

Science and Technology Committee

Oral evidence: UK Science, Research and Technology Capability and Influence in Global Disease Outbreaks, HC 136

Tuesday 3 November 2020

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[Watch the meeting](#)

Members present: Greg Clark (Chair); Aaron Bell; Dawn Butler; Chris Clarkson; Katherine Fletcher; Andrew Griffith; Darren Jones; Mark Logan; Carol Monaghan; Graham Stringer; Zarah Sultana.

Jeremy Hunt and Lord Patel attended the Committee.

Questions 1433 - 1564

Witnesses

I: Sir Patrick Vallance, Government Chief Scientific Adviser; and Professor Chris Whitty, Chief Medical Officer for England.

Examination of witnesses

Witnesses: Sir Patrick Vallance and Professor Chris Whitty.

Q1433 **Chair:** This is a special hearing of the Committee to consider the evidence and advice that informed the Prime Minister's announcement of new restrictions that he made on Saturday evening and that will be debated in Parliament tomorrow.

I am very grateful to the Government's Chief Scientific Adviser, Sir Patrick Vallance, and the Chief Medical Officer, Professor Chris Whitty, who agreed straightaway to the Committee's request to appear before it today.

I welcome to the Committee Jeremy Hunt, who is Chair of the Health and Social Care Committee, to Darren Jones, who is a member of this Committee but also chairs the Business, Energy and Industrial Strategy Committee, and Lord Patel, who is Chair of the House of Lords Science and Technology Committee.

Perhaps I may start, before turning to colleagues, with some questions to Sir Patrick. Without the proposed new measures that were announced on Saturday to be debated tomorrow, how many deaths a day from Covid do you expect the peak to be this winter?

Sir Patrick Vallance: It is very difficult to put numbers on an exact peak and when that occurs. What we can see, though, is that the R remains above 1 everywhere. The epidemic continues to grow. If you take the six-week forward projection, that is the part of the modelling where you are going to get greatest reliability, because, in any model that relies on data, theory and assumptions, the further you go out the more unlikely it is that you get the number exactly right. As you come nearer, you get more accuracy, and the six-week projections that the SPI-M modelling groups have been looking at for the past number of weeks have turned out to be pretty good in tracking what happens.

They look as though, during that period, if nothing changed—that is important, because things clearly are about to change—you would expect the number of hospitalisations to breach the first wave number probably towards the end of November. You would expect the number of deaths, potentially, to equal the first-wave numbers somewhere in mid-December. That is what they would look like. That is the range you think of in the trajectory if nothing changed from where it was now.

Q1434 **Chair:** From where it was now—so before these measures had been introduced.

Sir Patrick Vallance: Yes.

Q1435 **Chair:** Can you explain how this relates to the chart you presented, which had some different curves from different research groups, about which there has been quite a lot of interest?

Sir Patrick Vallance: Yes. When that was presented on Saturday, I said that those were scenarios that were put together to try to look at what a

new, reasonable worst-case scenario might look like. They are from a couple of weeks ago. They are longer-term modelling, which come with all the caveats in terms of accuracy.

You can see that different groups have done those scenarios and have made assumptions. The assumptions they were given at that point were that the R would be between 1.3 and 1.5, and that it might go up by 10% during the winter. They modelled on that basis. You can see that the different groups came up with different peaks as a result of that. That would be to inform a reasonable worst-case scenario.

Another example might be, if you go back to June, that the Academy of Medical Sciences did a reasonable worst-case scenario for the winter that came up with higher numbers at that point.

That curve was then to lead into the six-week projection, which are the ones that carry more validity in terms of the numbers. Again, it is still a model, so you just project forward for that period and you see that, quite quickly, we reach similar numbers as in the first wave. The six-week ones are integrated across all the models.

Q1436 Chair: Is there a consensus view in SAGE through the modelling group on when the peak will be, assuming these new measures do not come in, and what level it will be?

Sir Patrick Vallance: The consensus statement of six-week, medium-term projections is a consensus from all the modelling groups taken through SPI-M projected forward over that six-week period. The other graph would come into a reasonable worst-case scenario consensus if that is what the Civil Contingencies Secretariat want, and they would commission that. At the moment, it is not a consensus. That is independent groups having modelled against a series of assumptions.

Q1437 Chair: So SAGE has not come to a consensus view on what the modelling projections would be.

Sir Patrick Vallance: For the six weeks, yes; beyond that, no.

Q1438 Chair: Turning to the NHS capacity, without the proposed measures being taken, when do you expect the acute bed capacity of the NHS to be used up through Covid patients?

Sir Patrick Vallance: I may bring Chris in on this. Clearly, what the SPI-M group can do is model forward the epidemic. Those are then provided to the NHS. Clearly, the NHS owns capacity modelling because it knows what the capacity is and we do not have the insight into the exact bed capacity.

The numbers, if you look at where the six weeks take you, suggest that the first-wave peak equivalent is somewhere at a national level towards the end of November, with greater pressure thereafter, but that will not be even across the UK. Some hospitals are clearly under pressure now; others will be under pressure later. That is an average. It is not expected that everyone will follow that curve.

Chris, you may want to say something about that.

Professor Whitty: It is important to say that a lot of the advice that I have given is not based on significant forward modelling. It is based on what has happened and what is observable. If you look at the number of in-patients—I am using management information service data, which is broadly accurate for England—on 7 September there were 536 cases. By the time you get to the beginning of October, it is over 2,500. As of today, it has breached 10,000 people in hospital. You do not need too much modelling to tell you that you are on an exponential upward curve of beds.

This is completely repeated in the ONS data—backward-looking data—looking at incidence over time, which has followed a very clear upward trend. We know from all epidemics that you get a doubling. Epidemics are either doubling or halving. This is currently doubling. It is doubling at slightly different rates around the country, although bits of the country are starting at different stages.

There are two things to say about your question on beds. The first is that the starting point—how full they are now—is currently very variable. Some hospitals, particularly in the north of England, have reached levels of Covid occupancy higher than they had in the first wave. Our worry about those areas is that although it looks as if the R in the community is flattening but has not fallen below 1 as far as we can see, it is still going up. If it carried on going up from this very high base, they would get into serious trouble with in-patients very quickly.

There are other bits of the country—for example, the south-west—where the rate of increase is faster than in the north now and bed capacity is lower, so, although they look further away at the moment, they could hit difficulties relatively quickly.

To make an obvious point, I hope, to this Committee—I think it is worth it for those watching—there are several different barriers you go through in hitting capacity in the NHS. The first thing we are already having to do in some areas is cancel non-urgent elective care. Then you start to impinge on urgent but non-emergency care. Then you get into acute care being constrained and, finally, into all the intensive care capacity being used up. That happens in sequence, but we are already seeing parts of the country having to cancel non-urgent emergency care.

If this continues, people worry, rightly, about all non-Covid care being affected. This argument is slightly the wrong way round. The way you prevent those services being impinged on and, potentially, being slowed right down or even in some cases cancelled is to keep the Covid rates down. If you do not, that is going to erode the capacity of the NHS to do not just Covid care but non-Covid care.

Q1439 **Chair:** Specifically, one of the slides that Sir Patrick presented on Saturday looking at projected bed usage showed that without these new measures the spring peak would be exceeded on 20 November or

thereabouts. With the extra beds it would be a few days later, and, even with the extra capacity that comes from cancelling operations, that would be early in December. Does that reflect your joint view of what would happen to hospital capacity usage without these measures?

Professor Whitty: There is some evidence of some slowing, particularly in the north-east and possibly in the north-west, that might push that out in time, but until you start to see rates falling—it is a matter of timing as to which week you get into for these various stages—and they do not happen all at once or all at the same rate throughout the country, the trouble about things that start doubling is that you move from very small numbers to very large numbers surprising quickly.

Q1440 **Chair:** As is clearly understood, you are advisers rather than decision makers. You give advice to Ministers. Is it your joint view that without these measures there is a serious risk, to put it no stronger than that, that the NHS intensive care capacity would be overrun?

Sir Patrick Vallance: This slide is from the NHS. This is the NHS view of what would happen based on the SPI-M model.

Q1441 **Chair:** Do you agree with it?

Sir Patrick Vallance: Yes, given the caveat that it is a model.

Q1442 **Chair:** As the Chief Scientific Adviser to the Government and the Prime Minister, your advice would be, based on this modelling, that there is a serious prospect of the intensive care capacity of the NHS being overrun within the period to which this graph refers.

Sir Patrick Vallance: If nothing is done, yes.

Q1443 **Chair:** We come to the importance of the inquiries into these forecasts. Accepting that Ministers decide and advisers advise, in practice, if the advice from advisers to the Prime Minister is that the capacity of the NHS is likely to be overrun within weeks, that is quite difficult advice to gainsay, is it not? That is why there is an interest in understanding the basis of the advice. It is not optional advice in that sense, is it?

Sir Patrick Vallance: That was the forecasting from the NHS. That is what they said.

Q1444 **Chair:** It is also what you said.

Sir Patrick Vallance: Yes. It is what we say from the modelling. As I said, we cannot deal with NHS capacity. I do not have insight into NHS capacity.

Q1445 **Chair:** But your advice to the Prime Minister and the Government, based on NHS data and the modelling data, was that this is a serious prospect and a serious risk.

Sir Patrick Vallance: Yes.

Professor Whitty: It is a serious risk but is not inevitable. The actions being taken by people are already having an effect. Our view is that it is

just a matter of time. Once the R is above 1, it will keep on going up and the question is only how long.

Q1446 **Chair:** Do the forecasts and projections include the impact of the tiered restrictions that began in most parts of the country on 14 October?

Professor Whitty: They will not yet be feeding through, in my view, fully into the numbers, but they will push them out in time. They would not change. It is not a question of whether, but it might be a question of when. The only part of the country at the moment where there is realistic evidence that the numbers have flattened where the R is approaching 1 is, probably, in terms of regions in the north-east. There may be some smaller areas elsewhere, but it is still, as far as we can tell, going up, albeit at a much, much lower rate. This is the view of the local directors of public health as well as the NHS view. This is a quite widely held view.

What you are indicating, and rightly, is that putting exact dates on these things is almost impossible because what the Government do—it is also how people themselves respond—is they see a problem locally and neither Patrick, myself nor anyone who is advising Government would say, “This is definitely going to happen on this date.” People who give that degree of certainty have not understood how modelling of this sort with scenario uncertainty properly works.

The inevitability, if your R remains above 1, even if it is by quite a small amount once you have reached a high level of bed usage, is that you have very little headroom. So quite a small R can take you from just about coping to not coping. We are looking forward in a bad way to the fact that the most difficult time for all respiratory viruses, as we all know, is during the winter months. We have not fully got into them. So the chances that things are likely somehow to improve without action between now and the next few months are quite low. If you are giving advice to Ministers, that has to be the advice you give.

Ministers then have to make decisions not just on that advice. They have to use multiple other things that have big social and economic impacts. Ministers have to take them into account. It is right that elected Ministers make those decisions. It is one strand of advice. I believe quite strongly that it is important that these deeply difficult societal measures fundamentally are decided by Ministers.

Q1447 **Chair:** I understand that. The point I have made is that, if the NHS can cope and things can be accommodated, there are decisions that Ministers can make about the impact on the economy. It is much more difficult to make choices and decisions if the bottom line is that people are going to be dying in hospital car parks.

There is a specific issue that I want to explore. I quite understand that specific dates are not possible to ascribe to models—it is the shape of it that counts. Given the presentation and the analysis that was made that justifies action that the Houses of Parliament are considering this week—the information and presentational analysis was given on 31 October—surely it would be reasonable for that analysis to include an assessment

of the prospective impact of measures that were decided many weeks before and indeed became operational on 9 October. Why is the prospective experience of measures taken and implemented on 9 October not factored into the analysis that you shared with the country on 31 October?

Sir Patrick Vallance: It is to the extent that the medium-term projections that were approved were approved on Thursday, so they are the latest estimate from SPI-M on the medium-term projections taking into account all the data that they have up until that moment.

Q1448 **Chair:** So they include an assessment of the impact of the tiered restrictions in different parts of the country.

Sir Patrick Vallance: As far as those tiered restrictions have had their impact at that point. They were looking on that date at the data they could have at that moment, but those data, of course, are also backward looking. They are not going, necessarily, to be able to project everything that happens as a result of changes that are not yet known.

