.

**Q.** Did the tier structure --

**A.** We hadn't discussed it. I mean, I -- you know, we discussed it afterwards, we tried to work out whether it would be effective, but it was new to us.

**Q.** The idea hadn't come from SAGE?

**A.** No.

**Q.** And the result of that tier structure was, wasn't it, it's been described as an epidemiological levelling up?

**A.** That was how I described it at the time, yeah.

**Q.** The terrible reality was that the spring uncoiled, the second wave re-emerged, and there was a second lockdown.

By the time of that second lockdown and the peak of the deaths at the end of December and January, the beginning of January 2021, was our surveillance better?

**A.** Oh, we, you know, our surveillance from late May/June was absolutely fantastic. You know, I think it's difficult to say with any certainty but if it wasn't the best in the world it must have been one of the best in the world. It was -- our situational awareness was fantastic.

**Q.** We have heard evidence of the ONS --

**A.** Exactly.

**Q.** -- coronavirus Infection Survey, the REACT Study, the multitude of surveys, as well as, by then, a much more developed testing structure?

**A.** Exactly.

**Q.** And a huge serological -- a platform on which all these tests could be ascertained and made.

SAGE had been warning since September, you've showed us the report and -- the paper that went into that meeting. What is your view as to whether or not that second wave was inevitable or the consequence of not having acted earlier?

**A.** So, you asked me earlier this morning about being -- you know, why didn't we raise the alarm in February or whatever, and I wanted to make sure that that didn't happen again. And of course our surveillance, as you just described, was so much better, so we did know what was happening. I think -- so we had all the information, we knew how to do it -- you know, that was what that report on the 21st was all about. So we could have avoided the -- much of the autumn wave -- we wouldn't have avoided everything but we could have reduced the incidence. And if we'd have then put the longer-term measures in place, we could have kept it low, you know, over the autumn. Cases would have happened, some people would have unfortunately, have



been hospitalised and died, it would have happened, but as it was, we let it go and, you know ...

And so when we did eventually -- as I'd explained on the 20th with the Prime Minister, I said the decision isn't to lock down or not, the decision is either you do it now and get on top of this epidemic and control the epidemic or you let it control you, and it will force you into a lockdown at a later date when you'll have to lock down harder and longer and many people will die as a consequence.

And unfortunately that is what happened: over that autumn from around 20,000 to 25,000 people died, and there's ... some would have done, but there is no reason for that number of people to have died at all. And then we -- then we entered the winter phase with our hospitals full, NHS staff having been under stress for months, as opposed to having -- you know, they could have been doing routine stuff that autumn and clearing the backlog from the -- and that was not the case. And then we got hit by the Alpha wave.

And so on top of all of this pressure, we then had this new virus that was -- you know, it took a little while, a couple of weeks to work out, but it was significantly more transmissible. Even worse, though we didn't know this until January, it was also more



pathogenic. So we were -- we couldn't have been worse prepared really.

**Q.** Why did the lockdown from the beginning of November to the beginning of December not bring the levels of incidence, the overall rate down enough to stop the re-emergence of the greatest part of that second wave, in fact the peak, in January?

**A.** So it wasn't as stringent as the original lockdown. The key reason: that the schools were open. And I think everybody wanted the schools to be open. But there were other things that had -- there had been slight adjustments in who would be key workers and things like that.

**Q.** Was it long enough?

**A.** Well, if it had been done earlier on, if it had been done, you know, in September, it would have been plenty long enough, or we could have done it around half term, so you'd have had the combination of the schools being closed.

As it was, it happened just after half term, it was really -- made no -- again, it showed there was no real strategy, no long-term thinking. You know, instead of just bouncing into, you know, a panic decision as opposed to taking a strategic view of it and getting a grip of the epidemic and doing what was necessary when



it was necessary.

**Q.** Is that why, on account of all the things that you say were not done that should have been done and because the consequence is so terrible, you describe in your statement that that second wave was, for you, the worst moment of the epidemic?

**A.** I said it publicly at the time, I really did think it was truly awful. And of course it did -- it was. Another 65,000 people died over the next few months.

**Q.** Alpha --

**A.** Yeah.

**Q.** -- was more transmissible and to a slightly lesser extent more severe, more pathogenic, it was very, very transmissible?

**A.** Yeah.

**Q.** To what extent did the emergence of Alpha at the end of November and the beginning of December contribute to that terrible level of death --

**A.** Oh, to a great extent, but of course we were starting from such a terrible starting point. You know, we were -- with our hospitals full and resources stretched and so on, so it was easy to miss it initially, because cases were so high that how would you pick up -- it was easy to miss an increase. If cases had been low you would have seen an increase much more quickly. So it

was -- we were in such a terrible state when that happened, that was -- you know, it may well have happened -- you know, the Alpha wave may well have happened anyway, there's no way of being able to tell that. Of course actually by letting the incidence increase, it made it more likely that we would have -- you know, that the virus would be able to mutate. But I think it probably would -- I think we'd have probably dealt -- but it might have happened -- if we'd have been in a lockdown we might have stopped it at source, when it first emerged. Who knows?

I don't think you could say that the -- that that wave was a consequence of what happened in the autumn, it might have contributed, but we would have been in a much better place to deal with it.

**Q.** The government acted, in your words, relatively quickly, however, in December --

**A.** Yeah.

**Q.** -- realising the consequences of Alpha, a great deal of work was done in ascertaining its transmissibility, its pathogenicity, the severity of the disease, and the government rapidly realised that Alpha had changed the dynamic and therefore there was the third lockdown imposed.

**A.** So it still was a little bit -- yes, they did act



quick -- you know, they did act quickly.

There was a -- so the -- there was a tier 4 that then arose and was imposed in the south east and London, but there was still a little bit of a sort of shambolic -- I remember the schools opened for one day in January and then they were closed. You know, again, hadn't really thought it through as a government, I don't think, you know, across the different sectors of government, properly.

But yes, they then acted relatively quickly.

**Q.** After the final national restrictions were eased in July of 2021, the following summer, you describe how the epidemic settled at a relatively high level. By that, do you mean that the level of incidence again, the general level of infection through the population, plateaued, but by comparison to other countries, and perhaps in particular our Western European friends, at a relatively high level?

**A.** Yeah, it was higher.

**Q.** Why was that?

**A.** We didn't have any measures in place, they did, so they had -- I say "they", of course it varied from country to country, but as a general -- as a sort of generalisation most countries had some measures in place. Mask wearing was still -- was still required. Many countries had



kind of a vaccine passport, so you couldn't get into a bar, for instance, unless you had been vaccinated. Which probably didn't make much difference to transmission, but made people get vaccinated. So they actually had -- so, particularly in their younger population, they had -- you know, as I say, I'm grouping, of course, all of Europe or something here, but many of our Western European neighbours had higher levels of vaccine coverage in younger individuals than we did. They had also started vaccinating children much earlier than we did. So I remember at the beginning of term, September of 2021, at that time France, about 80% of -- I may have these numbers slightly wrong, but roughly speaking about 80% of their kids had -- secondary school age children had had one dose and about 50% had two dose, we hadn't even started vaccinating our children.