Q1449 **Chair:** We know what those restrictions were. The restrictions were chosen, presumably, on the basis that they were going to have an impact on the prevalence of hospitalisation, deaths and the capacity of use of hospitals. You must have an assessment of what they hoped to achieve. There are at least two weeks, perhaps more, of data on what they were achieving. Were they factored into the projections of the impact on the NHS that was presented on 31 October?

Sir Patrick Vallance: They are factored in. The forward projection is the best estimate by the modelling groups of what would happen going forward.

Q1450 **Chair:** Including the impact of the tier restrictions.

Sir Patrick Vallance: If you look at the performance of the six-week projections over the past month, the actual data has tracked very closely to the projections, suggesting that they are pretty good in being able to look forward and taking into account what would happen, but they cannot be perfect because no model ever is.

Q1451 **Chair:** What has been the modelled impact of the tiered restrictions that were introduced early in October? By how much have they reduced the number of modelled deaths? I refer to Professor Whitty's point: how far back they have pushed the prospective peak?

Professor Whitty: It is difficult to be absolutely confident about how far their effect has gone. I am confident that tier 2 has had an effect and that tier 3 has had a bigger effect. The communities in the north and the midlands, in particular, where most of these are—London is in tier 2, as are some parts of the east of England—have responded remarkably to this. Because of that, I am confident that the rates are substantially lower than they would have been had those activities not happened. The early indications are that this has not achieved getting the R below 1. It has brought it much closer to 1 but it is still doubling over a longer period. It

is not possible to put an absolutely accurate fix on that, unfortunately. We now have hospitals, such as in Liverpool, that are above their previous peak. It does not take much of an increase from that to run into quite serious trouble. On the ability to hang on and say, "Let's wait a couple of weeks; let's just see what happens," the problem is, as you know, that the people who are in hospital now were infected several weeks ago, so there is quite a long lead time between taking an action and having an effect on reducing the number of people going into hospital, into intensive care and, sadly, in some cases dying. Therefore, if you wait too long, you have baked in a very large backlog of things where the rates are still going up. We do not, in my view, have clear evidence at this point that R is below 1 anywhere with significantly high rates. That is a reality that my NHS colleagues in the north of England would say they recognise.

Q1452 Chair: I understand that lagged effect on admissions and, ultimately, deaths, but in Liverpool, for example, which you cited, the peak level of positive tests was around the time of the imposition of tier 3—around 9 October—where there were about 3,500 positive tests a day. That is the seven-day rolling average. The most recent seven-day rolling average, which has come down consistently since that peak, is about 1,900—falling towards about half that rate.

Does that indicate, in your view, that the tier 3 restrictions are working, and has that been fully captured in the modelling that has been put forward to justify the new national restrictions?

Professor Whitty: Looking at the data, particularly in the north of England—I tend to look backwards at data as I am, for exactly the reasons you give, Chair, very cautious about short forward projections; I am much more interested in how the data is playing out in real time and, therefore, the immediate future—we are seeing that the rates, particularly in younger people, have fallen. That is a combination of, probably, some slight reduction in uptake and some levelling off and, possibly, a reduction in positivity rates. There is a real effect and an artificial effect, if you see what I mean.

We are not seeing that reliably in the older age bands as it is moved up through the age bands. That is important because the rates falling in people in their 20s will have remarkably little impact on the NHS. A few people in their 20s get into serious trouble. More may have long-term morbidity problems, not necessarily getting into hospital but have a group of syndromes that are currently known as long Covid, but the rates are still steadily tracking up. All the data that I have seen is in the older age groups, who are the ones likely to translate into hospitalisations, ICU cases and deaths.

It would require an extraordinary degree of confidence that the overall data were translating through to say the incidence is still going up in the age groups who are most vulnerable to having severe outcomes and ending up in hospital and, in some cases, having very bad outcomes. It is that age differential that I do not think is necessarily captured in the

headline figures. If people who are spending their entire time looking at hundreds of pages of data see the headline and think it is going down, which is reassuring, although not necessarily going down overall, but the rate of increase is going down, there is this quite marked age differential where it is the young adults where the reduction is most marked.¹

Q1453 **Chair:** So you believe that the fall in positive tests in places like Liverpool—they are quite marked in the last few weeks—is not reflected in the prevalence among older people.

Professor Whitty: Correct. This is a differential effect among different ages. My hope is that it is now levelling off in the older ages as well. There is some evidence that that may begin to happen, but it is certainly not to the point where you can reliably say, “I know the models show this but I think it may be going lower than that,” but that is not what we are seeing in these older age groups. I would be delighted, obviously, if the answer was that they were going down faster than the data currently are showing. There is always a bit of a data lag. If that was the case, that would be very good news, but it would be very imprudent to work on that basis.

Q1454 **Chair:** The implication is that the local lockdowns and tiered measures are not working for older people.

Professor Whitty: The implication is that all the tiering has slowed things down from where it would have been otherwise. That would be my judgment as to where we are: more in tier 2 than in tier 1, and more in tier 3 than in tier 2.

That is due to the remarkable work of individuals taking quite difficult social decisions for quite long periods in many of the towns in the north. We should not forget how long some of them have been in these measures. There is no evidence, in my view, at this point that in the older age groups the R is now reliably falling below 1. It may be in some places approaching 1 and, therefore, the doubling time is going out in time. That is not the same as the doubling time turning to a halving time, which is what you want to see.

Q1455 **Chair:** It is precisely for that reason, Professor Whitty, that people who have suffered restrictions for a long time would want to be reassured that their experience has been reflected in the model and that we are not justifying a national lockdown without reference to the experience that they have gone through.

Will you publish the NHS capacity usage model that lies behind these figures, because it is such a pivotal one for the measures that are taken?

Professor Whitty: The data that I was talking about were not NHS data. Those were the JBC test and trace data. They are not my data, but I do

¹ Witness clarification:

<https://committees.parliament.uk/publications/3279/documents/30950/default/>

not see any reason why anyone would not want to publish data of this type.

Q1456 **Chair:** Will you write to the Committee in the next few days with the details?

Professor Whitty: As I said, it is not my data to release. From my point of view, it should be openly available. Almost all the key headlines are openly available in almost all areas through PAT and other routes.

Q1457 **Chair:** As the Chief Medical Officer, I am sure you have influence.

Professor Whitty: All I am doing is trying to avoid promising something that I cannot guarantee to deliver. I am pretty confident that I can, and I want to because I wish people to see that I am very strongly in favour of people seeing the data. I am very strongly in favour of it.

Q1458 **Graham Stringer:** Following up on your points about infections increasing in the elderly and more vulnerable people, which is the key criterion? Is it the R figure or the rate of infection in elderly people?

Professor Whitty: The rate of infection in elderly people—the number of people infected—tells you what is going to happen in a small but important proportion because the total numbers are very large, with a significant number of people having severe effects. What has happened in people over the age of 60 is the strongest predictor of what will happen in the NHS. For the sake of argument, of course, it is much greater in those in their 70s and much greater again than those in their 80s. There is not a cut-off. It is a log-linear curve.

If R is above 1, it is doubling, and it is halving if R is below 1. At this point in time, all around England, R is either above 1 or tending towards 1 but not falling at this point overall. This is the figure that comes out of SPI-M. Patrick is in a better position to talk about that, but the R is a summary figure—it is either rising or falling. That is the key question. The R, in a sense, is a reflection of that.

Q1459 **Graham Stringer:** I understand that the R is a composite figure. If R is at 0.8 or 0.75, but there are many infections among elderly people and hospitalisations, which is the key factor in your recommendations?

Professor Whitty: In the immediate term, the number of people currently infected is key, but the R will tell you that you have this number of infections now, but if it was 0.8—I would be delighted if it was 0.8—that would tell me that if I look forward two, three or four weeks the numbers of people who are new incident cases would be going down. We would be back to the numbers halving rather than doubling. Currently, they are doubling in most places.

Q1460 **Graham Stringer:** Sir Patrick, Professor Whitty said that for anybody familiar with modelling it was clear what was going in. However, it is fair to say that the vast majority of people in this country are not familiar with modelling. Was it sensible or fair to put forward the graph with 4,000 deaths a day with or without the caveats? Pictures tell a much

more powerful story than numbers. That will have frightened many people around the country. Would it not have been better both to give the source data and explain it in great detail, not just that it was modelling, and that the figures that had gone into it were six weeks old?

Sir Patrick Vallance: I positioned that—if it did not come across, I regret that—as a scenario a couple of weeks ago based on an assumption to try to get a new reasonable worst-case scenario, and that those figures, therefore, were not as reliable as the six-week figure, which I spent time talking about. Those figures were done by major academic groups based on those assumptions. In the spirit of trying to make sure that things are shared and open, they are the things that we have seen. It is important that people see that.

Q1461 **Graham Stringer:** I do not think people see that. If you look at the serious broadsheet press and the more popular tabloids, you see that people have been horrified in the way that was presented. They thought it was a biased way of presenting it and not at all clear. You must realise that, if you put a graph up saying 4,000 deaths a day, that is going to be the message that the vast majority of people take home. Do you regret that at all?

Sir Patrick Vallance: The aim of the presentation was to try to get as much information as we could to the public. The six-week projections were important in terms of their reliability. Those were models for the reasonable worst-case scenario, and people have been interested in the reasonable worst-case scenario. They were modelled at the time to try to project that. They came from significant academic groups. They are no more than a model of the reasonable worst-case scenario based upon assumptions. The further the models go out, the more unreliable the numbers are and the more it becomes a qualitative exercise to look at the shape of things. It is important that people understand and see what is being looked at by the modellers who believe that these things are important to have in the reasonable worst-case scenario.

Q1462 **Graham Stringer:** You do not think that you just frighten people who do not have your scientific background and understanding of models.

Sir Patrick Vallance: I hope not. That is certainly not the aim. In a sense, we went through this a bit on 20 or 21 September when we said that we thought things could be headed towards 50,000 cases per day if we had a doubling—again, it was a scenario, not a prediction—and deaths might reach 200. The argument was that those slides were meant somehow to scare people, they were not. They were there to give a scenario. As it happened, the numbers turned out to be very close to that by the time we got there. It is very difficult to project forward in a way that does not inevitably lead to a problem of, “Is that real?” No, it is not real. It is a model, but it is what we need to understand because this is a disease that is spreading, like all epidemics, in a way that will affect us in weeks to come but is not felt today. There is a balance between trying to explain what may be coming, basing things, as Chris has said, as far as possible on what data you have today, which again is why things were

presented as they were, to say, "Here are data from today and what is happening in hospitals today," but giving an illustration of what may happen in the future, which is an important part of this. The tendency otherwise is to wait and to say, "We will find out in a few weeks' time," by which time you have baked in another three or four weeks of cases.

Q1463 Graham Stringer: It seems to me that there are two reasons for having a lockdown: to save lives and buy time so that you can improve test and trace in all parts of the service. In terms of your recommendations, you are very clear in your models, the information you provide in the models and what numbers you want to present to the Prime Minister and to the public. You always add a caveat that there are economic consequences and health impacts, but it is never quantified. The last time you were here you told us of the paper on 8 April, which was a quantification of some of the deaths that will be caused by the failure to treat cancer—I am not going to go through the whole list—and the consequences of poverty on morbidity. Why do you not present both sides of the equation in numbers?

Sir Patrick Vallance: Chris may want to come in on this. The paper you referred to was a paper that we asked for from ONS actuaries, and the other was to try to look at the overall effect. That was a very important paper and it has been updated.

Q1464 Graham Stringer: And the Department of Health.

Sir Patrick Vallance: That is being updated, and Chris may want to say more about that.

It is very clear that SAGE exists to provide the science advice. The Treasury and the Cabinet Office bring in the other parts of the equation, particularly on the economy. I do not think it is right to think that SAGE would be the place that you integrate all of this and come out with a single number. We have a particular part of this to look after and the rest needs to be integrated at Cabinet Office level. Ultimately, of course, Ministers need to look at all those other points.

It is an interesting question. The science advice is very clearly in the public domain. It is very clearly public; you can see it and question it. The other advice, of course, is less visible, so it is more difficult to answer those questions.