**Q.** It's important to note, isn't it, though, that in terms of -- and this is for a later module, but in terms of the United Kingdom's vaccination programme, its development of vaccines, getting them out there, getting people vaccinated, in a general sense that that was a very considerable success?

**A.** It was, and I think we started absolutely fantastically. We were fast. There were some very brave decisions made



about the timing of one and two doses and things early in January of 2021, around then, which were vindicated for sure. I'm not sure we finished quite so well. We were a bit slow to finish the job.

**Q.** Then, of course, the further variant, the Delta wave, arrived and there were very significant further deaths, were there not, between May 2021 and December 2021?

**A.** There were, despite all the vaccination, and we rolled out then a booster dose in the autumn of 2021 and so on, so -- but still I think there's about 15,000 people died in that -- in that long drawn-out -- I don't know whether you would call it a wave because it was just a long drawn-out period of high -- of high incidence.

**Q.** That was going to be my next question.

What link, if any, is there between the continuing high, relatively high level of incidence and the number of deaths that ensued?

**A.** Oh, well, there's a clear link if you -- the higher the incidence then the greater the risk, of course, of someone vulnerable being -- acquiring infection, and so yeah.

**Q.** By the time that the Omicron wave arrived in the winter of 2021, of course, there was a very extensive vaccination programme in place, booster programmes had been initiated for higher risk groups, and, as it turned

out, the Omicron variant was not as -- you know, it was no worse, it was no more severe or pathogenic than its predecessors?

**A.** It was far more transmissible, and it was able to evade the immune response. So even though we had high levels of immunity in the population mainly through vaccination, it could still spread amongst immunised individuals. So it was -- and we didn't know that it was less pathogenic. There were anecdotal reports, but I'm not sure you can really make government policy on kind of one or two anecdotes. So it took a while to work out -- some really nice work by Imperial College and others, PHE and others, to look -- to try and work out the risk. And the risk was lower. And thank heaven it was.

**Q.** I want to conclude just by putting to you some general questions and propositions from the core participants or some of the core participant groups in this Inquiry, which I have not so far addressed.

The Long Covid groups ask whether the 14 April 2020 post-lockdown epidemiological scenarios paper didn't refer to long-term sequelae, if you can recall?

**A.** I really don't remember, I'm sorry. I mean, we all knew of course by then this was becoming a -- it took a while of course to realise anything about Long Covid. You



have to have people to have Covid and then not recover, so it takes a little while for this to be sort of realised, but by then it was starting to become clear.

**Q.** When this debate about mitigation and suppression and levelling the peak or squashing the sombrero was being had, to what extent were long-term health conditions considered?

**A.** They were, actually, considered. This was something that I remember that Chris Whitty was very, very, very keen for us to keep forefront in our mind, that some of these measures would have significant effects on people's lives, livelihoods, and, therefore, health later on down the track. So Chris was -- sorry, Professor Whitty was very -- was very keen for us to never forget that and make sure that we tried to take it into consideration. And they did set up a couple of studies to try and look into it early on.

**Q.** Covid Bereaved Families for Justice Cymru ask: did you receive any data from the devolved administrations which was used in your modelling?

**A.** Yes.

**Q.** FEHMO ask: do demographic data sources and early statistical modelling typically include ethnicity?

**A.** If you're looking at the risk, so the risk if you -- of severe outcomes if you're infected, then yes, that's



routinely -- that's routinely looked at. We didn't look at it in terms of the risk of you actually becoming infected, so it wasn't in our mathematical models. We didn't distinguish people's ethnicity in our transmission dynamic models.

**Q.** We now know, of course, that there were varying degrees of severity of impact depending on ethnicity. In future, would you agree that that is an issue which needs to be better modelled?

**A.** Absolutely.

**MR KEITH:** Thank you very much, Professor.

My Lady, those are all my questions.

**Questions from THE CHAIR**

**LADY HALLETT:** Could I just ask one question, Professor Edmunds.

You have mentioned an awful lot of work, and for which I know the public would be extremely grateful that you and your colleagues were doing. I've seen the times of some of the emails; I'm not sure when you lot were sleeping. But there are a lot of groups, committees and subgroups. Was that the right structure? Did they work? In other words, just looking out as the layperson it looks like an awful lot.

**A.** It looks terrible, doesn't it?

But actually they did work quite well, very well.



And it was -- some of the key ones that was planned, that had been planned long before, so that SPI-M would feed in to SAGE, that NERVTAG would feed in to SAGE. Because before that they were standing committees and they would feed in somewhere in the Department of Health, but in an emergency they would feed in to SAGE and they did.

And the way of working particularly of SPI-M was planned long in advance that we would always try to have -- or SPI-M would always try to have multiple groups looking at the same question independently so that -- to give some sort of validation. You know, models, you know, they're coming -- I'm sure they're going to get overly criticised in the next session and, you know, they are very uncertain. You know, projecting forward, it is uncertain. And so the idea was always to have these multiple groups looking. And that had been planned a long, long time ago and it worked -- clicked into gear very well, and the expansion of SPI-M worked to SPI-M-O worked extremely well and it was brilliantly led by Graham Medley.

And the other groups, it made sense. You were talking about ethnicity just now, that wasn't obvious before the pandemic, that there would be a greater risk in ethnic -- maybe we should have thought it through

more carefully, but that wasn't obvious to -- certainly to me at least, so an ethnic group -- an ethnicity group was set up, and that, and I think that was very important that it was, to get to the bottom of why -- why there was a higher risk, so -- and other things like that happened.

I think you had Cath Noakes this morning. She -- they played a fantastic role of terms of understanding the physics of transmission. We were sort of the population dynamics and they were looking at the kind of, you know, does -- how -- does ventilation work. And that became -- you know, that -- suddenly, that -- you know, in sort of April, whenever it was, it became obvious that we needed something like that.

So, yes, it looked -- at the end it looked like there was this enormous spaghetti, but actually, no, there was a sensible reason for all of those groups. They fed in to SAGE. And, okay, that meant perhaps SAGE did get rather big, but it worked incredibly well, actually, at being able to assimilate all of that information. I mean, you asked me before about the role of the secretariat. I mean, I'm still astounded that they managed to keep all of that together and -- and yes, we can criticise the SAGE minutes, they are a bit terse and they are -- you know, but all together, the



role that the civil service did to support that enormous effort -- so there was huge scientific efforts going on but -- you know, to bring it together, to make it available to government, it was a huge effort by the civil service. And it worked. So that our government really was -- perhaps not at the beginning, not up to March, but after that it really was incredibly well informed.

**LADY HALLETT:** Thank you very much indeed.

If I may say so, Professor, I think you were unduly harsh on yourself this morning. You had a job, and you described it yourself, your job was to provide expert advice to the policy and decision-makers, and if the system is working properly that advice is relayed to them, then they consider advice coming from other quarters about economics and social consequences and the like. I'm not sure you could have done more than you did, consistent with your role at the time, but you obviously did as much as you felt was appropriate. So I'm really grateful to you, I'm sure we all are.

**THE WITNESS:** Thanks.

**LADY HALLETT:** And I'm afraid you're not the first and you won't be the last scientist whose work is misunderstood. It probably goes with the territory, I fear.

Thank you very much.



**THE WITNESS:** Thank you.

**(The witness withdrew)**

**LADY HALLETT:** Shall we break now?

**MR KEITH:** Indeed, my Lady.

**LADY HALLETT:** I shall return at 3.20.

**(3.06 pm)**

**(A short break)**

**(3.20 pm)**

**MR O'CONNOR:** My Lady, our final witness for today is Professor Carl Heneghan.

**PROFESSOR CARL HENEGHAN (affirmed)**

**Questions from COUNSEL TO THE INQUIRY**

**MR O'CONNOR:** Can you please give us your full name.

**A.** Carl James Heneghan.

**Q.** Thank you. Professor, you have prepared at our request a statement for the Inquiry, which is being brought up on the screen, and I know that you're familiar with the contents of that statement.

We can see, I don't ask for this to be brought up on screen, but on the final page of your statement you've signed the statement below an assertion that you believe the facts stated within it are true, and that signature was dated 24 September of this year; is that right?

**A.** Correct.

**Q.** Thank you.



You are a professor of evidence-based medicine at Oxford University. Could you please explain what that discipline entails?

**A.** Yes. So evidence-based medicine is the integration of the best available evidence with clinical experience and expertise with patient values, about making decisions about healthcare for individual patients or systems. It largely grew out of about the 1980s when there was a growing recognition that there were severe harms being caused in healthcare --

**Q.** Professor, I'm just going to interrupt you. If I could ask you to try to keep your voice slow. I appreciate it's not an easy thing to do, but it would make everyone's life a little easier if you could.

**A.** In the 1980s, a realisation that the use of poor quality evidence or opinion was harming patients in quite significant numbers and leading to excess mortality. Over time, what's happened is there has been a change to the use of best available evidence. And a very good example of that, which you saw yesterday in the RECOVERY Trial, you would expect to see randomised controlled trials for the use of interventions in healthcare around drugs and vaccines. That's the same as well for non-pharmaceutical interventions.

We particularly sit at the top of the tree doing

systematic reviews, we try to take -- look at all the available evidence, diagnostics, prognostics and treatment effects.

**Q.** Thank you. So that's a taste, at any rate, of that field in which, as we've said, you are a professor at Oxford University.

It's also right, is it not, that you are a member of the Royal College of General Practitioners and in fact still a practising GP alongside your academic work?

**A.** Yes, so I qualified as a doctor in 2000 and received MRCGP status in 2005, and I work as an NHS urgent care GP, who basically works right at the frontline, and my speciality is doing visits and I continued to do that right throughout the pandemic.

**Q.** Professor, in the time we have this afternoon, I want to ask you about events that took place during the autumn of 2020, in particular a time, as we know, when calls were made to alter the approach to the pandemic. There was a public debate, was there not? On the one hand we heard calls for a circuit breaker lockdown and an increase in the restrictions that were in play, and on the other hand there was argument about reducing the restrictions and, as we'll come to see, the Great Barrington Declaration.

And as part of that debate, as in fact we've already



heard, you and others met the Prime Minister in September 2020, and that's another area that I will wish to ask you some questions about.

Before we get into the detail of those events, I'd like to ask you a little bit more about your expertise in this area, as it stood at 2020, at the outset of the pandemic.

As you know, because I think you have been following the Inquiry, we have heard this week from a series of academics who have spent, in the main, their professional careers researching, analysing the spread of infectious diseases, developing models, to analyse how such diseases are spread and how they can be controlled, and considering large-scale public health issues relating to pandemic preparedness and so on.

You don't have a comparable type of expertise in this area, do you?

**A.** So if you mean do I have a narrow expertise in a single specific disease, the answer is no.

**Q.** Well, that wasn't quite my question. That may be right, but it's also the case, isn't it, that you have not studied, over the course of your academic career, preparedness for pandemics, infection control, the way in which viral diseases spread through populations and so on?



**A.** Yeah, so let me elaborate on where my expertise lies. You know, it lies in the evidence base in the community, and increasingly what we see now is a realisation that most of what we're seeing requires a generalist approach, because it's two areas broadly which you can consider, is non-communicable diseases, things like cancer, heart disease, and then you've got communicable diseases, acute respiratory infections, and what's particularly important is how they interact in the community, and you develop an evidence base. And as we sit here, about 27% of the English population has multimorbidity, that's two or more chronic conditions. By the time that goes to 65, that becomes over 50% of the population.

Now, you'll have started to realise in the Inquiry, and we've learned, the relationship between multimorbidity and the impact of communicable diseases is interesting and important because of its elevated risk and the exacerbations in the severity of disease that's caused by that interaction.

My expertise is in how we develop the evidence on diagnostics, prognostics and treatments to look at those areas.

**Q.** All right.

**A.** And --



**Q.** Sorry to interrupt you there, Professor.

I would like just to call up a document, because before we get into the detail of 2020 I'd like to just have a look at the types of matters that you were researching in that period or rather the year or so before 2020.

Could we call up on screen, please, INQ000314600.

**LADY HALLETT:** Whilst that document is coming up, Professor, could I repeat the message: it's really important that we get your evidence down in full.

**A.** Okay.

**LADY HALLETT:** Although I'm not taking every word, I'm struggling, and so I suspect our stenographer is too.

I speak too quickly as well, so I understand the problem.

**A.** Apologies.

**LADY HALLETT:** If you could just slow down a bit.

**A.** Mm-hm.

**MR O'CONNOR:** Professor, as you know, because you've seen this document today, it's actually just an extract from your website.

**A.** Yeah.

**Q.** On your website you list the peer review publications that you have published down the years, and these are the publications from 2019, 2018, 2017 and so on, in

other words the years running up to the pandemic.

If we can look briefly, one can see, for example, on this first page, in the last few months of 2019, papers that you published included papers about urinary tract infections, shoulder pain, a couple of papers about bacterial infections in older people.

If we can go over to the next page, please, there are papers there, are there not, about heart attacks, strokes. There is a paper towards the bottom about sodium valproate, which I think is a drug used to treat epilepsy; is that right?

**A.** Yeah.

**Q.** If we go over to the next page, childhood cancer in Egypt, cardiovascular risk, about halfway down the page there's a paper on hypertension. And looking at these papers, you seem to have had a particular interest in high blood pressure; is that right?