Q1465 Graham Stringer: But the advice is lopsided, isn't it? I would be interested in seeing the updated paper of 8 April, which, from memory, projected more than 200,000 deaths not over a year but over a period of time. I think the public would be very surprised to see that that was the other side of the equation. At the very least, I can accept that you need economists to do it and all sorts of other specialists, but do you not feel a responsibility to make sure that people know there is another side to that equation?

Professor Whitty: Could I add something? I think there is a danger that people watching will have a misapprehension. Most of the additional

deaths stack up because you don't deal with Covid. Basically, there are four different ways in which this causes mortality. I will go through them. This is a really critical point that has been wholly misunderstood in some areas. Direct deaths from Covid is easy to understand. I agree with that.

The second group, which hopefully we will not get to, are deaths from emergency services being overwhelmed. We did not have that in the first wave and we have every intention of trying to avoid that in the second wave.

The third group is things that would happen: because of Covid putting pressure on the service, you have to cancel elective and other urgent care. Those deaths might be cardiovascular. In the medium term, that might be cancer. Those are on the Covid side of the equation.

Then you have some that were around the lockdown itself, which are things like reduction in air pollution on the good side, and an increase in mental health problems on the bad side.

The final ones, which are very important, are the economic ones: counterintuitively, the immediate effect is not negative but in the long term that is very important. That is the bit that is on the other side of the equation. I have always said that clearly. If you are in public health, caring about increasing deprivation is central to what you do. It is absolutely critical. I have always tried to say that that is the other side of the equation.

The cancer and cardiovascular deaths are on the Covid side. If you don't deal with Covid, those are going to get worse.

Q1466 **Graham Stringer:** I am running out of time. I understand the point that you are making that, because of the pressure of Covid, some of those services are reduced. Some of those services were reduced because a service was withdrawn, but not directly because of Covid. That is a more complicated equation. My point to Sir Patrick is: should not that somewhere in the system be put together, whichever side of the equation you put it on? Will you do that?

Sir Patrick Vallance: Again, you are right. It needs to come together with the economic analysis. That is not something that takes place in SAGE, nor should it take place in SAGE. It needs to come together in the Cabinet Office.

Q1467 **Chair:** You have been very good at publishing at the request of the Committee and others the papers and evidence that SAGE has considered. There is a bit of a time lag there. I think this week shows it would be good to have the real-time information. Can you arrange for that economic analysis to be published in the same way?

Sir Patrick Vallance: No, I cannot.

Q1468 **Chair:** Whose decision is that?

Sir Patrick Vallance: That is one that you would need to take up with Ministers and the Cabinet Office.

Q1469 **Chair:** I have another question on publication. You mentioned several times the reasonable worst-case scenario. That, as I understand it, has been leaked rather than published. You can commit, I think, to publish that on a regular basis.

Sir Patrick Vallance: No, it is not our document to publish. That is the Civil Contingency Secretariat.

Q1470 **Chair:** Do you think that should be published?

Sir Patrick Vallance: There is an advantage in having as much published as possible.

Professor Whitty: I would like to add a rider to that. That was a point Mr Stringer was making, which I agree with. There is a danger with these extreme forward projections that people misinterpret them as, "This is what is going to happen," and, as you said, get unduly worried by something that is not intended to happen. The whole point of a reasonable worst-case scenario is to say, "Do we need to do something? We are going to stop this happening."

I can understand why colleagues in the Civil Contingency Secretariat would pause. I am, personally, in favour of publishing as much as possible, but I wanted, in a sense, to reflect back the point that Mr Stringer was making, which has some force and has to be balanced against it.

Chair: I am grateful.

Q1471 **Andrew Griffith:** Sir Patrick, I am sorry for the slightly forensic tone but these are very grave matters. They are some of the most grave matters that we, as Members of Parliament, are ever called to vote on. I want to stay with slide 3, which is one of those you presented on Sunday, "Winter scenarios". The blue line is a clear outlier. Its peak is almost double the level of the next highest scenario. The other three scenarios all have their own peak forecast lying within a range of about 20% of each other. It really is very different in terms of the slide that you present. If you did not have that blue line, for example, you would have to change the scale.

At the time you presented that data to the Prime Minister, did you understand the assumptions behind the blue line that we now know is the Public Health England/Cambridge model?

Sir Patrick Vallance: When we present data from SAGE, we look at the integrated SPI-M output, which is the six-week ones. In due course, it would be an integrated reasonable worst-case scenario. That slide is of independent groups and what they have modelled. As you can see, there is a lot of variability in that slide with most of the groups coming out on the right-hand side and one being left and higher. Clearly, that is an outlier because of the way in which they have done their model and

assumptions. That is why we tend to go for integrated views from SPI-M and not go with individual group projections.

Q1472 **Andrew Griffith:** Do you know what it is in those assumptions that produces that very different shape to that curve?

Sir Patrick Vallance: The assumptions underlying the models will be published in full, so it will be possible to look at why curves differ.

Q1473 **Andrew Griffith:** Are they in the public domain now before tomorrow's vote?

Sir Patrick Vallance: The intention is to get the information on the models out as soon as possible. I don't know exactly when that is coming out, but very soon, I think. Some documents are coming out today, if we can get them out today. They are not ours, so they would need to come out from the groups.

Q1474 **Andrew Griffith:** I understand that. It would certainly be very helpful to colleagues if it was.

That chart forecast more than 4,000 deaths a day at peak. I do not think any country in the world has seen that rate of deaths. If you bring it back to today and the time you were presenting that to the Prime Minister and his advisers, it would already have been off the curve. It would have already been predicting around 1,000 a day at this particular moment in time. Can you remind me how many deaths there were yesterday?

Sir Patrick Vallance: I cannot remember the exact figure. It was 138, I think.

Professor Whitty: Mondays are always low. Today will be artificially higher for the same reason. I would not concentrate on individual days.

Sir Patrick Vallance: We have looked at the initial portion of those curves in relation to the data and, indeed, in relation to the six-week forecast as well. What you see is the initial portion of those curves for the other projections are there or thereabouts for two of them and higher than the real data for two of them. Ultimately, of course, data trumps models.

Q1475 **Andrew Griffith:** I agree with that. Sitting here today with the ability of those data, would your advice to colleagues be essentially to discard that model and accept that it is somewhat discredited and that we should set it aside when thinking about whether this is the right course of action?

Sir Patrick Vallance: I do not think it is at all fair to say it is discredited. These are scenarios put together on assumptions to look at what a reasonable worst-case scenario might be. As Chris has said, you do not want a reasonable worst-case scenario to happen but it could plausibly happen if things went in a certain direction.

The right graphs to focus on are the six-week medium-term forward projections. They have been shown to be relatively good over the past four weeks. You would expect them to project forward. They are

assuming nothing changes going forward. Things may well change, as you know.

You should also base it on the data we have today, which show where things are at the moment in hospitals, which are filling up. These are models that tell you how things can look; they are not forecasts and should be looked at knowing that.

Professor Whitty: If someone feels that being supportive of these very restrictive and difficult measures is the difference between 1,000 and 4,000 deaths a day, if that is the case, remembering that if there were 1,000 deaths a day it would imply significant pressure on multiple bits of the NHS, this becomes a very material question. I think all of us would say that the rates would probably be lower than that top peak, but reaching the peak we reached in April strikes me as an entirely realistic situation. Therefore, if people wish to take a conservative view, that would be something the short-term projections would take us to.

Andrew Griffith: That is very helpful and clear.

Q1476 **Chair:** Professor Whitty, there is particular relevance in that statistic, is there not, in that the NHS did cope with the peak last time? One must assume that we have made further improvements during the summer. Therefore, a whole set of other choices is possible if the NHS is not going to be overwhelmed. Therefore, the difference between 1,000 and 4,000 is quite material.

Professor Whitty: Yes. I feel slightly uncomfortable implying that this is a decision for me as a doctor in advising government on 1,000 or 4,000. All I am saying in response to this question is that there has been some rather overblown rhetoric. People can take different projections if they wish, but getting to the stage we got to in April and, if we do nothing, carrying on up from there is entirely realistic.

Q1477 **Jeremy Hunt:** I want to pick up what Professor Whitty has just said. Talking about 4,000 deaths was not overblown rhetoric; some slides were presented to the public. If I take your conservative view that it is not at all unreasonable to say we will reach the same level of deaths as in the first peak, many will find that very curious. We now have dexamethasone; we are much better at knowing when we need to transfer people into ICUs; we understand when to use or not use ventilators; and testing is much better. We are monitoring people who have the disease and finding about them much earlier, and we have had the whole summer to plan capacity. I think a lot of people are very curious about why we are likely to see, if we take no action, the same level of deaths as we had in the spring.

Professor Whitty: The point you make about the reduction in mortality that we will get with some of these interventions is important. On dexamethasone, the UK can feel proud that this is something we did for the whole world very fast. That will reduce mortality. There is less use of ventilators and there are a number of other medical improvements.

Those will reduce mortality but not take it right the way down, unfortunately. Sadly, some people who come into hospital will die whatever you do. The idea that there has been a huge transformation in the infection mortality rate would not be supported by the current data. I am confident there has been a reduction; there might have been a halving. It is difficult to tell on the current data. Let us hope that is the case.

What we are seeing at the moment is that the numbers of deaths have been going up relatively steadily over the past two or three weeks. Given this is an exponential curve, the idea that this could go from the mid-200s to the 1,000 mark over a number of weeks does not strike me as a particularly strong thing to be saying.

Q1478 Jeremy Hunt: That sounds very sensible. I just do not understand why, because you have just said it may be the infection mortality rate has halved, but has certainly come down. I am curious about why we should be looking at the likely prospect of deaths reaching the same daily level as the previous peak.

Professor Whitty: Because if you have doubling incidence all you have to do is have one doubling time and, even if the mortality is half that, you are still at the same number.

Sir Patrick Vallance: If you look at the six-week projections over the past month, deaths track the projections, so that is taken into account in those projections. I do not think the infection fatality rate has necessarily halved. I think the in-hospital mortality rate has gone down.

Professor Whitty: My halving was that that is the best we can hope for. It is probably less than that. I want to be clear about that, Patrick.

Q1479 Jeremy Hunt: I want to follow up Graham Stringer's questions to the Chief Scientific Adviser about the two graphs.

You show in slide 3 one graph of scenarios—you were very clear that they are not predictions or forecasts—that indicate deaths could be two to four times higher than the first wave peak. The very next slide, slide 4, was the SPI-M medium-term projection of daily hospital admissions in England. That showed hospital admissions going up by approximately 25%, not doubling, tripling or quadrupling. Is it not very confusing to show two slides consecutively, one suggesting we could see two to four times the number of deaths and another showing hospital admissions going up by just 25%?

Sir Patrick Vallance: They were very different timelines. Clearly, one is a longer-term modelling scenario and the other is a shorter-term projection. The shorter-term projections are rather similar to the upswings at the very base of some of those curves.

Q1480 Jeremy Hunt: Slide 3, the winter scenario, shows those deaths peaking at around the end of December and the hospital admissions rate is shown for the week of 8 December. There might be a difference of a week or so, but that is not a massive difference in the timeline, is it?

Sir Patrick Vallance: If this is confusing, I apologise, but I was clear that the model projections for six weeks were the things on which one needed to concentrate. Those are the things about which you can have more reliability in terms of the numbers. The others were scenarios for reasonable worst-case planning, making an assumption about what the R would be and that it may increase over the winter.

The projections are a forward look over the next six weeks with a greater degree of reliability, but it is still a model. They show in the hospital admissions that under these projections quite quickly you would get to a hospital level above the first wave peak somewhere towards the end of November, about 3,000, and deaths would move up towards several hundred by early December. As the CMO has just said, with a doubling that can increase very quickly, depending on what the doubling rate is at that point. The whole aim is to make sure that not only the doubling rate goes out much further but that ideally it becomes a halving rate, and that is what you would want to do to get these down.

Q1481 **Jeremy Hunt:** Professor David Spiegelhalter said today, referring to slide 3, which talked about the winter scenarios and the potential quadrupling of the death rate, "I was very unimpressed. I was disappointed that graph was shown." I know that Professor Whitty has previously praised Professor Spiegelhalter for his insights into how to use statistics. Does he have a point?

Sir Patrick Vallance: I am second to none in my admiration for David Spiegelhalter. I would reiterate that the two graphs that are important are the six-week projection ones.

Professor Whitty: Can I be clear that for that reason I have never used anything beyond six weeks in anything I have ever said to any Minister on this issue?

Q1482 **Jeremy Hunt:** I understand that, but I am curious that you have not used it with any Minister but you were prepared to present it to the public jointly at a very important press conference on Saturday afternoon and a day when the Prime Minister made a complete about-turn in his policy. Therefore, if it was not important or reliable enough to present to Ministers I am surprised you both decided it was important or reliable enough to present to the public.

Sir Patrick Vallance: That graph had also been presented to the Prime Minister.

Q1483 **Jeremy Hunt:** He has seen projections beyond six-week projections.

Sir Patrick Vallance: Yes.

Q1484 **Jeremy Hunt:** Professor Whitty, I want to ask you about the role of test and trace as we go forward. You will know the latest figures. We reach only about a third of the total number of those who have been infected when you take into account the ONS projections of the daily numbers being infected. Probably fewer than a quarter of those being asked to isolate are actually isolating. That led SAGE to say on 21 September that

this system was having only a marginal impact on transmission. You chair SAGE. Is that your view about NHS test and trace?

Professor Whitty: Let me start off with the figures with which you began. Test and trace has gone from a standing start to a long way down the track. However, there are two “buts” to this. The first is that you have very high rates in many parts of England now. We have all said from the beginning that this is most effective when the rates are low. Therefore, one of the reasons why getting rates low is a very good thing is that it gives test and trace greater ability to pick up a much higher proportion of people.

There are probably two caveats to the data you have just talked about. The first is that you would expect test and trace to pick up only symptomatic people. The ONS data also pick up asymptomatic people, so you do not set them a completely unfeasible target. The second is that some of the commentary on this, including the academic commentators, implies that if someone has been contacted and does not follow exactly every single element of an isolation scheme they are doing nothing. Therefore, in a way they take a one/zero approach. A lot of people may well be responding to being contacted by changing their behaviour very substantially in a way that reduces transmission, but it is not an exact replica of what is expected. I am not disagreeing with you. All I am doing is finessing slightly an understanding of the numbers you have just given.

Q1485 **Jeremy Hunt:** Perhaps you could explain that. As I understand it, what the contact and trace element of test and trace does is contact people who have been in close contact with someone who is confirmed as positive and asks them to isolate. Therefore, it is contacting people who are potentially asymptomatic transmitters of the disease, and that is why you get overall a rather low number. Is that not correct?

Professor Whitty: No. The point about picking people up is that it is the entry point or first point. For the person it picks up, the index case, they do it on the basis of symptoms. This person has gone in for a test.

Q1486 **Jeremy Hunt:** I understand, but then they contact the close contacts.

Professor Whitty: That is the index case you are judging them against in terms of the ONS stuff. In a sense, that is the correct denominator.

Q1487 **Jeremy Hunt:** But we are still asking only a low proportion of the people who are potentially transmitting the disease to isolate. Anyway, you are saying you do not disagree with what SAGE said. It is having only a marginal impact on transmission, but the reason for it is that we have such high levels of transmission. Do you think test and trace is likely to be more effective when you have lower transmission? Is that essentially what you are saying?

Professor Whitty: Even under optimal conditions it will do a lot better with much lower incidence. All other things being equal—that is a big “if”—it will probably be having a bigger effect now, if anything in the areas which have slightly lower incidence than higher incidence areas. That is what most modelling in this area would imply.

Sir Patrick Vallance: You would expect it to be more effective. You can see across Europe that that is also the case. Even very effective test and trace systems do not work well at high prevalence.

Professor Whitty: The secondary gain of reducing incidence due to what the Prime Minister has announced, if it is voted through by Parliament, is that it will bring the numbers down to a rate where this becomes a much bigger part of the solution, but we need to be clear that, even under perfect conditions, test and trace takes only a proportion of the R. It is not that that you do that and forget everything else; it is a proportion. That is all we can reasonably expect of it.

Q1488 **Chair:** The SAGE paper Jeremy Hunt quoted from referred to the system having a marginal impact on transmission at the moment was dated 21 September, when prevalence was much lower than it is now. Therefore, even in those conditions the verdict of SAGE was that it was having marginal impact. What assessments have you made in your models of the contribution that test and trace is making?

Sir Patrick Vallance: I cannot give you the exact proportion; it varies from model to model and what view people take on that.

Q1489 **Chair:** You are looking ahead; you are familiar with the plans of test and trace. Are you modelling it with an expectation that it is going to make an appreciable impact?

Sir Patrick Vallance: I think there is a paper from June which looked at the question of the impact and effectiveness of different levels of test and trace on the overall ability to control R, and what other measures you would have to have in place depending on that. The papers lays that out.

Q1490 **Chair:** Going back to our earlier discussion, in making sure your projections and modelling for the next six weeks take account of all the relevant information have you assumed that test and trace is going to make an impact on transmission over the next six weeks?

Sir Patrick Vallance: I cannot tell you exactly what is in each of the models, but it will not be an assumption that there is a big impact from test and trace at current levels of prevalence.

Q1491 **Dawn Butler:** It is a known fact that lockdown buys us time but it is in no way a solution to anything. What we have to do is focus on actions. Sir Patrick and Professor Whitty, I think you are both contradicting yourselves when it comes to test, trace and isolate. Let me explain what I mean. You have spoken a lot about trying to get the R rate below 1. We know that once you start testing people if you do not get the results back within 24 to 72 hours it has an effect on the R rate. Therefore, you cannot talk about the R rate without talking about testing and getting the results back on time. Am I correct or incorrect in my thinking?

Professor Whitty: You are probably bringing together two separate important points. The first one is that you are absolutely right that to reduce R test and trace systems need to get the results back as fast as possible. The faster they do so the bigger the effect on R. That is a

critical part of it. One of the reasons that I among others are keen not to have test and trace always being asked to do yet more things is that the shortening of the time is a critical part of it. The calculation of R itself does not depend on the length of time, but on the number of cases over a period of time. Therefore, the point you make is a perfectly reasonable one, but it does not affect the R in terms of how you calculate it. We must try to reduce those times because that is how test and trace has its biggest impact.

Q1492 **Dawn Butler:** Therefore, over the short term it will have an effect because you will know the infection rate. When we went into national lockdown in the summer about 100,000 people were showing symptoms of Covid. During the winter that number will rise exponentially to 500,000 people a day who show symptoms of Covid. They may have Covid; they may have flu, or something else. Surely, that means we need to ramp up our testing capacity to 500,000 tests a day. How close are we to achieving that?

Professor Whitty: I am very cautious about getting into the business of trying to talk about the tests that are available, the tests that are done and the tests done on individual people. They are all slightly different calculations, but the capacity to do testing of people who are symptomatic is substantially greater now than it was at the beginning of this month, but I am not going to put an exact number on it because I am not the right person to answer that question.

Q1493 **Dawn Butler:** Who is the right person to answer the question?

Professor Whitty: Test and trace have the data on that.

Q1494 **Dawn Butler:** That is Dido Harding. Are you in any way in discussion with them? Do you know how close we are to achieving what we really need in order for you to be able to model correctly what we need going into winter? I am sure you are aware of the public's frustration. You have both said previously that in order for us to combat and control the virus we need the public to comply. As you know, the public are very frustrated. These questions are important for the public to understand what is going on and why. In your estimation, how close do you think we are to achieving the capacity required to test 500,000 people with Covid-like symptoms a day? We need to know the numbers. How close are we to achieving that in regard to testing?

Professor Whitty: I am trying to answer your question helpfully, I hope. There are varying indications for testing. The point you are making, completely rightly, is that as we go into winter and autumn we are likely to have more people with symptoms compatible with Covid but who do not have Covid, but they still need to be tested. I hope I am paraphrasing you correctly. Part of the key reason to increase capacity for test and trace in my opinion has been exactly to achieve the point you have just raised. My hope and expectation is that test and trace will have the capacity to test people who are symptomatic through the winter period.

There are also some very clear indications on which everybody agrees in terms of other uses. There are clinical uses in hospital; there is testing in care homes and a variety of other indications; and there is also a lot of additional things people think of which could be used for testing.

As you know, there was an asymptomatic mass testing pilot launched yesterday in Liverpool. People are talking about doing much more widespread testing of health and social care workers. Mr Hunt on the Health and Social Care Committee has rightly made a very strong point on this. It depends on the denominator you are talking about, but for those who have symptoms my expectation is that test and trace, which has done a really good job in this area, should have the capacity in terms of numbers of tests to be able to do that.

Q1495 Dawn Butler: Professor Whitty, in February you said SAGE recommended that there be an increase in testing. We also know that testing people who are symptomatic is not good enough, because we have been told by SAGE that if we test only those people who are symptomatic we miss 70% of people who have the virus. In the summer when we went into national lockdown did the shielding of vulnerable people help to save lives?

Professor Whitty: We have not had a really clear answer. There were definite benefits and disbenefits of shielding. The benefits were reducing the risk that people got Covid. The trouble with that is that it was not a denominator because you took all the people who were at risk into the shielding group.

The downsides to it were also clear: an increase in loneliness and, in some cases, probably mental health issues and so on. In trying to work out the balance between those, our impressionistic view is that shielding was useful but there should be a less strict version of shielding in the next phase to allow people a little bit more time outdoors particularly and so on. There was a real worry that people were feeling trapped in their houses with all the downsides that went with that. There has been an adaptation of that.

We are also intending to change over time the group of people who are in the shielding list, and something was published in the *BMJ* a couple of weeks ago which explains how we are going to do that. The exact risk factors that led to the shielding list were generated at a stage when we understood much less about Covid than we do now. We are still learning a hugely greater amount and we will know more in another six months, but at the moment we think we can change that, the biggest change being a very high proportion of children who were shielded. The view is that the risk is not sufficient to justify the significant downsides, but there have been other important changes with the shielding, so you have asked an important question.

Chair: We need to keep questions and answers more succinct. I will come back to Dawn if we have a chance, but I turn now to Chris Clarkson and then Aaron Bell.

Q1496 **Chris Clarkson:** Gentlemen, thank you for appearing today. I want to go back to testing, in particular PCR. At what rate have you accounted for false positives and false negatives in your modelling, and what are those rates?

Sir Patrick Vallance: I am not sure I can give you an exact answer to that. PCR does not have much in the way of false negatives apart from swab negatives. It is very sensitive and picks up lots of things, even very small amounts of RNA. That is probably one of the reasons it picks up people who are not actually infectious but those with residual RNA from having a virus. In that sense it is a false positive in terms of infectiousness. PCR is extremely sensitive and, apart from swab failures, does not have a big false negative in that way, and I am not sure it would make a big difference to any of the modelling assumptions.

Professor Whitty: The ONS data, which are the gold standard, have a series of good technical slides on how they have made their estimation on PCR, which is probably the best way to look at that. It is quite a technical area. The point I make as an epidemiologist is that the key metric is not sensitivity or specificity, although that is important, but the positive and negative predictive value which varies by point prevalence at a point in time. Those tests will become more accurate, depressingly, as prevalence rates go up, so the risk of a false positive is higher when the rates are lower.

Q1497 **Chris Clarkson:** What about the risk of false negatives?

Professor Whitty: The converse is true. At sufficiently low levels it makes much less difference.

Q1498 **Chris Clarkson:** If you had to put a figure on it what would it be?

Professor Whitty: On false negatives?

Q1499 **Chris Clarkson:** Yes.

Professor Whitty: It depends on what use you are using it for. Is it a clinical use or an epidemiological sampling use? If it is an epidemiological sampling use I refer you to the ONS data because it is a really good technical document on that. For clinical use, what you want to do is pick up those people who have symptoms that are important enough to want to do something about them.

The big risk there is about sample acquisition more than the lab side of it. The lab side of it is pretty good. Do you do swabs properly? That is one of the reasons I am very keen that particularly for social care and NHS staff we are moving towards saliva testing because that has a much lower difference, if we can get it right, in terms of sample acquisition.

Q1500 **Chris Clarkson:** Would you be able to make that ONS document available to us?

Professor Whitty: It is a public document. I can point you in the direction of it.

Q1501 **Darren Jones:** Professor Whitty, is it right to assume that there are health implications associated with the economic consequences of decisions around tiered regions and the national lockdown?