**A.** I need to answer the question in full, so --

**Q.** Well, let me just look at one or two others and then you can respond.

If we look over at page 4 there are papers about people who suffered strokes, the effects of statins in the elderly. Towards the bottom of the page, vitamin D, whether or not it prevents fractures and falls.

**A.** Mm-hm.



**Q.** Then finally, this takes us to the end of that year of 2019 on page 5, for example another paper about hypertension, something about sleep-wake disturbance and ocular disease. And at the top of the page there, a paper about the human papillomavirus -- I think I pronounced it correctly -- which I think is something that can cause warts and in some cases cancer.

So, Professor, the general picture I would suggest, at least looking at your published papers prior to the pandemic, is that you had a sort of general interest in matters relating to primary care, perhaps running in parallel with your practice as a general practitioner, but -- let me put the question -- but not that detailed interest in viral transmission of diseases that we've seen with the other experts?

**A.** So, number one, in 2019 you're referring to my role as editor in chief of BMJ evidence-based medicine, so you've referred to a number of editorials, which I will have wrote. Secondly, as you're referring to, I'm also director of programmes in evidence-based healthcare, which is a global programme that supports DPhil opportunities and Master's, so when we're talking about cancer in Egypt, that's -- I'm supervising a DPhil student at that moment in time is publishing in that arena.



But if you go across the breadth of what I -- you do go back to 2014, where you start and go: oh, well, with the Tamiflu reviews in the last pandemic where we spent four and a half years doing that evidence. The second aspect is within the respiratory team -- is it's a team effort. So when I am in a position where we're looking at something and there's something, for instance, not quite there in a disease specialist, we will pull that to us.

As an example, when we was asked by the World Health Organisation in 2020 to do the systematic reviews on transmission, of which we published 17 papers, there was a microbiologist, a virologist, immunologist, medical statistician, and there is also an expert in the clinical epidemiology of respiratory viruses. So we bring -- I bring together a team. But yes, it's fair to say I have a view, particularly diagnostics, particularly harms. And I would say more so in the elderly I have an interest in the interaction between communicable and non-communicable diseases. So, for instance, some of those diseases we see, like diabetes, has a huge impact when you look at acute respiratory infections in the community.

It's also important to realise, what does the community respiratory transmission look like when



you understand there are 30 different pathogens that can cause viral immunity in the community in the UK. That broad understanding allows me to then use the evidence-based approach to come and say what's the best available decision we should be using for a decision or action.

**Q.** Professor, I think really we're not disagreeing over very much at all, you describe a broad approach, which is different from the very specialist experience and practice of some of the other experts we've heard.

Just finally on this, many of the experts, the academics who have given evidence this week have sat on either SPI-M-O or SAGE or NERVTAG, and I think it's right to say that you have not sat on those committees?

**A.** No, I have not.

**Q.** Thank you.

Let me move, Professor, then, to, as I said, the debate in autumn 2020 about appropriate Covid guidance or regulation.

By way of context, as I've said, we saw that cases in that period were rising, there had been a call for circuit breaker lockdowns, others arguing that so-called whole-population measures were inappropriate.

Amongst those making that latter argument were Professor Sunetra Gupta, also of Oxford University, and

also yourself.

We have heard that on 20 September, which was a Sunday, there was a meeting with the Prime Minister and the Chancellor which you and Professor Gupta attended. I said "attended", it was, of course, a Zoom meeting.

**A.** Mm-hm.

**Q.** The day after, 21 September, we just heard from Professor Edmunds that there was a SAGE meeting but it's also right, isn't it, that you and Professor Gupta and others published an open letter on that day relating to Covid regulations? We may look at that in a moment.

Then the third date I wanted to mention was a couple of weeks later, on 4 October, when the Great Barrington Declaration was published.

I would like to start, if I may, with that document, the Great Barrington Declaration.

It's helpfully been brought up on screen. It's a relatively short document, and we can take it page by page. We see at the top, after the title, there is a summary which states that:

"As infectious disease epidemiologists and public health scientists we have grave concerns about the damaging physical and mental health impacts of the prevailing COVID-19 policies, and recommend an approach



we call Focused Protection."

I'm going to come to ask you about that "Focused Protection" policy.

While we're looking at this page, one notes that at the end of the document there is a reasonably lengthy list of signatures which doesn't include your own, but there is a reference here to 937,000 signatures. Are you one of the 937,000?

**A.** No.

**Q.** You didn't sign the declaration?

**A.** No.

**Q.** Well, if we may, we will simply note the contents of the declaration. I'll come and ask you why you didn't sign it.

So if we can go over the page, the first substantive paragraph really just repeats the summary we've already noted. There is then a paragraph which refers to the, as it's said, devastating effects on short and long-term public health of current lockdown policies. Examples are given: lower childhood vaccination rates, fewer cancer screenings, and so on.

Over the page, please, there is a reference to the fact that the understanding of the virus is growing, and in particular it is said that:

"We know that vulnerability to death ... is more



than a thousand-fold higher in the old and infirm than the young. Indeed, for children, COVID-19 is less dangerous than many other harms, including influenza."

Then perhaps really the core of the declaration, it's asserted that:

"As immunity builds in the population, the risk of infection to all -- including the vulnerable -- falls. We know that all populations will eventually reach herd immunity -- ie the point at which the rate of new infections is stable -- and that this can be assisted by (but is not dependent upon) a vaccine. Our goal should therefore be to minimize mortality and social harm until we reach herd immunity."

Reading on, it's said:

"The most compassionate approach that balances the risks and benefits of reaching herd immunity, is to allow those who are at minimal risk of death [by inference the young who have been referred to] to live their lives normally to build up immunity to the virus through natural infection, while better protecting those who are at highest risk."

That paragraph is a description of, it is said, this policy of "Focused Protection".

Then next paragraph emphasises the need to adopt measures to protect the vulnerable, that's one half of



the equation, and the paragraph afterwards stresses the other half of the equation, which is:

"Those who are not vulnerable should immediately be allowed to resume life as normal."

Simple hygiene measures are referred to, but then the theme is schools and universities should be open, restaurants and other businesses should open, arts, music, sport and so on should resume. And finally, people who are at more risk may participate if they wish while society as a whole enjoys the protection conferred upon the vulnerable by those who have built up herd immunity.

So that's the declaration.

Why was it, as you've told us, Professor, that you did not sign this declaration?

**A.** So you referred to the meeting of 20 September.

**Q.** Yes.

**A.** Can I elaborate on that meeting, or are you going to come back to that?

**Q.** I'm certainly coming back to it, Professor.

**A.** Okay.

**Q.** I wanted to just use this declaration, this document, as a way of identifying what that policy was before we go back to the meeting.

**A.** That meeting, when I -- it was announced, was the first

time I met Professor Sunetra Gupta, who is a theoretical epidemiologist. Subsequent to that, as you talked about, disease expert, she's a disease expert in the area of interest, and I spoke to her weekly.