Professor Whitty: Yes.

Q1502 **Darren Jones:** Sir Patrick, earlier you said it was inappropriate for Treasury officials or economists to be on SAGE. Why do you think that in this context?

Sir Patrick Vallance: We do have somebody from Treasury on SAGE. What I said was that it is inappropriate for SAGE to be the place where all economic advice gets integrated with the health advice. Chris and I have said many times that we think very carefully about the health impact of lockdown and other measures. We are very aware there are impacts, and the paper that has been referred to already from June from the ONS actuaries and DHSC, which is being updated, looks at that in great detail.

Q1503 **Darren Jones:** I am interested to understand the depth of the economic assessment. For example, I looked at the last set of SAGE's minutes and searched for the word "economic". It only came up saying "excluding economic impact". How much time or input do you have at SAGE about the economic consequences of these decisions?

Sir Patrick Vallance: We do not. That is not the role of SAGE. We have been very clearly instructed that the economic impact of this sits in HMT. HMT looks at the economic impact. Therefore, we do not look at the economic impacts and we are not mandated to.

Professor Whitty: It is very important that our economic colleagues also understand the epidemiology. I talk to my colleagues in the Treasury. For example, yesterday I talked to the governor of the Bank of England. We take our responsibility to inform the economic debate very seriously. Patrick, I and Clare Lombardelli, chief economist in the Treasury, have been involved in some joint discussions on this on many of the key issues for exactly the reasons you are implying. These are very difficult decisions. We have no illusions that there are health disbenefits to the economic things; there are massive economic disbenefits. None of us is under any illusions. This is really problematic. We are choosing between bad choices. None of us should shy away from that and pretend that is not the case.

Sir Patrick Vallance: To be clear, SAGE is not the place where this happens. There are other places in which this integrates. As Chris has said, we are involved in discussions where we will be presenting some of the health and other aspects and others will be thinking about and presenting the economic aspects.

Q1504 **Darren Jones:** Therefore, you present the health aspects to an economic committee; there is no presentation of the economics to SAGE.

Professor Whitty: For example, the paper referred to earlier by Mr Stringer, which is a fairly weighty document, has within it economic analyses. What SAGE is good for is doing a formal review of all the

science from the different disciplines. I think it would be very dangerous if a group of scientists started to try to make economic pronouncements. It is, however, important and absolutely right that the economic elements are integrated in policy in the end.

Q1505 **Darren Jones:** I understand that. It is just that the answers on where the economic debate comes into it are not particularly clear. Professor Andrew Hayward, who I understand is a member of SAGE, said on Radio 4 this week that the two-week circuit breaker in September would have saved thousands of lives and would clearly have inflicted substantially less damage on our economy. Do you agree with Professor Hayward?

Sir Patrick Vallance: The advice in September was about a circuit breaker with the intention of driving the numbers back to how they were in August, going back to the discussion on test and trace, because that means you have a greater chance of test and trace being effective. That takes more of the load in managing the disease and you may have to do fewer in terms of other non-pharmaceutical interventions. That is the logic behind that suggestion and I think that is what Professor Hayward is reflecting in that comment.

Q1506 **Darren Jones:** Therefore, you agree.

Sir Patrick Vallance: I think there is a logic that, if you can drive something back down to very low levels, you get a bigger return for test, trace and isolate. It can carry more of the burden and fewer other measures are required.

Q1507 **Darren Jones:** Therefore, it is "yes". Professor Whitty, do you agree with Sir Patrick?

Professor Whitty: I am trying to give an answer which is helpful but does not mean I fall into the trap of giving a yes/no response. It is not a yes/no response. You have to think of what my economist friends would call the counter-factual on this and what is realistic and possible. Different things will have different effects at different times. I am very cautious about ever saying, "If we just did things differently in a slightly different way at a different point of time", where there is a whole series of imponderables that you do not know, "the following would definitely have happened as a result." We should be cautious about that. As scientists, we should be humble enough to realise there is a lot of uncertainty in these things.

Q1508 **Aaron Bell:** Thank you both for appearing today and in the past before this Committee and other Select Committees. It has been very helpful to Parliament. You said earlier that your best estimate of R right now is still above 1. Would either of you comment on King's College's Zoe app report this morning that now estimates it is at 1.0 across England, and that is before we have gone into lockdown.

Sir Patrick Vallance: We get different estimates of R from different places. You will know that the REACT study from Imperial from the end of October suggested that the R was 1.6 across the UK. One of the reasons

we have the SPI-M group do what it does is that it tries to integrate the values from different places and comes up with an overall estimate of R, taking into account ONS results, REACT studies, the Zoe app and so on and the data it sees. Therefore, we will expect a new updated R from the SPI-M group which will be published on Friday and see where that is.

Q1509 **Aaron Bell:** Other colleagues have already spoken about the PHE report. The modelling seems to be based on an R between 1.3 and 1.5, yet the Government had already published on Friday before those slides that the current rate was between 1.1 and 1.3. Why was that not reflected in the charts presented to the nation on Saturday? The current R was below that driving the charts that you showed the nation.

Sir Patrick Vallance: It was an assumption in that one graph; it was not in the six-week projections. The reasonable worst-case scenario is based on an assumption of an R between 1.3 and 1.5 getting potentially 10% worse over winter. That is how you construct a reasonable worst-case scenario. You put in a series of assumptions and say that could happen and what it would look like. That is what those scenarios were projecting. The six-week projections were based on what we are seeing now.

Q1510 **Aaron Bell:** You mentioned the reasonable worst-case scenario. The fact we were proclaimed to be above is what seems to have driven the rapid change in policy. Is the leaked version of the reasonable worst-case scenario on 30 July which was published in *The Spectator* accurate?

Sir Patrick Vallance: The reasonable worst-case scenario is a document owned by the Civil Contingencies Secretariat, and I think it is for them to respond to that. We model what the Civil Contingencies Secretariat sees as a reasonable worst case and that is then modelled by the SPI-M modellers.

Q1511 **Aaron Bell:** SPI-M must have had input into the reasonable worst-case scenario.

Sir Patrick Vallance: Yes.

Q1512 **Aaron Bell:** To quote David Spiegelhalter again, what explains the odd plateau in October in that reasonable worst-case scenario? The infection rate in October was shown as being perfectly flat in a worst-case scenario, which I cannot equate with the meaning of either "reasonable" or "worst case".

Sir Patrick Vallance: They were the assumptions put to the modelling group to model as to what that might look like. There would be people at that time who thought that reasonable worst-case scenario was excessive; there were others who would think it not. One of the challenges is to come up with a scenario that is both reasonable and worst case. I think that was exceeded in terms of the speed of the upswing. We still do not know what shape this is going to be. It is quite plausible that as R comes down further, as we hope it will not only with the measures in place but also with any new measures put in place, at 1 you would reach a plateau. That is what you would see. Numbers would effectively stop at that level for quite a long period. That is why it is quite

important not to end up fixing it at a high level because then you have baked in a very large number of hospitalisations and deaths from one period.

Q1513 **Aaron Bell:** I understand that. Given we all know it is a respiratory disease and we expect it to be seasonal, I cannot quite understand how, even with a heroic assumption about what Government intervention might do, October infections were forecasting the reasonable worst-case scenario to be static throughout the month, whereas we all know they have been doubling approximately on a fortnightly basis.

Professor Whitty: None of us has been through this virus at this time of year, so how can we know exactly in advance exactly what different things will do? Let us be a little bit cautious about our own ability to predict.

Q1514 **Aaron Bell:** In SAGE's assessment on 21 September, looking at non-pharmaceutical interventions, it forecast there could be up to 3,000 hospital admissions per day by the end of October. The figure on 28 October was 1,442. I find it very hard to square those numbers—it was half as much as you potentially forecast as recently as 21 September—with the idea that we are suddenly above a reasonable worst-case scenario. Would either of you comment on those numbers?

Sir Patrick Vallance: They were from the modelling group looking at the interventions. At that point the view was that it was going to breach the reasonable worst-case scenario. That was predicted. What you are really getting at, which is entirely reasonable and is a point I made right at the outset, is that as you look at the longer-term projections the numbers are almost bound to be wrong in one direction or another. As you look at shorter time periods you can have much more confidence in that. In the next two weeks you can have some degree of confidence that you will probably be there, or thereabouts. Over six weeks they have performed reasonably well. When you go beyond that you start to have uncertainty. That is when you have to rely on data and it is a changing baseline, because measures have been introduced since that document which have undoubtedly brought things down.

To echo what Chris has said, there have been heroic efforts from people across the country to adhere to some quite difficult things that have brought levels down. That has been important in getting the R, which would naturally want to be at about 3, to somewhere between 1.1 and 1.3 at the moment.

Q1515 **Aaron Bell:** I understand the point you are making. Modelling is difficult; forecasts are difficult, particularly ones about the future. The hospital data is what has driven the decision to go into lockdown. I presume you would agree that we need to be focusing on the over 60s admission data and so on. To go back to the same points colleagues made about the public presentation of that, the slide you showed about hospitals included my local hospital, the Royal Stoke. They were only the top 29 hospitals in the country. It was put out to indicate that a number of hospitals were

over capacity, but what proportion of hospitals at the moment are above where they were in the first wave?

Professor Whitty: At this point in time, quite a small proportion. What I said and what was on the slide—in my view, having seen it replayed, it was not an ideal slide from the point of view of it being seen on the TV—was that those were just hospitals which at this point in time had 100 Covid cases or more. My point about it is that you have 100 and you are now about half where it was in sequence. It is a small number of hospitals at this point, but it is an increasing number and they have exceeded what they were at the peak. It was clear from that slide that the number at this point in time is small. What we are trying to do is keep it that way. A situation where a very large number of hospitals exceed the first wave is exactly what we are trying to prevent.

Q1516 **Aaron Bell:** I understand. You said yourself it was not an ideal slide. There was an avalanche of data. I just wonder whether either of you have any reflections on whether that was an appropriate way to make the case you were making to the nation at large, or whether simpler, clearer data would have been more helpful.

Sir Patrick Vallance: I always like to make things simpler and clearer than they are. That would always be an aim. Some of those slides are quite complicated and it is a very complicated subject.

Professor Whitty: This Committee keeps telling us, “Publish more data, publish more data.” When we publish more data you say we have published too much. We do our best and accept there is no perfection in this.

Chair: Touché!

Q1517 **Katherine Fletcher:** Gentlemen, thank you for your time today but also for your service. I am sure it has not been an easy few months. I also thank you for the acknowledgment you have made about the efforts that have been going on in Lancashire, Liverpool, Greater Manchester and large parts of the north-west to keep the R rate down. It has been a difficult few weeks. My question to you is on their behalf.

They have been doing lots of work. Quite a lot of people are saying that the existing tier restriction system has not worked and, therefore, how can we believe that a lockdown is going to work. I want to dive into the behavioural side of the modelling. There was talk that we had underestimated the levels of compliance in the original lockdown. I wonder whether we have overestimated levels of compliance in the slightly complex local restrictions under the burden of which we have been working up in the north of England. Do we think we understand how people complying can help to translate into defeating this virus through those models?

Professor Whitty: I will go first and Patrick may want to talk about the social science more widely. I have the privilege—and it really is a privilege—of talking to colleagues, particularly the directors of public health, who are just remarkable, across all of the north of England and

the midlands, but also local authority colleagues, on a regular basis, and I get their idea about how people are adhering to what is being recommended, first in guidance and then in some cases in law.

Across the board, my reflection is that the great majority of people—and this is reflected in all the polling and a variety of other things—both intend to stick to the rules and do stick to the rules to a remarkable degree. To go back to Patrick's point, were that not the case, we would be in a massively worse place than we are at the moment. My expectation is that R would have shot right up if people had not massively reduced the number of people they have contact with, had not stuck to all the things we need to do in individual actions they can take—such as hands, face and space—and businesses had not done a huge amount to try to make them Covid secure. Without that, we would be in a very difficult place compared with where we are now.

It is a huge tribute to the people that you represent, and more widely in the country, that we are where we are at the moment. The fact that the north-east has managed to flatten things and that things are coming down, although not quite fast enough, in Liverpool, and Merseyside more widely, and so on, are because people have done a lot more. It is very easy to get a couple of photographs in the newspapers that imply widespread flouting of the laws and guidance. Actually, that is not the reality on the ground that is described to me and when I go out and about that I see in places like Morecambe or Morpeth, or wherever it is.