We are broadly in agreement about many areas, but one of the issues that happened after that meeting was it was subsequently leaked to the press, and then I was under pressure from articles calling me an agent of disinformation, abuse on social media, and felt under pressure. I communicated with Professor Kulldorff and -- Martin Kulldorff and Jay Bhattacharya and Sunetra Gupta, was asked to sign it, and at the time I was -- we was also working on a series of systematic reviews that we felt we were trying to interpret and understand.

I agree with the broad aims of the Barrington Declaration, but I would not let my emotions and opinions run into something when I didn't have time -- because there are one or two areas where you might look at it and go, "I think actually it needs more detail", and -- you know, particularly if you said everybody should return to work as normal. You know, that's the sort of thing where, given the gravity of what was happening, from an evidence-based perspective I would have derailed it and said, "We need to step back



and really consider that issue". It would've took me quite a few weeks with my team to get to an opinion on that.

In doing so, like I said, I agree with the broad themes but by the time it had been published and was out there I think the position was clear and there was no weight to be added by me signing it, and, as I said, I was under considerable pressure in all sorts of different ways, and still trying to inform the debate in the background, as you will see later, with an evidence-based approach.

**Q.** All right.

So I think you've made the position very clear, Professor, which is that you did agree with the broad terms of the declaration, and you've explained the sort of pragmatic reasons why you didn't sign it.

The evidence that the Inquiry has received is that there are at least three quite sort of high level principled objections to the Focused Protection policy, and what I want to do is go through them with you one by one. And of course if they sort of overlap with any of your concerns about the policy, you will be able to say so.

Just to be clear, once we've done that, we'll go back and talk about --



**A.** Okay.

**Q.** -- the meeting in Downing Street.

What I'm going to do for these purposes is really look at Professor Woolhouse's statement, because he identified what he regarded as the real problems with the focused protection approach, but I will also take you to Chris Whitty's statement, because he has said some similar things.

So if we can go to paragraph 175 of Professor Woolhouse's statement, he says:

"As I understand it, the Great Barrington Declaration ... advocated an approach where vulnerable individuals are protected but the virus is left to circulate until enough people have been infected to reach the herd immunity threshold. I had three concerns about that approach at the time, and declined to sign the declaration when invited to do so."

Then we can see at paragraph 176 he identifies the first of those difficulties or objections, which is that:

"... the size of the resulting epidemic would be so large that the public health burden just in the low risk segment [by that he means the young people] of the population would be enough to overwhelm the NHS, noting that low risk is not zero risk and some of these



individuals would develop severe disease."

What do you say to that?

**A.** Which one, the first or both? Sorry.

**Q.** Well, I think he is making a single point.

**A.** Oh, so what he's basically coming at is the aspect that what we've got to understand from respiratory infections is -- the first thing is to say between summer and winter there is a large increase in unplanned respiratory admissions. We go from about 15,000 to about 30,000 every year. The vast majority of the deaths in respiratory infections occur in that winter phase.

There is an element that you cannot reduce the risk to zero for anybody. Some of the respiratory pathogens will affect younger people much more so: influenza, RSV. The coronavirus was very much to the elderly population.

I think the problem is if you say we're going to have no approach whatsoever, that was not the approach that was being undertaken by Sweden. That actually there were subtle reductions in mobility in the population. So, for instance, they didn't have mass gatherings, they didn't -- they had reductions in people attending restaurants and public houses. You couldn't stand at a bar, for instance. So they didn't have no effect.

**Q.** Can I just interrupt you there? Is this one of these areas where you didn't agree with the Great Barrington Declaration? We've looked at it.
**A.** Yeah.
**Q.** It's very clear that really, beyond hand washing, for that younger segment of the population they would live their lives as normal. Are you saying that you didn't agree with that?
**A.** Well, I think that the idea of live life as normal in the face of an emerging risk is not possible, because everybody will attenuate their risk in some way.

So, for instance, if you are a young person and you have a grandma who's 85, 90, you have to attenuate your behaviour, because if you're going to take your illness, irrespective of whether it's coronavirus, it could be a common cold, it could be highly harmful for that elderly person. So I would expect younger people to change their behaviours in some ways to match the risk that is presented.
**Q.** Thank you.

So are you agreeing with me that you do not agree with the broad proposal in the Great Barrington Declaration that young people should live their lives as normal?
**A.** And I think what's happening there is --



is what happens is you equalise the risk across all the age groups, and in doing so the theory says, and actually the practice is, you actually can increase the risk of those in the most vulnerable category.

As an example of that, in the first wave care homes -- 45% of care homes had outbreaks and in some parts of the north it was 55%. What -- the argument about the younger population, those least at risk, which is what happens now, is that as they go about their daily life, they will build up a wall of immunity and reduce the susceptible population, and in doing so that means the elderly actually gain an advantage. But if you're telling me you lock down and the elderly are at less risk, that didn't happen, as you saw in the first wave and in the second wave, that actually there is not a clear relationship between reducing the risk in the young people and your ability to suppress the virus in areas like care homes.
**Q.** Professor, I'm going to interrupt you, I think we might be at slightly cross-purposes.
**A.** Okay.
**Q.** You're now talking about whether lockdowns of the whole population are effective, but I'm asking you about whether this policy of focused protection is effective, and the criticism that was made by Professor Woolhouse



**Q.** Professor, could I ask you for a yes or no answer, please.
**A.** Yes, I am.
**Q.** Thank you.

I'm going to move on to the second of Professor Woolhouse's propositions. He said:

"... it wasn't made clear how well the vulnerable segment could be protected from infection in practice."

Here, of course, he is referring to the older segment of the population.

"It certainly couldn't with 100% and that meant a further, also potentially very large, burden on the NHS."

Now, Professor, before you answer, we're going to come to your paper that you produced for the Downing Street meeting, and we will see in there a number of measures are encouraged to protect the vulnerable population.

The point that Professor Woolhouse is making is that it just isn't possible to provide a sufficient level of protection to protect them when the rest of society is not taking those measures, and it may be that that rather chimes with the point you just made about young people visiting their grandparents?
**A.** So when you decide to lock down, one of the key issues



and, amongst others, by Chris Whitty, is that this idea of -- we've heard various descriptions -- cocooning, segmenting, shielding, that vulnerable section of society, it may be a very attractive idea in principle, but, to use Chris Whitty's phrase, it's entirely impracticable, it simply won't work?
**A.** Well, that's -- I think that's an opinion, and it comes from people's opinions. It's not rooted in evidence. So, for instance, in care homes there is evidence, for instance in the US, what they call greenhouse homes, smaller homes, less mortality, more clinical care reduces mortality, more nurses reduces mortality. So there are many areas you could sit in a room, but what you can't do is come off the top of the head with how you would look at this and propose this, but there is evidence to suggest how you might go about this. It is not an evidence-free zone, as these people suggest. However, if you want to integrate and understand how you might go about it, I would argue that's where you need a generalist who can talk to you about what's happening in the community and how you might go about that.