Sir Patrick Vallance: First, you are absolutely right to raise the point that these interventions do work. It is not that they don't work. They have an effect, and you can see that in terms of the R having come down a bit. There is no doubt they work, and they work because people have adhered to them. If you go back to the first wave, it is very clear that, in the modelling, the hospital admissions track very closely to a good adherence model. People really did adhere. The simpler things are and the more people are engaged with the information, the more likely it is that we get to good adherence.

Q1518 **Katherine Fletcher:** I am glad for those comments, because it is difficult to not see your family and hug your relatives, and worry about what is going to happen at Christmas. So, yes or no, is this lockdown going to work?

Professor Whitty: If people adhere to it in the way that I expect they will, it will reduce R below 1, in my view, in the great majority or all of the country, and that will pull us back in time and make a huge difference. I would not want to imply that that suddenly means that Covid is over as a problem. This is a long haul, and I have said repeatedly—and I think people broadly accept this—that we need to see this through winter. This does not mean that we need to stay in these measures through winter—I want to be very clear about that—but we will need to be doing things that keep the rates down, which, for exactly the reasons you say, at every level, even well short of the lockdown, are very much not what we want to do.

People have been incredibly good at adhering to it. Going back to your point from the beginning of this hearing, young people, who everybody gave a whack at, have brought the rates down in their own age group by their actions. That has been remarkable. We should really celebrate that and mark the fact that they have done this on behalf of society.

Sir Patrick Vallance: I do not think I have anything to add to that. I agree entirely with what Chris has said.

Q1519 **Chair:** On Katherine's point, do you expect us to be able to lift these restrictions on 2 December?

Professor Whitty: The Prime Minister has stated that that is what he intends to do.

Q1520 **Chair:** On your modelling predictions, based on these measures being taken—we have talked about what would happen if they did not—would you expect to recommend that we did?

Professor Whitty: The decision as to whether to lift the restrictions on 2 December is not a modelling decision. It is, rightly, a decision for Ministers and Parliament. What I am trying to do is exactly what at the beginning I said we must do, which is to provide technical data and helpfully interpret it as best we can, but it is for Ministers and elected politicians to make those sorts of decisions.

Q1521 **Chair:** You must have modelled the prospective impact of the measures that are being recommended to the House of Commons and the House of Lords tomorrow. If we adopt these measures and vote for them, will they succeed? According to your best ability to forecast this, do you think they have a good chance, a reliable chance, of succeeding to the point that they can begin to be lifted on 2 December?

Professor Whitty: The aim of this is to get the rates down far enough that it is a realistic possibility to move into a different state of play at that point in time.

Q1522 **Carol Monaghan:** Can I say to start with that more data is better? I think all of us on the Committee would agree with that. It is up to people how they interpret it. As people who advise the Prime Minister, are you confident that your advice is actually being heeded and acted upon?

Sir Patrick Vallance: Our job is to make sure that the science advice that we pull together is heard and understood, and can, therefore, inform decision making. It is clearly not advice that turns into the decision. Do I think that the advice has been well put together by scientists who know what they are talking about? Absolutely. We have great people working on SAGE, including many of them from all of the devolved Administrations as well. The advice has been clearly presented and it has been understood. As we have alluded to several times during this, there are many other factors that need to be taken into account, including economic analyses and other societal considerations, that must ultimately come into a decision. I do not think it is linear to say, "Has the science

advice been taken and turned into action?" That is a decision for Ministers.

Professor Whitty: I talk to my fellow CMOs from the four nations very regularly, often on a daily basis. I am very confident that in all four nations—and that, therefore, represents multiple parties if you look across the four nations of the UK and local authorities—people are listening to medical advice in a way that has not happened for a very long time, and that is for a bad reason, which is that we have a pandemic on our hands. But I am not sensing from my fellow CMOs, from the directors of public health, that they are not being listened to at all in any of these environments. I am not making a point about any particular Administration or any particular level of Government. What then happens is that politicians have to take difficult decisions that integrate the economic and societal aspects as well, which is as it should be.

Q1523 **Carol Monaghan:** We have seen across the world that those who have taken action quickly have seen less of an economic impact. I do not want to really get down the line of it. Why are we at the moment among the worst in the world at dealing with this pandemic?

Sir Patrick Vallance: There is a long way to go in understanding how this all plays out across different countries. We clearly had a big infection, for sure. We were seeded with multiple introductions in February and March, and we had a very big nationwide pandemic, whereas many other countries ended up with quite localised outbreaks. We ended up with one right the way across the country. That has been a big problem. All sorts of reasons to do with population demographics and other things have played into that as well. We are broadly similar to other countries in Europe—not all of them—and we know that some that have had very well-funded and well-structured public health systems like Germany have done very well. We still do not really understand why. Even they do not really understand why they are different. There is a long way to go to understand why there are differences.

What has become absolutely clear is that it is important to go quite early and to go quite significant in terms of reaction to this. It is a problem, because, at the time you need to move, the problem is not evident. That is exactly what we are facing at the moment.

Q1524 **Carol Monaghan:** Sir Patrick, you made your grim predictions, scenario or whatever you are calling it. I will take you to task slightly on that. You tried to make a difference between a scenario and a prediction. When answering questions from my colleague, Aaron Bell, a few minutes ago, you referred to your own prediction, not scenario. It is difficult for members of the public, and indeed politicians, to understand the difference between predictions and scenarios if these words seem interchangeable. On 21 September—you have referred to that already this afternoon—you made this prediction/scenario, and yet here we are over six weeks later and it seems as though we are only now starting to pay heed to this. Have we learned no lessons since March?

Sir Patrick Vallance: Just to be clear, what I said on the 21st was very clearly not a prediction. It was a model saying, if it doubles, this is what it could look like. It turns out that it does look like what we said, not because it doubled but because it started from a higher baseline, but those numbers turned out to be just about exactly where we ended up in October. That is exactly the point. These are things you need to take account of when you see them. They are there.

Q1525 **Carol Monaghan:** Having seen what happened in March, why were we not acting on 21 September? Why did we wait till 31 October before we saw England taking any action?

Sir Patrick Vallance: The choices, as both Chris and I have said, are difficult ones for Ministers to take. They have to take into account many other factors. The fact that we are having this rather difficult discussion today about what may happen over the next few weeks and whether or not we have the action required to bring this back under control—whereas everything we are seeing says, “Yes, there is a big problem that needs to be dealt with”—shows how difficult it is to make these decisions. All I would reiterate is—

Q1526 **Carol Monaghan:** How regularly between 21 September and 31 October were you giving this advice to Government that we had to take action?

Sir Patrick Vallance: We have been consistent all the way through that there is an increase coming and, therefore, if you want to do something about it, the increase does not go away on its own.

Q1527 **Carol Monaghan:** How many times have you given this advice?

Sir Patrick Vallance: Probably Chris and I have been in meetings virtually every day.

Q1528 **Zarah Sultana:** The proposed set of restrictions will see educational institutions staying open. We have seen data from the Office for National Statistics showing that the biggest growth rate is among secondary school pupils, and the National Education Union has analysed these figures showing that virus levels are now nine times higher among primary school pupils and a shocking 50 times higher among secondary school pupils since the start of term in September. On one particular day, 15 October, the Department of Education estimated that 412,000 state school pupils were not at school for Covid-related reasons. That is a huge number.

We know that, while the virus does not badly affect children themselves, there is clear evidence of transmission into the wider community, staff and parents. As long as schools are open, do you believe that the R rate will fall below 1 or do you predict that we may have to have a longer lockdown purely because schools and universities are staying open?

Professor Whitty: For the four nations, all the CMOs and DCMOs did a joint statement on this because they wanted to be really clear about where they stood on it. I divide the problem into three sets of problems.

The first and most important problem, rightly, is children. There is really clear evidence that not being at school is a big disadvantage to children. It is particularly a big disadvantage to disadvantaged children. It has mental health impacts. That will be true for all the children who are not at school. Set against that for children, although they do catch Covid, they usually catch it much more mildly. Severe disease is really substantially less than even for young adults, and deaths are mercifully very rare—not completely none but very rare. On balance of risk for children, that balance in our view, professionally, is firmly for children to be at school.

The second set of questions that are legitimately asked are: what are the risks to teachers? That is a fair question. As to the risks internationally, although the data are not absolutely overwhelming, all the data, including ONS data, do not imply that teachers are a high-risk occupation, unlike, for example, social care workers, medical staff like myself and others who when they go into work have an increased risk. If you look at the ONS rates, they look almost identical to the communities from which they are drawn at this point in time. Data moves on, but at this point in time that would be my judgment as a public health epidemiologist.

The third bit is the question about R. Here, we have quite a lot of consensus that the transmission in primary school children probably is a relatively small contribution. It will not be zero but it is really pretty small. There is more debate around the questions about secondary school, particularly older secondary school children—17, 18, 19-year-olds. In a sense, there is then a societal question. Given the huge benefits to children, what is the right balance for society? That is fundamentally a political question, but the reality is, in our view, that the benefits to children are really clear.

Q1529 **Zarah Sultana:** I would like to move on to university education. On 21 September, SAGE advised that higher education tuition should move online or to distance learning for the first term until prevalence has fallen. The proposed measures that come into force from Thursday advise increased levels of online learning where possible. What is the effect on transmission of higher education institutions remaining open for face-to-face learning, even if that is partial opening?

Sir Patrick Vallance: All of the things that are open carry some price on R. That is just a fact. The more contacts you have and the more interactions you have, you will increase the pressure on R. I think the universities have done a really good job of trying to get on top of this. You can see levels decreasing across that age group both outside and inside universities. That is an age group where we see the numbers coming down. Many of them have really done a lot in trying to test in their own institutions. They will have to make their own judgments around what courses are best delivered face to face and what can reasonably be done online. Many of them have gone to very large lengths to make that happen, and they have also gone a long way in terms of making sure they have appropriate ventilation in rooms, space and so on. The universities are handling this in a very mature way to try to make

sure they get on top of this. The evidence is that, among that age group, things are coming down a bit in some places.

Q1530 **Zarah Sultana:** In Coventry specifically, as my constituency is there, the Cannon Park area and the university area have seen the highest concentration of cases, and that has been the case for some time. There have been around 119 university Covid outbreaks so far this term, and figures from the University and College Union say that there have been more than 35,000 student cases since term began.

In what scenario could we see universities being told quite firmly that they must move all non-essential in-person teaching to online, and what would you say to students who feel that they are locked in their university halls or private accommodation who are essentially trapped and want to go home before we move into a national lockdown or just before Christmas?

Sir Patrick Vallance: I will try to stick to the science on this. There are lots of questions in there about how universities want to run and what politicians may want to advise. In terms of the impact, I think the universities have done a rather good job of making sure that this is damped down. There is a real issue about two things. One is the quality of education that people are getting, which is important. In some cases that needs to be face to face, which will be important for some courses and some approaches; and it is obviously important that the mental health and other aspects of student life are properly considered. It cannot be nice to be locked in a place for isolation, and I know universities are thinking about that very hard.

Q1531 **Mark Logan:** Sir Patrick and Professor Whitty, what advice does SAGE give to Government in making decisions where evidence is weak—for example, on the closing of places of worship?

Sir Patrick Vallance: In looking at a package that might get R below 1, which is the aim, we have said that it has to be a package. You have to think of this as a series of things that interrupt individual activities but that, as a whole, will also have an effect on contact and interaction. The danger in trying to pick apart each one, and when you get down to the ones towards the lower level where you might say, "This doesn't make much of an impact on its own," is that you keep cutting things off and you end up with a suboptimal package that does not get R below 1.

You are right: we do not have good evidence on the exact value of each intervention on R. We produced a paper suggesting what that might be in different areas but said that this is not a very exact science at all. Therefore, I am afraid it is a rather blunt instrument, and it is about making sure that there is a package of measures that, together, has a chance of getting R below 1, because shrinking this is the key thing.

Q1532 **Mark Logan:** Since 4 July, whenever we have had national relaxations, in these last few months, how much transmission do you think has taken place within places of worship? Is it significant or is it quite negligible?