I'll give you --
**Q.** Can I just interrupt you there, Professor? Again, can I ask for a yes or no answer: do you agree with the objection that Professor Woolhouse is making to

the Great Barrington approach; yes or no?
**A.** No.
**Q.** I'm going to move on to the last of his objections, which goes to this question of herd immunity which, as we saw, is really the sort of bedrock of the Great Barrington Declaration, isn't it? Because the whole approach assumes that the younger segment of the population will acquire herd immunity through infection, and you have just referred to what you describe as the advantage of that, because it provides protection to the older population as well.
The point that Professor Woolhouse makes here is that there was an assumption in the Great Barrington Declaration that there would be what he describes as "solid post-infection immunity", and that therefore "herd immunity threshold could be reached in a matter of months".
He says -- and I think it's clear he is talking about back in 2020 -- he was concerned that this might not be the reality, in which case the threshold might not be reached for years or not at all, and therefore the strategy would fail.
He goes on, and he is clearly now talking about his current state of knowledge:
"We now know that post-infection immunity does not



give 100% protection, that individuals can be re-infected multiple times ..."
It may be that some people in this room know what he is talking about.
"... and that the herd immunity threshold is almost certainly unattainable."
He says:
"This undermines a core premise of the Great Barrington approach."
Is he right about that?
**A.** Before answering, I need to be clear, where does it say "solid post-infection immunity" in the Great Barrington Declaration?
**Q.** Well, Professor, it must be right, mustn't it? We looked at the Great Barrington Declaration. The premise there was that the younger population who were living their lives normally would catch Covid, would thereby gain immunity, and that corporately that segment of the population would attain herd immunity.
If they're not going to attain immunity, having caught Covid, then the policy just doesn't work, does it?
**A.** So that's a misunderstanding of the Barrington Declaration and what the authors were proposing. Having spent two and a half years with



Professor Gupta, I've never heard her make that statement.
What happens in reality -- there are a number of other circulating pathogens, like rhinovirus, for which we know this; there are also other circulating coronaviruses like 229E and OC43 -- that when you get an infection, you will get an immune response that will be of variable nature and will last for a certain period of time, up to about 12 months, possibly 18 months.
But as you've secondly understood, these pathogens have the ability to escape your immunity. That's where the variants come in. So if you look at rhinovirus, there are about 150 different variants that exist.
So what happens is, what you're describing is the position we find ourselves now, with all of the other viruses that have been post-pandemic, there will come a position where a part of the population will have immunity and that will dampen it down from going to the 60%, 70% that was thought would happen in the models. That figure is roughly around 30% of the population.
So as you transit into winter now, you are susceptible to a number of different viruses and you will re-catch them, but some people are not susceptible and that's why we will still have waves of infection, we



will have problems in the NHS -- 17 of 20 years we've had a winter crisis -- but a part of the population will be not susceptible and therefore we won't get these massive waves that are in the models.
**Q.** I see. So is what you're saying that the Great Barrington Declaration never suggested that there would be, as it were, complete immunity amongst that younger segment of the population? Is that -- yes or no?
**A.** I am saying, yes, it never said that.
**Q.** All right.
There is one more point I want to ask you about the Great Barrington Declaration, Professor, and that's an issue which isn't mentioned by Professor Woolhouse, although it's related to one of them.
We've spoken about the risk that the younger segment of the population would themselves catch Covid and suffer acute symptoms from it. That was the first of Professor Woolhouse's objections.
But there is another point, which is that already by the autumn of 2020, when the Great Barrington Declaration was published, it was becoming understood -- it was already understood -- that a significant group of people who caught Covid would go on to suffer long-term sequelae from it, a post-viral syndrome, which of course

we know as Long Covid.

That risk, which affects young people and old people alike, was another reason, was it not, why the proposal in the Great Barrington Declaration was flawed?

**A.** So all of the acute respiratory infections that circulate in the community have the potential to cause long sequelae. Now, your influenza increases your risk of stroke, heart disease, bacterial pneumonia, meningitis, RSV, bronchiolitis, risk of a hospital admission, and then there are others like glandular fever that can give a long immune response.

The question you're asking me, which is what you need to ask, is: to what extent does an infection with a coronavirus lead to increased complications and long-term outcomes compared to the other acute respiratory infections? Because they do have a significant impact on morbidity and mortality, particularly in those with comorbidities and multimorbidities. So if you've got a pre-existing disease like heart failure, it will be worsened to the point where it can have a significant impact on your morbidity and mortality.

If you'll let me --

**Q.** I'm just going to interrupt you, because I think we're diverting from the question a little bit, Professor. We



have heard expert evidence about post-viral syndromes, we know they exist; I would like to focus very sharply on Long Covid, please.

**A.** Yes.

**Q.** Just coming back to my question, it wasn't -- the existence of Long Covid, where significant numbers of people suffer very serious long-term sequelae, including people in the younger population, wasn't that another reason why the policy of letting that group of people, as it was said, live their lives normally was flawed?

**A.** It can be used as an argument, but I think if you're going to take an evidence-based approach, you really have to define what you're on about and quantify what you're on about and then I can truly answer the question. But it is an argument that people would put forward for one reason for having alternative views to try and suppress the virus.

**Q.** Thank you.

**LADY HALLETT:** I'm sorry, Professor, I'm not following. Why isn't -- and I understand an evidence-based approach, it's my approach, it has been as a lawyer throughout my working life.

Why isn't the fact that we now have evidence that you have post-viral long-term sequelae -- and Long Covid



is the example here being given -- why isn't that evidence for your evidence-based approach?

**A.** Because when you compare that -- as the evidence has just emerged in the last month, if you compare that to other acute respiratory infections, what you're interested in is to what extent you get more of something with the coronavirus.

So, for instance, the evidence shows things like taste and smell is worse with a coronavirus SARS-Cov-2 infection, but your risk of heart attack or stroke might not be as severe. It could turn out there are specific respiratory complications in people with, like, asthma and chronic airways disease, but it's incredibly important you say, "What's the risk compared to the baseline?", which is other acute respiratory pathogens, and not compare it to the normal population.

I am not saying that the infection leads to no risk. It is quite clear it has severe complications. The question is: how much is that more severe than the other acute respiratory infections for which you don't have the same restrictive policies, but they do have a severe consequence in the population.

**LADY HALLETT:** I understand the comparison is important, or the comparative analysis is important. What I'm just questioning is the fact that -- what Mr O'Connor was



putting to you was that we know post-viral syndromes exist, and therefore I was just putting: why isn't that evidence? It may be there's more evidence that needs to be put into the balance, but it just seemed to me that it was evident.

**A.** Well, yes, so everything exists as evidence, even my opinion exists as evidence within --

**LADY HALLETT:** Not in my world it doesn't, I'm afraid. Well, not in a court of law it doesn't.

**A.** What you need to do is quantify the size of the effect of the difference, and that's really important because then that helps you understand where you need to intervene if you've had a post-viral Covid infection. That's incredibly important. What do you treat?

And it's particularly important in two groups of people: those with pre-existing conditions who have worsened, but also there are some people who would come with no pre-existing conditions and then will have complications, for instance maybe they have respiratory complications. That then helps you understand how to intervene.

**MR O'CONNOR:** Let me just ask you one more question about that, and perhaps you can answer shortly.

You just said that the risk of, in this case, a post-viral symptom needs to be quantified. The Great

Barrington Declaration doesn't mention Long Covid at all.
**A.** No.
**Q.** Now, I know you didn't draft it, but do you know whether it was taken into account at all or not?
**A.** I don't know the answer to that.
**Q.** All right.
I'm going to move on, Professor, and finally just ask you a few questions about the meeting we've referred to once or twice and which we've heard about from others.
It was a Zoom meeting on a Sunday in September 2020. The context, as we've heard, was a very public debate going at the time about whether there should or shouldn't be some form of circuit breaker, as it's been described, and it's clear from some of the documents that the Inquiry has seen that the meeting -- a Zoom meeting, as we've said -- had a title, which was:
"Should the Government intervene now and if so, how?"
Now, I'm not sure whether you ever were aware of that. Some of the attendees, it looks as though when they were sent the invitation they were told: this is what the meeting's going to be about.
Was that the case with you, or can you remember one



way or the other?
**A.** I can't remember one way or the other, apologies.
**Q.** All right.
It's right, though, isn't it, that before the meeting -- and I know I'm going to ask you about when -- but before the meeting, you were asked to provide a short note for the purposes of it?
**A.** Correct.
**Q.** Now, we know that the meeting took place on Sunday, the 20th. When were you asked to provide the note?
**A.** I was asked about roughly in an email around about 7 pm, 8 pm on the Friday. I can't quite remember the exact time.
**Q.** Were you able -- or were you told when the note was needed by?
**A.** 12 o'clock the next day.
**Q.** On the Saturday?
**A.** On the Saturday.
**Q.** Were you able to meet that deadline?
**A.** No, on the Saturday morning I was working in urgent care doing home visits, and I didn't finish till 1 pm, so I sent them an email and said: can I have till 4 pm, was the agreed timeline for me to submit the one-page submission.
**Q.** Did they give you that extension?



**A.** Yes, they did.
**Q.** All right.
So we're going to look at the note now but we'll bear in mind -- and I think this is what you're telling us, Professor -- that it was compiled in something of a rush?
**A.** It was compiled in something of a rush and it was compiled with my colleague Professor Tom Jefferson, who also had input to the document.
**Q.** We'll look at some of the detail in the note in a moment, Professor, but can I ask you at the outset -- and, if you like, in summary -- did you argue in writing in this note and then, when it came to it, orally at the meeting in favour of the type of policies that we have been looking at in the Great Barrington Declaration?
**A.** I think in reading that you'd say broadly, yes.
**Q.** Yes.
If we do look, for example, about halfway down, we see there:
"Aim: to control the spread of acute respiratory illness while minimising societal disruption."
**A.** Yeah.
**Q.** So, in summary, a similar approach.
And we see -- sorry, if we can zoom out again, we



see the bullet points below. Many of them are, as I mentioned, focused on that need to protect the vulnerable, and there are some practical --
**A.** Yeah.
**Q.** -- policies that you were proposing as to how that should be done.
I would like to ask you if I may about a line towards the top of the paper. Sorry, we'll need to go back. So at the very top after the title there's a bit in italics about terminology, and then immediately underneath that it says this:
"The current strategy requires acknowledging the virus is endemic and the need to learn to live with Covid."
Now, Professor, I want to ask you about your description of the virus as endemic at that point.
Tell me if I'm wrong, but there is a distinction, isn't there, between a virus or a disease which is at a stage of being an epidemic, where it spreads quickly, unexpectedly and unpredictably -- it becomes a pandemic if it acts in that way across a very large area, across nations -- but that's on the one hand; on the other hand, an endemic disease is one that is consistently present in a region or population and where its prevalence remains stable and its spread fairly

predictable?

Now, that's what I understand by those terms, but are you saying -- or were you saying there -- that Covid, in September 2020, was a disease that was stable and predictable?

**A.** No, because there's nothing predictable about acute respiratory infections per se. Across the whole of my 20 years -- apart from broad areas, for instance a seasonal effect, which you can understand -- they're highly unpredictable agents, and therefore the point being made is that where we were at, if -- and I have to elaborate here, if you don't mind -- we'd gone from March/April to flattening the curve, two weeks to protect the NHS, to an area now where we were talking about zero Covid and suppression. The policy on the table was to reduce infections below 1,000 and then keep Test and Trace to keep it below that level.

What had happened over the summer is, remember, we're scaling up testing and there was a misperception that actually out there was far less cases. The only cases were the ones that were being detected. Well, actually there's pre-symptomatic phases, asymptomatic phases, there are also people who don't turn up for testing.

My experience throughout the whole summer was



telling me, right back to March 15th, that there was much wider circulation than this virus is being understood if you're just looking at the case numbers.

And that's one of the problems when you're just research focused and data focused. If you don't have an ability to triangulate and say what's happening on the ground, you will read inconsistencies and come to misperceptions in the data.

**Q.** Thank you, Professor, but I do just want to press you on this sentence here which you put in the note, albeit drafted in a bit of a rush, for the Prime Minister. You are a scientist, and you used that word "endemic" deliberately, and it does mean, doesn't it, a disease that is stable and predictable?

**A.** Well, not in all -- it's not a clear definition that I would agree with. What it means --

**Q.** Well, I'm going to interrupt you a moment.

Let's just look, if we may, at a graph just to get the context here. It's INQ000283367. We can see there's a date there of 1 October. So we see if we look just to the left, obviously, that's 20 September of that year. There was nothing stable or predictable, as it turned out, about Covid at that date, was there, Professor?

**A.** Well, in terms of the seasonal effect, there are



predictable natures to January. The second week of January, about seven of the last ten years you will see the highest number of deaths from acute respiratory infections. Most of that occurs in the over 80s.

So within -- if you notice my plan is that actually there is a seasonal effect, but actually what's more so is unpredictable is the fact you've got the sharp rise in April/May. I'd say that's more unpredictable.

There is a generalised predictability to the seasonal effect that starts in about 1 December and goes into January/February --

**Q.** I just want to press you though, Professor, because you used that word "endemic", didn't you, to suggest it's no longer an epidemic, it's no longer unpredictable, growing exponentially; it's endemic, it's stable in the community, it's predictable? And if we look at that graph, you were wrong to use that word, weren't you?