Sir Patrick Vallance: I do not think we have good data to answer that with any degree of certainty.

Professor Whitty: One additional thing is that there is some very weak data to imply that, even if the place of worship has been incredibly good about being Covid secure, by bringing people together, people can congregate outside and do things that lead to transmissions, but this is very variable. A lot of this is anecdotal, so we should be a little careful about putting that out as a scientific fact. These are just reported behaviours.

Sir Patrick Vallance: There are reports of outbreaks, as we know. Particularly in the US, there have been several reports of outbreaks from churches. There are environments where you are bringing together people who might not normally come together in internal environments. So there is an environmental aspect of this, but we cannot put an exact number on this, for sure.

Q1533 **Mark Logan:** Looking at it from the perspective in my constituency, Bolton North East, we have roughly 59,000 Christians and about 11,000 Muslims. My constituents have been emailing me and saying that they feel that the Government see faith as nothing more than an optional social activity. What would you say about that?

Professor Whitty: I would say that we are not the right people to advise on that. It strikes me as a theological question.

Q1534 **Mark Logan:** It is quite important, if we want people—constituents—right across the country to adhere to Government advice and the science, that we make a convincing argument. When I look at the SAGE advice from the NPI paper of 21 September, it does not make a hugely convincing argument about the R rate in relation to places of worship. You have talked about a whole package, but when it comes to places of worship, would you advise the Government to reconsider on this one example?

Professor Whitty: We are trying to avoid a situation where we are constantly double-guessing at a micro level what individual Government decisions are. However, all the faith communities of the UK have been extraordinarily responsible in the way they have tried to address this. I have spoken to faith leaders from every faith for which it is possible to find a faith leader group. In every case, they have been very much of the view that this is very regrettable for everything they are trying to do, but at the same time they absolutely see the need to put health at a very strong premium to protect the health of citizens of all faiths.

Q1535 **Chair:** Staying on this theme, it is not a theological question when it comes to exercise. As chief medical officer, you are someone who promotes the importance of exercise, not least in being fit and well in the face of Covid. Presumably it continues to be the case that we should take exercise.

Professor Whitty: I would strongly say to anybody that taking exercise of any sort, whether indoors or outdoors, is something that people should try to promote at all stages. It is important that people take extra care that they build it into their day during lockdown. In fact, the data would imply that quite a lot of people have done more exercise in lockdown than they have normally, but other people have not. Exercise as a whole is something that we absolutely would want to promote, and it is one of the exceptions for going out of your home for exactly this reason.

Q1536 **Chair:** That being the case, Sir Patrick, are you aware of any instance in which a Covid infection has taken place between children playing football out of doors?

Sir Patrick Vallance: Not that I am aware of, but there may be evidence; I have not seen it.

Q1537 **Chair:** Given what Professor Whitty said about the benefits of exercise, it is the case that children's sports teams outside school settings are now not allowed to meet. This seems perverse given the importance of exercise, and, as you have told this Committee before, the very low incidence outdoors of transmission. It seems to me that this a matter that is not theology but scientific advice. Is it something that you could further advise the Government on, because there is a lot of concern among children's sports teams across the country?

Sir Patrick Vallance: We have been very clear as to where we think the areas of transmission are most likely to be. We have also been very clear that an entire package that takes into account everything including interactions around events becomes quite important. It is not just the event itself but what happens in and around it, and it is then for policy makers to decide what policies they want to adopt on the basis of that.

Q1538 **Chair:** Would you advise that children's outdoor sports should be banned?

Sir Patrick Vallance: As Chris said, we just do not go down to that level of individual activities.

Q1539 **Chair:** So who does? You are the chief scientific adviser and the chief medical officer. We talked about the importance of exercise and fresh air, yet a decision has been made to suppress children playing sport outdoors, and it does not benefit from your advice. Who is advising the Government on this? Who is telling the Government what to do?

Sir Patrick Vallance: They have had advice from us in terms of the general principles and some of the areas, but, as I say, not down to individual specific activities like that, and the same is true on the medical side as well.

Professor Whitty: To be honest, it would be deeply unhelpful if we then started to try to unpick really difficult packages that policy groups have put together. This is a difficult balancing act across Government. We fully understand that. Our job is to give the broad advice and then leave it to those who have to integrate the various elements.

Q1540 **Chair:** I do understand that, Professor Whitty, but part of our role as parliamentarians is to voice the concerns of our constituents, and the fact that a package has been stitched together does not qualify for it to be exempt from scrutiny and understanding. It might be helpful if we were able to think about these things before they are irrevocably stitched together. This seems to be an important one. SAGE has advised in its assessment of what are called non-pharmaceutical interventions that, for outdoor gatherings in general, there is a very small reduction in transmission to the extent that, quoting from the paper, the reduction in R is likely to be less than 0.05%. In the context of not just what you said to the Committee but the work you do to promote health and exercise, is this not something that, notwithstanding what you said about the whole package, needs to be looked at again?

Professor Whitty: I am going to rather boringly repeat myself. If Patrick and I end up trying to unpick quite complicated packages that have been put together, in that way disaster lies for everybody. We have to give broad principles, which we have done. You accurately reflect some of the broad principles. They are published in SAGE minutes. Packages then have to be put together, which is very difficult to do. Everybody who is doing this is balancing really difficult things and it is not our job to make their lives even more difficult in these difficult balancing acts.

Q1541 **Chair:** How can MPs representing their constituents influence this if we can only scrutinise things that are too late to do anything about?

Professor Whitty: I suggest the people to scrutinise are those who have to put together these very complicated packages. It is stupid for us to try to act as a proxy for a process in which we should not be interfering at that level of detail. It would be very unhelpful to the process if we did so.

Q1542 **Lord Patel:** Good afternoon, Patrick and Chris. It is nice to see you both. I am an interloper from the genteel side of the Palace, so my question, I hope, will be more gentle.

I would like to understand what your thinking is in terms of the metrics that you will use to assess the effectiveness of the measures we are about to go into. You mentioned several times admissions to hospital, so that would be one. Following on from that, when we come to the end of the period, whatever decision is made beyond that, no doubt we need to be thinking right now how we will maintain the transmission at a low level so that we do not get back to the same scenario. What are your comments on those two aspects?

Sir Patrick Vallance: In terms of the measures, it is very important that we are in a much better position than we were first time round with things like the ONS survey, the REACT survey, the ability to measure infections in the community, and all the work JBC is doing. We should absolutely look at infection rates. That is the way we are going to find out earliest what the effect is. Contact rates may give you more information even earlier. For infection rates, hospital admissions will be a slightly lagging indicator. Unfortunately, there will be deaths, and they will be an even more lagging indicator. For example, if things worked almost

instantly, and you got the R down to 0.8 or 0.7, you would expect to see an effect on infections quite quickly. You would expect to see an effect on hospitalisations maybe after two or three weeks. You may still see an increasing number of deaths over the period because they are lagging even further. We have to get leading indicators rather than relying on lag indicators.

At the end of whatever happens there, it is going to be important to determine what the measures are that will continue to be required to keep R down. As Chris has said several times, we are likely to need degrees of social distancing and other measures over the course of the winter. It is only come springtime and beyond when other things such as testing improvements, vaccines and improved therapeutics might start to allow further relaxation. I expect at the end of this there will still be a need for some changes, and, hopefully, increased testing can come along first out of all of those interventions and would potentially help.

Q1543 **Lord Patel:** Chris, do you have any comments?

Professor Whitty: No, I agree with that.

Q1544 **Lord Patel:** If the current measures are stopped after 2 December, we will soon enter into a period of festivities when there is likely to be more likelihood of contact. What effect do you think that might have on transmission, and what would be the measures that will need to be taken to keep the transmission rate below R1 on the basis that we will not have a vaccine or anything by then?

Professor Whitty: The policy that the Government have announced is that the aim would be ideally to move into a series of tiers at the end of that period. That is what the Prime Minister has said he intends to do. We will have to design those to try to match the situation we see ourselves in at the end of this month epidemiologically. You are quite right that the festive season for all religious traditions—obviously they come at slightly different times—has risks associated with it. There is no two ways about that. It is true for every religion. That is one of the reasons why festivals are held. We will have to work out ways in which we can advise people in a way that maximises their ability to keep to the essence of what the festivity is but minimises the risk of transmission. We are trying to work that through at the moment. How risky that is going to be and how far we can go down that path will very much depend on what epidemiological situation we face as we head into December and towards the peak festive season at the end of the year.

Lord Patel: Thank you both very much. The burden on your shoulders is enormous. I could not think of two better guys to do it.

Q1545 **Chair:** On the criteria for coming out of the proposed restrictions, alluded to by Lord Patel, is it possible to imagine lifting the restrictions if the R is still greater than 1?

Professor Whitty: The aim of the whole thing is to make sure that R is not greater than 1.

Q1546 **Chair:** But if we get to 2 December and R is greater than 1, does that mean that we cannot come out? Is that what your advice would be?

Professor Whitty: I do think it is sensible to see how we go on this. I have quite a lot of faith in the adherence of the general public in a way that will lead to the R reducing. That is what I anticipate. That is what all the polling and other data show. People intend to do this and I am expecting that the R will drop.

Q1547 **Chair:** You expect by 2 December the R to be less than 1.

Professor Whitty: Yes. Nothing is certain in this world. It may not be absolutely everywhere, but my expectation is that over the country as a whole that is what I would hope to happen.

Q1548 **Chair:** If the R was very slightly above 1, and the NHS was adjudged to have the capacity to cope with it, given the importance of overrunning the NHS's capacity in this, would it be possible to contemplate that the infection could still be spreading, albeit at a rate that we could contain comfortably within the capacity of the NHS?

Professor Whitty: The problem we have here—I am making an obvious point—is that we have almost infinite future scenarios as to what this could look like come the end of this month. Rather than try to speculate on almost infinite numbers of them, which may well be regionally different and may well have different stages of NHS capacity being threatened in different parts of the country, the sensible thing to do is to wait until we see the effects of this and then take a view. I am sure you will want to ask some pretty hard questions of the political leaders who make those decisions as we get closer to that point in time. Before we have even had Parliament vote on these, speculating where we will be in three to four weeks' time is a little premature in terms of exactly the kinds of questions you are asking about what plans should happen next.

Q1549 **Chair:** It is not to speculate. In voting on these restrictions, the support of many MPs may be contingent on having an idea as to how they will be lifted and whether, if they are persuaded that the threat to overrun the NHS is removed but, nevertheless, the R is still technically above 1, that will be a veto. They need to have an ability to interrogate that now before they vote tomorrow.

Professor Whitty: The decision as to the strategic goal is rightly a decision for Ministers. I make the point—and we make it repeatedly—that it is important that we do not claim to take the strategic decision. The strategic decision is a ministerial decision answerable to Parliament and, therefore, to the people.

You could have a scenario where R is just below 1 but there is an incredibly high rate and a very struggling NHS in one area, and in another area R is above 1 but the NHS is a long way away from difficulties. I am not saying this will happen; it is just a theoretical possibility. Those kinds of scenarios would lead to different responses from Ministers at that point in time, and reasonably so. Patrick and I, and I suspect all the people on the Committee, could probably paint 100

scenarios, each one of which is not implausible— there will be varying degrees of plausibility—that will lead to different places. The sensible thing is to see where the data finds us as we get through to the point that this decision has to be taken.

Q1550 **Chair:** Are you aware of what the strategic goal of the Government is?

Professor Whitty: The strategic goal of the Government is primarily to reduce mortality, but they have much wider strategic goals, including protecting the economy and society. There are multiple strategic goals and they are the ones that you should ask Ministers about.

Q1551 **Graham Stringer:** Professor Whitty, you said earlier on that there were really remarkable directors of public health. I agree with you. They have done a good job. Sir Patrick said—or it might have been you—that there had been a huge increase in the testing at an essential level. Both those things are true. My view is that the test and trace system would have been more effective had it been concentrated more locally. What is your view, and do you feel it is within your purview to give advice on that?

Professor Whitty: I am going to emphasise the bit of my role that is chief medical officer and de-emphasise the element that is chief scientific adviser at the Department of Health and Social Care. My point is not a science point; it is an operational point in a sense.

As you rightly say, the directors of public health in local authorities have done an absolutely amazing job throughout this. Standing this up from a standing start in the first wave, when—with the possible exception of London—there was quite a degree of similarity across the whole country, given that we had much less capacity on testing and so on at that point in time, there was a strong logic to take a more national approach, but I completely agree with you that the capacity of local authorities, particularly on the trace and isolate element of test, trace and isolate, is there steadily to increase the ability for people to do things. The question is at what rate and how, but I broadly agree with your general idea that, where possible, we should be using local skills.

Q1552 **Graham Stringer:** It is good to hear that. One of the problems has been communication from the central test and trace system. It has either been slow or the quality of information has been pretty useless. It has been very difficult to disaggregate at a local level or apply to individual situations. That is one of the arguments for moving it to a local area. More generally, it has been difficult to get information both out of test and trace and out of the NHS at a trust level. Is that a problem you have had?

Professor Whitty: I try to get as much information from as many different areas as I can and then I try to disseminate it as widely as I can. I speak to the directors of public health on a weekly or bi-weekly basis. Part of the aim of that is to try to pass on what I know. One of the things that Sir Patrick has made a real push on—and I completely agree with this—is that not just the NHS but the whole system needs data to flow more fully in every direction. That is in everybody's interest so that

everybody sees as much information as possible. This is important scientifically, operationally and for public health.

Q1553 **Graham Stringer:** In answering the question about international comparisons, you mentioned in passing that some health services were much better funded than our health service. We come mid-way in the European pecking order. Had we had six times the capacity in intensive care units—and I realise this is a hypothetical question—would our response have been able to be less dramatic than it has been?

Sir Patrick Vallance: Clearly, if we had had six times the intensive care capacity, there would have been more headroom, but you still would have had an enormous number of deaths associated with that. The question then for Ministers and society is whether you are prepared to tolerate those numbers of deaths. But, yes, it must be the case that, with a larger healthcare system, you would have more headroom to avoid collapse of the system or get close to real pressures.

Q1554 **Dawn Butler:** Sir Patrick and Professor Whitty, thank you very much for your evidence today and all the work that you are doing. I am sure that it is extremely frustrating being scientists and giving advice that is not always the sole factor for decisions that are made. I am just asking for your advice really. Have you given any advice to Government in regard to how Parliament works, the number of people that are currently in Parliament and how we operate?

Professor Whitty: That is a straight factual question and the factual answer is that, quite early in the epidemic, I spoke to the Speaker and the Lords Speaker, but most of this has been done with Public Health England giving the professional advice since that time.

Q1555 **Chair:** Sir Patrick, do you have anything to add?

Sir Patrick Vallance: No. It is a Public Health England matter and maybe Health and Safety Executive as well. Regarding the frustration about the sole advice being science, I do not think it is. We absolutely recognise there are many other bits of evidence and important parts that need to come into decision making.

Chair: Viewers will notice today that we are abundantly socially distanced in this room. Aaron Bell has one brief supplementary question.

Q1556 **Aaron Bell:** Regarding the projected end of this lockdown period in December, do you think that going back to the tiered system, as is proposed, would push R back above 1?

Professor Whitty: That very much depends on the situation in which we find ourselves and what takes its place, and those are two imponderables.

Q1557 **Aaron Bell:** The proposal at the moment is to go back to the tiered system we currently have. Any relaxations will clearly push R back up again, so is there an absolute case rate that you would want to see by the end of this lockdown period before you would recommend

relaxations? For example, would it be sub-200, given that the average in England is around 300 at the moment?

Professor Whitty: The Prime Minister would probably want us to look at where there should be variations on exactly the same tiering system as at the moment rather than just assuming we would revert to an absolutely identical one. There is a lot to learn. In fact, over the next two or three weeks we will start to see the effects of the tiering in an even more granular way than we have to date. We should wait until we have that before we start to decide how best to use that in future.

Q1558 **Chair:** Are you comfortable with the prospect that Wales may lift its restrictions whilst England is imposing them?

Professor Whitty: I am very strongly of the view that, under the devolved settlement, what happens in Wales is for Wales. I talk to my Welsh colleagues regularly, but I certainly do not see that as something that I should interfere with in any way.

Q1559 **Chair:** If it is the case that there are different restrictions in Wales, reflecting no doubt different choices and circumstances there, is it reasonable for Cornwall or Devon, for example, to have a different regime over the next four weeks than London?

Professor Whitty: The whole basis of the last few weeks has been that there has been a significant difference in contrast to the first wave, which was pretty similar across the country, in different parts of the country. One thing that is happening at the moment is that, because the R is in fact higher in some of the lower areas now, that difference is being eroded. That is just an epidemiological point. The reality is that the settlement for health is that there is an English system and there is a Welsh system, and it is important that we respect the fact that those are separate systems.

Q1560 **Chair:** It is a reflection of the constitutional settlement rather than the epidemiological difference.

Professor Whitty: It is a reflection of the constitutional settlement; exactly so.

Sir Patrick Vallance: The point that Chris has just made that the growth is faster in some of the low prevalence areas is important because that growth is not visible to people, and it comes back to the point that the tendency is to want to act when things are very extreme and you can see hospitals in real trouble, whereas there is real merit in acting sooner to stop areas becoming high prevalence areas.

Q1561 **Chair:** Indeed, but, if I take the case of Devon for example, there has been a rate of less than 100 infections per 100,000 population since the middle of October. That seems to have been relatively stable by contrast to other places. I was interested in whether there is the capacity to have differences such as there are between the two sides of the border in England and Wales.

Professor Whitty: That has been the basis of policy for the last few weeks. Our worry in the south-west in general is that it is not just a matter of the rate, which is certainly higher than in some parts in the north now, but also the fact that the bed base and other issues mean that the ability to constrain that is also different. These things are not just about R numbers; it is also about where you find yourself.

Q1562 **Chair:** There is a school of thought, something called the Great Barrington Declaration that you will be familiar with, whose signatories' view is that there should be a different approach to managing this pandemic such as the more aggressive shielding of vulnerable people. Do you model the prospective impact of different approaches, or is your work on SAGE exclusively focused on the lockdown and social distancing measures that we have been talking about today?

Professor Whitty: I have no doubt that the scientists and others involved in the Great Barrington Declaration feel they are providing a useful contribution, and I mean no disrespect to them in what I am about to say at all. Although it said some perfectly sensible things like lockdowns are very destructive, and no one can argue with that, the basis for this is, in my view, scientifically weak, probably dangerously flawed, operationally impractical, and, I think personally, ethically a little difficult. I will explain why that is and Patrick might want to say a little about how SAGE views this.

The biggest weakness in this is that it starts from the thesis that inevitably herd immunity will be acquired if you leave things long enough. That is not the case for a very large proportion of the most important diseases in the world. On all the ones I have worked on, you never acquire herd immunity ever. You do not for malaria; you do not for HIV; you do not for Ebola; and you do not for most of the things that come in from the front door of hospitals. You just do not. It never occurs. The idea that this is an inevitable thing, which is a fundamental tenet to this, is simply incorrect.

We do know that with this particular infection you can get some degree of immunity early on—that is reasonably clear—but we do not know how long that lasts for. Even if it could be achieved over time and people maintained that immunity for long enough, you would need to get up to probably 60% to 70% of the population, which we are a very long way short of. So, for all of those reasons, that bit of it is wrong.

The second bit that is problematic is the next assumption that you have what they call focused protection, by which they mean identifying all the people who are vulnerable and keeping them out of the way of anyone who might have the disease. That is theoretically a perfectly attractive idea practically with this disease, which has a huge force of transmission. You can catch it from people who do not have any symptoms, is highly transmissible and is everywhere. The idea that you can do that and do it for year after year is simply impractical. We have been asked this multiple times—and Patrick might wish to talk about how SAGE has looked at this—but everyone who has looked at this says what a great

idea until they look at the practicalities. How are you going to look after people in nursing homes? How will you look after people in hospitals? How will the elderly meet their grandchildren?

It is practically not possible, and it would make an assumption that very large numbers of people would inevitably die as a result of that decision. You would have to get all the people up to that 60% naturally infected, and, for something that has a 0.5% to 1% infection fatality rate, that means a very, very large number of people—if you think of the 60% or 70% of the UK population²—would inevitably die as a result unless you could achieve this perfect identification of everyone who is going to get ill, which you cannot, and entirely isolate them for several years, which you cannot. Other than that, it no doubt has some merits.

That is the reason why I am really quite cautious of this and I share the view with the director general of the World Health Organisation that, given all of those, to have this as an element of policy would be ethically really difficult. There is only one place you should be thinking to get herd immunity as an element of policy, and that is when you have a good vaccine. That is the one situation where it genuinely makes sense, but we currently do not have one. I hope we will get one soon.

Sir Patrick Vallance: We published a paper outlining exactly that a few weeks ago as the argument why this really is not a good idea and why the argument has some fatal flaws. There are two others that I would add. First of all, I completely agree that you get to an attempt to herd immunity through vaccination, if you can, but that is not always possible either.

There are two other things to bear in mind. It is not that people under the age of 70 do not die from this disease. You do get deaths. Even if you were able to shield totally, you would still see a significant number of deaths in younger people as it went through the population.

We also know that the long Covid syndrome causes quite a lot of problems for people. You would have a big burden from that as well.

The final point, to build on something Chris said, is that multigenerational households are a very real thing in this country, particularly among certain communities. That would be a major problem. You would be essentially causing a big problem among some of the communities that are most hard hit by this already.

Q1563 **Chair:** With the exception of vaccines and effective treatments as they come—that aside—there is no alternative to the types of measures that we have been talking about today, in your view.

Professor Whitty: Clearly, we want to get to medical countermeasures. They may be drugs or vaccines, or some combination of drugs, vaccines,

² Witness clarification: when referring to 60% or 70% of the UK population, I was referring to 60% or 70% of the UK population infected, rather than suggesting 60% or 70% of the population would die.

diagnostics and other things. I am really confident, Chair, that we will get to that because we have got to that with every other major infection. We are incredibly good at handling infections over time. The problem is that until that happens—and none of us can know which ones will finally get over the finishing line and when—it will usually be an accumulation of small advances that add up to a big enough advance so that we can say, “This hasn’t gone away, but it is much smaller.” We are left with these very destructive, blunt tools. None of us would wish to use them. If you could say then, “We will never get a scientific answer,” then you might say, “Well, okay, fine, it’s never going to happen.” Anyone who thinks about this would be very confident that over the next year, and probably even sooner than that, we will have multiple shots on goal from science.

The situation will get steadily better, in my view, from early next year onwards. It will be a rolling through of the extraordinary scientific effort currently going on internationally across the public and private sector all working on this. I am very confident that we will get medical countermeasures. We have to hold the line until that point, and that is where unfortunately these economically and socially destructive tools are what we have in the absence of anything else.

Q1564 **Chair:** A difficult winter but a bright spring.

Sir Patrick Vallance: Yes; I think that is right.

Professor Whitty: A brighter spring.

Sir Patrick Vallance: There are some concrete bits to this. First of all, we have one drug already that we know reduces mortality in patients that require oxygenation in hospital, and that is Dexamethasone. There will be others that come along. That is looking concrete. Secondly, testing technologies, near-patient testing and things that are faster, are here and now. They are beginning to happen. That will improve the ability to do that. Thirdly, on the vaccine situation, we did not know at the beginning of the year where we would get to. There are now vaccines that produce good immune responses. It does not mean they are going to work but they are on track. They are in late stage clinical trials and we will get the readouts. Those are all quite concrete things that are pointing in the right direction.

Chair: Thank you. We are very grateful. This Committee with the Health and Social Care Committee in its joint inquiry will take evidence tomorrow morning with the leaders of the vaccines and treatment programmes in this country. This time next week, we will be talking about test, track and trace with the leaders of that programme. We will go into that in great detail.

I would like to thank our two witnesses for coming today at necessarily short notice. I can say that Sir Patrick and Professor Whitty have accepted every invitation that I have issued as Chair of this Committee. I am very grateful for the extensive evidence that you have given today. These are very important decisions, as has been evident in our discussions, which I know you appreciate. Parliamentarians have an

important debate and vote tomorrow.

It is important to be able to ask questions and to understand the basis of the advice, which, in turn, leads to recommendations by Ministers. You have given us the chance to do that today, and we are very grateful and hope that you will do so again at similar junctions in the future. Thank you very much.