**A.** No. So, you're using interchangeable terms all the time, which is difficult to follow. Epidemic --

**Q.** Just, sorry to interrupt you. "Epidemic" and "endemic" are not interchangeable terms, are they?

**A.** Well, "epidemic" and "pandemic" are.

**Q.** I wasn't asking you about "epidemic" and "pandemic", I was asking you about "epidemic" and "endemic".

**A.** So what in terms of endemic is there's widespread global



circulation of the pathogen that's gone beyond low level circulation. No acute respiratory infection is predictable or stable, so I would contest what you're looking at is not my interpretation of the word "endemic", and I would have had the opportunity at the meeting to explain all of the nuances around those issues of what I meant.

Within the problem of, remember, throughout summer you were scaling up the testing, we were scaling up the testing, so our actual understanding of what was going on was fairly limited until we scaled up the testing.

**Q.** I see. I'm going to move on, Professor. You referred to the meeting. I would like to take you to something different, please, which is the Prime Minister's account of the meeting.

If we could go, please, to INQ000255836, and it's page 130.

**LADY HALLETT:** The then Prime Minister's account.

**MR O'CONNOR:** The then Prime Minister's account.

I know you've had a chance to look at this in advance, Professor. We see at paragraph 462 Mr Johnson referring to this meeting and the title, "Should the Government intervene now and if so, how?" He runs through the attendees that we've heard something about.

We see your name there, as well as actually many others.

He refers at paragraph 463 to the views presented by Professor Edmunds and Professor Angela McLean, who he describes as representing the more conventional epidemiological view, and then he said that Professors Gupta and you were there to present two opposing views, and refers to Dr Tegnell presenting the Swedish approach.

He records, about halfway down the paragraph, Professor Edmunds's advice, which of course we've heard evidence about this afternoon, and Mr Johnson states at the bottom of this page:

"I greatly respected [Professor Edmunds'] views, but had always put him at the gloomier end of the spectrum. I wanted to give the Rule of 6 a chance to work, and to hear some alternative views."

And of course one of those alternative views was yours.

And if we look at the next paragraph, Mr Johnson says that he thought "we put all the scientists through their paces". He says that by this point he had a much better understanding of the data and evidence, and he certainly thinks that he was able to probe the different points of view that were being presented. And he says he was willing to be persuaded by the



lockdown sceptics. But then this, he says he:

"... found that in reality they [that is you] were reluctant to argue any such case, or not very hard. When pressed, the so-called dissenters actually seemed to agree with SAGE's position and did not present anything compelling to make me think it was sensible to change [his] approach."

Is it right that at the meeting you more or less agreed with the SAGE approach?

**A.** Well, that's the interpretation of the then Prime Minister.

**Q.** It is, which is why I'm asking you whether you agree with it.

**A.** The approach at that time was the tier system, which I can't -- I don't know if that's what SAGE was proposing.

**Q.** Did you agree with the tier system?

**A.** Yes, I did at that moment in time, because it was a much better alternative than to the zero Covid suppression argument that was being put on the table, which was to get the cases below 1,000 and keep them there.

In terms of looking at the tier system, what that was attempting to do was trying to find a middle ground between the two positions and match what was going on in Sweden. Which was not an approach that did nothing; it



was an approach that was responsible and managed it, so, for instance, as I've said previously, with certain interventions but minimise the disruption to society while trying to get your maximum intent in terms of reducing the impact in terms of disease outcomes.

**Q.** Yes. Now, Professor, in the course of his evidence earlier today, Professor Edmunds made various statements about you and about the contribution that you made to the meeting, and I'd like to give you a chance to respond to them. There were three points.

First of all, we looked at an email between him and Dame Angela McLean where they described the approach that you and, I think, Professor Gupta were taking at the meeting as "half-baked nonsense"; we looked at a WhatsApp message sent by Dame Angela McLean during the meeting where there was a reference to a "fuckwitt", and Professor Edmunds I think inferred that that was probably a reference to you; and he also said today that he thought you didn't understand basic epidemiology.

What are your reflections on that evidence that the Inquiry has heard?

**A.** I would never in a professional capacity use such language about other individuals.

It is not unusual to find yourself in disagreement and a position of disagreement. We call it uncertainty.



And the job of an evidence-based approach is to try to reduce uncertainties so that you can make an informed decision.

The very fact that you have opposing views shows that you there is a problem within the interpretation and the understanding of the evidence, but it also shows me a position of: that sort of language would mean I would become resistant to any other's viewpoint or discussion. And I think that's unhelpful. And it goes back to why we were brought in in the first place, is to try to propose a viewpoint that obviously was not being aired in SAGE, was not being aired at any point of the government advice.

Despite the fact I'd been working for the World Health Organisation, I'd given evidence to the Irish Parliament, I spoke to a number of MPs outside of the Cabinet Office -- and I said did the work for the World Health Organisation. So to be clarified as classed at that, you know, just goes to probably the heart of the problem here, because one should always have an open viewpoint about alternative views.

It is -- you know, the idea that a statement could provide all of the answers is not something that you would recognise, but what it was proposing was an alternative view, how you might look at the issues,

how you might develop an evidence base and test some things you have to, just as we were doing with drugs, and in doing so come to a difference of what the current strategy was.

In the round, I think it's fair to say that everything that we were proposing and the way we were looking at the epidemiology, remembering up to that point we'd established clearly that many faults in the data, as an epidemiological team, we also would be, and I would be very ... the idea we would -- so one of the evidence-based approaches, we would be looking at the data trying to understand what was happening.

What I found very difficult was a modelling approach which kept looking into the future and saying "This is what we now predict", with some certainty. And what comes with certainty is a reluctance to engage in the discussion, in the debate.

**MR O'CONNOR:** Professor, thank you. We've seen the contribution you made at that time, and those are all the questions I have for you.

And there are no questions from CPs, my Lady.

**LADY HALLETT:** Thank you very much indeed, Professor Heneghan.

I'm sorry we haven't had more time, but I think Mr O'Connor has explained: if there are other matters



that you wish me to explore, by all means submit them in writing --

**THE WITNESS:** Will do.

**LADY HALLETT:** -- and I will consider them.

So thank you very much for your time this afternoon.

**(The witness withdrew)**

**MR O'CONNOR:** My Lady, that concludes the evidence for the day.

**LADY HALLETT:** Right.

Well, we're now in the position where we're going to take a break from the hearings and return on Monday 30 October, a week on Monday.

When I say we're taking a break, I'm afraid it doesn't mean that we're taking a break from work. I know that the Inquiry team and the core participants' teams will all be working enormously hard to ensure that we're ready for the next phase of the hearings, and there's also a great deal of work going on as far as other aspects of the Inquiry is concerned. So I'm afraid it's not a holiday break, it's a break from the hearings solely.

Thank you all very much indeed, and for those who wish to follow proceedings, either in person or online, Monday 30 October --

**MR O'CONNOR:** Thank you, my Lady.



**LADY HALLETT:** -- at 10.30.

**(4.20 pm)**

**(The hearing adjourned until 10.30 am on Monday, 30 October 2023)**



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